Developing a Strategic Competitive Intelligence Framework for Decision-Making in VUCA Environments

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In the name of God, the Most Gracious, the Most Merciful. All praise and thanks be to God, the source of all knowledge and wisdom, for bestowing upon me the resilience, strength, and intellectual capacity to complete this journey. His guidance, like a beacon in the darkest night, illuminated my path and sustained me through every challenge. "And say, 'My Lord, increase me in knowledge.' (Quran 20:114). This verse represented a constant prayer throughout these years and reflects my unwavering belief in the transformative power of knowledge and my gratitude for the opportunity to pursue it.

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On a more personal note, this thesis is a testament to perseverance and dedication, it is etched with the bittersweet memory of my beloved mother, who departed this world amidst the ravages of COVID-19 in February 2021. Just two months before I would have welcomed my second child, a cruel twist of fate snatched her away, leaving an unfillable void in my heart. Like a delicate bloom felled by an untimely frost, her absence casts a long shadow over this accomplishment. Yet, her spirit, a constant source of inspiration, fuelled my determination to complete this journey, a tribute to her unwavering belief in my potential.

Mama, a star now dimmed, a light withdrawn,

Your laughter hushed; the morning gone.

A winter's grip, a fever's fire, Stole you away, a soul's desire.

Though grief may cloud, and tears may fall,

Your love remains, embracing all.

A whispered prayer, a gentle sigh,

My guiding star in the vast sky.

- *To God, we belong, and to God, we shall return.*

The past four years have been a richly textured journey marked by both celebratory and challenging moments. This journey would not have been possible without the unwavering encouragement of my beloved father, whose wisdom and strength have been my constant anchors. May God grant him a long and healthy life, filled with happiness and blessings.

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Declaration

Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

I hereby declare that this thesis contains a total of 81,859 words, excluding the abstract, references, appendices, and other supplementary materials as specified by the institution's guidelines.

Abstract

This study investigates the growing importance of strategic decision-making in VUCA environments. It fills an important gap in the existing literature: the lack of a comprehensive framework that incorporates strategic management principles and competitive intelligence (CI) to respond effectively and overcome VUCA challenges. Such integration of strategic management and CI has emerged as a key driver for triumphing over challenges posed by VUCA. Strategic management provides a forward-looking and visionary framework for conceptualising organisational direction and proactive allocation of resources, and CI offers mechanisms to anticipate trends, decipher complexities, and create actionable insights into the competitive environment. This enables organisations to move beyond reactive responses and instead proactively shape and influence their context. The study's primary objective is to develop, evaluate and validate the SCI framework as an innovative model designed to empower organisations to successfully navigate and address VUCA challenges. Employing a mixed-methods approach, the research is structured into two phases. Phase one integrates a survey with both quantitative and qualitative components targeting CI professionals and Chartered Managers (CMs). Phase two involves an online interactive workshop that incorporates a real-world VUCA scenario. Key findings reveal an ongoing dependence on conventional analytical tools including but not limited to SWOT, PESTLE, and Porter's Five Forces when addressing VUCA challenges despite their acknowledged limitations in highly dynamic context. These traditional frameworks are used to examine the individual components of VUCA in isolation rather than holistically. In contrast, the proposed SCI framework put forth in this research aims to tackle the multifaceted aspects of VUCA in a more integrated, comprehensive fashion. A significant shift towards advanced intelligence tools and techniques (AITTs) such as automated weak signal detection, advanced modelling techniques, data mining and processing, predictive forecasting, inter alia, has been observed when practitioners confront tangible VUCA challenges. Additionally, practitioners have expressed strong support for the SCI framework and its structured approach, underpinned by the concept of the VUCA chain reaction effect (VUCA CRE). The research has significant implications for both theory and practice. It proffers a novel framework designed to enhance strategic decision-making under VUCA environments and provide practical guidance for CI professionals and CMs. It also lays the groundwork for creating an easy-to-use SCI application with AI-integrated features. This research opens exciting possibilities both for expanding theories on strategic decision-making in VUCA environments, as well as giving practical help to professionals in the field.

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List of Abbreviations

VUCA – Volatility, Uncertainty, Complexity, Ambiguity

CRE – Chain Reaction Effect

SCI – Strategic Competitive Intelligence

4IR – Fourth Industrial Revolution

CI – Competitive Intelligence

CMs – Chartered Managers

DT – Design Thinking

HUMINT – Human Intelligence

MCDM – Multicriteria Decision Making

ROI – Return On Investment

SCIP – Strategic Consortium of Intelligence Professionals

CMI – Chartered Management Institute

KM – Knowledge Management

GIS – Geographic Information Systems

SOCMINT – Social Media Intelligence

FOIA – Freedom of Information Act

CEW – Competitive Early Warning

BE – Business Excellence

SEM – Structural Equation Modelling

ExO – Exponential Organisation

CDT – Constructive Developmental Theory

LAS – Lean and Agile Startup

CSF – Critical Success Factors

MNE – Multinational Organisations

SME – Small and Medium Organisations

PLS-SME – Least Squares – Structural Equation Modelling

SF – Strategic Flexibility

SFA – Strategic Foresight and Agility

SDG – Sustainable Development Goals

VACINE – Volatility, Ambiguity, Complexity, Interconnected, Nonlinear, Exponential

RUPT – Rapid, Unpredictable, Paradoxical, Tangled

OSPA – Oxford Scenario Planning Approach

TUNA – Turbulence, Uncertainty, Novelty, Ambiguity

EV – Electric Vehicle

GST – General System Theory

KVT – Key Vulnerability Topic

CMM - Complexity Modelling Map

WEF – World Economic Forum

DSR – Design Science Research

DSRM – Design Science Research Method

KIT – Key Intelligence Topics

IPT – Information Processing Theory

RBV – Resource-Base View

DCT – Dynamic Capability Theory

KBV – Knowledge-Based View

SDT – Signal Detection Theory

FCMI – Fellow of Chartered Management Institute

SD – Standard Deviation

GDPR – General Data Protection Regulation

SMTT – Strategic Management Tools and Techniques

AITT – Advanced Intelligent Technological Tools

API – Application Programming Interface

SMTF – Strategic Management Tools and Frameworks

SIIT – Systematic Intelligence Integration Tools

IIN – Immediate Intelligence Needs

Introduction

1.1. Background and Context

Contemporary organisations face multifarious challenges arising from significant economic, social, and technological changes, often described as ‘polycrisis’ – a convergence of multiple systemic disruption (Albert, 2024). As industries undergo disruptive innovations and global interconnectivity increases complexity, organisations must navigate a volatile environment of significant turbulence. Researchers have summarised these dynamics using the term "VUCA," which stands for volatility, uncertainty, complexity, and ambiguity. The swift progression of technological innovation, globalisation, and evolving market dynamics has ushered in an era of profound change and disruption, challenging traditional approaches to strategic decision-making and organisational performance, an environment often described through the VUCA framework (Bennis & Nanus, 2007; Bennett & Lemoine, 2014; Millar et al., 2018; Schoemaker et al., 2018).

Initially devised by the U.S. Army War College to describe the multilateral world that emerged after the Cold War (Whiteman, 1998), the concept of VUCA has gained significant traction in the business world as a framework for understanding the environment in which organisations operate (Niehaus et al., 2024). Volatility refers to the speed and magnitude of change, while uncertainty denotes the lack of predictability and the difficulty of anticipating future outcomes (Bennett & Lemoine, 2014). Complexity arises from the intricate web of interconnected factors and relationships, and ambiguity signifies the lack of clarity and the potential for multiple interpretations of a given situation (Mack et al., 2016). In this VUCA world, strategic decision-making has become an increasingly critical and challenging endeavour. Strategic decisions, which are typically non-routine, complex, and have long-term implications for an organisation's direction and performance (Eisenhardt & Zbaracki, 1992), must now be made in the face of heightened uncertainty and ambiguity. Traditional strategic management approaches, which often rely on assumptions of stability and predictability, have proven inadequate in navigating the complexities of the VUCA landscape (Schoemaker et al., 2018).

The limitations of these traditional approaches have been well-documented in the literature. Scholars have argued that the VUCA context compels the development of more adaptive, flexible, and proactive strategic frameworks that can effectively capture the interrelatedness of VUCA elements (Mack et al., 2016; Millar et al., 2018; Barthélemy, 2022). Moreover, the role of knowledge management in enabling strategic decision-making has come to the forefront, as organisations seek to leverage their intellectual assets to mitigate organisational ignorance and enhance their ability to detect weak signals and anticipate change (Schoemaker et al., 2018). It is within this context that the present research seeks to make a significant contribution to the field of strategic management. By proposing a novel SCI framework grounded in the conceptualisation of the VUCA Chain Reaction Effect (VUCA CRE), this study aims to provide organisations with a unique tool that may better equip them to address the specific challenges of the VUCA world. The VUCA CRE posits that the elements of VUCA are not merely discrete challenges but rather form a dynamic and interconnected system in which each element can trigger or amplify the others, leading to cascading effects on organisational performance. Through a rigorous examination of the interplay between strategic decision-making, knowledge management, and the VUCA CRE, this research endeavours to shed new light on the underlying mechanisms that shape organisational success in turbulent environments. The integration of insights from strategic management, organisational theory, chaos theory, systems theory, CI and insights from stakeholders, subjects of this research, seeks to forge a holistic, user-centric and innovative artefact, a framework for strategy formulation and implementation in the face of VUCA challenges.

The significance of this research lies in its theoretical contributions and its practical implications for organisations across industries. The SCI framework, which provides a distinguished and unprecedented approach to VUCA, will serve as a functional roadmap for navigating the VUCA environment. It has the potential to enhance organisational resilience, adaptability, competitive advantage, and strategic decision-making in an increasingly uncertain and complex world. As such, this study represents a timely and vital step forward in the ongoing quest to develop more effective strategic management approaches for the 21st century.

1.2. Defining the Gap and the Research Problem

A growing divide has been noticed between conventional strategic decision-making practices and the messiness of the contemporary challenges confronting organisations (Haslam & Shenoy, 2018). This disconnect has emerged because strategy nowadays increasingly involves "wicked problems", which are intractable issues with multiple causes that are difficult to define and have no clear solution (Grewatsch et al., 2023). Conventional strategic decision-making techniques are deemed ill-equipped to handle these wicked problems, let alone obsolete strategy tools and techniques designed in the early 20th century when business environments were relatively stable, resulting in the following planning dilemma: organisations make significant decisions about initiatives when they know the least, then are surprised when things do not go as anticipated (Head, 2022; McMillan & Overall, 2016).

Gläser (2023) argues that VUCA discourse has often become mired in describing the phenomena and their effects with excessive focus on the disruptive effects and inherent unpredictability of such environments. The focus on nonlinearity and unpredictability frequently takes centre stage, overshadowing considerations of VUCA as an opportunity for systemic transformation. Gläser proclaims that insufficient attention is paid to developing concrete action strategies that facilitate moving beyond situational analysis to cultivating profound understanding and proactive change planning. This is particularly pertinent for organisational leaders across the private, public and non-profit sectors, who face constant challenges in maintaining agility under maximal uncertainty. Despite the increasing recognition of the VUCA paradigm as a defining feature of the contemporary business environment, the academic literature continues to exhibit a critical gap in the development of context-specific, adaptive, and integrative strategic frameworks. Scholars have extensively examined the predicaments of VUCA and suggested various strategies for navigating its complexities (Bennett & Lemoine, 2014; Schoemaker et al., 2018); however, much of the discourse remains focused on broadly conceptualising VUCA rather than offering systematic and holistic solutions for each of its dimensions. Although the need for greater agility, adaptability, and foresight in VUCA environments is well established (Minciu et al., 2024), the current body of strategic management and CI literature often falls short in providing actionable tools that bridge the gap between theoretical understanding and practical organisational implementation (George, 2024; Nemashakwe & Kayawe, 2023). This disconnect delineates a pressing need for the development of frameworks that not only recognise the implications of VUCA but also translate them into operational strategies capable of addressing its volatility, uncertainty, complexity, and ambiguity in an integrated and actionable manner. Therefore, this work addresses an indispensable research problem. The lack of a contextually grounded, practically applicable strategic tool that equips organisations to effectively navigate the dynamic and unpredictable terrain of VUCA environments. This gap is particularly concerning given the increasing interconnectedness of global markets, rapid technological advancements, and the emergence of disruptive business models, all of which amplify the challenges posed by VUCA (Kumar et al., 2022).

Several compelling reasons support the urgency and significance of this research problem. 1) Existing strategic management and CI frameworks often fall short in systematically navigating the complexities of VUCA environments. Developed primarily for relatively stable operating contexts, these frameworks frequently lack the agility, adaptability, and anticipatory capabilities required to effectively detect, interpret, and respond to the dynamic uncertainties and unpredictable shifts that define the contemporary competitive landscape (Wheelen et al., 2017). The accelerating pace of change in today's interconnected and hypercompetitive global environment increasingly exposes the limitations of management models optimised for more linear and predictable systems. As such, a recalibration and expansion of strategic thinking is needed to arm organisations with the capacity for resilience, flexibility, and foresight in turbulent and opaque conditions where conventional planning logics falter. 2) Academic scholarship contains extensive theoretical explorations of VUCA and their implications for organisational strategy and leadership. However, a disconnect persists between these conceptual understandings and their practical translation into effective decision-making and action by organisational leaders navigating VUCA environments (Richardson, 2024). Conceding their significant theoretical knowledge, these prevailing approaches often lack the contextual specificity, operational details, and actionable recommendations required to implement VUCA concepts successfully in real-world practice. This underlines the urgent need for more practical and immediately applicable approaches that bridge the theory-practice divide. Instead of isolated abstract theory, VUCA insights must be synthesised into accessible and customisable strategic frameworks that empower leaders to effectively transition from conception to execution. A tighter coupling of theoretical knowledge with practical application will require ongoing collaboration between scholars and practitioners. The development of these strategic tools and processes represents an opportunity to translate VUCA theory into organisational resilience and agility. 3) The stakes of inaction are rising precipitously for organisations navigating intensely volatile, uncertain, complex, and ambiguous conditions. Failure to effectively detect and interpret weak signals and patterns in this turbulent environment risks strategic inertia, competitive decline, and potentially catastrophic obsolescence in the face of disruptive change (Yawson et al., 2024). As the pace of innovation and transformation accelerates across the globe, organisations that persist with rigid conventional strategies risk rapid irrelevance (Zhang et al., 2021). This escalating imperative for agility and adaptation heightens the need for a strategic tool offering capabilities that cultivate organisational foresight, resilience, and responsiveness in the face of exponential uncertainties. A proactive SCI framework that interrogates assumptions, anticipates alternative futures and identifies strategic inflection points will prove increasingly critical in redeeming competitive advantage from the VUCA world rather than being overcome by it. The window for organisations to develop and implement preventative strategic architectures may narrow rapidly. As such, building these anticipatory and sense-making capacities represents an urgent priority for long-term survival and competitive viability.

1.3. Research Aims and Objectives

This research aims to develop an SCI framework that enables organisations to enhance their strategic decision-making capabilities and effectively navigate the challenges posed by the modern VUCA business environment. To achieve this aim, the following specific objectives will be pursued:

1. To critically review and synthesise the existing literature on strategy, strategic decision-making, CI, and the VUCA concept to identify key theoretical and empirical gaps the proposed SCI framework seeks to address.

2. To develop a conceptual understanding of the VUCA concept and its implications for strategic decision-making, with a particular focus on examining the interconnectedness and cascading effects of the four VUCA dimensions (Bennett & Lemoine, 2014; Saleh & Watson, 2017).

3. To propose a novel SCI framework that integrates adaptive and proactive strategic planning practices, continuous environmental scanning, and scenario analysis to enhance organisations' strategic decision-making capabilities and improve their organisational resilience in VUCA environments (Calof et al., 2018; Ramirez & Selsky, 2016).

4. To empirically evaluate the proposed SCI framework through a mixed-methods research design, combining qualitative and quantitative surveys of strategic decision-makers with a real-world VUCA scenario, to assess the framework's effectiveness and refine its key components.

5. To provide actionable recommendations for organisations on how to implement the SCI framework within their organisations, addressing any potential limitations, challenges and best practices for fostering a culture of proactive and adaptive strategic decision-making in VUCA environments.

6. To contribute to the advancement of theoretical knowledge in the fields of strategic management and CI by offering new insights into the conceptualisation and operationalisation of the VUCA concept and by developing a novel framework that bridges the gap between theory and practice.

1.4. Research Question

Globalisation has profoundly reshaped the modern business landscape, rendering it increasingly interconnected and complex. The proliferation of new technologies and the liberalisation of trade between major economic blocs have undoubtedly driven global growth and prosperity (Banzuela et al., 2024). However, these same forces have also introduced a heightened level of volatility and uncertainty in organisations' operating environments. This complexity, compounded by the inherent instability of industries and the broader macroeconomic climate, has created arduous challenges for policymakers, business leaders and strategy professionals who must navigate an increasingly unpredictable environment.

Traditional strategic management and planning frameworks such as SWOT analysis, Porter's Five Forces, PESTLE analysis and the like, have increasingly proven inadequate in meeting the evolving needs of executives, strategic planners and CI professionals. A primary reason for this is that these tools originated in the 1960s and the 1970s, when the business world was stable, significantly less complex and volatile (Ansoff, 1957; Porter 1979, 1980). Most conventional frameworks fail to account for the dynamic nature of today's environment characterised by VUCA, offering static analyses of the current situation and lacking the necessary considerations of how conditions may evolve over time (Mack & Khare, 2016). Furthermore, these approaches often rely on the assumption of constant growth, rendering normative strategic recommendations less viable in an era of heightened uncertainty and disruption. This unpredictability has made it increasingly difficult for corporate strategists, business leaders, and intelligence professionals to develop adaptive strategies that ensure long-term resilience and competitive advantage.

Under these transformative circumstances, this research seeks to answer the following question:

"How can an SCI framework, grounded in the conceptual understanding of the VUCA chain reaction effect, be designed to enhance the effectiveness of strategic decision-making processes within organisations operating in VUCA environments?"

1.5. Rationale and Need for SCI Framework Development

The impetus for devising and proposing an SCI framework is predominantly rooted in the work of authors, including, but not limited to, Child and Rodrigues (2011), Mack et al. (2016), Vuorinen et al. (2018), Millar et al. (2018), Lópes-Robles et al. (2019), and Taskan et al., (2022). Child and Rodrigues (2012) emphasised that it is the unparalleled acceleration of change and innovation that organisations must now perpetually confront, rather than change itself as a new phenomenon. This intensified unpredictability and complexity demand the development of novel strategies and competencies to address unanticipated challenges and vulnerabilities. Vuorinen et al. (2018) further highlighted the surprisingly traditional nature of strategy tools, indicating a gap in the incorporation of contemporary strategic thinking into usable tools, and noticed that tools are missing regarding topics prevalent in contemporary strategic literature; as a result, business success requires new leadership and strategic approaches (Schoemaker et al., 2018).

Lópes-Robles et al. (2019) identified the challenges organisations face in today's VUCA business environment, wherein they must navigate the volume, velocity, and variety of big data, including the prevalence of misinformation, leading to information overload and impacting the quality of decision-making. Taskan et al. (2022), in turn, emphasised the urgency for subsequent research to engage in and construct an all-encompassing VUCA model, which they deemed a critical subsequent step. Moreover, the authors accentuate the importance of scrutinising VUCA's role in strategic decision-making. In harmony with this perspective, Millar et al. (2018) advocated dismantling entrenched business paradigms and models while promoting management innovation in the VUCA world. Drawing upon these scholars' insights, there is a clear rationale for developing a new tool, herein referred to as the SCI framework, to address VUCA. Additionally, much of the cynicism towards strategy and CI methodologies is related to their failure to offer any method of systematic forecasting in an unpredictable VUCA environment. It is not within human capacity to accurately foresee the future. However, the core thrust of leaders and managers facing the VUCA challenge is whether they want to respond to each VUCA challenge reactively or proactively. Both perspectives have merits and limitations. Agility comes with a prompt reaction to change but requires awaiting the threat to the surface and then adapting to it (Balzano & Guido Bortoluzzi, 2024; Doz, 2010). Proactivity implies predicting change before it happens but may be faced with the burden of information imperfection and scarcity, or at least difficulty in predicting where the next problem may come from (Millar et al., 2018).

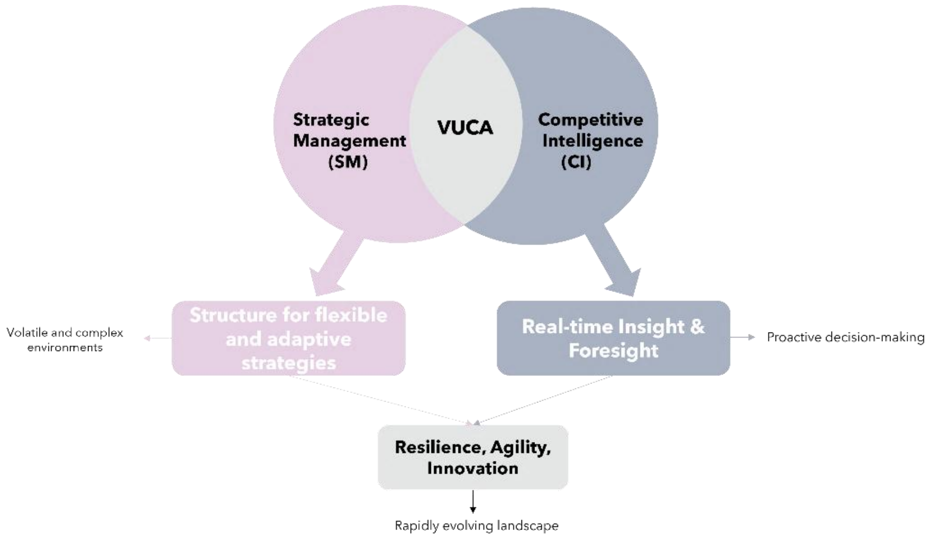
Therefore, developing the SCI framework may empower management to act proactively rather than reactively to prepare sufficiently for the impending future.

1.6. Rationale for Integrating Strategic Management and Competitive Intelligence in Addressing the VUCA Environment

It is well established that business annals are significantly influenced by the complex interplay between strategy and competition. The fundamental essence of strategy is contingent upon the existence of competition, whereas the design and trajectory of strategic initiatives actively direct the scope and characteristics of competitive dynamics. Nevertheless, the fourth Industrial Revolution (4IR) exemplifies an era characterised by turbulence and volatility, requiring organisations to accelerate and intensify strategic decision-making processes while concomitantly witnessing the transformation of the core principles of strategy (Lanteri, 2021) and CI (Wu et al., 2023). Fairholm and Card (2009) aptly proclaim that business history is written on the interaction of strategy and competition, where the demand for strategy relies on the presence of competition, and the formulation and patterns of strategy govern the extent and dimensions of competition.

In the face of VUCA reality, long-established strategic principles are being challenged by the emergence of digital technologies, such as artificial intelligence (Esposito & Tse, 2017), the internet of things (IoT), distributed ledgers and blockchains (Maull et al., 2017), augmented and virtual reality (Porter & Heppelmann, 2017), and 3D printing (Holzmann et al., 2017), which are transitioning from theoretical constructs to tangible realities. These advancements fuel novel consumer behaviours and stimulate digital business models, participating in the advent of the fourth industrial revolution (4IR). Lanteri (2021) argues that business leaders should harness six strategic drivers to maintain relevance amidst the continuously evolving environment of Industry 4.0: collaborative intelligence, learning systems, exponential technologies, value facilitation, ethical championship, and responsive decision-making.

Figure 1.1 Dual-Field Integration to Navigate VUCA



Note. *By the author.*

The impetus for selecting strategic management and CI as the principal domains to confront VUCA challenges is rooted in their complementary attributes and their potential to give organisations a more holistic understanding of their operational setting (Calof & Wright, 2008) within the context of Industry 4.0. Strategic management provides the structure for flexible and adaptive strategies, essential in volatile and complex conditions. CI offers real-time insights and foresight into market dynamics, enabling proactive decision-making. Together, they enhance organisational resilience, agility, and innovation, which are fundamental for thriving in the rapidly evolving landscape of the 4IR. This need is particularly important when the rapidly transforming business requires executives to conceptualise, incubate, and revolutionise novel ideas and solutions to transform their businesses into long-term viable entities (Horstmeyer, 2020). In this context, the exploration of the synergistic potential of strategic management and CI to tackle VUCA challenges is both timely and relevant, as organisations increasingly seek effective means to navigate and thrive in such complex environments. The drive to concentrate on these disciplines inventively is anchored in their capacity to cultivate foresight, organisational resilience, and agility amid an escalating complex and uncertain business terrain. This underlying potential symbiosis of strategic management and CI represents an enriching scholarly pursuit for both academic literature and practical implementations, thereby delivering invaluable insights and guidelines for organisations navigating the tumultuous waters of VUCA environments.

1.7. Significance and Contribution of the Research

This research is the first of its kind to prescribe a dedicated framework that targets VUCA rooted in strategic foresight as part of the strategic management and CI disciplines, by building upon the existing VUCA perspective which has been widely adopted as a lens for understanding the challenges posed by the contemporary business environment (Bennett & Lemoine, 2014; Millar et al., 2018 and Taskan, et al., 2022). However, it also seeks to address the limitations of the current VUCA framing, particularly its insufficient elucidation of the temporal and directional chain reactions conceivably connecting the four dimensions (Saleh & Watson, 2017) and proposing an integrated strategic solution at each VUCA stage under the SCI framework. Though empirically decoding leading indicators, direction of travel, and effects among the four VUCA dimensions, this study aims to convert VUCA from a descriptive planning checklist to a predictive navigation system. This approach acknowledges the strength of the foundational VUCA constructs while extending the framework into the anticipatory domain through temporal dynamics modelling, network analysis, and scenario simulations.

The research takes forward the work of Taskan et al. (2022), who emphasise the need for developing a comprehensive VUCA model and examining the role of VUCA in strategic decision-making. In so doing, a granular understanding of the interconnectedness and cascading effects of the VUCA elements will be provided, thus contributing to the development of a holistic framework for strategic decision-making in VUCA environments. Correspondingly, this research seeks to advance the conceptual understanding of strategic management under VUCA dynamics by expounding the complex chain reactions and interdependencies between the constituent elements of VUCA. Bennett and Lemoine's (2014) seminal work on VUCA established the imperative for bespoke organisational strategies that align with multifaceted environmental turbulence. Building upon their formative insights, this study aims to provide enhanced granularity regarding the VUCA architecture to inform the development of tailored strategic responses. As well, the study also draws inspiration from adjacent frameworks, such as the Cynefin framework (Snowden & Boone, 2007), VUCA Prime (Johansen & Euchner, 2013), and the BEVUCA model (Saleh & Watson, 2017), while also addressing their limitations in fully capturing the interconnectedness and cascading effects of the VUCA elements and offering a full-spectrum solution to address VUCA elements as they develop from one element to another.

The VUCA chain reaction effect (VUCA CRE) underpinning the SCI framework aims to offer a heightened perspective, empowering researchers and practitioners to reconceptualise VUCA not only as a singular phenomenon producing a cumulative effect but rather as a complex interplay of interactive elements that follow a dominant trajectory. Such an approach seeks to deepen understanding by emphasising the distinctive yet interrelated nature of volatility, uncertainty, complexity, and ambiguity, thereby revealing the patterns of their interaction and influence, hence allowing for the design of more targeted and effective strategic interventions. The overarching goal is for the SCI framework to better handle the unique challenges of VUCA and improve organisational proactive skills, resilience, and flexibility in the face of unprecedented change and disturbance.

Literature Review

2.1. Purpose and Scope of the Literature Review

The main aim of the present literature review is to examine the central theoretical foundation, key concepts and contemporary research on the VUCA (volatility, uncertainty, complexity, ambiguity) environment, strategic management, and CI. By establishing VUCA as the contextual foundation, the review points to the limitations of existing strategic management approaches in responding to VUCA and explores how CI can enhance decision-making in such conditions. In doing so, this review serves as the basis for developing a tailored Strategic Competitive Intelligence (SCI) framework for decision-making in VUCA environments.

The scope of this review spans multiple domains, beginning with the nature and implications of VUCA, including its origins, key characteristics and challenges organisations face in VUCA conditions. From there, the review examines existing responses to VUCA and outlines the strategies and tools businesses currently use to mitigate its impact. The discussion then shifts to critically evaluating the limitations of contemporary strategic management and CI approaches and identifying gaps in their ability to navigate VUCA environments effectively. This assessment sets the stage for exploring alternative conceptual approaches to VUCA and the potential need for new frameworks.

A key aspect of this review is the role CI can play in strategic decision-making, particularly in volatile business environments. The discussion contextualises CI within strategic management, exploring its definitions, historical evolution, and integration into decision-making processes. The literature underlines how CI contributes to resilience, agility, and proactive organisational strategies in VUCA conditions. It also critically examines the limitations of current CI and strategic decision-making models to reinforce the necessity for a more effective and adaptable framework.

The literature review employs a funnelling approach (Hofstee, 2006; Machi & McEvoy, 2016) that progressively narrows its focus from broad contextual factors – VUCA as an overarching challenge – to the specific tools and frameworks available for managing it. This outlines a logical progression, starting with a broader focus on VUCA and then transitioning into strategic management, decision-making, and the role of CI. In so doing, the review evaluates existing models and identifies gaps and opportunities to enhance decision-making approaches under VUCA conditions.

In aggregate, the literature review endeavours to understand the context, identify the main arguments and consider counterarguments, analyse and evaluate evidence, and synthesise relevant theoretical and empirical insights to draw conclusions and inform the development of and the need for the SCI framework in VUCA settings. Through a critical analysis of the current state of knowledge, the review first identifies the shortcomings of existing models and methodologies within VUCA contexts while also casting light upon opportunities to enhance decision-making approaches under VUCA conditions. Specifically, integrative frameworks and advanced adaptation strategies show promise in helping organisations develop vigorous and reliable solutions.

2.2 The VUCA Environment

2.2.1 Origins and Definitions of VUCA

In the ever-evolving terrain of contemporary management and leadership theory, the concept of VUCA has emerged as a paradigm of profound significance. VUCA may be the clearest acronym to describe the impact this perfect storm is beginning to have on the world. It explains the characteristics of contemporary global transformations and their impact on daily life (Bennett & Lemoine, 2014).

The term VUCA has been widely adopted to describe the challenging and unpredictable nature of modern business environments (Melanthiou & Vasic, 2024). First introduced in 1987 by Bennis and Nanus (2007) in leadership theory, VUCA was later formalised by the U.S. Army War College in 1991 to describe the post-Cold War geopolitical landscape, which was marked by fragmentation, shifting alliances, and increased uncertainty (Millar, Groth, & Mahon, 2018). Over time, the concept has been applied beyond military strategy, becoming a dominant framework in business and strategic management to explain the volatility and unpredictability organisations must navigate (Sinha & Sinha, 2020).

VUCA is more than just a theoretical concept; it represents a fundamental shift in how organisations operate and make decisions. In today's interconnected world, technological disruptions, global supply chain vulnerabilities, and financial instability contribute to an increasingly volatile and complex business landscape (Bennett & Lemoine, 2014). Scholars argue that the 21st-century corporate environment is progressively more uncertain, with decision-making becoming less structured and more ambiguous (Schoemaker et al., 2018). This unpredictability is further exacerbated by accelerating technological innovation, which encourages global interconnectedness and amplifies complexity (George et al., 2016).

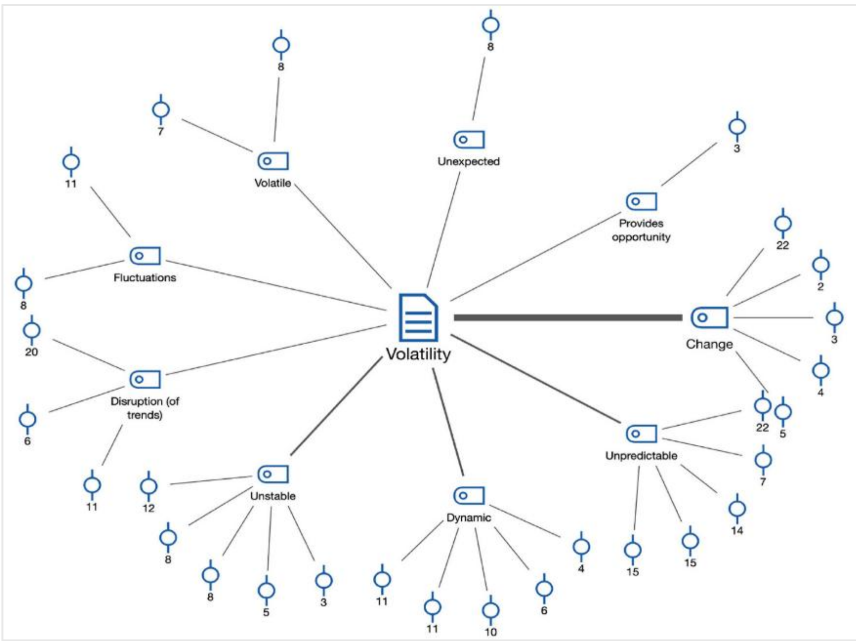
As organisations attempt to navigate this volatile ecosystem, traditional strategic management tools have struggled to keep pace with the dynamic and non-linear nature of VUCA challenges. While conventional strategic frameworks emphasise planning and control, the unpredictable nature of VUCA demands more adaptive, intelligence-driven decision-making approaches. This has led to increasing interest in the integration of strategic management with CI, a fusion that promises to enhance organisational foresight, agility, and resilience in uncertain environments.

Despite the widespread use of VUCA in management literature, scholars have debated its conceptualisation, which has led to inconsistencies in its definition and application. For instance, Taskan et al. (2022) conducted a structured literature review to clarify the conceptual map of VUCA and unveiled a multiplicity of definitions related to the acronym. Their meticulous analysis, synthesis, and interpretation of the identified constructs furnished a deeper understanding of the profound interrelationships between the acronym's constitutive elements. Consequently, their findings feature both areas of convergence and divergence, resulting in the delivery of valuable insights into the intricate dynamics underpinning the VUCA phenomenon. Empirical evidence further underscores the growing unpredictability of the corporate environment, with heightened levels of uncertainty becoming a defining feature (Schoemaker et al., 2018). This unpredictability is exacerbated by the accelerating pace of technological innovation, which fuels global interconnectedness and, consequently, intensifies complexity (George et al., 2016). As organisations struggle to keep pace with these rapid changes, it becomes imperative to explore alternative strategic frameworks that move beyond traditional planning and control models.

2.2.1.1 Volatility

Upon scrutinising the inaugural construct of the VUCA acronym, volatility, authors discern that it encompasses the perpetual mutation manifesting in the contemporary world (Billiones, 2019). According to Taskan et al., (2022), constructs and notions representing volatility within each definition in the literature revealed salient themes, including change as the most dominant description (n=33 citations), uncertainty (n=11 citations), unpredictability (n=11 citations), dynamics (n=10 citations) and instability (n=7 citations) were used to characterise volatility. Furthermore, the concept of volatility demonstrated associations with the disruption of prevailing trends (n=5 citations), daily fluctuations (n=4 citations), intrinsic attributes of a volatile world (2 times), and unanticipated occurrences (n=2 citations).

Figure 2.1 *Conceptual Analysis of Volatility*



Note: "◇" means the number of times they are identified in our review. "▬" means that they are the most common terms related with volatility

Note. *By Taskan et al. (2022).*

Volatility, as the first construct of the four components of the VUCA framework, refers to the rate, magnitude, and unpredictability of change within an environment (Taskan et al., 2022). While volatility shares conceptual similarities with uncertainty, its defining characteristic lies in the inevitability of change, even when the magnitude and duration remain unknown (Ehsani & Osiyevskyy, 2022). Volatility does not necessarily imply a lack of information; it instead represents a condition where fluctuations in external conditions, such as financial markets, geopolitical events, supply chains, or technological disruptions, occur frequently and sometimes sharply (Bennett & Lemoine, 2014).

Volatility has garnered significant attention in academic and professional discourse. Bennett and Lemoine (2014) argue that volatility is often positioned as the most tangible and measurable dimension of the framework, frequently operationalised through metrics such as variability, frequency, and intensity of change. For instance, they define volatility as the nature and dynamics of change, including the speed, magnitude, and duration of shifts. This definition demonstrates the dual nature of volatility: its quantitative dimension, characterised by measurable fluctuations, and its qualitative dimension that encompasses its disruptive influence on systems. This interpretation is widely accepted, particularly in the realm of management and organisational studies, where its emphasis on measurable and observable phenomena provides a practical framework for understanding and addressing volatility in dynamic environments. Nevertheless, certain scholars contend that this explanation may inadvertently oversimplify the complexity of volatility by predominantly focusing on observable phenomena and neglecting its subjective and perceptual elements (Cernega et al., 2024). Another iteration of the definition by Bennett and Lemoine (2014) posits that volatility represents relatively unstable change, characterised by the availability of information and an understandable situation yet marked by frequent and occasionally unpredictable shifts. This interpretation is widely accepted, mainly due to its pragmatic emphasis on the dual nature of volatility. While it involves discernible patterns and accessible data, the rapidity and unpredictability of changes can still overwhelm systems and decision-makers. Scholars such as George et al. (2016) have further elaborated on this perspective, noting that volatility's defining feature lies in its capacity to disrupt even well-informed strategies, thereby requiring adaptive and resilient responses. However, critics argue that this definition may inadvertently downplay the subjective experience of volatility, as the perception of instability can vary significantly across individuals and organisations depending on their resources, capabilities, and prior exposure to similar conditions. This definition differentiates volatility from uncertainty: In a volatile scenario, change is inevitable, but in uncertainty, change may not occur at all (Ehsani & Osiyevskyy, 2022). Raghuramapatruni and Kosuri (2017) add further depth by describing volatility as involving speed, magnitude, and dynamics of change, where the situation is unstable but not necessarily unanticipated, for instance, share price fluctuations after a leadership change.

Scholars have debated whether volatility should be understood as an isolated construct or an accelerator of other VUCA elements. Giones et al. (2019) argue that volatility amplifies uncertainty and complexity, thus creating environments where managers face additional layers of unpredictability. In highly volatile conditions, absolute ambiguity becomes invasive, yet inaction is rarely a viable option. This leads to a core managerial challenge: how to navigate volatility without succumbing to its destabilising effects. The literature extensively explores the origins and dimensions of volatility and emphasises its emergence from both exogenous shocks and endogenous change processes (Van Tulder et al., 2019). Among the key sources of volatility identified are macroeconomic and financial instability, technological disruptions, geopolitical and regulatory changes, and organisational-level dynamics.

Macroeconomic and financial volatility has been widely studied, with notable examples including commodity price fluctuations, currency exchange instability, and stock market crashes. Bennett and Lemoine (2014) shed light on how these economic factors contribute to unpredictable market dynamics. Giones et al. (2019) further demonstrate this by examining natural gas price volatility, which destabilised energy markets, leading to significant effects on stock values and investor confidence.

Technological disruptions represent another critical source of volatility. The rapid pace of technological innovation has become a hallmark of the digital economy. George et al. (2016) argue that interconnected global networks magnify volatility by introducing new competitors, reconfiguring value chains, and accelerating innovation cycles. These dynamics create a scenery marked by constant flux and heightened complexity.

Geopolitical and regulatory changes also introduce substantial volatility into the global business environment. Events such as Brexit, the Belt and Road Initiative, and trade sanctions exemplify how political decisions ripple through international markets. Volatility also exerts psychological and behavioural effects on decision-makers. Millar et al. (2018) stress that sustained exposure to volatility can detrimentally impact the well-being and mental health of CEOs, managers, and entrepreneurs and may lead to stress-induced decision fatigue. However, this area of research remains underdeveloped, with most studies focusing on tangible effects, such as innovation and leadership adaptability.

Buckley (2020) argues that in order to navigate volatility, firms must adopt strategies that incorporate redundancy and slack resources. One approach emphasised is the strategic stockpiling of inventory, which allows businesses to maintain continuity in operations during potential supply chain disruptions. Buckley also underlines the importance of diversifying sourcing and production activities to mitigate the risks associated with dependence on a single supplier. Complementing these efforts, firms are encouraged to internalise critical resources while simultaneously developing robust external partnerships to create a balance that enhances operational resilience (Duchek, 2020). Finally, the investment in data collection and real-time intelligence systems is presented as indispensable to enable firms to detect and respond swiftly to shifts in external conditions and ensure that they remain adaptive in a rapidly changing environment (Davenport, 2006; Yeoman, 2009). Together, these strategies underscore the need for organisations to build flexibility and foresight into their operational frameworks to thrive amidst volatility.

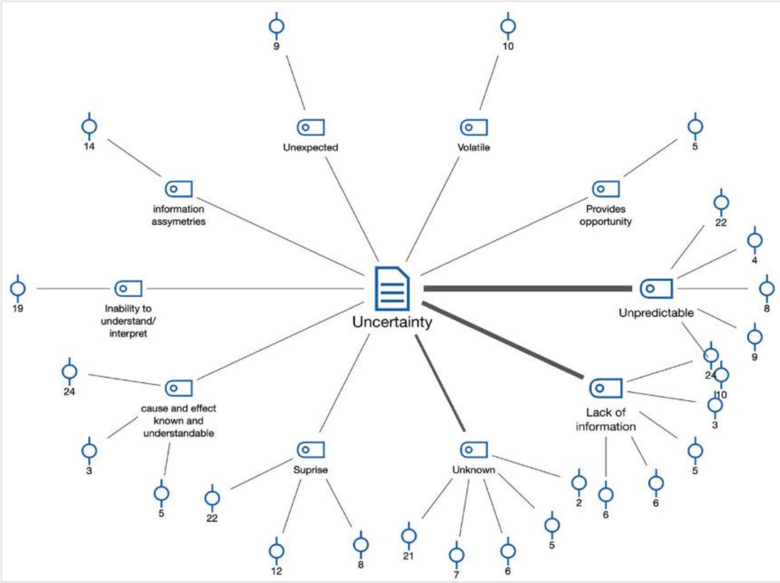
Future research should explore the psychological dimensions of volatility, particularly its impact on leadership decision-making and organisational well-being. Additionally, scholars must examine how volatility interacts with the other VUCA elements to shape long-term business resilience. With a deeper understanding of volatility, organisations can move beyond reactive crisis management and develop resilient and forward-looking strategies in an increasingly turbulent world.

2.2.1.2 Uncertainty

Uncertainty stands as the second principal construct underlying VUCA, where the "U" denominator in the VUCA signifies unpredictability and the inability to reliably forecast future situations and events (Lawrence, 2013). According to the findings by Taskan et al. (2022), uncertainty appears inextricably linked with the variability of prospective circumstances and contemporary existence more broadly (n=22 citations) in (Bader et al., 2019; Billiones, 2019) (n=22 citations). Academic discourse also characterises uncertainty as an information deficit regarding probable outcomes (n=12 citations) in Bader et al. (2019) and causal mechanisms of change, which prove not solely stochastic but also inscrutable (9 instances) in Bodenhausen and Peery (2009).

As Welbourn (2015) demystifies, uncertainty represents an epistemic limitation concerning a given situation or occurrence, particularly its causal antecedents and ramifications (n=5 citations) in Bennett & Lemoine (2014). This ignorance thereby heightens prospects for surprise (n=3 citations) in Hernandez and Allen (2013). However, despite its unexpected nature (n=2 citations) in Busch (2022), uncertainty may foster serendipity and possibility (n=2 citations) in Busch (2022). Moreover, scholarship links uncertainty to the related notion of volatility (Bader et al., 2019). Altogether, the academic treatment of uncertainty emphasises its indeterminacy and unpredictability while allowing that it may contain positive potential.

Figure 2.2 *Conceptual Analysis of Uncertainty*



Note: "⚲" means the number of times they are identified in our review. "━" means that they are the most common terms related with complexity

Note. *By Taskan et al. (2022).*

The concept of uncertainty lies at the heart of the VUCA framework; it captures the profound epistemic limitations faced by individuals and organisations operating in turbulent environments. As Bennett and Lemoine (2014) observe, uncertainty points to an all-too-common inability to reliably predict future events, make sense of complex causal chains, or acquire sufficient knowledge to render the world fully intelligible. While volatility denotes the measurable dynamism of variables that may fluctuate wildly over time, uncertainty emphasises the deeper inscrutability of phenomena that defy neat probabilistic calculation (Millar et al., 2018).

Strategic uncertainty has emerged as a pivotal concept across management scholarship; it encapsulates the profound challenges of strategy formation and decision-making amidst turbulence. While definitions vary, a consensus holds that uncertainty marks a state of deep unknowability related to future events, where neither the sequence nor repercussions of developments can be reliably foreseen (Narayanan & Ramanathan, 2014). As Chakraborty (2019) notes, uncertainty points to an absence of consistency, such that while one may anticipate events, their nature and impacts remain opaque. Uncertainty, therefore, differs fundamentally from risk, where probabilities can be reasonably assigned to outcomes. As Millar et al. (2018) helpfully discuss, uncertainty arises when the structure of a strategic issue is discernible, but core variables underpinning outcomes lack definition.

While perspectives on uncertainty's precise contours differ somewhat, scholars broadly concur that it denotes an awareness of one's own ignorance concerning dynamics that fundamentally shape organisational futures. This sensibility seems ever more relevant amidst growing turbulence. A key distinction in the literature is between known uncertainties (where potential outcomes are recognised, but probabilities are unclear) and unknown uncertainties (where even the possible outcomes are not identifiable) (Knight, 1921). Bennett and Lemoine (2014) further differentiate between moderate uncertainty, where some patterns exist, and extreme uncertainty, where no historical precedent is available to guide decision-making.

Scholars have sought to delineate volatility and uncertainty as distinct facets of the turbulent strategic environment. While often conflated in practice, their differences hold meaningful implications for strategy formulation. As Bennett and Lemoine (2014) discuss, volatility denotes an environment where change occurs frequently and intensely but remains underpinned by discernible causal drivers. Here, strategists encounter dynamism but not utter inscrutability. In contrast, uncertainty points to more fundamental unknowability concerning future states, severely impeding predictive analysis (Kaivo-oja & Lauraeus, 2018). Çiçeklioğlu (2020) elucidates this distinction further, stating that volatility implies measurable, if rapid, fluctuations in known variables. A volatile stock market exemplifies this condition. Uncertainty, however, arises when even the essential predictability required for probabilistic calculation falls away, as often occurs when new regulations disrupt an emerging industry. Attending to the differences between volatility and uncertainty may prove vital for strategy formulation. While volatility poses challenges, uncertainty suggests more profound limitations on foresight and thus requires alternative approaches embracing flexibility.

Uncertainty can stem from diverse external and internal sources that intersect to create a profoundly uncertain environment. As Frynas et al. (2018) discuss, today's highly interconnected and technologically fluid global economy amplifies organisational uncertainties. Strategists must grapple with multifaceted drivers of opacity and ambiguity. On the one hand, from an exogenous perspective, technological disruptions represent a fundamental source of uncertainty. The rapid advance of innovations like artificial intelligence and automation fundamentally destabilises established business models and creates new competitors with unclear impacts (Kaivo-oja & Lauraeus, 2018). Geopolitical and regulatory fluxes add further uncertainty, as shifting political dynamics and international trade policies make the competitive landscape challenging to predict (Van Tulder et al., 2019). Environmental issues like climate change and social shifts in consumer behaviour also introduce uncertainty by changing market conditions in often unexpected ways.

On the other hand, in addition to external drivers, uncertainty also emerges from within organisations themselves, compounding the challenges of strategy formulation. A pivotal internal source stems from information asymmetries between firms. As Stiglitz (2002) and Schmidt and Keil (2013) discuss, larger resource-rich companies often possess informational advantages in turbulent conditions, which makes them benefit from more extensive intelligence gathering. Smaller firms face more significant uncertainty given their more limited environmental scanning capabilities. Furthermore, Internal uncertainties also arise from the inherent difficulty in predicting competitors' future moves or customer needs (Narayanan

& Ramanathan, 2014). Firms must craft strategy amidst uncertainty around how other players may react and how demand may shift. While forecasting and scenario planning can aid predictive efforts, even the most sophisticated models struggle to capture the full complexity of strategic environments (Johansen & Euchner, 2013). Thus, internal organisational dynamics create further uncertainty beyond external disruptions. Strategists must recognise how internal factors like information gaps and cognitive barriers intersect with external opacity.

Organisational responses to profound uncertainty have received growing scholarly attention. Broadly, firms appear to pursue three main approaches: expanding information gathering, embracing flexible decision-making, and cultivating organisational agility. Many scholars advocate expanding information networks to mitigate uncertainty (Bennett & Lemoine, 2014; Johansen & Euchner, 2013). By investing in intelligence gathering via big data, real-time monitoring, and digital platforms, firms can approach uncertainty proactively rather than reactively. However, some caution that more information alone may prove insufficient amidst deep complexity (Bartscht, 2015). Therefore, others emphasise that decision-making flexibility is enabled by tools like simulations and experimentation (Bennett & Lemoine, 2014). Scenario planning also allows firms to prepare for multiple futures rather than relying on single forecasts (McCausland, 2022). This portfolio approach seems attuned to uncertainty's challenges.

Agility and continuous learning similarly receive endorsement (Raghuramapatruni & Kosuri, 2017; De Moura et al., 2023). As emergent conditions reshape the landscape, iterative decision cycles based on updated environmental understanding appear more effective than rigid planning. Firms must also cultivate entrepreneurial agility to capitalise on uncertain conditions (Sarasvathy, 2001). Critically assessing these responses, one may conclude that while information gathering and flexibility seem beneficial, overemphasising prediction risks leading to miscalibration. Perhaps agility offers the most promise to enable organisations to nimbly navigate uncertainty's inevitability rather than expend undue resources trying to eliminate it entirely.

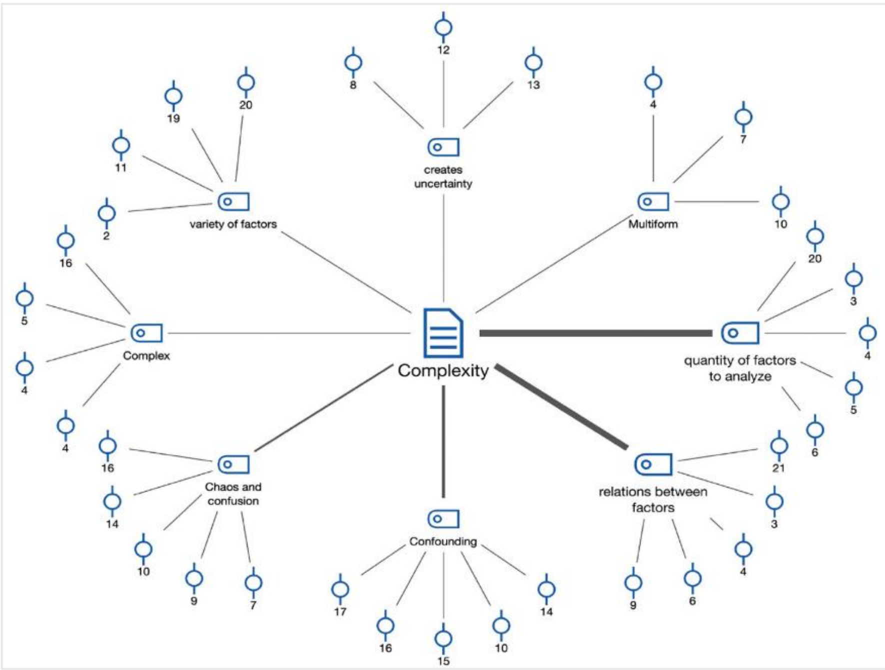
Scholars situate uncertainty within the broader VUCA framework and highlight intersections with complexity and ambiguity (Lawrence, 2013; Van Tulder et al., 2019). Appreciating uncertainty’s internal and external drivers allows an in-depth understanding of modern strategic environments that defy traditional planning models. The VUCA Prime model helpfully stresses continuous understanding over prediction (Raghuramapatruni & Kosuri, 2017), aligning with calls for agility and learning in conditions of constant change.

In the final analysis, uncertainty poses profound challenges distinct from mere volatility in contemporary strategy contexts. It denotes fundamental unknowability about future states. Uncertainty defies traditional predictive planning models. As scholars emphasise, effective navigation of uncertainty requires moving beyond risk-based thinking towards agile approaches to leverage information sharing, collaborative sensemaking and scenario planning. Nevertheless, gaps persist in understanding uncertainty's behavioural and psychological dimensions. How do leaders and organisations psychologically cope amidst obscure environments that confound cognitive biases for prediction and control? Additionally, further inquiry into emerging AI-based forecasting tools would enrich the understanding of enhanced strategic foresight capabilities. However, uncertainty need not solely be framed as a constraint. By reframing uncertainty as an impetus for adaptation and innovation rather than a risk to be eliminated, firms may unlock new sources of competitive advantage. Uncertainty's inevitability demands strategic agility and entrepreneurial opportunity-seeking. Thus, uncertainty may prove a powerful wellspring for creative strategy formulation rather than its nemesis.

2.2.1.3. Complexity

The "C" construct in the VUCA framework denotes complexity, associated in the literature with an organisation's interconnected components, networks, procedures, and the many-sided external business environment (Bennett & Lemoine, 2014; Rodriguez & Rodriguez, 2015). This complexity stems from unidentifiable and/or contradictory dynamics (Shaffer & Zalewski, 2011). As reported by Taskan et al. (2022), academic discourse construes complexity as primarily driven by the vast array of factors requiring analysis (n=16 citations) and the intricate interrelationships between them (n=22 citations).

Figure 2.3 *Conceptual Analysis of Complexity*



Note: "⚲" means the number of times they are identified in our review. "▬" means that they are the most common terms related with complexity

Note. *By Taskan et al. (2022).*

As Billiones (2019) explains, such complexity manifests in myriad confounding issues that individuals confront daily. Specifically, the convoluted nature of variables that individuals navigate (n=8 citations) alongside resultant chaos and confusion produces complex, heterogeneous environments (n=5 citations) with numerous elements to analyse (n=4 citations). The extant scholarship also posits complexity as an antecedent to the uncertainty denoted by “U” in the VUCA model (n=9 citations). The academic treatments of complexity characterise it as underpinned by multiplicity and interconnectedness of factors, generating disorder and cognitive overload.

Complexity poses distinct challenges from mere volatility or uncertainty within VUCA environments. Whereas volatility denotes the intensifying pace of change and uncertainty reflects unknowability of future states, complexity stems from the multiplicity of interconnected variables defying reductionist analysis (Bennett & Lemoine, 2014). Complex systems exhibit nonlinear dynamics generating emergent behaviours through intricate interactions between heterogeneous agents. Consequently, understanding emerges not from isolating variables but from appreciating broader interrelationships (Fuchs, 2013). Complexity thus represents a pervasive condition, not a problem to be eliminated. Firms must move beyond seeking to simplify towards embracing complex sensing, exploration of adjacencies, and networked integration. Rather than reducing complexity, the task becomes creatively leveraging complexity for novelty while sustaining coherent orientation. This draws attention to complexity's positioning within VUCA, not as a risk to be mitigated but as an environmental condition demanding cognitive, strategic and leadership agility. Complexity calls for wayfinding through rich interconnections rather than vainly grasping for elusive simplicity.

Scholarly characterisations illuminate the distinct nature of complexity within turbulent business environments, beyond mere volatility or uncertainty. Chakraborty (2019) describes that complexity stems from multilayered interactions and interdependencies generating overload from proliferating information. Bennett and Lemoine (2014) further delineate complexity as elaborate networks with numerous components, often convoluted but not necessarily dynamically changing like volatility. Thus, complexity represents more than the pace of fluctuation or lack of knowledge. Instead, it indicates complex systemic entanglements that overwhelm linear cognition. This multiplicity breeds emergence and nonlinearity as relationships evolve. Hence, complexity warrants framing as an environmental condition rather than a temporary problem. Effective navigation demands expansive cognitive frames, comfort amidst messiness, and an understanding of organisations as complex adaptive systems nested within broader ecosystems. Leaders must eschew reductionist simplification in favour of sensemaking, wayfinding and riding waves of complexity. Savvy strategy embraces complex reality rather than seeking illusory simplicity.

A key characteristic of complexity is that it does not always involve instability or unpredictability but makes decision-making more difficult (Diehl & Sterman, 1995; Moxnes, 2000). As Diehl and Sterman

(1995) and Moxnes (2000) discuss, complexity may not entail volatility but overwhelms linear cognition by transcending tidy categories and transparent causal chains. For example, firms expanding into international markets must navigate a web of regulations, tariffs, and logistical challenges, a complex process that is not necessarily volatile or uncertain (Bennett & Lemoine, 2014). Similarly, Collinson (2014) observes that organisational complexity emerges as firms scale up, accumulating internal structures, processes, and bureaucratic layers, which may become an obstacle to agility and efficiency.

Ashby's (1984) Law of Requisite Variety furnishes a seminal theoretical grounding to unpack complexity, which posits that only variety can absorb variety, meaning that firms must develop internal complexity to match the external complexity they face (Mack et al., 2016). If a company operates in a highly complex environment but remains rigid and simplistic in its internal structure, it will struggle to adapt. Simon (2012) similarly argues that complexity in decision-making arises when organisations must consider a vast number of interdependent factors, which makes it computationally difficult to identify optimal strategic choices. From a systems theory perspective, Qudrat-Ullah et al. (2007) underline that complex systems are characterised by both their composition (multiple interacting components) and their behaviour (non-linear interactions, feedback loops, and emergent properties). In a business context, this means that the relationships between different market forces, organisational units, and regulatory environments are not static but evolve dynamically, requiring firms to continuously adapt their strategies.

Unlike volatility, where stockpiling resources is a viable response, or uncertainty, where gathering information is key, complexity requires a fundamentally different approach. The literature suggests that firms must adopt structural, cognitive, and adaptive strategies to manage complexity effectively. Collinson (2014) reports that one of the biggest drivers of complexity is the proliferation of regulations and the increasing diversity of regulatory environments. Firms must allocate significant resources to ensure compliance, leading to more bureaucracy, meetings, documentation, and procedural requirements. As external complexity increases, internal structures must adapt, which often leads to more rules, layers of management, and administrative burdens.

Complexity can be overwhelming, but research suggests several strategic approaches to effectively help organisations navigate this challenge. One of the most critical countermeasures to complexity is clarity. According to the VUCA Prime framework, complexity should be addressed by distilling essential insights from vast amounts of information to ensure effective communication in decision-making (Johansen & Euchner, 2013). Clarity in business policy and strategic direction plays an essential role in cutting through complexity to allow leaders to provide a coherent vision that helps organisations stay on course (Baran & Woznyj, 2020). Without this guiding framework, complexity can quickly spiral into confusion and inefficiency.

Beyond clarity, organisational design plays an important role in managing complexity. Bennett and Lemoine (2014) argue that organisations should not resist complexity but rather structure themselves to mirror the dynamic environments in which they operate. This means adopting agile systems that enable quick adaptation to external changes. Sherehiy et al. (2007) further explain that while external complexity may be unavoidable, internal complexity should not be self-inflicted; as a result, a simplification of workflows, processes, and IT systems is essential to prevent unnecessary operational burdens. The way decision-makers approach complexity also determines how effectively it is managed. Tamara et al. (2021) draw attention to the importance of balancing data collection with synthesis and prioritisation and caution against information overload, which can paralyse decision-making. Instead, managers must focus on gathering relevant facts, weighing alternatives and making logical inquiries to extract actionable insights. Similarly, Antucheviciene et al. (2017) advocate for hybrid decision-making models, which integrate both quantitative analysis and qualitative heuristics to navigate the intricate nature of complex systems. These models help leaders make informed decisions without becoming overwhelmed by excessive data.

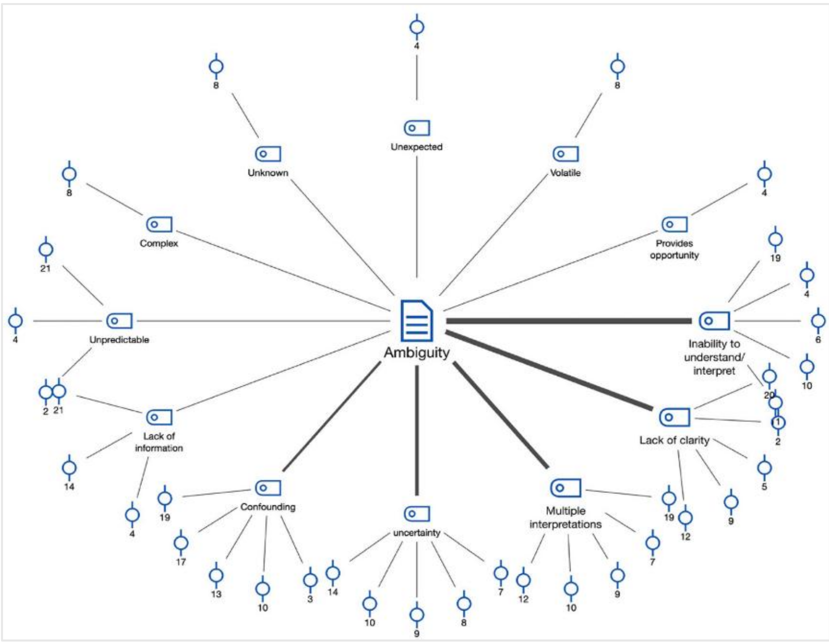
Finally, structural complexity and expertise development provide another avenue for managing intricate business environments. Van Tulder et al. (2019) highlight that many firms outsource or offshore specialised tasks to experts who can make complexity computable, as this enables organisations to focus on their core competencies. Meanwhile, firms operating in highly complex global markets increasingly invest in specialist departments and AI-driven analytics to efficiently process large volumes of regulatory, financial, and market data. By leveraging technological advancements and expertise, companies can transform complexity from a challenge into a competitive advantage.

In retrospect, complexity does not exist in isolation; it is deeply intertwined with volatility, uncertainty, and ambiguity, all creating a dynamic and often unpredictable business environment. Bennett and Lemoine (2014) caution against treating all VUCA elements as if they require the same strategic responses, as approaches practical in one domain may prove counterproductive in another. For instance, stockpiling resources, a viable response to volatility, may fail to address the interdependent decision-making challenges posed by complexity. Similarly, expanding information networks, a common strategy for managing uncertainty, can exacerbate information overload and lead to decision paralysis rather than clarity. An effective complexity management, therefore, requires a targeted approach. Hodgkinson and Starbuck (2008) argue that organisations must prioritise clarity and ensure that key insights are distilled and communicated effectively. Additionally, they should invest in expertise development and leverage specialised knowledge to navigate intricate systems.

2.2.1.4. Ambiguity

The extant literature defines ambiguity as a lack of clarity regarding the causality, context, and details surrounding events (Sullivan, 2012; Lawrence, 2013, as cited in Kaivo-oja & Lauraeus, 2018). Past research characterised it as an inability to aptly comprehend threats and opportunities before they become dire (Lawrence, 2013). The scholarship also associates ambiguity with challenges in understanding or interpreting situations (n=17 citations), overall absence of clarity (n=17 citations), and consequently, the potential for multiple explanatory frameworks for each event (n=15 citations). Moreover, ambiguity interrelates with uncertainty (n=9 citations) and volatility (n=3 citations), while complexity contextualises it (n=2 citations).

Figure 2.4 *Conceptual Analysis of Ambiguity*



Note: "◊" means the number of times they are identified in our review. "▬" means that they are the most common terms related with ambiguity

Note. *By Taskan et al. (2022).*

Specifically, scholarship links ambiguity to the convoluted nature of manifold meanings that events can create (n=7 citations) and the lack of sufficient information to facilitate interpretation (n=4 citations). The unpredictability of occurrences also interacts with ambiguity (n=3 citations) as does their unexpectedness (n=1 citation) and inscrutability (n=1 citation). However, despite predominantly negative depictions, ambiguity may foster opportunities as well (Bennett & Lemoine, 2014). Eventually, academic discourse portrays ambiguity as a lack of causal and contextual clarity surrounding situations, enabling multiple meanings and uncertainties.

The concept of ambiguity within the VUCA framework represents perhaps the most elusive and ontologically challenging dimension of contemporary organisational theory. Considerable scholarly attention has focused on understanding ambiguity, but there remains significant theoretical fragmentation concerning its precise definition, manifestation, and implications for organisational decision-making. At its most fundamental level, ambiguity manifests as a profound epistemological challenge. March and Olsen (1976) offer a typology of organisational ambiguity that encompasses four distinct forms: ambiguity of intention, understanding, history, and organisation. This multidimensional conceptualisation moves beyond simplistic notions of ambiguity as mere uncertainty and positions it as a pervasive condition that simultaneously destabilises organisational sense-making at multiple levels. The conceptual distinction between ambiguity and uncertainty emerges as fundamental. Schrader et al. (1993) articulate that uncertainty involves dissatisfaction with knowledge values within an understood problem structure, while ambiguity represents a more profound epistemological challenge in which the problem structure itself, including relevant variables and their relationships, remains indeterminate. This distinction positions ambiguity not as a quantitative extension of uncertainty but as a qualitatively different phenomenon.

Small et al. (2022) introduce a phenomenological perspective and frame ambiguity as simultaneously holding multiple interpretations, a cognitive state characterised by dualities and multiplicities that transcend binary thinking. This perspective positions ambiguity not merely as an environmental condition but as an interpretive stance that is deeply connected to experience, context, history, and character. This subjective, interpreter-dependent quality distinguishes ambiguity from uncertainty's more positivist orientation toward discoverable truths. The neurological response to ambiguity further complicates this distinction. Small et al. (2022) note that the brain often reacts to ambiguity as if it were uncertainty, suggesting that, although conceptually distinct, these conditions may trigger similar psychological and behavioural responses. This observation stresses the challenge of operationalising ambiguity as a distinct construct in empirical research.

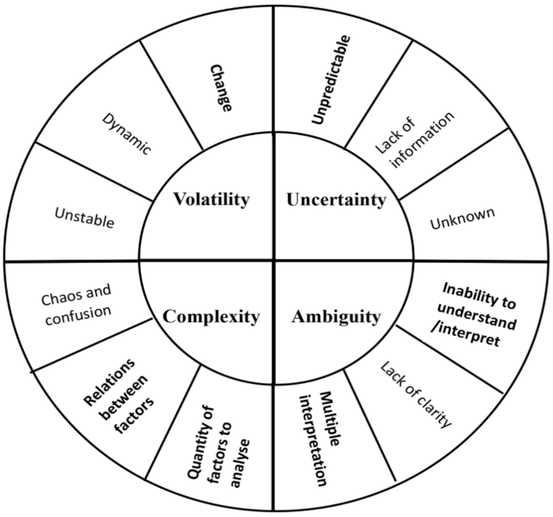
For Bennett and Lemoine (2014), ambiguity is branded as situations where cause and effect are not understood, and there is no precedent for making predictions. They advocate experimentation as the primary strategic response, a notably different prescription than those offered for uncertainty (information gathering), complexity (restructuring), or volatility (building slack resources). This prescription underscores the unique nature of ambiguity as requiring generative rather than analytical approaches. The literature reveals a significant evolution in organisational perspectives on ambiguity. Earlier works (Alvesson & Sveningsson, 2003; Denis et al., 1996) predominantly framed ambiguity as problematic and detrimental to organisational functioning. However, more recent scholarship (Cappellaro et al., 2021) has identified the potential strategic value of ambiguity in what might be termed "strategic ambiguity"—for mobilising stakeholders, maintaining flexibility, and navigating complex environments.

For Ilut and Schneider (2022), an important distinction has been made by positioning ambiguity as uncertainty when probabilities themselves are unknown. This Knightian conceptualisation accentuates that ambiguity can generate "first order welfare losses" that risk alone cannot explain. Their observation that ambiguity can still be characterised using standard linear approximation and estimation techniques suggests practical methodological approaches for integrating ambiguity into formal decision models. The inaction or inertia that ambiguity engenders presents a significant organisational challenge. As Ilut and Schneider (2022) note, ambiguity can lead to non-participation in asset markets that an investor is not familiar with, rigidity and memory in nominal prices, or lack of adoption of new technologies." This behavioural consequence manifests across multiple organisational domains, from strategic decision-making to technological adoption.

As a final point, one can infer that several tensions emerge across the literature when it comes to demystifying ambiguity. First, there is a fundamental epistemological tension between positivist conceptualisations, which frame ambiguity as an objective environmental characteristic, and constructivist perspectives, which position ambiguity as socially constructed and interpreter-dependent. This tension remains largely unresolved. Second, scholars diverge on whether ambiguity represents a temporary condition to be resolved through experimentation (Bennett & Lemoine, 2014) or a permanent feature of organisational life to be embraced and strategically leveraged (Cappellaro et al., 2023). This tension carries significant implications for organisational responses to ambiguity. Third, the relationship between ambiguity and the other VUCA dimensions remains undertheorised. Ehsani and Osiyevskyy (2022) claim ambiguity is "different from the rest of the features of the VUCA world," yet this distinction remains insufficiently elaborated. The potential interactive effects among VUCA dimensions and how ambiguity might amplify volatility or be exacerbated by complexity represent a critical gap in current understanding.

To address this gap, the seminal work of Taskan et al. (2022) attempts to build a conceptual map of VUCA, striving to interpret the precise meanings of each constituent and examine potential overlaps. To achieve this objective, the authors analysed 26 papers from an initial pool of 833 related publications. Overlaps were indeed identified among the VUCA components. Notably, the individual elements of VUCA were seldom disruptive in isolation; instead, they tend to coexist in various combinations. For instance, a new product market could exhibit both volatility and ambiguity or penetrating a new region during significant governmental shifts could present both complexity and uncertainty.

Figure 2.5 *Conceptual Map of the VUCA Acronym*



Note. *By Taskan et al. (2022).*

Consequently, the distinctions between volatile, uncertain, complex, and ambiguous business environments lack clear demarcation. Taskan et al.'s findings also revealed associations between uncertainty and volatility, complexity as a cause of uncertainty, ambiguity's close relationship with uncertainty, and volatility arising from complexity. This implies that when researchers address a particular construct, their intended focus may not be explicitly evident, according to Taskan et al. 2022. For example, ambiguity might encompass uncertainty, volatility, or complexity. Therefore, discussions surrounding VUCA components might not consistently convey the same concepts due to the absence of explicit distinctions between its elements. This inconsistency can lead to potential misunderstandings and erroneous interpretations when investigating ostensibly similar components by referencing dissimilar concepts.

Another perspective submitted by De Andrade et al. (2021) claimed that the 'V' represents the volatile business environment that has extreme and rapid fluctuations. The 'U' depicts an uncertain business environment in which there is no knowledge about situations or events, especially their causes and effects on relationships. This results in an unpredictable future, affecting this organisation's long-term growth. Uncertainty refers to situations that are characterised by a lack of knowledge of whether an event is significant enough to have a meaningful cause. Milliken (1990) previously defined uncertainty as "an individual's perceived inability to predict something accurately". By complexity, it is meant the complex ecosystem of moving parts in any environment. It describes iterations of simple patterns combined in a labyrinth of overlaps and loops, making it difficult to decipher the signal from the noise. By ambiguity, they submit that it relates to the confusion about a situation or event, and there is a diversity of potential results, so the result cannot be clearly described.

For Badr et al. (2019), volatility refers to the nature, magnitude and speed of change that occurs within a company's internal and external environments. The uncertainty is the extent to which one can confidently predict the future. In other words, even though the fundamental cause and effect of a situation are known, there is a lack of information about the outcome. Also, the mechanisms of change are unknown and often unpredictable. Uncertainty means one knows cause and effect but does not have other information. Complexity, as described by Badr et al. (2019), refers to the multitude of factors that warrant consideration, their heterogeneity, and their interrelationships. Ambiguity, in contrast, manifests as a dearth of clarity and an inherent challenge in accurately comprehending the details of a given situation. Consequently, causal relationships remain obfuscated, and reliance on past experiences is rendered untenable.

According to Elkington (2018), volatility encompasses the inherent characteristics and dynamics of change and the nature and rapidity of the forces and catalysts that drive transformation. Uncertainty embodies an absence of predictability, an increased potential for unforeseen developments, and a heightened awareness and comprehension of issues and events. Complexity represents a confluence of multifarious forces, the entanglement of issues, and the chaos and disarray enveloping an organisation. Ambiguity, in contrast, is characterised by the nebulous nature of reality, the susceptibility to misinterpretations, and the equivocal implications of prevailing circumstances, which together contribute to a muddled understanding of cause-and-effect relationships and heightened confusion.

In the view of Kaivo-oja and Lauraeus (2018), volatility encapsulates the nature, velocity, volume, and magnitude of change that lacks discernible patterns. Uncertainty, in their view, signifies the absence of predictability regarding issues and events. Complexity, on the other hand, is characterised by a myriad of intricate causes and mitigating factors, both internal and external to the organisation, that contribute to the complexity of a given problem. This additional layer of complexity, coupled with the tumultuous nature of change and the unavailability of historical predictors, exacerbates the challenges associated with decision-making. Ambiguity, as defined by Kaivo-oja and Lauraeus (2018), refers to the absence of clarity about the interpretation of an event.

Pandit et al. (2018) posited that volatility pertains to the velocity, magnitude, and dynamics of change. Uncertainty, in their perspective, is characterised by the absence of predictability concerning events and issues. Complexity, as described by the authors, arises from the confounding challenges encountered by an organisation, whether military or otherwise. Ambiguity, on the other hand, denotes a lack of clarity regarding the conditions faced by the organisation. Sharif and Irani (2017) characterised volatility as a state in which the rate of change itself is prominent. Uncertainty, according to their description, pertains to a lack of clarity concerning both present and future outcomes, complexity manifests in the presence of numerous competing decision factors, and ambiguity is a condition wherein multiple meanings and significances coexist.

Finally, for Bennett and Lemoine (2014), volatility is considered a relatively unstable change; information is available, and the situation is understandable, but change is frequent and sometimes unpredictable. Uncertainty refers to a lack of knowledge as to whether an event will have meaningful implications; cause and effect are understood, but it is unknown whether an event will create significant change. Complexity involves many interconnected parts forming an elaborate network of information and procedures, often multiform and convoluted, but not necessarily involving change. Ambiguity refers to the lack of knowledge as to "the basic rules of the game"; cause and effect are not understood, and there is no precedent for making predictions as to what to expect.

Drawing from the definitions of the aforementioned authors, one can observe that they converge in viewing VUCA elements as four independent dimensions, each describing a distinct aspect of the business environment, completely ignoring any association or link among its elements. However, Bennett and Lemoine's (2014) work has attracted considerable attention and prompted extensive debates, leading to a heightened interest that can be attributed to the fact that their work represents the first attempt to develop a model for understanding VUCA. While their conceptualisation of the VUCA environment and its implications for organisational performance have been influential, it has not been without its critics. Lawrence (2017) argues that the separation of the four dimensions may lead to an oversimplification of the intricate and interrelated nature of contemporary business challenges, potentially resulting in fragmented or superficial solutions. Another point of contention raised by scholars is the lack of empirical evidence supporting the VUCA framework. While Bennett and Lemoine (2014) deliver a useful theoretical foundation for understanding the challenges associated with VUCA environments, empirical studies validating the framework's applicability and effectiveness in different contexts are scarce. This gap in the literature leaves the utility of the VUCA concept open to question. Furthermore, Bennett and Lemoine's (2014) article is primarily focused on diagnosing the challenges associated with VUCA environments rather than offering concrete solutions or strategies for organisations to navigate these challenges effectively. Critics argue that this limitation diminishes the practical relevance and applicability of the VUCA concept, as it provides little guidance for practitioners seeking to address VUCA-related threats to performance.

In synthesis, the extant literature on VUCA consistently posits its constituent elements as four distinct dimensions, each characterising a separate facet of the business environment (Bennett & Lemoine, 2014). Volatility encapsulates the velocity and magnitude of change, uncertainty corresponds to the unpredictability of occurrences, complexity encompasses the interrelatedness of multiple variables, and ambiguity signifies the absence of lucidity and the challenge of discerning cause-and-effect relationships. However, the definition put by Bennett and Lemoine (2014) was the most cited by subsequent works and highly regarded for its simplicity and practicality, in that organisations could identify and treat the challenges pertinent to them in every given dimension (Bennett & Lemoine, 2014).

However, critics contend that this separation of the four dimensions has the tendency to result in an oversimplification of the complex and interwoven nature of the challenges faced today, for which fragmented or superficial solutions might be proposed (Lawrence, 2017). From the foregoing discussion of the literature review, one may infer that scholars address organisational perceptions of VUCA elements either separately, one by one, all at one time, or in random combinations. However, viewing VUCA as a sequential process is highly understudied, thus creating an equally compelling research opportunity.

2.2.2. Key Characteristics and Challenges of VUCA Environments

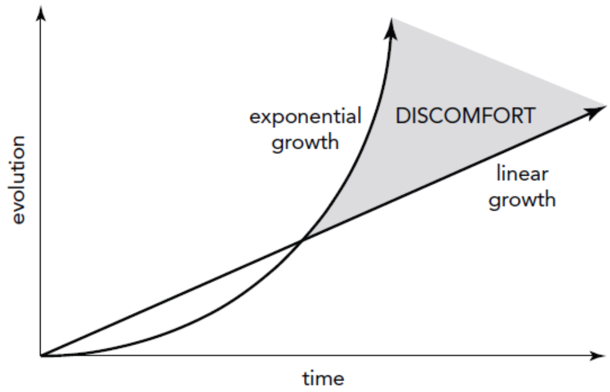
The concept of VUCA stands in stark contrast to the status quo, which traditionally signifies stability amidst volatility. The status quo epitomises the former world order, where many enterprises thrived in a relatively predictable environment. However, the present business climate is rife with paradoxes, characterised by an abundance of VUCA scenarios that have disrupted and even led to the downfall of major corporations (Buckley & Casson, 2020) and managing across VUCA context involves accepting inherent contradictions and embracing paradoxes in organisational life (Lewis, 2000; Worley & Jules, 2020). Ordinarily, modern organisations strive to challenge the status quo by embracing change and adaptability. Paradoxically, within the realm of the VUCA world, these same entities seek to preserve elements of the status quo to foster stability amid volatility, certainty amid uncertainty, simplicity amid complexity, and clarity amid ambiguity. This perspective supports the research of Fletcher and Griffiths (2020), who contend that digitally mature organisations intentionally cultivate an internal environment that counterbalances the perpetual VUCA challenges by emphasising attributes such as stability, certainty, simplicity, and precision.

Beyond mere managerial jargon, VUCA serves as a navigational tool. Embracing its four dimensions may lead organisations to gain clarity during the turbulence of current times and acquire a clear picture of the way the world is evolving. Volatility acknowledges rapid shifts, uncertainty demands adaptive thinking, complexity underscores interconnectedness, and ambiguity highlights the need for informed decision-making (Taskan et al., 2022). Rather than viewing change as an exogenous force to be resisted or managed, the VUCA model posits that environmental dynamism is an intrinsic characteristic of contemporary systems (Millar et al., 2018). This perspective implies a fundamental shift in organisational mindset from reactive change management to proactive environmental engagement. However, traditional management paradigms often treat change as a linear rather than an exponential process with well-defined beginnings and endings (Mezhevov et al., 2022). But Heraclitus' timeless insight that change is the sole constant in the universe contradicts this view. Organisations rigidly adhering to predefined change initiatives risk obsolescence (Olson & Eoyang, 2001).

In a thought-provoking inquiry, Barthélemy (2022) raises the pertinent question of whether the business environment has always been VUCA and truly evolved into a more VUCA environment over time. This inquiry mirrors a common challenge faced by earlier VUCA theorists. Johansen noted that he was frequently asked whether the world has not always been VUCA (Johansen & Euchner, 2013), reflecting widespread scepticism about the novelty of VUCA conditions. These parallel observations, spanning nearly a decade, highlight an ongoing debate in management literature about the historical context and relative intensity of VUCA factors. Though scholarly investigations have delved into this topic, their findings remain inconclusive. Some studies indicate a decline in persistence and performance, implying heightened market instability (Chakraborty, 2019). Conversely, other research suggests no significant change. Notably, a recent study asserts that successful firms are increasingly likely to maintain industry dominance since the 1970s (Skapinker, 2018). However, there needs to be a recognition that these mixed findings do not negate the VUCA nature of the present business world. Instead, it is plausible that VUCA conditions have persistently characterised the corporate milieu at varying intensities. Skapinker (2018) asserts that the challenges inherent in VUCA have persisted for decades as business leaders have continually battled these complexities, consistently balancing strategic foresight and vulnerability.

The evolving nature of the global business environment and its relationship to VUCA characteristics merits a more detailed exploration, particularly considering the transformative forces of internationalisation, globalisation, and the emergence of the internet and computing power. The assertion that the business environment consistently exhibits VUCA characteristics is subject to debate. Still, it is undeniable that these elements have become increasingly pronounced in recent decades (Niehaus et al., 2024). The accelerating pace of information generation and dissemination, primarily spearheaded by technological advancements and global interconnectedness, has indeed led to a rapid obsolescence of existing knowledge. Mezhevov et al. (2022) posit that approximately ninety per cent of all available information has emerged within the past two to three years, rendering much of the world as it existed more than three years ago outdated. This phenomenon, often referred to as "information explosion" (Toffler, 2020) or "exponential growth" (Naylor, 2017), has been amplified by the ubiquity of the internet and the proliferation of digital technologies (Hilbert & López, 2011), causing exponentiality discomfort. As the interplay among organisations, geographies, and technological advancements persists and the pace of technological development, particularly in computing power, exponentially accelerates, organisational discomfort arises within the tension between linear and exponential trajectories (Naylor, 2017), as illustrated in the figure below.

Figure 2.6 *Exponential Growth vs. Linear Growth*



Note. *Naylor (2017).*

Figure 2.6 depicts two growth curves plotted against time and evolution. The linear growth line represents a steady, predictable rate of change that many human systems and institutions are designed to handle. In contrast, the exponential growth curve starts slowly but accelerates rapidly, eventually outpacing the linear trajectory. The area labelled "discomfort" between these curves is particularly noteworthy. This region signifies the growing gap between exponential change (often driven by technological innovations or complex global systems) and the linear adaptive capacity of individuals, organisations, or societal structures. This disparity creates what Kurzweil (2014) termed the "law of accelerating returns," where the rate of change itself is increasing. Haslam and Shenoy (2018) astutely labelled this phenomenon as the changing nature of change.

The concept of "discomfort" in this context aligns with organisational theorists like Handy (1995), who discussed the "sigmoid curve" and the necessity for proactive change before reaching points of inflection. Similarly, it echoes Christensen's (1997) work on disruptive innovation, where established entities struggle to keep pace with exponential advancements. This model has profound implications for strategic management, policy-making, and educational systems as it suggests that traditional linear planning and adaptation strategies may be insufficient in an increasingly VUCA world (Bennett & Lemoine, 2014). As a result, in the face of such rapid technological progress, organisations find themselves unable to keep pace, which leads to a state of discomfort. This predicament presents a difficult challenge, as comprehending such swift changes exceeds cognitive capacity. Apprehension and feelings of being overwhelmed arise due to the inability to match the current velocity of transformation, let alone envision future scenarios (Klus & Müller, 2021).

The emergence of the internet and computing power, in particular, has been a catalyst for VUCA conditions. By dramatically reducing information asymmetries and transaction costs, the Internet has accelerated the pace of change across industries, intensifying competitive pressures and shortening product lifecycles (Brynjolfsson & McAfee, 2014). The digital transformation of businesses has led to the emergence of platform-based business models and ecosystems, further blurring industry boundaries and increasing environmental complexity (Jacobides et al., 2018). However, the perception of increased VUCA characteristics may be partially attributed to enhanced measurement and awareness capabilities. Advanced data analytics and real-time information systems have made it possible to detect and quantify environmental turbulence with unprecedented precision (George et al., 2014), leading to improved visibility that creates the impression of increased volatility and uncertainty, even if the underlying rate of change has not accelerated to the same degree.

As Mezhevov et al. (2022) point out, there has indeed been a high level of interest in management approaches and principles which conjoin under the VUCA acronym since 2015 on the part of global scientific and business circles alike. This focus reflects a growing recognition of the need for adaptive and resilient organisational structures capable of thriving in dynamic environments (Worley & Jules, 2020). However, Winkler et al. 2024 described that this awareness has led to ambivalent responses and usually prescriptive suggestions in the strategy literature regarding how to cope with VUCA. Hence, Kraaijenbrink 2018 voiced that the VUCA framework should be addressed critically, remembering its limitations and a tendency to excessive simplification of complex environmental relations.

2.2.3. Reactions and Responses to VUCA Challenges

2.2.3.1. Unravelling the Link among the Four VUCA Dimensions

As previously mentioned, the VUCA concept originated from military strategy in the early 1990s. The term then gradually reached business discussions during the early 2000s since organisations were trying by all means to get through the now-increasing environmental turbulence. However, during the earlier adoptions into the business perspective, it was majorly covered in broad and sometimes superficial use without a systematic approach for practical application (Singh et al., 2024). It was in this context of growing yet unfocused VUCA awareness that Johansen and Euchner (2013) introduced their VUCA Prime framework, offering one of the first systematic approaches to addressing VUCA challenges in organisational leadership. Hence, Johansen and Euchner represent perhaps a sea change in thinking through how to conceptualise leadership responses to VUCA environments. Their work, however, deserves special mention for its somehow foundational proactive approach to VUCA challenges, as it contributes a counterpoint to each VUCA element and implicitly addresses their interconnectedness. The authors posit that effective leadership in VUCA contexts requires the development of corresponding capabilities: vision to counter volatility, understanding to address uncertainty, clarity to navigate complexity, and agility to manage ambiguity. This VUCA Prime framework (Vision, Understanding, Clarity, Agility) presents a subtle viewpoint on how leaders can cope with and potentially thrive in turbulent environments.

Figure 2.7 *VUCA Prime*

Note. *Adapted from Johansen & Euchner (2013).*

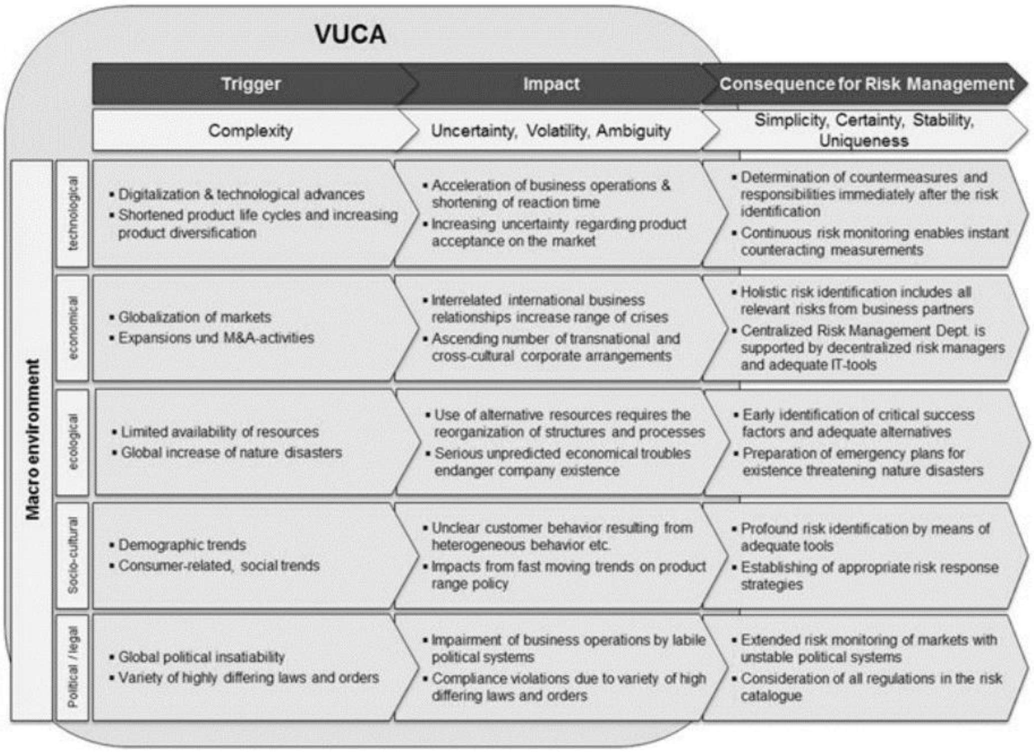
A key strength of Johansen and Euchner's work lies in the attribution of actionable adjectives to describe qualities that are necessary for taking action in response to each VUCA element. The very act of proposing these countermeasure propositions may implicitly hint at the recognition of the interplay between VUCA elements. The proposition of countermeasures that are themselves interrelated by the author may have tacitly acknowledged the systemic nature of VUCA challenges. For instance, the clarity required to address complexity can enhance understanding, which in turn helps mitigate uncertainty. To manage ambiguity, one might need both agility and clarity. This implies that the ability to navigate one VUCA element often depends on addressing others. This tacitly connected approach to VUCA management foreshadows later, more explicit examinations of VUCA element interactions. Johansen Euchner's (2013) framework also introduces a temporal dimension to VUCA leadership. Vision, for example, is presented as a long-term antidote to short-term volatility, suggesting that VUCA elements and their countermeasures operate on different timescales. This temporal aspect adds depth to the understanding of how VUCA dynamics unfold and how leadership responses must be calibrated over time. Moreover, VUCA prime represents a shift from a reactive to a proactive stance in VUCA environments. Rather than merely responding to environmental turbulence, Johansen and Euchner advocate for cultivating leadership capabilities that can shape and influence the VUCA environment. This perspective aligns with emerging views on strategic agility and adaptive leadership in the management literature (Andersen et al., 2019; Attar & Abdul-Kareem, 2020; Nguyen et al., 2024). However, while Johansen Euchner's work is groundbreaking in its conceptualisation, it remains largely theoretical; the work does not explicitly explore or quantify different VUCA interactions, for instance, to explain and support the assignment of attributes (vision, understanding, clarity, agility) to each VUCA element. This drawback largely limits the empirical validation of their VUCA prime at the time of its introduction, leaving room for future scholars to investigate how VUCA elements influence and amplify each other more directly.

Bennett and Lemoine (2014) subsequently offered a more critical academic examination of the VUCA concept, addressing the need for more explicit purview, definitions and detailed understanding of its constituent elements. The authors assert that there exist three salient issues in how leaders have employed the various constitutive elements of VUCA. Their use has been primarily characterised by a nonchalant attitude, transforming VUCA into an appealing, fashionable expression synonymous with unpredictable change. The authors ascertain that while the constituent words of VUCA share semantic correlations, it is the distinctions among these terms that hold the utmost significance for leaders to comprehend. The authors also emphasised the importance of dissecting the individual components of the VUCA acronym in future studies to derive more precise and reliable results. By doing so, an in-depth understanding of each constituent element can serve as an invaluable resource for managers tasked with navigating the complexities of rapidly evolving environments. Secondly, Bennett and Lemoine also argue that notwithstanding the occasional sensitivity demonstrated by pundits and leaders towards the distinctions in meaning, there prevails a conspicuous dearth of information about the specific actions leaders should undertake to address one or more of these VUCA conditions effectively. They further explain that executives frequently allude to the challenges associated with "conducting business in a VUCA world" during interviews and press releases; however, they tend to shift their focus to more simplistic subjects without delving into the precise way an organisation can strategically position itself within such a dynamic setting. Moreover, the select few who venture to contemplate potential strategies for coping with VUCA generally propose a single, overarching solution applicable to all four components, including recommendations such as "innovate," "exercise creativity," "demonstrate agility," or "enhance active listening". The authors also claim that VUCA concurrently functions as both a consequence of disruptive innovation and a catalyst for it.

Furthermore, they contended that VUCA is often employed as a pretext to eschew planning and action and further added that although scholarly investigations have endeavoured to explore the four elements independently, a discernible deficiency in the examination of their interaction and integration persists. Thirdly, and plausibly owing to the scarcity of practical guidance available, the authors reported that an excessive number of leaders confront the complexities of the VUCA world by merely resigning themselves to the situation. As articulated by one executive, strategic planning has become a futile exercise within his organisation, as he questioned the feasibility of devising plans in the face of a markedly VUCA world (Mack et al., 2016). This most likely explains why emergent intellectual movement contends that, due to the overwhelming chaos and uncontrollability characterising VUCA world, erstwhile concepts such as strategy and marketing have ostensibly become 'obsolete' and are now deemed 'dead' (D'Aveni et al., 2010; McGrath, 2013; Mezhevov et al., 2022; Mintzberg et al., 2020; Rasche & Seidl, 2017; Wirtz et al., 2016).

In this context, in their seminal work, Mack et al. (2016) offer a prospective and unique examination of the interconnectedness of the VUCA elements, providing a foundational framework for understanding their impact on risk management. In Figure 2.8, the authors present a framework that showcases the impacts of environmental complexity on organisational dynamics and risk mitigation strategies. The model posits complexity as the primary trigger in the VUCA paradigm, which subsequently prompts uncertainty, volatility, and ambiguity within the business ecosystem. This causal relationship emphasises the interplay between environmental factors and organisational risk profiles.

Figure 2.8 *Effect of the VUCA World on Risk Management*



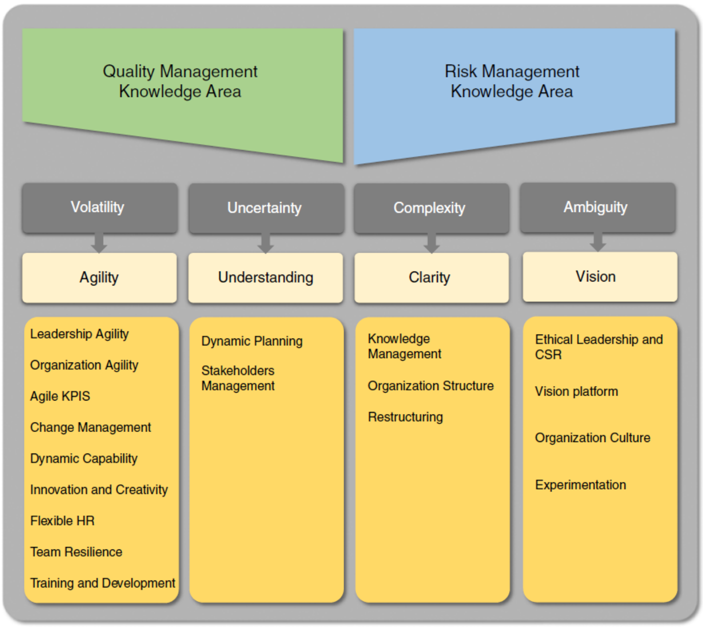
Note. *Mack et al. (2016) p. 83*

In response to these challenges, the framework proposes an approach to risk management, emphasising the cultivation of simplicity, certainty, stability, and uniqueness in strategic initiatives. This dialectical relationship between complex triggers and simplified risk responses in Mack et al .'s (2016) approach offers a novel perspective on adaptive organisational behaviour in turbulent environments. The model's approach, encompassing technological, economic, ecological, sociocultural, and political dimensions, provides a multifaceted lens through which to analyse and address the various challenges posed by VUCA conditions. This integrative framework describes the dynamics of VUCA environments and prescribes a structured methodology for developing risk management strategies in an increasingly complex global business environment.

A key contribution of Mack et al.'s (2016) work is their exploration of the recursive relationships among VUCA elements. They demonstrate how ambiguity, for instance, can feed back into volatility by obscuring clear cause-and-effect relationships, thereby intensifying market fluctuations. This feedback loop concept represents a significant advancement in VUCA theory, moving beyond simple additive models to more progressive, dynamic interpretations of environmental turbulence. The authors also delve into the cognitive dimensions of VUCA interactions, positing that the interplay between these elements can create perceptual distortions that further complicate strategic decision-making. This cognitive perspective adds an important layer to understanding VUCA, stressing the subjective nature of environmental interpretation and its implications for organisational adaptation. Moreover, Mack et al. (2016) implicitly alluded to the concept of "VUCA contagion," wherein the manifestation of one element can trigger or amplify the others across different organisational domains or even industry sectors. This realisation carries profound implications for risk management and strategic planning in such a way that VUCA mitigation strategies must be holistic and adaptive. It has to be said that while Mack et al. provided a sound theoretical understanding, they were considered conceptual. The authors acknowledge that their propositions should be empirically validated, most notably regarding the quantification of interactions of VUCA elements. This limitation provides opportunities for further studies, which may be carried out as either longitudinal or cross-sectional testing of the interlinkages.

Whilst Mack et al. (2016) established the conceptual steps for understanding the systemic interactions of VUCA elements, Saleh and Watson (2017) advance this line of inquiry by providing empirical substance to these theoretical constructs, offering a quantitative approach to measuring and analysing VUCA dynamics in organisational contexts. Saleh and Watson's work represents a sizable advancement in VUCA research by mentioning a new conceptual framework that links VUCA challenges with business excellence (BE). The authors employ an advanced methodological approach, using structural equation modelling (SEM) to set the relationships between VUCA dimensions and their effects on business excellence. This quantitative rigour lends substantial credence to their findings and offers a replicable model for future studies in this domain. A key contribution of Saleh and Watson's work is their development of the BEVUCA framework, which integrates the principles of business excellence (BE) with the dynamic challenges of a VUCA environment, as illustrated in Figure 2.9.

Figure 2.9 *BEVUCA Conceptual Framework*



Note. *Saleh & Watson's (2017) BEVUCA framework.*

The authors' approach to developing this framework demonstrates a detailed understanding of the multilayered nature of VUCA. They identify eighteen critical success factors essential for business excellence and categorise them into four key areas: Agility, Understanding, Clarity, and Vision. These categories help organisations focus on enhancing their responsiveness, knowledge management, process clarity, and strategic direction. The author's work acknowledges both the individual contributions of each VUCA element and their collective synergies. For instance, they discuss how volatility requires organisational agility, uncertainty necessitates a deep understanding of the environment, complexity demands clarity in processes, and ambiguity needs a clear vision, nearly a similar stance taken by Johansen (2013). Besides, their framework integrates quality management and risk management practices, ensuring that organisations are well-equipped to handle the compounded effects of VUCA elements. Particularly notable is their finding of non-linear relationships among VUCA elements. For instance, they observe that the impacts of VUCA elements can amplify each other, suggesting that the increases in complexity can lead to more significant uncertainty.

Saleh and Watson also explore the differential impacts of VUCA elements on various aspects of business excellence. Their analysis reveals that while volatility and uncertainty have more immediate effects on operational efficiency, complexity and ambiguity exert a more substantial influence on long-term strategic planning and organisational adaptability. This granular assumption of VUCA impacts may provide invaluable contributions for tailoring organisational responses to specific environmental challenges. However, there are certain limitations in their work. Being a systematic literature review and not based on empirical data collection, this therefore limits any possibilities of making causal inferences. The integration of quality management and risk management practices, although providing an intelligible framework, might not fully capture qualitative distinctions of VUCA experiences at individual and team levels within organisations. Saleh and Watson's contribution opens several avenues for future research. Their BEVUCA framework provides a foundation for empirical studies that could further explore the differential impacts of VUCA elements and the effectiveness of various management strategies over time. Furthermore, their approach could be extended to develop predictive models for organisational resilience in turbulent environments.

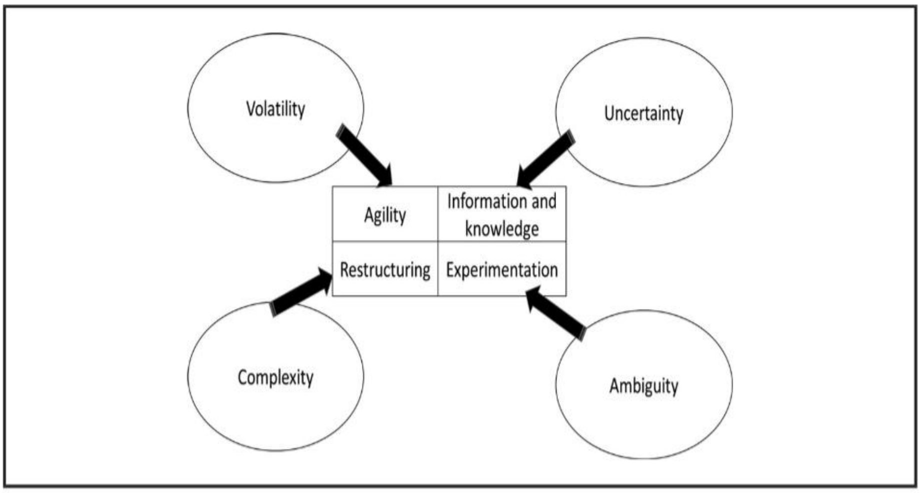
In summary, the exploration of the VUCA framework through the lenses of Johansen's (2012) VUCA Prime, Bennett and Lemoine's (2014) strategic responses, Mack et al.'s (2016) theoretical elaborations, and Saleh and Watson's (2017) business excellence integration has provided a sturdy foundation for understanding the complex interplay among volatility, uncertainty, complexity, and ambiguity. Johansen and Euchner's VUCA Prime (2013) offered a counterbalance to each VUCA element, proposing vision, understanding, clarity, and agility as antidotes, thus providing a practical approach to navigating VUCA challenges. Bennett and Lemoine's work emphasised the strategic responses needed for organisations to effectively counteract the threats posed by each dimension, thereby highlighting the necessity for tailored strategies in different VUCA contexts. Mack et al. (2016) expanded the theoretical framework, delving into the specified ways these dimensions influence organisational behaviour and decision-making processes. Their work underlines the importance of a deep theoretical understanding to inform practical strategies. Finally, Saleh and Watson's (2017) integration of VUCA into the business excellence model highlighted the operational implications, demonstrating how quality and risk management practices must evolve to maintain organisational resilience and excellence in a VUCA world. Collectively, these foundational works illuminate the relationship and compounded effects of the VUCA dimensions, accentuating the necessity for a composite and dynamic approach to strategic management. They provide an essential backdrop against which newer, emerging strategies and frameworks can be assessed and developed, setting the stage for the subsequent discussion on contemporary strategic approaches to navigating VUCA environments.

2.2.3.2. Contemporary Strategic Approaches and Frameworks for Navigating VUCA Environments

Extending on the initial examination of VUCA and its detailed facets discussed earlier, it becomes indispensable to explore modern strategic methods and frameworks that have arisen to address the complex challenges presented by VUCA environments. To begin, Cousins (2018) offers an innovative perspective on design thinking (DT), positioning it as a tool for organisational learning in VUCA environments. The author grounds this approach in absorptive capacity theory (Cohen & Levinthal, 1990), which provides a viable theoretical foundation for exploring how organisations recognise, assimilate, and apply valuable external information. Cousins argues that design thinking enhances absorptive capacity by nurturing continuous learning and innovation. This is particularly relevant in VUCA contexts, where rapid adaptation is vital. The iterative nature of design thinking, involving ideation, prototyping, and testing, aligns well with the dynamic requirements of VUCA environments, potentially enabling organisations to understand better and respond to emerging trends and disruptions. One of the key contributions of this work is the re-conceptualisation of DT from a mere problem-solving tool to a comprehensive organisational learning construct. Cousins emphasises that this broader application of design thinking can lead to effective theory-building and practical implementation. Such a re-conceptualisation is particularly significant as it allows for the integration of DT into various aspects of organisational strategy to enhance the overall resilience and adaptability in VUCA environments. The work by Cousin provides a strong rationale to support the fact that organisations may include DT in their strategic frameworks, as these can develop their capabilities of managing VUCA environments by building a culture of experimentation and learning and creating processes to allow rapid knowledge assimilation and application. Against that, one may argue that empirical validation is required to extend the benefit of the integration of DT. One line for future studies can be the practical application of this framework in various organisational settings. Furthermore, it would have added more practical relevance if the challenges of implementing DT at a strategic level were discussed in greater detail, with some propositions regarding overcoming those challenges.

Unlike the DT perspective, Kaivo-oja and Lauraeus (2018) submit a distinctive framework that integrates the VUCA model with corporate foresight practices. The authors address the pressing need for organisations to effectively manage technological disruptions and navigate the complexities of a VUCA world. Such integration is particularly relevant in the context of rapid technological advancements and global disruptions, which call for robust foresight and adaptive strategies. In their work, the authors meticulously link VUCA elements with corporate foresight, proposing a fresh framework that enhances an organisation's ability to anticipate and adapt to technological changes. They use the Gartner Hype Cycle as a case example to illustrate the "vucability" of technological turbulence. The Hype Cycle's phases, from the technological trigger to the plateau of productivity, mirror the volatility, uncertainty, complexity, and ambiguity inherent in technological innovation and adoption. This subtle understanding emphasises the importance of agility, information and knowledge management, restructuring, and experimentation as strategic responses to VUCA conditions.

Figure 2.10 *The VUCA Challenges and Key Solution Concepts*

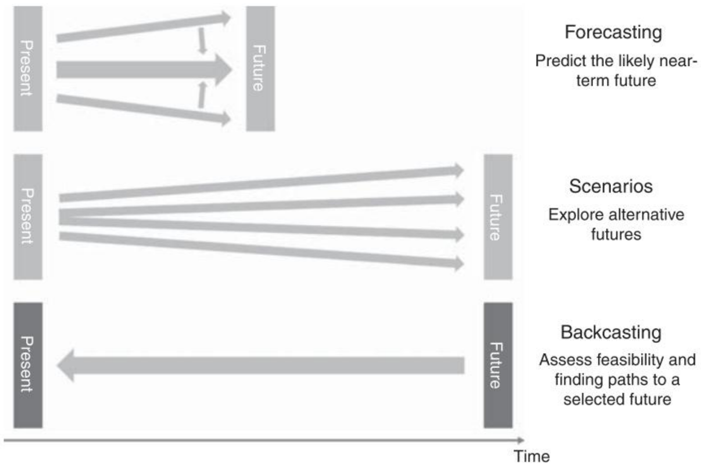


Note. *Kaivo-oja and Lauraeus (2018).*

The most important contribution of their work is the identification and application of appropriate strategic foresight tools for VUCA environments. These involve challenging tools, decision-making tools, alignment tools, and learning tools that offer structured procedures through which organisations can deal with the fast-moving technological environment. For instance, an organisation may use challenging tools to question assumptions and consider alternatives to future issues. In contrast, decision-making tools can help enhance the quality and speed of strategic decisions. Alignment tools ensure that strategic initiatives are coherent and support overall organisational goals while learning tools foster continuous improvement and adaptation. Although the study offers a viable framework for integrating VUCA with corporate foresight, akin to Cousin's (2018) work, it could benefit from empirical research that validates the proposed tools and strategies across various organisational contexts. Furthermore, the authors could have delved into the challenges organisations could encounter when implementing these tools and provided practical solutions to address them. Future research could also assess the lasting effects of strategic foresight practices on organisational performance and resilience within VUCA environments.

A synthesis of four VUCA studies published in 2019 underlines their consistent insights and practical implications for strategic management in VUCA contexts. It also reveals potential gaps and areas for further investigation in the field of strategic management under VUCA conditions. The first work of Krawczyńska-Zaucha (2019) effectively argues for a paradigm shift in leadership that emphasises qualities such as authenticity and flexibility. The author claims that traditional models, rooted in stability and predictability, are insufficient for addressing the dynamic and unpredictable nature of VUCA environments, hence the need for leadership qualities such as authenticity, flexibility, openness, and cohesion. These attributes are claimed to enable leaders to navigate the complexities of VUCA conditions effectively. Expanding on the necessity of adaptive leadership, the second work (Thorén & Vendel, 2019) introduces backcasting as a proactive strategic planning method. The idea revolves around defining a desirable future and working backwards to identify necessary steps, which is presented as an effective tool for navigating uncertainty and complexity.

Figure 2.11 *Standard Methods for Understanding the Future*

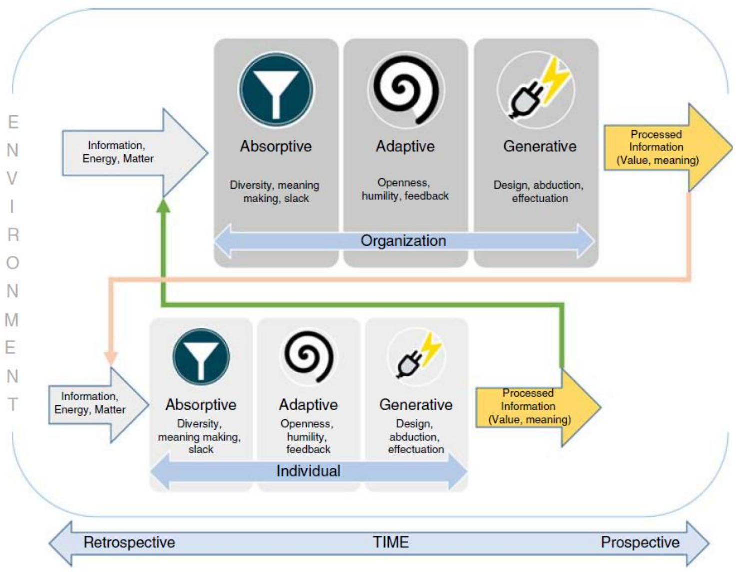


Note. *Proposed by Thorén and Vendel (2019).*

The authors argue that organisations can improve their strategic foresight and resilience by practicing backcasting, which allows them to create flexible plans that can adapt to different future situations. This aligns with the adaptive leadership qualities discussed by Krawczyńska-Zaucha (2019), which prioritises long-term goals and the creation of strategic pathways. The study's analysis of VUCA factors provides a solid theoretical basis, indicating that leaders in VUCA situations need to be able to adjust their practice and embrace a resilient attitude for effective management. In a VUCA context, the backcasting approach might show promise in improving strategic foresight; nevertheless, the method's value may differ by industry and by the organisation's ability to imagine and adjust to many future possibilities. However, it would seem that a reasonable premise put forth by Barthélemy (2022) conflicts with the incorporation of backcasting into the VUCA framework. Backcasting entails visualising a desired future and then working backwards to identify the required actions. According to Barthélemy, if a strategy is needed, the first question then becomes: a strategy towards what goals when all is uncertain? This perspective raises critical questions about the relevance and effectiveness of the backcasting approach in a VUCA environment. In particular, it casts doubts about the very foundation of backcasting: How can organisations effectively identify and articulate desired future states when the future per se is uncertain? This challenge is further compounded by the potential for "black swan" events, as described by Taleb (2008), which are rare, high-impact occurrences that are essentially unpredictable. The intersection of VUCA conditions and the possibility of black swan events creates a particularly complex scenario for strategic planning and goal setting, potentially undermining the core premise of backcasting and long-term organisational visioning and strategy formulation. This tension features the complexity of strategic decision-making in dynamic environments where uncertainty prevails. Besides, the authors' work on backcasting could be further strengthened by addressing other potential limitations, such as cognitive biases in future projections and the method's applicability in rapidly changing industries.

The third work by Castillo and Trinh (2019) delves deeper into the theme of leadership by exploring the specific leadership capacities necessary for thriving in VUCA environments. The study argues that traditional command-and-control leadership approaches are ineffective in today's VUCA environments. They propose a new model of leadership concerned with building three core capacities in organisations: the capacity to absorb and make valuable sense of information (absorptive capacity), the capacity to respond effectively in light of a changing environment (adaptive capacity), and the capacity to generate a continuous flow of new ideas and innovations (generative capacity) as seen in Figure 2.12.

Figure 2.12 *Absorptive, Adaptive, and Generative Leadership Capacity in a Complex System (VUCA environment)*

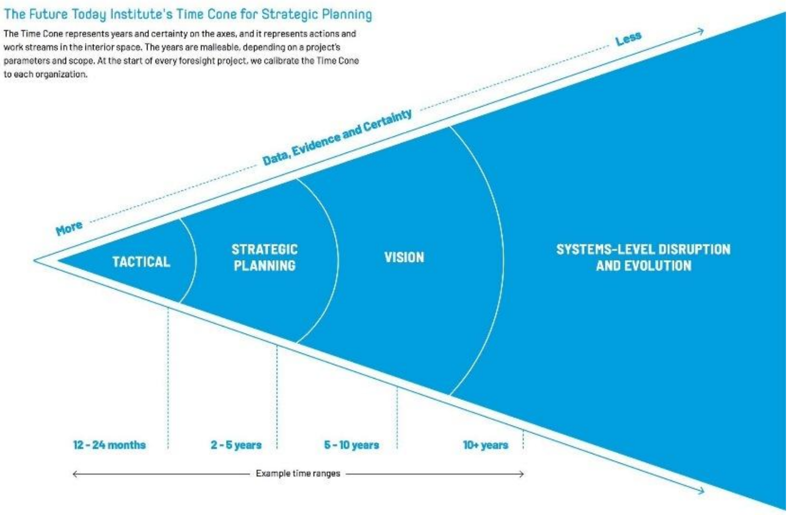


Note. *Castillo and Trinh (2019).*

The work logically follows the argument that such capacities enable organisations to constantly align with their environments and thus navigate the conditions of VUCA. The capacities of this type seem to fit well with the leadership qualities emphasised by Krawczyńska-Zaucha (2019). What follows is a theoretically sound conceptual model in which leadership in complex environments is rethought. While the framework is strengthened by more empirical validation, it provides leaders with at least instructive guidance in seeking to promote organisational flexibility and innovation under uncertainty. Of particular note is the call to embrace rather than eradicate uncertainty.

In 2020, scholarly attention has increasingly focused on organisational responses to VUCA environments, particularly in the context of emerging economies and digital enterprises. Four significant studies are contributing to the insights in this domain, both in terms of theoretical frameworks and empirical evidence. In the first contribution, Chauhan et al. (2020) employ a case study on BookMyShow (BMS), one of the popular Indian online ticketing websites, and research how dot-com enterprises strategise under VUCA conditions. Their "hindsight-insight-foresight" approach draws on the need for retrospection to comprehend past patterns, analyses present conditions and cause-effect linkages, and uses foresight of future change to develop resilience and strategic agility. They believe this triadic approach allows an organisation to develop better decision-making capabilities and strategic agility to navigate VUCA. The research underlines strategic foresight as paramount in navigating turbulence and uncertainty effectively; using a time horizon such as the one in Figure 2.13 for strategic planning should be adopted to facilitate foresight projects.

Figure 2.13 *Time Corner for Strategic Planning*



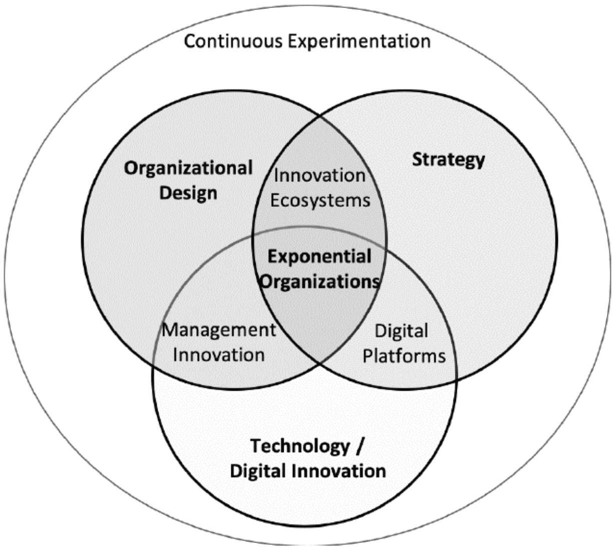
Note. *Future Today Institute (2019).*

The fact that the authors use process tracing and counterfactual analysis strengthens their causal inferences and allows them to outline how the strategic decisions of BMS interacted with the changing VUCA environment. This adds methodological rigour and enhances the validity of their findings, although reliance on one case study limits generalisability. Chauhan et al. (2020) also identify the critical role of entrepreneurial capabilities in mitigating VUCA risks. They have provided a venue to show how the leadership of BMS demonstrated agility and creative problem-solving in the face of turbulence. The emphasis on entrepreneurial agency provides rich insights into human capital factors essential to organisational success in turbulent conditions. However, the study's limitations should be noted. The single-case design, while offering depth, limits the generalisability of findings. Future research may benefit from comparative case studies or mixed-methods approaches to validate the "hindsight-insight-foresight" framework across different contexts and industries.

Santoso et al. (2020) curate a special issue examining strategic entrepreneurship in Asian emerging economies. The authors examine the role of entrepreneurial leaders in navigating VUCA conditions to denote the importance of adaptive leadership, organisational ambidexterity, and innovation management. This collection of studies spans multiple strategic domains, including resources and capabilities, leadership, and organisational structure. A key contribution is the exploration of context-specific factors shaping entrepreneurship in these economies, such as the role of "faminess" in family firms and government involvement in encouraging entrepreneurial ecosystems. This work challenges the universality of Western-centric entrepreneurship theories and highlights the need for more culturally sensitive approaches. One of the weaknesses of the work of Santoso et al. (2020) lies in the focus on Asian emerging economies, which may limit the generalisability of the findings to other regions and contexts. The unique socio-economic and cultural factors in these economies could influence the applicability of the proposed strategies in different settings.

Finally, Marchese et al. (2020) investigate decision-making systems in VUCA environments, drawing on survey data from Romanian academics and students. Their work reports the limitations of traditional decision analysis techniques in rapidly changing contexts, arguing for more intuitive and flexible approaches. This study calls for adaptive leadership and proactive management styles in navigating VUCA conditions. The authors purport that traditional hierarchical structures are often too rigid to respond effectively to rapid changes and uncertainties. Exponential organisations (ExO), marked by their ability to leverage technology and network effects, can achieve rapid growth and scalability. The authors discuss key attributes of exponential organisations, such as decentralised decision-making, agile structures, and a focus on leveraging external resources. In their view, the adoption of an exponential organisation enables companies to enhance their adaptability and resilience, positioning themselves for long-term success in VUCA conditions.

Figure 2.14 *Exponential Organisation Interpretation*



Note. *(Marchese et al., 2020)*

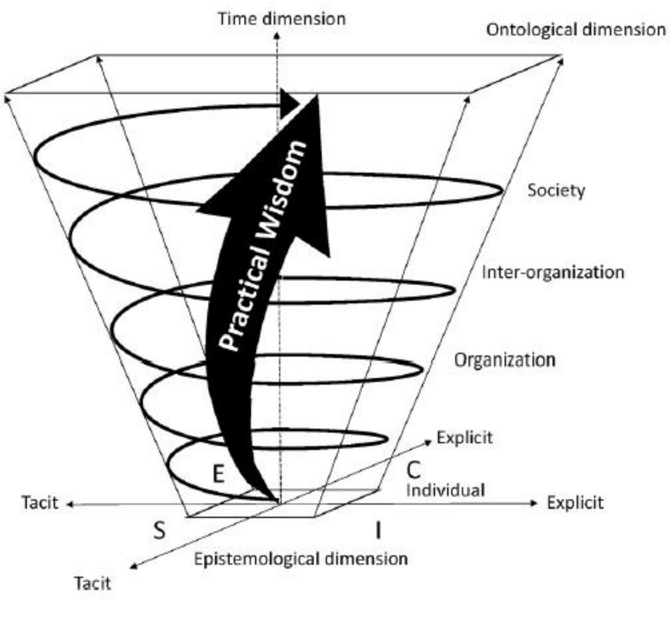
The idea of using technology and network effects to achieve rapid growth is particularly appealing given that it partially draws from the concept of the 'keystone advantage' (Iansiti & Levien, 2004). This conception suggests that certain elements or components within a system can disproportionately influence overall performance, much like a keystone in an arch supports the entire structure. In the context of technology and network effects, identifying and leveraging these critical components can lead to exponential growth and competitive advantages. However, the study falls short of adequately discussing the risks linked to exponential expansion. These risks include sustainability concerns, ethical considerations, and the possibility of heightened volatility due to rapid scaling (Yates, 2021). Moreover, the shift from conventional hierarchical structures to exponential models presents difficulties, including organisational resistance and the necessity for substantial cultural and operational adjustments. This suggests a more versatile exploration of managing these transitions and mitigating associated risks to enhance the work's practical applicability.

In synthesising the 2020 works' contribution to understanding VUCA navigation strategies, one finds that they provide a rich understanding. The integration of hindsight-insight-foresight, advanced decision systems, strategic entrepreneurship, and exponential organisational design offers sustainable support for enhancing organisational resilience and adaptability. However, these must be implemented cautiously to ensure empirical validation, data quality, cultural shift, regional relevance, and risk from rapid growth. In effect, weaknesses in those respects are expected to be overcome by further research and practical guidelines for strengthening the proposed strategic frameworks given their applicability in diverse organisational contexts surrounded by VUCA challenges.

The research trajectory in 2021 took a significant leap forward. It delved deeper into human-centric leadership, the advanced concept of VUCA 2.0, and the pivotal role of sense-making and organisational agility. This shift is predominantly characterised by a growing recognition of the need for more refined and sophisticated strategies to survive and thrive in an ever-changing world. The following analysis of 2021 VUCA articles further elucidates these emerging paradigms, presenting a complementary understanding of the evolving strategic scenery in VUCA environments.

Nonaka and Takeuchi (2021) deliver a compelling reconceptualisation of strategy in the VUCA world. They emphasise a human-centric, future-oriented approach grounded in practical wisdom. The authors argue for a shift from traditional "outside-in" strategic approaches to an "inside-out" perspective that originates from human beliefs, ideals, and intuition.

Figure 2.15 *The SECI Spiral Model*



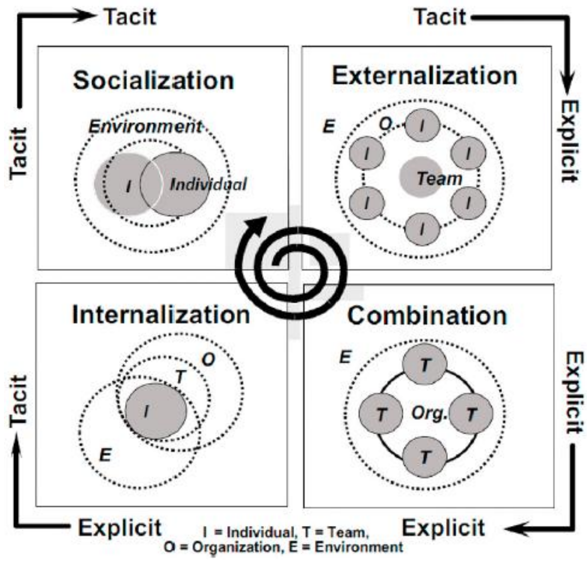
Note. *Nonaka and Takeuchi (2021).*

The SECI (Socialisation, Externalisation, Combination, Internalisation) Spiral Model in Figure 2.15, as presented in Nonaka and Takeuchi's 2021 work, represents a worthy evolution of their seminal knowledge creation theory, particularly in the context of VUCA environments. This model merits careful consideration in light of the authors' reconceptualisation of strategy. The authors' emphasis on practical wisdom (phronesis), multi-level dynamics and future orientation aligns well with the authors' broader argument for a more human-centric, societally focused approach to strategy. This fundamental driver of strategy represents a significant departure from traditional analytical approaches. Additionally, the integration of moral purpose with contextual judgment provides a model for maintaining strategic agility along with pursuing long-term societal value. This makes parallel with recent literature underlining the importance of adaptive decision-making in unpredictable settings (Teece, 2018b; Schoemaker et al., 2018), extending a detailed perspective on navigating ethical complexities in VUCA environments.

Nonaka and Takeuchi's focus on future-making and narrative as strategic tools resonates with emerging research on prospective sensemaking in uncertain contexts (Stigliani & Ravasi, 2012; Rohrbeck & Kum, 2018). Their argument for using storytelling to clarify strategic direction amidst ambiguity contributes to understanding how organisations can shape identity and action through strategic narratives (Fenton & Langley, 2011). The work's advocacy for a human-centric approach to strategy offers a compelling counterpoint to increasingly prevalent data-driven and AI-centric strategic paradigms. The integration of insights from neuroscience to support this position by the authors adds interdisciplinary depth to their argument, aligning with works such as the criticality of human judgment and creativity in VUCA environments (Maitlis & Christianson, 2014). Furthermore, the authors' discussion of dynamic adaptation through practices like Toyota's kata contributes to ongoing conversations about dynamic capabilities and organisational ambidexterity in turbulent settings (O'Reilly & Tushman, 2013; Teece et al., 2019). Their emphasis on continuous adaptation and embracing "dynamic duality" reflects broader discussions in complexity leadership theory about navigating paradox and contradiction in VUCA environments (Uhl-Bien & Arena, 2018).

However rich and insightful, Nonaka and Takeuchi's work is not without limitations. The article relies heavily on anecdotal evidence and lacks systematic empirical validation of its proposed "inside-out" approach. Future research would benefit from rigorous studies testing the efficacy of this framework across diverse organisational contexts and industries. In addition, the authors draw significantly from Japanese business practices and philosophy, which, albeit valuable, may limit the global applicability of some concepts. Further consideration of how such ideas cross over into disparate cultural contexts would serve to enhance their generalisability and contribute toward higher-order learning in strategic adaptation within dissimilar VUCA environments. More critically, given the growing debates about the purposes of the corporation in turbulent times (Harrison et al., 2019), the critique of shareholder primacy and the advocacy of stakeholder capitalism within this article do not address some key questions. It is here that the tension between the pursuit of social good and competitive advantage in turbulent markets needs further exploration. How can organisations reconcile such competing goals in practice, pressed as they are by short-term imperatives and resource scarcity? Drawing on their updated conceptualisation of the knowledge-creating company, Nonaka and Takeuchi's extended version of the SECI model brings the dynamic interaction between the tacit and explicit dimensions of organisational learning and innovation into focus.

Figure 2.16 *Updated SECI model*



Note. *Nonaka and Takeuchi (2021).*

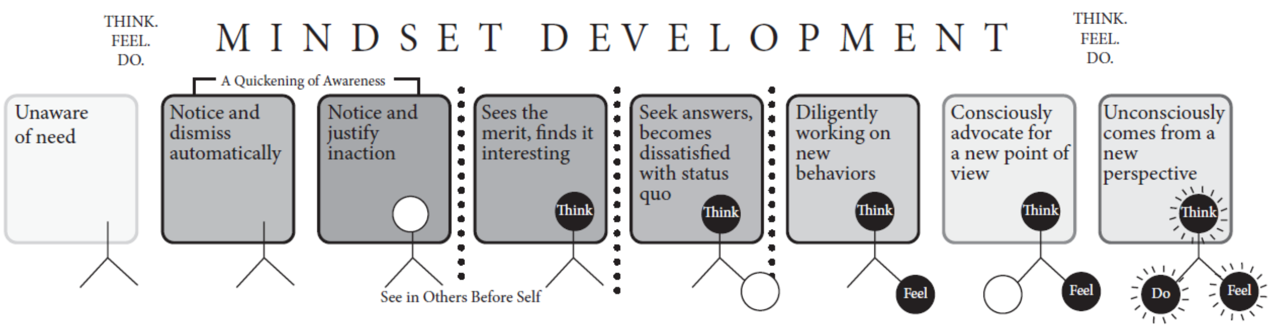
The SECI Spiral Model they present in their work further accentuates the importance of contextual judgment and continuous knowledge creation in navigating complex business environments. This theoretical foundation provides a rich background against which to examine Fridgeirsson et al.'s (2021a) empirical study on risk identification.

Another seminal concept is the VUCA meter projected and tested by Fridgeirsson et al. (2021b), which can be seen as a practical application of Nonaka and Takeuchi's principles of knowledge creation and practical wisdom in the specific domain of project risk management. It employs a normative approach based on the VUCA framework. The VUCA meter enables the externalisation of tacit knowledge about potential risks that may not be captured through traditional, more explicit risk identification methods. This aligns with Nonaka and Takeuchi's emphasis on the importance of tacit knowledge in dealing with complex and ambiguous situations. Moreover, the VUCA meter's ability to identify a broader range of risk factors, particularly those related to social and environmental aspects of projects, resonates with Nonaka and Takeuchi's concept of 'Ba' (Nonaka & Nishiguchi, 2001), the shared context for knowledge creation. 'Ba', translated as 'place or 'space' describes the locations where individuals engage with each other and exchange knowledge as the origin of knowledge creation. The VUCA meter, in other words, creates a 'Ba' for the identification of risk beyond the traditional boundary of project management into a more holistic perspective of the contextual setting of the project and its probable impacts.

The empirical findings of Fridgeirsson et al. (2021a), which demonstrate the VUCA meter's ability to potentially identify Black Swan events, align with Nonaka and Takeuchi's arguments for the need to embrace uncertainty and ambiguity in strategic thinking. The identification of these low-probability, high-impact events requires the kind of "future-making" mindset that Nonaka and Takeuchi (2021a) advocate, moving beyond mere analysis of past data to envision potential future scenarios. Furthermore, the reduced inconsistency in risk evaluations observed when using the VUCA meter suggests that this tool may facilitate what Nonaka and Takeuchi refer to as the "spiraling up" of knowledge creation. In providing a structured framework for exploring VUCA elements, the meter may enable project teams to more effectively combine individual insights into a collective understanding of project risks. Nevertheless, it is worth considering that although the VUCA meter holds potential for broadening risk identification, its effectiveness may be limited by the same factors that Nonaka and Takeuchi identify as challenges in knowledge creation: organisational culture, leadership, and the ability to create a shared context for understanding. The generic nature of some identified risks in Fridgeirsson et al.'s study suggests that further process improvement is needed to fully leverage the tacit knowledge of project stakeholders.

Additional perspectives on addressing the challenges of the VUCA world originate from Heaton (2021) and Bundtzen and Hinrichs (2021), focusing on individual leader development and organisational agility, respectively. Together, they provide a multi-level approach to enhancing adaptability and effectiveness in turbulent business environments. Heaton's work on "Sense-Making in a VUCA World" emphasises the importance of vertical development in enhancing leaders' learning agility and adaptive capabilities. Predominantly influenced by the idea of Nin (1973), who eloquently stated that "*We do not see things as they are; we see them as we are. Because it is the 'I' behind the 'eye' that does the seeing*". The depth of the statement lies in recognising the lens through which one views the world, a lens moulded by personal experiences, beliefs, and emotions. Heaton's efforts also draw from constructive developmental theory (CDT) (Kohlberg, 1984; Kegan, 1982; Basseches, 1984; Laske, 2006) and ego development theory (Loevinger & Blasi, 1976), by contending that leaders need to transform their sensemaking structures to effectively navigate VUCA conditions. This work presents vertical development as a process of expanding cognitive, emotional, and behavioural complexity, allowing leaders to take multiple perspectives and make more refined decisions.

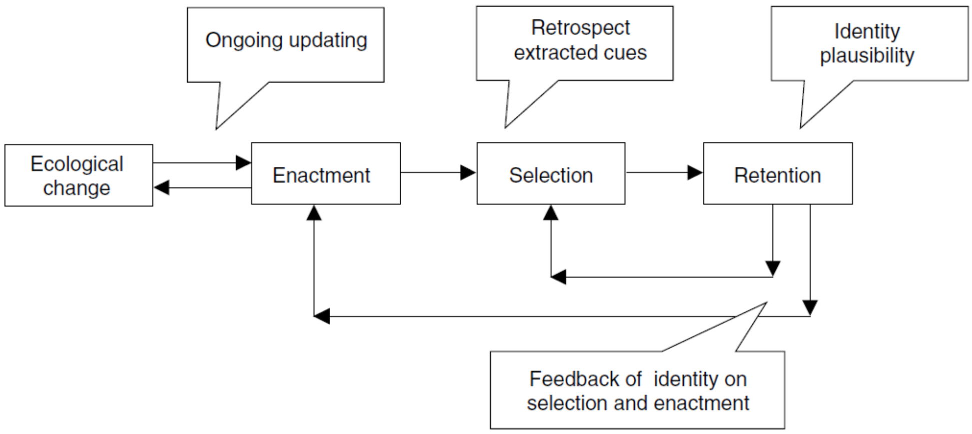
Figure 2.17 *Development as a Process*



Note. *Heaton (2021).*

In explaining Heaton's model, a linear progression of mindset development can be observed. It illustrates a journey from unawareness to unconscious integration of new perspectives, encompassing cognitive ("THINK"), emotional ("FEEL"), and behavioural ("DO") dimensions. The model outlines individual growth and the gradual internalisation of new ways of thinking and acting that align well with the challenges of sensemaking in VUCA. It suggests that the development of the capacity for effective sensemaking in these contexts is not a simple or quick process but rather a journey of awareness, reflection, and integration. Weick et al. (2005) conceptualise sense-making as an ongoing social process that is grounded in identity construction, retrospective, enactive of sensible environments, focused on and shaped by extracted cues, and driven by plausibility rather than accuracy (Weick, 1995).

Figure 2.18 Sensemaking Process



Note. *Weick et al. (2005).*

Respectively, Heaton's model offers contrasting yet complementary perspectives to Wieck's sensemaking model, focusing on how individuals and organisations create meaning in ambiguous situations. The model presents development as a relatively linear process with distinct stages, while Weick et al.'s model views sensemaking as a continuous, cyclical activity without clear beginnings or endings. Heaton focuses primarily on individual mindset development, whereas Weick et al. emphasise the social nature of sense-making, focusing on how meaning is constructed through interaction with others. Heaton's model implies a more conscious development process, particularly in the middle stages. In contrast, Weick et al.'s model, on the other hand, often describes sensemaking as a more implicit, ongoing process that may occur below the level of conscious awareness. Heaton's model suggests a progression through distinct stages of awareness and competence. Weick et al.'s model emphasises continuous adaptation and reinterpretation based on new information and experiences. Finally, Heaton explicitly integrates cognitive, emotional, and behavioural aspects of development. Weick et al.'s model, while not ignoring these elements, places greater emphasis on how identity shapes interpretation and action. Despite these differences, both models offer helpful insights for understanding adaptation in VUCA environments. Heaton's model provides a framework for understanding and facilitating individual growth and mindset change, which is necessary for leadership development. Weick et al.'s model offers a broader perspective on how organisations and individuals collectively create meaning in ambiguous situations essential for organisational adaptation. In practice, these models could be seen as complementary. Weick et al.'s sense-making model could provide the broader context within which individual development as described by Heaton occurs. Together, they offer a more comprehensive view of how individuals and organisations can develop the capacity to navigate and thrive in complex, uncertain environments. Further research could explore how these models interact in real-world settings, potentially leading to more integrated approaches to individual and organisational development in VUCA contexts.

In their work, Bundtzen and Hinrichs (2021) received acclaim for adopting an organisational perspective. They put forth an all-inclusive model that effectively aligns specific agile practices with the various components of VUCA, with particular attention to the interplay between agility and the challenges posed by the dynamic and unpredictable nature of today's business environment. Their work synthesises various existing agility frameworks to create a practical tool for assessing and developing organisational agility. Notably, their model provides differentiated responses tailored to each aspect of VUCA, integrates multiple existing agility frameworks, and maintains a strong focus on practical applicability for organisational assessment and development.

Figure 2.19 *Agile Characteristics Model to Deal with VUCA Forces*

Note. *Bundtzen and Hinrichs (2021).*

The model purports that when addressing volatility, organisations should integrate specific enablers such as slack resources, decentralised power, and customer focus, a perspective that echoes emerging literature on organisational agility. For instance, Teece et al. (2016) argue that dynamic capabilities, including the ability to reconfigure resources rapidly, are paramount for thriving in volatile environments. The inclusion of "slack resources" in the model aligns with this perspective, suggesting that maintaining flexible resource allocation can indeed enable organisations to capitalise on volatility rather than be hindered by it. Furthermore, the emphasis on decentralised power structures reflects the findings of Lee and Edmondson (2017), who posit that less hierarchical organisations are better equipped to respond swiftly to environmental changes. This decentralisation, coupled with a strong customer focus, aligns with the agile principle of customer-centricity outlined by Beck et al. (2019) in the Agile Alliance Manifesto.

This approach shows an interesting detail in the model of agile characteristics concerning uncertainty and complexity. The inclusion of "IT and data systems" as part of the complexity quadrant also reflects a growing awareness among management scholars, as George et al. (2014) have discussed in the context of big data and management. The "iterative work and learning" tenet of complexity does fit the criteria of practices for agile methodologies since Rigby et al. (2016) explain that iterative processes are needed as part of dealing with ambiguity and uncertainty regarding complex scenarios. This iterative approach facilitates continuous learning and adaptation, which are important in VUCA environments. The model's treatment of ambiguity, particularly the inclusion of "innovation" and "experimentation," resonates with current literature on organisational innovation in uncertain environments. For example, O'Reilly and Tushman (2013) discuss the concept of organisational ambidexterity, which involves balancing exploration (innovation) with exploitation (efficiency). This notion seems to be captured in the model's approach to ambiguity.

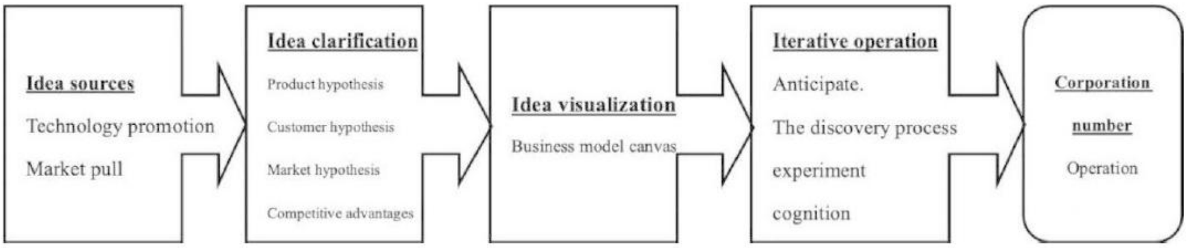
The conceptual framework presented in the circular diagram presents both strengths and weaknesses. One of its strengths is its integrated approach to VUCA challenges. The circular design implies interrelation among the different elements, suggesting that strategies for addressing one aspect of VUCA may have implications for others. This view aligns with the work of Bennett and Lemoine (2014) previously discussed, who argue for tailored strategies to address each component of VUCA while recognising their interrelations. However, upon critically scrutinising this model, various issues were discovered about the fundamental assumptions underlying this approach. First, it lacks explicit mention of some key agile principles, such as cross-functional teams and continuous delivery, which are considered central to agile methodologies as described by Rigby et al. (2016). Future research could explore how these core agile practices specifically address VUCA challenges. Additionally, the framework could benefit from empirical validation to assess the effectiveness of these characteristics in real-world VUCA scenarios. To that end, longitudinal studies examining organisations that implement these agile characteristics could reveal valuable findings about their practical value. Second, the framework's reliance on predominantly reactive measures may limit its responsiveness to the layered complexity of VUCA challenges. In particular, the wait-and-see approach, where organisations are poised to respond to VUCA elements as they manifest instead of proactively shaping their environment, is somewhat limiting. As Johansen (2017) argues, genuinely effective leadership in VUCA contexts requires the ability to anticipate and influence future scenarios, not merely react to them.

The reactive paradigm is seen in the model's emphasis on "slack resources" and "decentralised power" as responses to volatility. While these strategies can enhance organisational flexibility, they do not inherently adopt the foresight and proactive stance necessary for thriving in VUCA environments. Teece (2018a) posits that dynamic capabilities, which include the ability to sense and seize opportunities before they fully materialise, are decisive for sustained competitive advantage in rapidly changing environments. The model's reactive orientation may inadvertently perpetuate a cycle of continuous adaptation without leveraging the potential for organisations to shape their competitive posture proactively. Third, although the circular design of the model implies some connection, it treats VUCA constitutive elements as distinct, segregated phenomena. The quadrant-based approach risks oversimplifying the complex intertwined nature of VUCA challenges. This segregation may lead to a fragmented understanding of environmental dynamics and, consequently, to the development of isolated and dissociated strategies that fail to address the joint nature of VUCA scenarios. As a case in point, Raghuramapatruni and Kosuri (2017) argue that VUCA elements are inherently interconnected, with volatility often breeding uncertainty, complexity exacerbating ambiguity, and so forth. Consequently, if treated in separate domains each requiring distinct strategies, the framework may inadvertently create confusion and hinder the development of integrated, systemic approaches to organisational resilience that may undermine the very essence of agility, which, according to Worley and Jules (2020), should enable organisations to navigate the intricate web of VUCA challenges holistically. The artificial boundaries imposed by the quadrant structure may lead to siloed thinking and strategy development, contradicting the integrative nature of effective agile methodologies.

As the discourse on VUCA environments continued to grow, scholars in 2022 built upon the foundations laid in previous years, offering diverse conceptualisations and practical frameworks that reflect the increasing complexity and dynamism of contemporary organisational contexts. For example, Wang et al.'s (2022) represent a notable contribution to the evolving body of literature on entrepreneurship and innovation in VUCA environments. The authors begin by contextualising their work within the broader discourse on VUCA, drawing on Bennett and Lemoine's (2014) seminal work to establish the defining characteristics of VUCA environments. They argue that traditional startup methodologies, embedded in more stable and predictable contexts, are increasingly inadequate for navigating the rapid changes and high uncertainty of the modern business world.

Building on this foundation, Wang et al. (2022) conduct a review of both traditional and modern startup theories. They trace the evolution from Timmons' (2016) classic startup process model and product development methods to approaches such as the business model canvas (Osterwalder & Pigneur, 2010), customer development (Blank, 2020), and lean startup (Ries, 2011). The authors argue that this panacea allows entrepreneurs to engage in a more iterative and adaptive process of startup exploration, embodied in a "hypothesis-exploration-test-cognition" cycle.

Figure 2.20 *Flow chart of Lean and Agile Startup exploration*



Note. *Wang et al. (2022).*

A source of strength of Wang et al.'s work is their detailed exposition of the lean and agile startup (LAS) process, which they break down into five stages: idea sourcing, idea clarification, idea visualisation, iterative exploration, and company operation, a structured approach providing a clear roadmap for practitioners while also offering a framework for future empirical research. The author's proposition to develop an iterative startup software based on the LAS method is particularly intriguing. This suggestion aligns with recent trends in entrepreneurship research emphasising the role of digital tools in supporting startup processes (e.g., Ghezzi & Cavallo, 2020). However, the work could have benefited from a more detailed discussion of how such software might be implemented and its potential limitations.

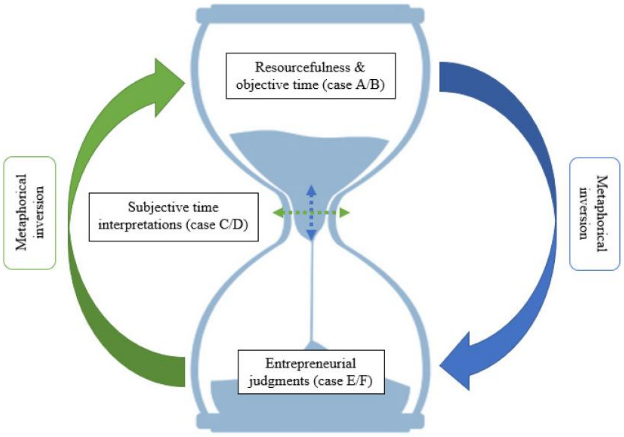
Wang et al.'s work can be situated within a growing body of literature seeking to adapt entrepreneurial methods to VUCA conditions. For instance, their emphasis on iterative exploration echoes Sarasvathy's (2001) effectuation theory, which similarly emphasises flexibility and experimentation in uncertain environments. The LAS method also shares commonalities with recent work on agile innovation management (e.g., Rigby et al., 2016), suggesting potential for cross-pollination between startup and corporate innovation literature. Even with making a significant theoretical contribution, Wang et al.'s work endures certain limitations that are worth explaining. As a conceptual piece, it lacks empirical validation of the proposed LAS method. Future research could address this gap through case studies or quantitative analyses of startups employing LAS principles. Additionally, the authors' treatment of VUCA could be more detailed; the latest work by Taskan et al. (2022) suggests that the components of VUCA are often conflated in the literature, and greater precision in defining these terms could strengthen future iterations of the LAS framework.

According to McCausland, there has been a genuine effort to connect the dots between theoretical conceptualisations and their practical applications, addressing a felt need in both the academic and professional communities. The author presents his approach based on influential groundwork, reviewing contemporary literature that spans a wide range of sources, including academic journals, business publications and thought leadership pieces. A methodological choice that allows for a rich, expanded exploration of VUCA-related innovation challenges and strategies, reflecting the interdisciplinary nature of the field. A key contribution of McCausland's work is the identification and analysis of five critical success factors (CSF) for innovation in VUCA environments, namely empowering leadership, external sensing capability, designing for resilience, clear vision with flexible implementation and willingness to commit. The emphasis on empowering leadership supports the recent work on transformational and adaptive leadership in turbulent environments (e.g., Uhl-Bien & Arena, 2018). McCausland's discussion of this factor brings into sharp focus the movement away from traditional, hierarchical leadership models to one that is more flexible and distributed in nature to cultivate innovation and adaptability. Salient among the factors McCausland identifies in his work are those operating at the individual level, and particularly the role of "Catalysts", people naturally suited to VUCA environments. This focus on human capital captures the emergent research into individual adaptability and resilience in turbulent contexts (e.g. Jundt et al., 2014). The authors suggest that organisations must identify and exploit these VUCA-primed individuals, which is an interesting avenue for future research and practice.

As with most of the research on VUCA, McCausland's invaluable work features several limitations. While comprehensive, the reliance on literature review and synthesis lacks empirical validation of the proposed framework. Future research could address this gap through case studies or quantitative analyses of organisations implementing these strategies in VUCA environments. Moreover, given the expansive scope of the review providing a detailed perspective, it may neglect industry-specific or organisational details. Targeted research that investigates the applicability of these principles within distinct sectors or organisational contexts would form a valuable contribution to the existing literature.

The subsequent synthesis of three VUCA-related works, published in 2023, underlines divergent approaches to VUCA challenges for education, public service, and project management, as well as the cross-fertilisation of theoretical frameworks with practical methodologies for resilience, agility, and performance in those spaces. Sindila et al.'s (2023) sand-clock resilience-building model for MNEs has demonstrated another fundamental step towards enmeshing resourcefulness with time and business judgment within the kaleidoscope of thriving in a VUCA world.

Figure 2.21 *The Sand-Clock Model of Resilience-Building*



Note. *Sindila et al. (2023).*

Their work diverges from the prevalent dichotomous view of organisational resilience, categorising firms as either resilient or non-resilient, and instead proposes a more hybrid perspective that emphasises the dynamic interplay of resources, time, and entrepreneurial judgment. The model's emphasis on integrating these three pillars, slack resources, time interpretations and entrepreneurial judgments, lend the model its strength. First, it emphasises slack resources, especially their strategic accumulation ahead of disruptive events. The Boeing example featured in their work shows that firms that strategically stockpile slack resources have better chances of weathering the shock and adapting their operations more efficiently. Second, the model features the centrality of time interpretations, both in terms of the objective time constraints on environments and the way in which urgent time frames shape decisions. It argues that multinational enterprises (MNEs) have better chances to respond to disruption by adopting an in-depth understanding of windows of opportunity. That is because it is temporal in nature, and the process of resilience-building is, in a way, like planting a seed for the future. Amazon's 'future-back' strategy to respond in a timely and coordinated manner to the unfolding COVID-19 supports this point. As a result, the model calls for agile decision-making processes that must be able to adapt in a shorter timeframe as the situation fluidly evolves.

Furthermore, Sindila et al. (2023) emphasise the role of entrepreneurial judgment as a critical factor in navigating VUCA environments. They argue that effective resource allocation and strategic decision-making under uncertainty require a combination of foresight, calculated risk-taking and an ability to adapt to unforeseen challenges. The case of CF Industries, North America's largest producer of nitrogen fertiliser products, which leveraged its windfall from the Ukraine conflict to invest in sustainable practices, exemplifies the power of entrepreneurial judgment in transforming short-term disruptions into long-term opportunities. Linking the three pillars together, the sand-clock model offers a compelling framework for understanding how MNEs can build resilience in the face of adversity. It recognises resilience as a process rather than a measurable trait of organisations. Such a rounded view offers valuable insights into how firms can respond to and organise in VUCA contexts.

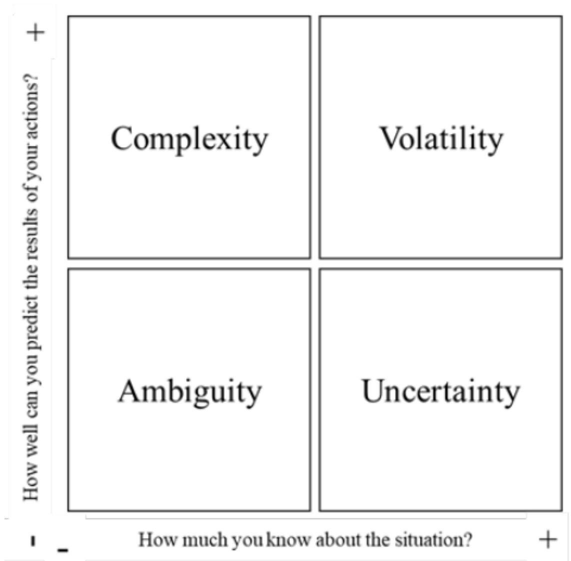
The Sand-Clock model stands as a valuable heuristic for conceptualising resilience-building in multinational enterprises (MNEs) operating within VUCA environments, however, its depiction of resources flowing seamlessly through the organisational structure, mediated by entrepreneurial judgments, may not fully capture the complex interplay of factors that contribute to resilience as depicted by Duchek (2020) in their meta-capability framework. Organisational processes are rarely as predictable or unidirectional as sand passing through an hourglass. The model's simplicity, while facilitating comprehension, could lead to an underestimation of the complex interplay of internal and external forces that shape organisational adaptation in turbulent environments. Also, the model's primary focus on MNEs raises concerns about its generalisability to smaller organisations or those embedded in different institutional contexts. The assumption of resource abundance and strategic autonomy, central to the model's propositions, may not hold true for smaller firms or those operating within restrictive regulatory environments. For instance, small and medium enterprises (SMEs), typically distinguished by limited slack resources and greater vulnerability to external shocks, might find the model's emphasis on resource stockpiling less feasible. Similarly, organisations in developing countries, where institutional voids and political instability are prevalent, might face constraints in exercising the entrepreneurial judgment advocated by the model.

Transitioning to the public sector, the study on managerial approaches in public services management incorporates the need to integrate the concept of business models with customer-oriented approaches. Indeed, the study by Gaule et al. (2023) offers a very timely and poignant review of how public service organisations could negotiate the stormy environment of VUCA. The contributions from the authors move away from traditional paradigms of public administration, primarily trapped in dysfunctional realities, to keep pace with changing demands and expectations linked to contemporary forms of governance. Instead, they offer a framework that makes use of business model thinking, customer-centric methodologies, and agile practices in cultivating better ways to deliver public services. Central to their argument is the adoption of 'public service logic' as an appropriate adaptation of service-dominant logic to the peculiar context of the public sector. This approach underlines that value is co-created by the providers of public services and the citizens; efficient service delivery must therefore be tinged with a deep understanding of the needs and preferences of the citizens. This represents a significant shift from the traditional bureaucratic model of public administration that often puts process efficiency above citizen-centricity. The authors also require agile methodologies, developed in the software development world, to be infused into public service management. They argue that agile's iterative and collaborative approach enhances flexibility and responsiveness, enabling public service organisations to adapt more effectively to evolving societal challenges. This certainly rhymes with the overall trend of 'digital era governance' that places a premium on agility, data-driven decision-making, and citizens' engagement as its key tenets for effective public service delivery.

In this light, the strength of this study is that it recognises that public service management, operating in a VUCA environment, requires an approach that can balance theoretical frameworks and practical methodologies. In fact, the framework that the authors proposed- public service logic, agile practices, customer experience management, and design thinking provides a very attractive roadmap for those public service organisations to be both resilient and responsive. The study's focus on the integration of business-oriented approaches to the management of public service raises important questions regarding potential tensions between efficiency, accountability, and democratic values. Future research could explore these potential conflicts and examine how public service organisations can balance the adoption of private sector best practices with the unique ethical and political considerations inherent in their mission.

In the case of De Moura et al. (2023), their work focuses more on the specific role of project management methodologies as moderators in VUCA environments and places special emphasis on differentiating the effectiveness of agile approaches. This, therefore, shows the increasingly pertinent interaction between VUCA environments and project success. The authors present their research based on the well-acknowledged contingency theory by Fiedler (1964); this theory states that the effectiveness of organisations depends on their ability to adapt to changes and align with contextual factors. It assumes that there is no universally best way to organise, lead, or make decisions within organisations. The best approach depends on the situation. Instead, it is the best action that is dependent on the given situation, a fact both internal and external to contingency theory. The authors further develop this by adding Bennett and Lemoine's (2014) VUCA matrix and operationalising it in a project management context.

Figure 2.22 *VUCA Matrix*

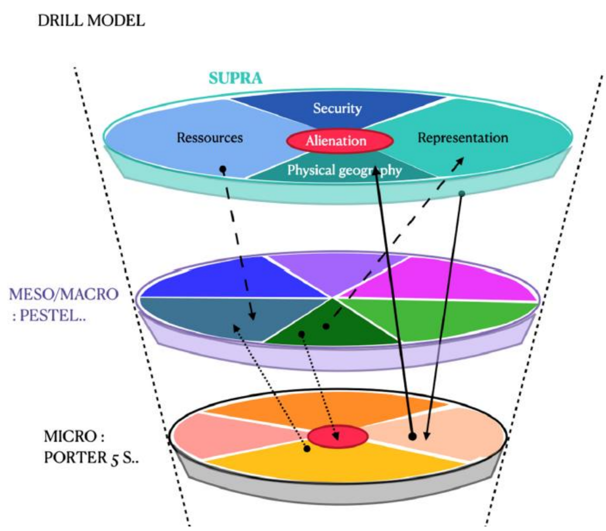


Note. *Bennett and Lemoine (2014).*

De Moura et al.'s (2023) study uses a quantitative approach, employing Partial Least Squares – Structural Equation Modelling (PLS-SEM) analysis of survey data from 332 project professionals, and provides empirical support for the detrimental impact of VUCA and ambiguity on project success. This finding aligns with a growing body of literature reiterating the challenges posed by VUCA to traditional project management paradigms. However, the study's most significant contribution lies in its subtle exploration of the moderating role played by project management methods. While confirming the intuitive notion that agile methods are better suited to volatile environments, the study challenges the prevailing assumption that agile is a panacea for all VUCA-related challenges. The fact that project management method choice did not significantly moderate the relationships among volatility, uncertainty, complexity, ambiguity, and project success does indeed hint at an increased need for context-specific approaches. Future studies could extend this study by including hybrid methodologies in their scope and investigating how tailoring the approach to specific combinations of VUCA elements works best. Longitudinal studies would also facilitate much stronger causal inferences and provide more fine-grained insights into how the interrelationship between VUCA and project management methodologies evolves over time.

The VUCA paradigm remains highly relevant for understanding the business environment in 2024. Multiple studies reinforce that organisations continue to face rapid changes, interconnected challenges, and unpredictable disruptions. The COVID-19 pandemic, geopolitical tensions, climate change impacts, and technological disruptions are cited as key drivers exacerbating VUCA conditions. This exhibits the ongoing need for organisational agility and adaptability. Given these conditions, Dugoin-Clément (2024) presents the "Drill model" as an original approach for analysing complex environments and supporting decision-making in VUCA contexts.

Figure 2.23 *The Drill Model*



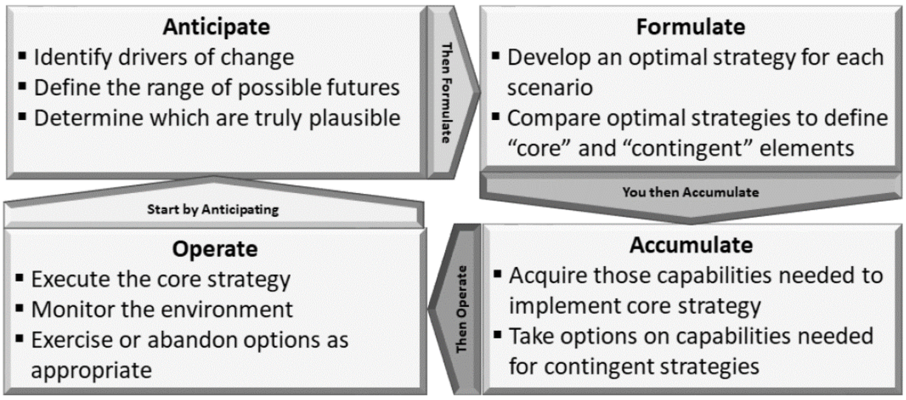
Note. *Dugoin-Clément (2024).*

As illustrated in Figure 2.23, the model builds upon existing micro, meso, and macro quantitative analysis models by adding a "supra" level of qualitative factors. This supra-level is conceptualised as a core that drills through the other levels, providing additional interpretive keys focused on human and social elements. The model assumes geopolitical diatopic approaches, which aim at providing an ontologically informed contribution related to the analysis of complex situations. Despite all its merits, the model offers a fascinating critique of traditional models of analysis operating in VUCA contexts. The complete presentation of the "Drill Model" has brought to light both great opportunities for further development and some critical weaknesses. While valuable, the theoretical contribution of this model presents important limitations that ought to be deeply considered in future research studies. This is because Dugoin-Clément (2024) asserts that models generally regarded as practically valuable – such as, but not limited to Porter's Five Forces, SWOT analysis, PESTEL analysis, and the BCG matrix, fail to account for and capture the dynamism of the role of chance, and the human factor inherent in the changing global environment today. The inadequacy, evidenced by the failure to foresee critical events like the global financial crisis of 2008, the COVID-19 pandemic, and the Russian- Ukrainian conflict, requires a new framework beyond static and quantitative assessments. The author also recognises the limitations of siloed approaches and advocates for an interdisciplinary approach to analysis, incorporating insights from fields like geopolitics, intelligence studies, and business strategy.

The strength of the proposed Drill Model lies in its attempt to bridge this gap by integrating a "supra" level of analysis focused on qualitative factors like human perceptions, motivations, and socio-political contexts. The particular focus on the human dimension is especially relevant in today's rapidly evolving technological environment, where emerging technologies like AI and blockchain are reshaping the VUCA environment in profound ways. The theoretical foundation of the model holds promise given its interdisciplinary nature, drawing from numerous studies. However, it could benefit from more precise positioning within the existing decision-making and strategic analysis literature. The lack of empirical validation in this work exacerbates this theoretical gap. Without concrete case studies, quantitative evidence or empirical testing demonstrating the model's effectiveness, its practical value will remain largely theoretical. Moreover, while fundamental, the model's heavy reliance on qualitative factors presents a significant challenge in terms of subjectivity and bias mitigation. Without clear guidelines for ensuring objectivity, the model risks falling prey to the very cognitive biases it seeks to address. On the other hand, the implementation of research also poses potential challenges. The integration of qualitative and quantitative data across multiple levels of analysis is a complex task, and the work provides limited guidance on how to operationalise this process effectively. This lack of clear implementation strategies may hinder the model's adoption and consistent application in real-world scenarios. In addition, the work remains unclear about the operationalisation of the model, particularly in terms of integrating and weighting the different levels of analysis. This lack of clarity could hinder its adoption and lead to inconsistent application. Lastly, the model's generalisability across different cultural contexts and organisational types remains an open question. The interdisciplinary approach of the Drill model suggests broad applicability, yet further exploration of its versatility in diverse settings would strengthen its case as a universally helpful analytical tool.

Yawson et al.'s (2024) contribution to the discourse on organisational adaptation in VUCA environments similarly represents a significant advancement in our understanding of strategic flexibility. Their work on Strategic Flexibility (SF) analysis offers a deliberate approach to enhancing organisational resilience and adaptability in the face of VUCA. The authors posit that SFA serves as a critical tool for improving an organisation's capacity to adapt quickly to thrive in turbulent conditions. Their work also recognises that traditional, rigid strategic planning cycles are ill-equipped to handle the rapid-fire changes and uncertainties characteristic of the contemporary business environment. Instead, they posit that organisational agility, underpinned by a potent capacity for strategic flexibility, is paramount for survival and thriving amidst disruption. The authors meticulously unpack the concept of strategic flexibility, moving beyond a simplistic definition to explore its multifaceted dimensions. They delve into the organisational capabilities that enable the sensing, seizing, and reconfiguring of resources and strategic direction in response to both opportunities and threats. This exploration extends beyond theoretical constructs to examine the practical implications for leadership, organisational structure, and decision-making processes. What is more relevant is the conceptualisation of SFA by Yawson et al. (2024) as a systematic process of identifying the organisations' strengths and weaknesses in terms of its adaptability, because it provides a valuable agenda for managers aiming to enhance their organisation's resilience, through the following four phases as described in figure 2.24.

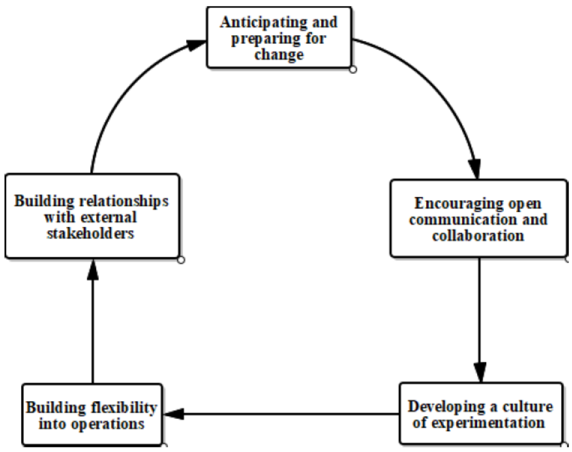
Figure 2.24 *The Four Phases of Strategic Flexibility*



Note. Yawson and Greiman (2017).

At the core of their contribution is the realisation that SFA can let organisations identify the competencies, knowledge, and abilities necessary to raise the level of flexibility, agility, and resilience. This view extends earlier contributions on dynamic capabilities but is narrower, offering a tighter frame within which organisational adaptation in VUCA contexts may be viewed. The authors consolidate the nature of SFA as cyclic, with anticipation, accumulation, formulation, and operation phases composing a self-reinforcing cycle that embraces the continuous process of adaptation and learning.

Figure 2.25 *Systemic Approach of Using Strategies to Adapt to Ambiguous Environments*



Note. *Ywson et al. (2024)*.

Although Yawson and colleagues' research supplies a beneficial contribution to the field, it does have some limitations. Their use of established concepts from strategic management and organisational theory in the framework of SFA is commendable, but further elaboration and empirical validation would enhance its theoretical underpinnings. Additionally, while viable, relying solely on literature review and theoretical argumentation leaves an opportunity for future research to explore the practical applicability and effectiveness of SFA in various organisational contexts. Additionally, the authors' characterisation of VUCA as a monolithic, undifferentiated construct, although prevalent in scholarly discourse, may inadvertently oversimplify the rich context of environmental challenges faced by organisations. Subsequent scholarly investigations could delve into the differentiated adaptation of Strategic Foresight and Agility (SFA) to address distinct facets of VUCA. This approach combines forward-looking insight with the flexibility to respond to change and to address distinct facets of VUCA. Such an inquiry would acknowledge that strategies adept at mitigating volatility might diverge from those necessary for effectively navigating VUCA as a whole. Despite these limitations, Yawson et al.'s (2024) work represents a significant step forward in understanding strategic flexibility and organisational adaptation. Their integration of SFA with concepts from human resource development offers a worthy approach to building organisational capabilities for VUCA environments. This interdisciplinary perspective opens new avenues for research at the intersection of strategic management, organisational behaviour, and human resource development.

The exploration of contemporary strategic approaches and frameworks displays an increasing emphasis on agility, adaptability, and preemptive sensemaking in light of VUCA environments. Approaches such as design thinking, corporate foresight, and the BEVUCA model all provide an enriched set of tools for building resilience and responsiveness for organisations in the face of constant change. Often, such approaches remain within the confines of the VUCA acronym, seeking to fine-tune the application rather than fundamentally challenge its limitations. This leads to the next section, which explores alternative conceptualisations beyond VUCA as the complexity of the current corporate environment may call for a more in-depth knowledge of environmental dynamics.

2.2.3.3. Alternative Concepts to VUCA for Navigating Complex Environments

The foundational VUCA framework, which itself represented an unsolved challenge for both academics and practitioners, catalyses a discourse that evolved towards the invention of new approaches and concepts to better address the dynamics of modern environments (Cascio & Montealegre, 2016; Millar et al., 2018). This evolution in thought led to the emergence of alternative frameworks that may reflect the growing recognition that the complexities of modern business environments may exceed the descriptive and prescriptive capacities of the original VUCA model (Bennett & Lemoine, 2014; Mack et al., 2016).

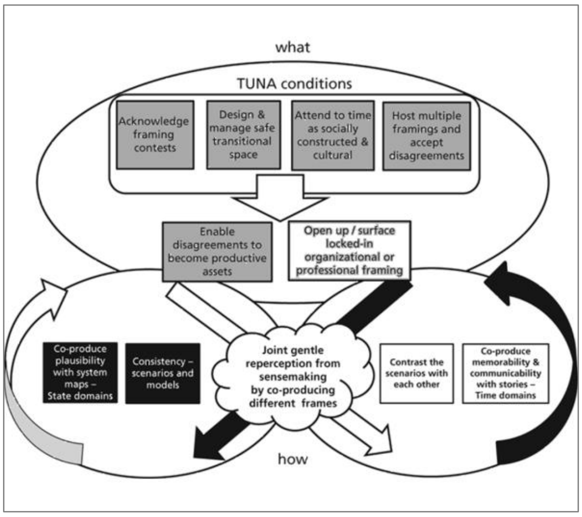
The proliferation of alternative frameworks to VUCA, while indicative of a vibrant scholarly discourse, raises critical questions about the usefulness of this conceptual expansion in addressing the core challenges of navigating complex environments. Though intellectually stimulating, this trend towards conceptual innovation may inadvertently contribute to a fragmentation of knowledge rather than a consolidation of understanding. The rapid emergence of frameworks such as VUCA 2.0 (Yoder-Wise, 2021), Brittle, Anxious, Non-linear, Incomprehensible (BANI) (Cascio, 2022), Turbulence, Uncertainty, Novelty, Ambiguity (TUNA) (Gordon, 2018), Rapid, Unpredictable, Paradoxical, Tangled (RUPT) (Horth, 2019) exemplifies this trend. Therefore, it is sine qua non to critically evaluate these frameworks and pursue a more integrated approach that enhances strategic clarity and coherence.

Yoder-Wise's (2021) introduction of VUCA 2.0 (Vision, Understanding, Clarity, and Agility), for example, aims to provide a proactive framework for addressing the complexities originally described by the VUCA model. While it offers useful leadership strategies, particularly within nursing education, the framework essentially reiterates existing concepts without significantly advancing the original VUCA framework. Derived from Johansen and Euchner's (2013) earlier work, VUCA 2.0 attempts to transform VUCA challenges into actionable leadership competencies, mirroring a broader trend in management literature toward prescriptive models for complex environments (Millar et al., 2018). As such, its scholarly contribution remains weak, reflecting a common issue in management literature where universal frameworks are proposed without sufficient consideration of the varying organisational and environmental contexts (Lawrence & Lorsch, 1967). Furthermore, the framework's positivity bias may overlook more severe environmental threats, mainly as more recent models like BANI focus on the increasing unpredictability and severity of contemporary challenges (Salun & Zaslavska, 2024). In the long run, VUCA 2.0 serves more as a reiteration of earlier work rather than a substantive advancement of the original VUCA concept.

Salun and Zaslavska (2024) present an overview of five conceptual frameworks for understanding and navigating complex business environments: SPOD (Static, Predictable, Ordered, Durable) world (Chaliuk, 2022), VUCA 2.0 (Yoder-Wise, 2021), RUPT (Horth, 2019), TUNA (Gordon, 2018), and BANI (Cascio, 2022). The authors' attempt to compare and contrast these frameworks is commendable, especially as they offer ample perspective on the evolving conceptualisation of environmental complexity. However, this approach also draws attention to the potential for conceptual overload in management theory. As Ghoshal (2005) cautioned, the proliferation of management theories can lead to oversimplifying complex social phenomena, potentially misguiding practice. Although the work informatively delved into each framework, it fell short in terms of the empirical validation one would expect from a well-researched academic study. The authors have relied on descriptive accounts of each model without providing substantial evidence of their effectiveness in real-world business contexts. This has, therefore, threatened to question the practical usability and reliability of the proposed frameworks in natural settings. What future research needs to develop in this direction is strong empirical validation of theoretical assertions that these frameworks can truly be tapped by practitioners operating in complex environments.

In contrast, a distinctive and novel method by Ramirez and Wilkinson (2016) put forward the Oxford Scenario Planning Approach (OSPA) as a distinct scenario planning methodology tailored to aid decision-making and strategy formulation under TUNA conditions, environments characterised by high levels of turbulence, uncertainty, novelty, and ambiguity. Scenario planning itself has been reproduced in recent decades as an organisational sensemaking technique for navigating unpredictable futures across both the public and private sectors in VUCA contexts. What distinguishes the OSPA from the profusion of other approaches is its tight interweaving of both social and cognitive dimensions in the learning cycle. The authors' elaboration of their theoretical grounding in social ecology offers functional conceptual bridges between organisational behaviour, futures studies, and strategy literature.

Figure 2.26 *The OSPA as Social Process: Reframing and Reperception in TUNA Conditions*



Note. *Ramirez and Wilkinson (2016).*

Ramirez and Wilkinson explicitly build their framework upon a social-ecological perspective, featuring the embeddedness of scenarios and sensemaking within complex adaptive social systems. This provides an ontological basis for their core argument regarding the need to balance competitive and cooperative strategic orientations when operating under TUNA conditions. Expressly adopting an epistemology of social construction helps explain the OSPA's emphasis on collective intelligence and model-building for illuminating diverse subjective perceptions of complex realities. The proposed reframing-perception cycle centres on intersubjective learning processes enabled through scenario workshopping. Two defining features of the VUCA environments that the OSPA confronts relate to turbulence and uncertainty. The framework mainly targets the development of dynamic capabilities in continuously sensing, interpreting, and responding to change across an evolving landscape. Scenario formulation aids requisite perspective shifting, while iterative reframing reinforces adaptive capacities. Scenario-based prospective sensemaking likewise helps agents envision plausible futures they feel unprepared to handle, so they undergo perspective transformations through the very act of grappling with unfamiliar envisioning.

Likewise, the novelty and ambiguity elements of TUNA dynamics pose further challenges for organisational sensemaking, often inducing paralysis. The OSPA employs scenario planning to expose agents to a diversity of perspectives to leverage greater cognitive flexibility. This, in turn, expands repertoires for action by spurring recognition of previously unseen alternatives. Introducing manufactured perplexity via multiple, divergent scenarios offers productive avenues for engaging with uncertainty and novelty, thus sharpening capacities for updating situational models via environmental scanning and pattern recognition amidst ambiguous signals. The OSPA framework put forward by Ramirez and Wilkinson leans heavily into the interactive social processes underlying how scenarios enable reframing and reperception for decision-makers navigating TUNA environments. Their elaboration of the theoretical logic grounded in social ecology offers beneficial connections across strategy, organisational behaviour, and futures studies spheres regarding the integral role imagination plays in prospective sensemaking. Further research around implementing their approach and measuring its impacts on sensing, sensemaking, and responding to turbulent change would prove highly valuable.

Nevertheless, the introduction of the TUNA framework risks falling into the same cycle of broad conceptual discussion without practical application, which has hampered organisational progress in addressing VUCA dynamics. The OSPA offers generically useful recommendations for scenario planning but could benefit significantly from demonstrating how its process concretely equips leaders to navigate specific TUNA-induced challenges. Without such vivid, tangible examples of the OSPA to facilitate strategic response to turbulence, uncertainty, novelty and ambiguity in context, the approach runs the danger of remaining abstract theory. Scholars and practitioners may talk about TUNA conditions without actually empowering organisations to operationalise foresight for adaptive capacity. As it stands, the OSPA framework may unintentionally perpetuate the existing discourse fixation on conceptualising volatility and complexity without grounding it in the messiness of practice. More case-based research is needed to document how the OSPA methods empower reframing and reperception across various industries and geographies in turbulent times.

In all, the continued proliferation of concepts designed to replace VUCA reflects a deep-seated problem in management studies: the balancing act between conceptual novelty and usefulness. Instead of further developing and spreading new acronyms, the field will be better positioned with a directed effort toward a deeper understanding of environmental complexity through stringent empirical research, cross-contextual analyses, and a focus on the actual practices of leaders in handling such complexity. It would go a long way to not only consolidate current knowledge but also make research findings even more relevant and enable the said rigour-relevance gap, so often invoked within the field of management studies. In contrast to an interest in novelty, perhaps one that is focused on depth might generate substantial insight into the forces at work in today's organisational settings; concomitantly, it would offer substantially more practical insights for practitioners.

As organisations wrestle with the realities of VUCA and its alternative conceptual frameworks, the fundamental challenge remains: how to strategically navigate complexity, uncertainty, and turbulence while maintaining organisational resilience and competitive advantage. The theoretical discourse around VUCA has undoubtedly illuminated the nature of environmental volatility and ambiguity. The practical question that follows is how organisations can systematically respond to these challenges.

To systematically address these challenges, this research frames VUCA not merely as a descriptive framework for environmental turbulence but rather as a conceptual lens through which the evolving challenges of strategic decision-making are examined. This work positions VUCA as a critical diagnostic tool, one that underscores the inadequacy of conventional strategic management approaches in environments where change is not only rapid but also unpredictable, interconnected, and often indecipherable. The engagement with VUCA in this study is not about reinforcing its status as an unchallenged paradigm but rather about exploring its limitations, interrogating its applicability, and refining its utility in organisational decision-making. Through an in-depth analysis of each VUCA individual component, the work goes beyond treating VUCA as a singular, abstract concept. Instead, it deconstructs it into its constituent elements and critically examines their interrelated effects on decision-making processes, risk anticipation, and strategic foresight.

At the core of this research is the recognition that VUCA does not merely describe the external environment; it actively shapes the internal capacity of organisations to respond. Traditional strategic management models have struggled to keep pace with the disruptive forces of VUCA, largely because they assume a degree of stability that no longer exists. By demonstrating these challenges, this research sets the stage for a more adaptive and intelligence-driven approach to strategy formulation, one that acknowledges the shifting nature of competitive environments and the urgent need for continuous and real-time insights. It is with this interpretation that attention is directed toward the essence of strategy and strategic management, and subsequently to CI as a vital extension of strategic management – not as replacement for strategic thinking, but rather as a necessary augmentation to help organisations explore how they can develop coherent approaches for creating and sustaining value amid increasingly turbulent environments.

2.3. The Essence of Strategy and Strategic Management

2.3.1 Role and Definition of Strategy

Strategy is pivotal in driving organisational success amidst modern turbulence and uncertainty. As dynamism and discontinuities reshape industries, strategy enables firms to maintain performance edges (Hitt et al., 2016). Strategy entails leaders setting direction while mobilising resources to sustain uniqueness in delivering value (Nag et al., 2007). This navigational function proves increasingly vital with heightening global complexity and competitiveness.

Fundamentally, strategy provides a focal vision to keep organisations oriented towards productive outcomes as environments shift (Porter, 1996). This gravitational centring effect counters the risk of reactive inertia. Strategic planning furnishes a critical analysis of capabilities, threats, and opportunities, setting priorities (Wolf & Floyd, 2017), resulting in decisions that channel resources towards value creation. Beyond planning, strategy offers unifying alignment (Teece, 2007). Strategic intent mobilises collective effort while granting local flexibility for resourceful responsiveness. A shared strategic understanding facilitates decentralisation without leading to fragmentation. Vision, values, and priorities align dispersed actions, ensuring coordinated progress toward objectives (Bart et al., 2001). Moreover, strategy cultivates identity, conferring corporate distinctiveness (Kaplan & Orlikowski, 2013). Signature strategies create barriers to commoditisation by reinforcing uniqueness. Distinctive positioning builds reputations that attract supportive stakeholders. Similarly, cultural alignment with strategy can ignite grassroots enthusiasm, surpassing mere compliance. However, strategy requires continual renewal as contexts evolve (Agarwal & Helfat, 2009). Dynamic capabilities enable the ongoing evolution of strategies and business models in anticipation of shifting market niches. Adaptive strategy prevents the rigidification of practices into rituals disconnected from real-time relevance. Vigilance to external change must be paired with internal sensemaking.

To effectively adapt and renew strategies, it is essential to have a clear understanding of what strategy is. Defining "strategy" has occupied management scholars for decades, resulting in a myriad of concepts with more than ninety definitions and no singular, universally accepted meaning (Yu, 2021). This ambiguity stems from the inherent complexity of the strategy itself, which encompasses various perspectives, levels of analysis, and contextual influences (Pitkethly, 2006). The definition of strategy stands as a foundational step in understanding strategic decision-making (Sinnaiah et al., 2023). Mintzberg (1979) posits strategy as a pattern in a stream of decisions, either deliberate or emergent, challenging the traditional view of strategy as a fixed plan and highlighting its dynamic nature. This perspective is further enriched by Day and Wensley (1988), who argue that strategy involves seeking new edges in a market while slowing the erosion of present advantages, emphasising the competitive dimension of strategy. Xavier (1993) extends this view, suggesting that business strategy encompasses achieving long-term objectives, matching resources with opportunities, achieving competitive advantage, and coping with a turbulent environment. Luehrman (2014) introduces the concept of real options, defining a business strategy as a portfolio of decisions optimised for future opportunities, featuring the importance of flexibility and adaptability in strategic decision-making. Barad (2017) complements this perspective by defining strategy as a high-level plan under conditions of uncertainty, involving skills like tactics, siegecraft, and logistics, thus highlighting the strategic significance of planning and execution in uncertain environments. In contrast, Steen (2017) offers a unique perspective, viewing strategy as the smallest set of choices that guide other choices, creating a hierarchy among decisions. This definition is further elaborated by Fairbanks and Buchko (2018), who define strategy as an integrated set of actions and resource commitments that position an organisation within the competitive environment to generate superior results over time.

In essence, early conceptions positioned strategy in the abstract realm of intentions and desired ends rather than concrete means. Mintzberg's seminal perspective defined strategy simply as a "pattern in a stream of decisions", the realised trajectory rather than any predefined path. He granted it could manifest deliberately or inadvertently "in the absence of intentions" (Mintzberg, 1979). This noncommittal stance contrasts later with more purposeful definitions, citing strategy as the setting of organisational direction. Mintzberg acknowledged that strategy could also imply 'perspectives' on direction, although he remained ambiguous about agency and planning. His concept of strategy, which he presented as a flexible, emergent 'arc of decisions', would later prove to be influential.

A prominent perspective that has significantly influenced the definition of strategy is the Resource-Based View (RBV). Pioneered by Barney (1991), the RBV posits that a firm's competitive advantage and superior performance stem from its ability to acquire, develop, and effectively use valuable, rare, inimitable, and non-substitutable resources and capabilities. From this viewpoint, strategy is defined as the means by which organisations identify, acquire, bundle, and leverage their strategic resources to create and sustain a distinctive competitive position (Barney, 1991; Peteraf, 1993). Proponents of RBV argue that strategies should be formulated based on a thorough understanding of the firm's internal resource endowments rather than solely focusing on external competitive forces (Wernerfelt, 1984). Consequently, the RBV has shifted the emphasis in strategy formulation towards the development and exploitation of idiosyncratic firm-specific resources and capabilities as the primary sources of competitive advantage (Amit & Schoemaker, 1993; Peteraf & Barney, 2003).

Building upon the resource-based perspective, the concept of dynamic capabilities offers a complementary lens for understanding strategy in rapidly changing and uncertain environments. Introduced by Teece et al. (1997), this view posits that in addition to possessing valuable resources and capabilities, firms must develop the capacity to continuously integrate, reconfigure, renew, and recreate their resource base to address shifting market conditions and technological landscapes (Eisenhardt & Martin, 2000; Teece, 2007). From this angle, strategy is defined as the means by which organisations sense and seize opportunities, as well as reconfigure their resources and competencies to sustain competitive advantage in dynamic and turbulent environments (Teece, 2007; Helfat et al., 2007). Proponents of the dynamic capabilities perspective contend that in rapidly evolving markets, the ability to adapt and reconfigure organisational resources and capabilities is a vital determinant of strategic success (Eisenhardt & Martin, 2000; Teece et al., 1997). Consequently, strategy is conceptualised as a process of developing and deploying dynamic capabilities that enable the organisation to orchestrate and reshape its resource base to create and capture value in response to environmental changes (Helfat & Peteraf, 2003; Teece, 2014). This view extends the traditional resource-based perspective by emphasising the importance of continuous renewal and adaptation rather than merely focusing on the exploitation of existing resources (Ambrosini & Bowman, 2009; Schilke et al., 2018).

Subsequent decades saw definitions morph towards more outcome-driven expressions of strategy as achieving organisational aims within competitive environments. Strategy became inseparable from the challenge of sustaining corporate success, which is variously defined as profitability, market position, and competitive advantage. Earlier conceptions, such as Xavier's (1993) work, presented strategy as the pursuit of 'achieving long-term objectives' and 'matching resources with opportunities.' Shortly thereafter, Day and Wensley (1998) more explicitly centred strategy on sustaining market position, seeking new edges while slowing the erosion of present advantages, based on ongoing 'monitoring of competitive position'. These conceptions reinforce managerial agency in strategising for corporate interests against market threats. Later perspectives narrowed the prior wide organisational berth, focusing strategy more singularly on shareholder returns. Luehrman's (2014) notion of strategy as a "portfolio of real options" designed towards "future opportunities" carries market-oriented tones resembling Day and Wensley but specifies that such opportunities mean shareholder payoffs. Similarly, Fisher et al. (2020) more recently framed effective strategy more restrictively as generating "superior returns over rivals" rather than any generalised organisational aims. This shift likely reflects ascendant shareholder primacy conceptions of corporate purpose. Sustainability and social movements have catalysed a rebalancing of economic, environmental, and social strategies. For instance, Devinney and Dowling's (2020) definition broadens the concept of organisational direction-setting to include societal 'engagement', moving beyond purely financial considerations. Furthermore, Barad's (2018) concept of strategy, which operates 'under conditions of uncertainty' and involves 'tactics, siegecraft, and logistics', evokes images of navigating turbulence towards ethical objectives that extend beyond mere profit (Barad, 2017).

While the preceding definitions have primarily focused on strategy at the organisational level, another perspective within the strategy literature emphasises the micro-level activities and practices that constitute the process of strategising. This view, known as 'Strategy as Practice', shifts the attention towards the individuals and groups actively engaged in the day-to-day enactment of strategy (Whittington, 1996; Jarzabkowski, 2005). Proponents of this perspective argue that strategy is not merely a property of organisations but rather a situated, socially accomplished activity constructed through the interactions, routines, and practical coping actions of multiple actors (Jarzabkowski, 2005; Vaara & Whittington, 2012). From this lens, strategy is defined not solely as a deliberate plan or an emergent pattern but as the ongoing, lived experience of strategising embedded within the practical contexts and power relations that shape strategic work (Golsorkhi et al., 2015; Seidl & Whittington, 2014). Through an examination of the micro-level practices and praxis of strategy, this perspective offers an in-depth understanding of how strategies are formulated, negotiated, and implemented within organisations, challenging the traditional focus on strategy as a purely top-down or rational-analytical process (Jarzabkowski & Spee, 2009; Vaara & Whittington, 2012). Consequently, the strategy as practice lens has broadened the conceptualisation of strategy to encompass the lived experiences, interactions, and improvisations of strategic actors, rather than simply considering strategy as a static, reified concept (Golsorkhi et al., 2015; Whittington, 2006).

Institutional theory provides another lens through which to understand the nature and definition of strategy within organisations. This theoretical perspective posits that strategic decisions and behaviours are shaped to a considerable extent by the broader institutional context in which firms operate (DiMaggio & Powell, 1983; Scott, 2008). Institutions, defined as the formal and informal rules, norms, and cultural-cognitive frameworks that guide social behaviour (Scott, 2014), exert significant pressures and constraints on organisations, influencing their strategic choices and actions (Greenwood et al., 2008). From an institutional perspective, strategy is conceptualised as a means by which organisations navigate and respond to the demands and expectations of their institutional environments, as well as actively shape and influence institutional arrangements to their advantage (Oliver, 1991; Pache & Santos, 2010). Proponents of this view argue that organisations often adopt strategies not solely based on rational economic calculations or resource considerations but also to gain legitimacy and ensure their survival within the broader institutional field (DiMaggio & Powell, 1983; Suchman, 1995). Consequently, strategy is defined as a process of conforming to institutionalised rules and norms while simultaneously seeking to differentiate and establish competitive advantages (Deephouse, 1999; Greenwood et al., 2008). This perspective challenges the traditional notion of strategy as a purely rational, profit-maximising endeavour, emphasising instead the role of institutional pressures, legitimacy concerns, and the embeddedness of organisations within broader social and cultural systems (Kraatz & Block, 2008; Lounsbury & Beckman, 2015).

Another influential perspective that has shaped the conceptualisation of strategy is the stakeholder theory, which emphasises the role of various stakeholder groups in shaping organisational strategies and decision-making processes. Introduced by Freeman (1984), this theory asserts that organisations must consider the interests and expectations of diverse stakeholders, including shareholders, employees, customers, suppliers, communities, and other relevant groups, when formulating and implementing strategies (Freeman et al., 2010; Parmar et al., 2010). From this viewpoint, strategy is defined as a means of balancing and addressing the often-conflicting demands and concerns of different stakeholder groups rather than solely focusing on maximising shareholder value (Freeman, 2010; Jones et al., 2018). Advocates of the stakeholder theory claim that effective strategies must account for the interdependencies between the organisation and its stakeholders and the potential impacts of strategic decisions on these stakeholders (Donaldson & Preston, 1995; Freeman et al., 2004). Consequently, strategy is conceptualised as a process of stakeholder engagement and management, involving the identification, prioritisation, and integration of stakeholder interests into the strategic decision-making process (Freeman et al., 2007; Harrison & Wicks, 2013). This perspective challenges the traditional shareholder-centric view of strategy and underlines the importance of considering broader societal and ethical concerns in defining and pursuing organisational objectives (Laplume et al., 2008; Mitchell et al., 1997). However, tensions persist around strategy as planned means versus realised pattern of ends. Fairbanks and Buchko straddle this divide, positioning strategy as “actions and resource commitments” that “position” organisations to “generate results” (Fairbanks & Buchko, 2018). This positioning implies intentionality while results allow for emergence. Steen (2017) similarly wavered between strategy as deliberate "choices" designed to "guide" other choices versus the holistic unfolding "pattern" itself.

There remains a persistent tension around the concept of strategy, particularly when considering it as a planned means versus a realised pattern of outcomes. Fairbanks and Buchko navigate this divide by defining strategy as 'actions and resource commitments' that 'position' organisations to 'generate results' (Fairbanks & Buchko, 2018). This definition implies intentionality through positioning while allowing for emergence through results. Similarly, Steen oscillates between viewing strategy as deliberate 'choices' designed to 'guide' subsequent choices and as the holistic unfolding 'pattern' itself (Steen, 2017). Indeed, the discourse on strategy has evolved from a vague awareness of long-term trajectories to a sharpened focus on competitiveness and shareholder returns and has now regained a more balanced consideration of uncertainty, sustainability, and social contexts. The means and ends continue to be entwined in a dance between planning and emergence. Nonetheless, common threads persist, centring on the idea that strategy sets the direction towards organisational thriving amidst turbulent times.

2.3.2. Strategic Management and the Strategy Process School within the Context of VUCA Challenges

Strategy delineates a particular course for achieving a discrete aim, whereas strategic management encompasses the broader process of coordinating analysis, planning, decision-making, and operational execution across multiple goals and lines of business (Law, 2023). Strategy defines the path, and strategic management concerns building supporting infrastructure and capabilities ensuring viable implementation towards organisational objectives (Augier & Teece, 2018). In effect, strategy specifies the end destination's coordinates, and strategic management provides navigational tools, contingency planning and mechanisms for adapting vehicle performance to changing terrain en route (Kotler et al., 2016, pp. 23–53). Strategic management serves a focal purpose in providing direction and alignment for organisations operating amidst uncertainty and change (Sinnaiah et al., 2023). It is a key function in firms focused on long-term goals and actions aimed at improving vitality and strength in relation to competitors. At its core, it involves high-level planning to achieve competitive advantage and superior firm performance over the long term (Nag et al., 2007).

Strategy and strategic management exhibit interdependency yet remain distinct concepts (Nag et al., 2007). Strategy refers to high-level plans to achieve sustainable competitive advantage and superior firm performance, involving setting organisational direction and resource prioritisation (Porter, 1996). Strategic management, on the other hand, denotes associated planning processes and coordinating systems that enable strategy formulation, evaluation, and implementation to yield desired outcomes (Wolf & Floyd, 2017). Essentially, strategy provides the "what", the substantive content regarding envisioned paths to valuable organisational outcomes. Strategic management furnishes the "how", the procedural flow and the infrastructure for developing, selecting, enacting and dynamically adjusting strategies over iterative planning cycles (Wolf & Floyd, 2013). Strategy plays a role in crafting strategy content, drawing on inputs from strategic management processes, while strategic management gives life to strategy. This reflects a reciprocal influence between strategy and strategic management. Through strategic planning, configurations of strategy shape perceptual filters for what directions emerge as feasible or desirable (Kaplan & Orlikowski, 2013). In contrast, disruptive strategies can potentially overhaul strategic management practices and the organisational culture that often resists deviations from the status quo. In practice, effective strategy requires a balance between leadership vision and strategic management analysis (Ansoff, 1984). Leaders are responsible for setting a clear strategic direction, while strategic managers facilitate informed decision-making by encouraging open exploration and providing analysis that clarifies choices. This analysis informs but does not override the strategic decisions made by leaders (Johnson et al., 2011).

In harmony with Johnson et al. (2011), Tokhirov and Abdurakhimjanov (2021) argue that strategy is fundamentally about addressing the gap between an organisation's current reality and its desired future choices and outcomes. This need for strategy emerges when problems arise from this gap, demanding logical prioritisation and creative solutions. Strategy, therefore, as per the authors, involves defining and solving problems, enabling organisations to move forward despite uncertainty. In contrast to Tokhirov and Abdurakhimjanov's (2021) perspective on the fundamental purpose of strategy, Bickel (2011) previously introduced a thought-provoking question that challenges the very premise of strategy formulation in the face of pervasive uncertainty. Bickel posits that before embarking on the development of a strategy, it is imperative to first establish a clear goal or objective. This assertion raises a critical point: in an environment characterised by high levels of uncertainty, defining a precise goal can be arduous.

Bickel's perspective suggests that the traditional approach to strategy involves setting a desired future state and devising a path to bridge the gap between the current reality and that envisioned state. This approach is akin to the concept of "backcasting," as proposed by Thorén and Vendel (2019), which serves as a strategic management tool for addressing VUCA challenges and will be discussed in later sections. However, a key point of contention arises when uncertainty shrouds the future. In such circumstances, setting a definitive goal may prove premature or even counterproductive. The dynamic nature of the environment imposes adaptability; goals may need redefinition as new information emerges when the business environment evolves. This perspective highlights the need for a more flexible and adaptive approach to strategy and, by virtue, strategic management practice in the face of uncertainty (Mankins, 2022; Reeves & Deimler, 2011). Rather than focusing solely on a fixed endpoint, organisations may need to embrace a more iterative and exploratory process, continually reassessing their goals and adjusting their strategies as they navigate the shifting contexts (Harrigan, 2017).

Strategic challenges require decision-making that either capitalises on opportunities or addresses threats. This means evaluating complex situations, setting priorities among competing demands, and allocating resources effectively (Arend, 2020). While strategy aims for rationality, real-world application is often messy, complicated by unclear and often contradicting information, internal politics, unintended consequences, and moral considerations. However, strategy remains focused on problem-solving, even as those problems become more complex and constantly change. The core purpose of strategy is to bridge the identified disparity between the firm and the industry environment (Grant, 2019, p. 10), whether addressing immediate crises or future risks. The firm embodies three of these elements: goals and values (simple, consistent, long-term goals), resources and capabilities (objective appraisal of resources), and structure and systems (effective implementation). The industry environment represents the fourth (profound understanding of the competitive environment) and is defined by the firm's relationship with competitors, customers and suppliers.

Figure 2.27 *Strategy as a link between the firm and its environment*

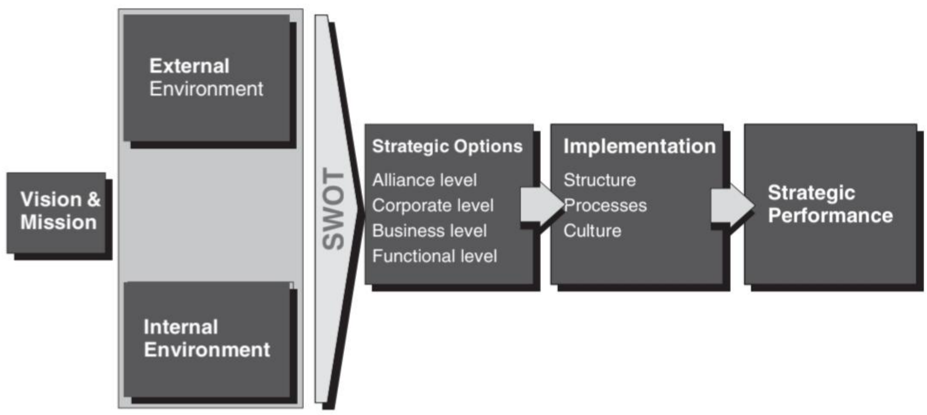
Note. *By Grant (2019).*

This constant navigation benefits from a multidimensional perspective that considers cultural, technical, and moral factors, going beyond purely analytical methods. Strategy integrates these perspectives to guide progress. Regardless of the specific situation, overcoming obstacles to achieve a better future remains central to strategic thinking. Fundamental to this view of strategy as a link between the firm and its external environment is the notion of strategic fit (Venkatraman & Camillus, 1984), which refers to alignment between the firm's strategy and both its external environment as well as internal goals, values, resources and capabilities. A primary driver of organisational decline and failure is strategic inconsistency with these internal or external dimensions.

An effective strategy is characterised by the seamless alignment of its constituent decisions and actions, resulting in a coherent strategic position and developmental trajectory (Srivastava & Sushil, 2017). This concept of 'internal fit' lies at the core of Porter's (1996) conceptualisation of the firm as an integrated activity system. According to Porter, strategy entails crafting a distinctive and differentiated position through a carefully orchestrated set of activities. The critical factor lies in how these activities interlock harmoniously, creating a mutually reinforcing and consistent system. The concept of strategic fit is one component of a set of ideas known as contingency theory, which postulates that there is no single best way of organising or managing. The best way to design, manage and lead an organisation depends upon circumstances, particularly the characteristics of that organisation's environment (Ensign, 2001; Venkatraman & Camillus, 1984). Conversely, Phillips and Moutinho (2018), inspired by others such as Sabatier (1986), contend that the perspective on strategy formulation and implementation presents a hierarchical, top-down approach that warrants critical examination. While it postulates that strategy emanates from organisational vision and mission, this linear proposition may oversimplify the complex and iterative nature of strategy formation in practice.

Phillips and Moutinho assert that a single strategy is insufficient and acknowledge the multilayered nature of modern organisations, yet the authors' proposed stratification of strategy into distinct levels (alliance, corporate, business, functional) risks creating silos that may impede holistic strategic thinking. Similarly, the prevalent categorisation of strategic, tactical, and operational questions as "Why," "What," and "How", respectively, offers a seemingly neat framework. However, this reductionist approach may not capture the complex interplay and feedback loops between these domains in real-world scenarios. Furthermore, the emphasis on the CEO and their team as the primary architects of strategy across all levels potentially undervalues the contributions of lower-level employees and emergent strategies arising from organisational learning (O'Shannassy, 2021). Contemporary strategic management scholarship challenges this top-down perspective as overly simplistic and deterministic (O'Shannassy, 2021; Phillips & Dar, 2009). The assertion that singular strategies are insufficient, needing multiple levels of strategy tailored to specific contexts, holds merit and aligns with calls for adaptable approaches (Mintzberg, 1987; Pfeffer, 1993). However, rigidly categorising "Why" as strategic, "What" as tactical, and "How" as operational risks perpetuates an overly simplistic and static view of strategy formation.

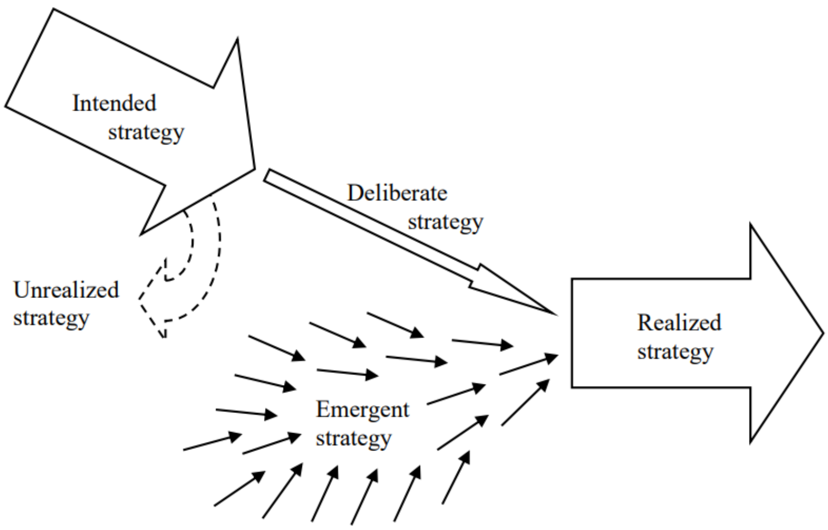
Figure 2.28 *Strategic management*



Note. *By Phillips and Moutinho (2018).*

Figure 2.28 succinctly captures the essential phases of strategic management. It emphasises the interplay between vision, mission, SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis, strategic options at various organisational levels, and implementation factors (structure, processes, and culture). Recognising the ever-changing nature of organisational contexts, a comprehensive approach to strategic management is evident. However, there are several shortcomings and simplifications in the framework that need to be carefully considered. The model suggests a linear, sequential process from mission and vision to performance, which may not accurately reflect the iterative and dynamic nature of strategy formation and implementation in practice. As Mintzberg (1978) argues in Figure 2.29 below, strategy often emerges through a more fluid interplay between intended and realised strategies. Placing SWOT analysis at the core of the model, as shown in Figure 2.28 above, overemphasises its importance and fails to acknowledge its limitations. As also confirmed by Hill and Westbrook (1997), the model fails to incorporate advanced methodologies for internal and environmental analysis.

Figure 2.29 *The Concept of Intended and Realised Strategy*



Note. *Developed by Mintzberg (1987).*

Further, the categorisation of strategic options into separate levels (alliance, corporate, business, functional) may result in the establishment of artificial boundaries. The levels frequently intersect and influence one another in complex manners (Jarzabkowski & Spee, 2009). Limiting implementation to structure, processes, and culture oversimplifies the complexities of strategy execution. It overlooks critical elements, including leadership, resource allocation, and change management (Beer & Eisenstat, 2000). The model suggests a direct causal relationship between implementation and strategic performance and neglects external contingencies and the possibility of emergent strategies (Burgelman, 1991). The unidirectional flow of Phillips and Moutinho's (2018) strategy, as illustrated in Figure 2.28, may not adequately account for how performance outcomes can affect future strategic decisions or require adjustments to the vision and mission. Also, the framework does not explicitly consider the influence of various stakeholders in shaping strategy, an essential element emphasised by Freeman's (1984) stakeholder theory. Furthermore, Grant (2019, p. 10) points out its drawbacks and suggests a deeper approach to strategic analysis in his critical view of the SWOT. Although extensively employed in strategic management, SWOT has come under scrutiny for its oversimplification of complex business environments. The strategic management framework contends that the rigid categorisation of internal factors as strengths or weaknesses and external factors as opportunities or threats is often arbitrary and potentially misleading (Teece, 2018). A central critique of the model is the challenge of definitively categorising factors as exclusively strengths or weaknesses, as demonstrated by how a single element can be perceived as both beneficial and detrimental depending on the specific context. This critique, however, is not new; it reiterates previous scholarly perspectives on strategic management. For instance, Teece et al. (1997) introduced the dynamic capabilities framework, which emphasises the need for organisations to adapt continuously to changing environments rather than relying on static analyses like SWOT. An ensuing contribution by Kraaijenbrink et al. (2010) argues for a more elaborate approach to resource-based theory, which underpins much of the 'strengths and weaknesses' component of SWOT. Besides, the limitation of SWOT confirms the concerns raised by Hill and Westbrook (1997), who questioned the effectiveness of SWOT analysis in practical strategic decision-making. Their study calls for a "product recall" of SWOT, suggesting that its time as a valuable strategic tool may have passed.

The limitations of SWOT analysis, as manifested by its critics, may contribute to strategic drift, as organisations relying on outdated tools may fail to recognise the need for realignment between their strategy and the evolving external environment. Strategic fit underlines the need for alignment between a firm's strategy and its internal capabilities and external environment. When strategic fit erodes, it creates tensions that can undermine performance and competitive advantage. This loss of fit is often driven by strategic drift (Rumelt, 1998) and emerged as a critical idea in the field of strategic management to highlight the gradual deterioration of competitive action within an organisation, resulting from its failure to recognise and respond to changes in the business environment.

As it stands, a key theoretical orientation within strategic management is the Strategy Process School (SPS), which reframes strategy not as a fixed plan but as a dynamic and evolving process. This school, advanced by scholars such as Ansoff (1965), Mintzberg (1985), and Pettigrew (1992), stress the emergent and contextual nature of strategic action. Unlike positioning-based approaches that rely heavily on formalised structures and stable environments (e.g., Porter, 1980), the SPS offers a more adaptable conceptual framework for navigating the turbulence, ambiguity, and complexity that characterise VUCA environments. It draws attention to the recursive interplay between intended and realised strategies, the importance of learning, and the socio-political forces shaping decision-making.

Currently, the SPS represents a key and highly relevant theoretical orientation within strategic management for the purposes of this research as it reframes strategy not as a fixed plan but as a dynamic and evolving process. Advanced by scholars such as Ansoff (1965), Mintzberg (1985), and Pettigrew (1992), the SPS focuses on the emergent and contextual nature of strategic action. Distinct from positioning-based approaches that rely heavily on formalised structures and stable environments (e.g., Porter, 1980), the SPS proposes a more adaptable conceptual framework for navigating the turbulence, ambiguity, and complexity that characterise VUCA environments. It draws attention to the recursive interplay between intended and realised strategies, the importance of learning, and the socio-political forces that shape strategic decision-making. With that foundation in place, the following section turns to examine the practical manifestations of this thinking through specific tools and techniques. These instruments, ranging from scenario planning to real-time analytics, translate the processual and adaptive logic of strategy into actionable mechanisms that support decision-making under conditions of VUCA.

2.3.3. Strategic Management Tools and Techniques in Turbulent Environments

The nature of contemporary business environments is nowadays defined by accelerating dynamism and complexity arising from phenomena like globalisation, technological disruptions, evolving consumer behaviours, and fluid industry boundaries (Stieglitz et al., 2015). These turbulence-forming conditions of heightened volatility, uncertainty, complexity and ambiguity (Bennett & Lemoine, 2014) pose intensifying challenges for organisational decision-making, strategic planning, and long-term viability. In response, scholars have continued to refine and expand the conceptual toolkits available to executives and managers to facilitate strategy formulation and implementation. Strategic management frameworks serve as structured intellectual scaffolds for simplifying complexity, mapping relationships, illuminating trade-offs, and ultimately guiding action in complex systems (Vuorinen et al., 2018).

This recognition conforms closely with the strategy process school and marks the evolving and iterative nature of strategic tools in addressing these turbulent conditions. For instance, scholars within the SPS, particularly Mintzberg (1994), Pettigrew (1992) and Ansoff (1965), have long recognised that strategic tools should not be viewed as prescriptive solutions but rather as part of an ongoing and iterative process of strategic adaptation. For example, Mintzberg's notion of emergent strategy challenges the idea that tools alone can dictate organisational success, instead advocating for a more fluid, learning-oriented approach where tools serve as facilitators rather than rigid frameworks. Similarly, Pettigrew's contextualist perspective reinforces that tools must be embedded within an organisation's evolving environment rather than applied in a vacuum. This perspective brings to light the importance of using strategic tools in conjunction with dynamic capabilities and continuous strategic sense-making to ensure their relevance in turbulent environments.

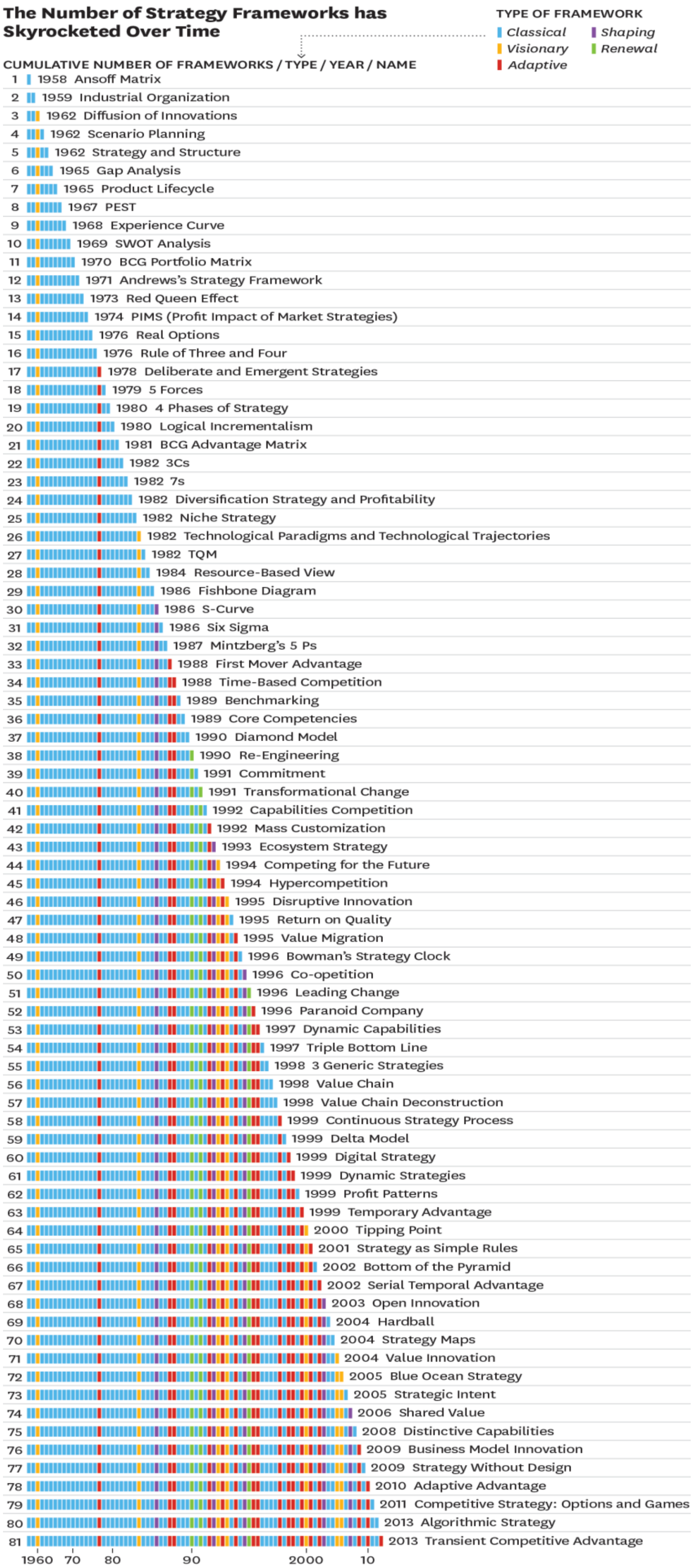
The SPS has indubitably spawned various tools in an attempt to operationalise its core tenets of emergence, learning and strategic flexibility. While these tools appear promising in theory, a critical examination reveals significant limitations, particularly in VUCA environments. For instance, scenario planning (Schoemaker, 1995), which is predominantly associated with the SPS and embraces exploratory, non-linear planning central to SPS, encourages organisations to develop multiple plausible futures as a hedge against uncertainty. However, this approach faces several critical limitations. Tapinos and Pyper (2018) argue that scenario planning's effectiveness diminishes in environments characterised by "hypervolatility", where the rate of change exceeds the organisation's capacity to develop and analyse meaningful scenarios. They note that "the very methodological foundations of scenario planning become unstable when the variables under consideration shift faster than the planning cycle itself" (p. 231). Furthermore, Varum and Melo (2010) found that scenario planning often suffers from cognitive biases where planners unconsciously anchor to familiar futures, which undermines the tool's purpose of expanding strategic thinking. The process typically relies on historical data patterns that may become increasingly irrelevant in discontinuous environments (Grant, 2003). As Wright et al. (2013, p. 634) critically observe, "scenario planning methodologies inadvertently privilege certain types of futures over others, and this creates blind spots precisely where organisations need enhanced visibility. Other limitations, such as temporal inadequacy (Ramirez et al., 2017), mention that the time required to develop robust scenarios often exceeds the window of strategic opportunities. Epistemic constraints by Derbyshire (2017) state that as uncertainty increases, the knowledge base for developing plausible scenarios becomes increasingly suspect. Lastly, O'Brien and Meadows (2013) raised the issue of organisational struggle to translate scenario insights into actionable strategic moves.

Another example is Weik’s (1995) sensemaking, which is at the core of the interpretive and behavioural aspects of SPS. Although the tool is a promising theoretical foundation for navigating ambiguity, it faces substantial operationalisation challenges. As Maitlis and Christianson (2014, p. 97) critique, "sensemaking remains more conceptual than practical, it offers limited guidance for systematic implementation." The highly contextual and socially embedded nature of sensemaking processes resists standardisation across organisational settings. Sandberg and Tsoukas (2015) identify what they call the "instrumentalisation paradox" of sensemaking: attempts to formalise and scale sensemaking practices tend to strip them of the very contextual richness that makes them valuable. Brown et al. (2015) further note that organisational power dynamics significantly influence collective sensemaking, often privileging dominant narratives and suppressing alternative interpretations, a perilous outcome in VUCA environments requiring diverse perspectives.

These SPS tools collectively demonstrate the persistent challenge of operationalising adaptiveness in VUCA environments. As Teece (2018a, p. 43) concludes, "the translation of process theory into practical tools remains one of the grand challenges of strategic management." The limitations of these approaches accentuate the need for further theoretical and practical development that can bridge the gap between process-oriented conceptualisations and organisational implementation realities in increasingly turbulent strategic contexts.

More generally, the strategic management field has long relied on a diverse array of tools and frameworks to aid practitioners in navigating the complexities of the business environment. These tools, ranging from simple analytical frameworks to more detailed management systems, aim to deliver structure, insights, and guidance for strategic decision-making. Core strategy tools like Porter's Five Forces, the Resource-Based View, and the Strategy Canvas popularised by Kim and Mauborgne (2014) provide accessible mental models for analysing and shaping competitive settings, identifying capability gaps versus rivals, and locating distinctive positioning opportunities (Porter, 2008). However, the value and relevance of these tools, particularly in the context of increasingly volatile, uncertain, complex, and ambiguous environments, have been subject to ongoing debate and empirical scrutiny.

Figure 2.30 *Strategy Tools in Historical Perspective (1958-2013)*



Note. *Competitive and business strategy in historical perspective. Developed by Ghemawat (2002-2013).*

Despite the proliferation of strategic management tools, not all frameworks are equally effective in addressing the distinct challenges posed by VUCA environments. Tools such as scenario planning (Schoemaker, 1995) and dynamic capabilities (Teece, 2007) have demonstrated their relevance by promoting adaptability and strategic foresight. Scenario planning, for instance, allows organisations to anticipate multiple potential futures, while dynamic capabilities ensure that firms can continuously realign their resources in response to environmental shifts. Conversely, more traditional frameworks, such as Porter's Five Forces (1979) and the BCG Matrix (Henderson, 1984), were designed for relatively stable market conditions and often struggle to provide actionable guidance in highly volatile and uncertain environments. Even tools that have undergone refinement, such as SWOT analysis, remain fundamentally limited in their ability to capture the speed and unpredictability of VUCA dynamics. This discrepancy underscores the need for organisations to move beyond a rigid reliance on classic strategy models and instead cultivate a more fluid, iterative approach to tool selection and application.

The accelerating profusion of strategic management frameworks, as represented in Figure 2.30, presents a paradox. Despite showcasing a rich history of intellectual effort aimed at equipping managers to navigate complex competitive environments, the sheer volume of tools available raises critical questions about their value amidst the increasing VUCA realities of the 21st-century business setting (Sarpong & Maclean, 2016). The main argument is that even though the evolution of strategic management frameworks reflects a growing awareness of dynamism and interrelatedness, their ability to meaningfully aid strategic decision-making in VUCA contexts has been limited (Dhillon & Nguyen, 2020), thus urging to move beyond mere tool proliferation towards a consideration of contextual fit, cognitive agility, and integrative pluralism. The variety of frames into Classical, Shaping, Visionary, Renewal, and Adaptive types provides a helpful typology but does not suitably answer the fundamental dimensions necessary in exploring real VUCA situations. While these existing categories may offer utility in relatively stable settings, they lack a dedicated emphasis on foresight, systems thinking, resilience, adaptability, and cognitive agility, without which strategic decisions may struggle to navigate times of rapid and unforeseen change. For example, the "visionary" framework category may be ostensibly forward-looking but often relies on and stresses the formulation of a compelling vision rather than the acquisition of strong foresight capability, thus falling short of providing a mechanism for navigating VUCA. To explain, scenario planning, as a visionary framework, often encounters difficulty in transforming many future possibilities into specific strategic actions in very dynamic circumstances, even though it promotes an examination of several future options (Tiberius, 2019). Similarly, frameworks focusing on "Leading Change" often assume a degree of control and predictability that is absent in VUCA environments.

In a similar vein, while the 'adaptive' category recognises the importance of responsiveness, certain frameworks within this school prioritise continuous adjustment to environmental shifts rather than a structured and proactive approach to shaping multiple possible futures. The "Renewal" category recognises the requirement of organisational transformation and adaptation but often emphasises internal change processes above the development of the dynamic skills needed for ongoing adaptation in highly unpredictable situations. Although they help to increase efficiency and effectiveness, frameworks such as re-engineering may not provide the agility required to navigate rapid and unpredictable market shifts and to react to quick and unexpected changes in the competitive scene (Huy & Mack, 2021; O'Neill & Sohal, 1999). In the same way, "Shaping" models, including Porter's Five Forces (Porter, 1979), stress the need to deliberately change the competitive environment. However, in VUCA environments, such models often lose effectiveness in forecasting and managing competitive pressures. Although knowledge of industrial structure is still vital, the focus should pivot towards developing organisational resilience and adaptability instead of attempting to control an inherently unpredictable environment. Given the growing frequency of VUCA circumstances in the corporate environment of the twenty-first century, the above-stated limitations present a legitimate source of concern in the VUCA world.

A critical omission can also be discerned when scrutinising these frameworks: the absence of explicit integration of CI capabilities. CI enables organisations to predict change, identify opportunities, and reduce risks by providing an enhanced understanding and knowledge of the competitive environment, developing trends, and possible disruptions (Fleisher & Bensoussan, 2007). Organisations are essentially navigating VUCA blindfolded, depending on antiquated assumptions and insufficient facts without strong CI capability. They are much susceptible to unanticipated competitive actions, technological upheavals, and changes in market dynamics. Good strategic decision-making under VUCA calls for not just a set of tools but also a dynamic, integrated strategy combining foresight, systems thinking, agility, and strong CI. Therefore, the image reminds us strongly of the importance of transcending conventional strategic management paradigms and adopting a more sophisticated and contextually appropriate strategy that helps companies flourish in the face of unparalleled complexity and unpredictability.

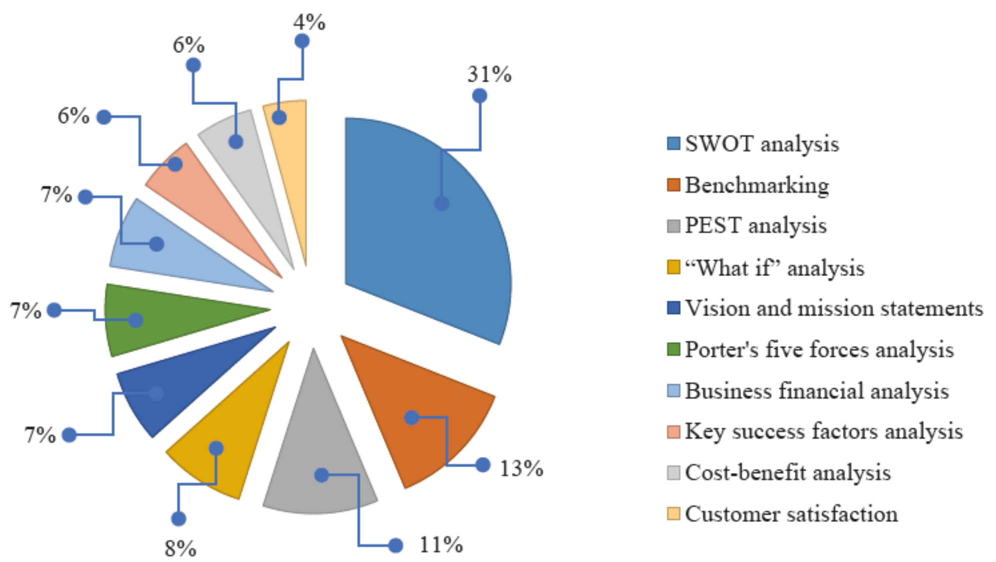
Another argument arises from the proliferation of these strategic frameworks, suggesting that their diversity indicates the field's adaptability to the growing complexity of strategic concerns. As business environments have shifted from stable to highly dynamic, analytical frameworks have evolved from classical, planning-centric models such as the Ansoff Matrix (1958) to more adaptive, process-oriented approaches like continuous strategy process (1999) and adaptive advantage (2010) (Hodgkinson & Healey, 2011). This transition indicates an increasing acknowledgement in strategic management research that VUCA environments require not only analysis but also agility, adaptability, and the ability for ongoing learning and adaptation (Schoemaker et al., 2018). Nonetheless, a counterargument arises that questions whether this proliferation indicates comprehensive advances in theory or rather exposes a deficiency in integrative capacity within the discipline. The continual introduction of new frameworks without the definitive replacement of existing ones indicates continued fragmentation and possible redundancy (Seidl & Whittington, 2014). This raises issues regarding "tool fetishism" (Janczak & Newbert, 2018), wherein the emphasis transitions to mastering specific frameworks while neglecting the cultivation of a profound understanding of the fundamental strategic processes and their interconnections. This strategy risks "paralysis by analysis," wherein managers, inundated by an abundance of tools, find it challenging to discern and implement the most pertinent frameworks for their particular setting (Barreto, 2010). Further complicating this debate is the recognition that many traditional frameworks are grounded in assumptions of relative stability and predictability that are increasingly untenable in VUCA environments (Augier & Teece, 2009; Berinato, 2014). For instance, frameworks rooted in classical economic models, such as Porter's Five Forces (1980), may struggle to account for the rapid shifts in competitive dynamics driven by technological disruptions, globalisation, and evolving consumer behaviours (Ghoshal, 2005). This does not refute their value but rather accentuates the need for critical reflexivity in their application to demand that managers develop the cognitive agility to discern when traditional frameworks require adaptation or supplementation to maintain relevance amidst turbulence (Hodgkinson & Wright, 2002).

Confronting this challenge entails transcending the concept of frameworks as fixed instruments and adopting a more dynamic and integrative viewpoint. Researchers such as Paroutis et al. (2015) promote a "strategy-as-practice" perspective, noting the significance of comprehending how frameworks are chosen, interpreted, and implemented within the distinct social and political contexts of organisations. This method considers that strategic decision-making is influenced not only by rationality but also by cognitive biases, power dynamics, and organisational routines (Balogun et al., 2014). What some academics consider to be "meta-frameworks" have significance in light of the abundance of frameworks (Cliffe, 2011). To assist managers in navigating the constantly shifting field of strategic tools, these higher-order frameworks could give recommendations for which frameworks to use and how to combine them. According to Gruber, MacMillan, and Thompson (2012), these types of meta-frameworks could provide a helpful and situationally aware method for analysing and making decisions based on strategies by incorporating ideas from behavioural economics, systems thinking, and complexity theory.

Figure 2.30 also shows a wide variety of strategy instruments, which is indicative of the variety of approaches to strategic decision-making. This variety also suggests that practitioners are not constrained by an absence of resources. Instead, they confront the problem of dealing with an excess of resources and the issue of identifying which one may best be used in the face of complex and unpredictable environments. This phenomenon has generated something of a paradox; despite the growing emphasis on strategic management tools, a spectrum of empirical studies has consistently revealed a limited use of strategic management tools and frameworks across organisations of varying sizes and sectors. For example, a seminal exploratory, empirical study of tools usage by strategic management practitioners conducted by Clark (1997) found striking similarities in the use of strategic management tools such as SWOT, PEST, and focus groups for core strategic tasks among practitioners in the United Kingdom and New Zealand. Similarly, Frost (2003), in an Australasian study, identified a consistent reliance on a limited set of tools, primarily SWOT, PEST and budgeting, among SMEs and even among experienced practitioners. These findings are echoed in research conducted in other contexts, including Turkey (Kalkan & Bozkurt, 2013) and the Czech Republic (Afonina, 2015), where SWOT analysis consistently emerged as the most widely applied tool.

Recent research similarly continues to reinforce the contention that SWOT analysis is still the gold standard when it comes to strategic planning and that this is widely true across all sectors and geographies. Qehaja et al. (2017), for example, synthesises qualitative research on the use of strategic management tools and techniques (SMTTs) in different organisational settings over 25 years. Among SMTTs such as SWOT, PEST, benchmarking, and Porter's Five Forces, the authors show that their adoption is both extensive and uneven, with SWOT being the most widely used. Tool usage trends have also been found to differ significantly among sectors, sizes of firms, and levels of national development, according to the authors. In contrast to SMEs in poor nations, which focus on a small number of financially orientated tools that are in line with immediate needs, large firms in developed economies use a more expansive repertoire of SMTT techniques.

Figure 2.31 *The Ten Most Used SMTTs by Country Level*



Note. *Study findings by Qehaja et al. (2017).*

Consistent with Qehaja et al. (2017), Nakayama (2018) likewise found SWOT to be the most employed tool, appearing in 22 of 25 examined global studies, with an 88% presence rate. Similarly, studies of Japanese companies demonstrate SWOT's high application levels, ranking it as the number one tool used in manufacturing and third in retail settings. Comparatively nascent tools, despite offering fresh perspectives, have yet to gain comparable adoption. For instance, the analysis of Strategy Canvas and VRIO (value, rarity, imitability, organisation) shows lower usage levels, likely owing to their relative novelty. Albeit potentially valuable, such frameworks' diffusion into standard strategic practice has lagged. One may argue that the overall picture of SMTT usage reveals a reliance on a relatively limited repertoire of tools despite the abundance of existing tools. The breadth and depth of the strategy tools being undertaken is called into question by this reliance on a narrow number of instruments. One possible gap in the use of more rigorous and future-oriented analytical frameworks is shown by the low utilisation or omission of tools like Porter's Five Forces, scenario planning, and value chain analysis from the most used categories.

Understandably, SWOT analysis has remained popular due to its versatility, ease of use, and straightforwardness. Suitable for a wide variety of strategic settings, it provides a transparent framework for analysing both internal (strengths and weaknesses) and external (opportunities and threats) factors. Likewise, financial analysis, benchmarking, and Porter's Five Forces analysis are additional popular methods that are used to gauge performance and analyse competitors. Interestingly, Gunn and Williams (2007) found that managers' tool choices were significantly impacted by their educational background, suggesting that tool preferences are a product of managers' educational experiences. While these different tools and frameworks have seen wide diffusion, perceptions about their effectiveness have been highly debated in the literature. Some empirical studies have indeed shown a positive link between the usage of tools and organisational performance metrics (Iseri Say et al., 2006; Al-Khadash & Feridun, 2006), but others have found the relationship to be ambiguous or at least contingent on more contextual factors (Rigby, 1994; Friedl & Biloslavo, 2009). This mixed evidence arises from variability across industries, measures of performance and challenges in isolating tool impact from other variables.

A growing critique indicates that traditional strategic frameworks have critical limitations, particularly in today's turbulent environments, due to their static, linear assumptions and tendency to oversimplify complex and dynamic realities. Identified constraints include: 1) the inability to capture rapidly changing conditions (Bennett & Lemoine, 2014); 2) embedded predictive logics that face challenges with unpredictability; 3) simplified abstractions that neglect situational nuances and complex system interdependencies (Sarpong & Maclean, 2016); 4) potential for fragmented rather than integrated usage; and 5) risks of fostering cognitive biases that limit expansive strategic thinking (Hodgkinson & Wright, 2002). Bingham and Eisenhardt (2011) claim that as turbulence increases, the adaptive limits and contextual specificity of these conceptual frameworks become apparent, which reveals a deficiency in their ability to adapt to new contexts (Moore et al., 2021). In increasingly discontinuous environments, the assumptions inherent in these analytic constructs may fail if applied rigidly rather than flexibly (Augier & Teece, 2009). Researchers have advocated for the development of strategy tools that are more dynamically orientated to address VUCA turbulence, as well as for enhancing managers' cognitive agility to effectively determine when and how to adapt traditional frameworks to meet evolving contextual needs (Cliffe, 2011; Hodgkinson & Healey, 2011; Mack et al., 2016). Turbulent phenomena interact in complex ways; therefore, the strategic management toolbox must expand to include interdisciplinary integrative frameworks that can effectively address multidimensional complexity (Gruber, MacMillan, & Thompson, 2012).

Therefore, advancing strategic management scholarship requires transcending mere toolbox refinement to, as Paroutis et al. (2015) assert, integrating other relevant conceptual domains to elucidate the sociocognitive framework that informs tool selection and implementation. This involves an interdisciplinary approach that combines psychological and sociological perspectives to understand the inherent agency challenges, contextual sensemaking, and socio-material interactions that activate strategy tools within complex contexts (Dameron et al., 2015). This backlight of strategy process complexity and tool malleability has enabled the movement of scholars toward elevating strategic management from fragments of abstraction toward situated practice (Hammer et al., 2012). The intent is to demonstrate sensitivity to the conceptual interdependencies, theoretical pluralism, social embedding, and practice dynamics that characterise the maturing field of strategic management. This centres attention on the actors, contexts, and interactions through which toolbox technicality translates into strategy emergence. The extensive cataloguing of strategic management techniques, frameworks, and perspectives has resulted in what Rigby and Bilodeau (2018) term an expansive "tool palette" now accessible to practitioners. However, although these conceptual tools can improve strategy analysis, researchers report that their effectiveness is highly dependent on alignment with contextual needs and requirements (Cliffe, 2011).

Tassabehji and Isherwood (2014) argue that strategic tools aimed at opportunity identification may provide diminished value for firms facing disruptive threats, in contrast to defensive analytical methods. Cognitive and political barriers related to executive tool fluency and legitimacy can limit effective application (Paroutis et al., 2015). The expanding strategic toolbox, while adding value, increases both the complexity of choices and the responsibility of managers in determining the appropriate analytical frameworks to address specific strategic enquiries within a firm's internal and external contexts (Hodgkinson & Wright, 2002). This contingence perspective demands more critical, context-attentive research on the tool selection and application practices through which strategy analysis activates certain lenses over others (Dameron et al., 2015) and the ensuing implications for strategic cognition and decision-making within the sociocognitive complexity of embedded strategy processes (Balogun et al., 2014). Addressing calls for greater strategy-as-practice examination, such inquiry can provide a clearer appraisal of how tool efficacy manifests within the sociocognitive embeddedness of strategy-making.

In the final analysis, the maturing domain of strategic management confronts conceptual fragmentation across the technical-prescriptive and practice-descriptive. Calling for more integrative pluralism, Seidl and Whittington (2014) suggest the need for bridging cogent analytical lenses "for strategy" with rich contextual attentiveness to the situated dynamics of strategy formation "in practice." These demands examine not just formulation but appropriation, surfacing not just a C-suite agency but socio-material constraints, and centring not just firm-level analyses but inter-organisational strategic co-evolution (Jarzabkowski et al., 2013). From this view, advancing strategy scholarship involves transcending toolkit critique toward elevating both ecological and practice perspectives in tandem that unravel multi-level complexities of strategy-environment interdependence. The key emphasis is bridging critiques with calls for elevating conceptual pluralism and reducing fragmented silos that have arisen within particular strategic management research streams.

Prominent strategy tools and perspectives bear re-examining in light of turbulent conditions that disrupt foundational assumptions around stability, predictability, and enterprise autonomy (Sarpong & Maclean, 2016). Frameworks based on classical economic equilibrium perspectives and deliberate planning logic risk reductionism are unable to account for market co-evolution, networked ecosystems, and socio-material strategy emergence (Stieglitz et al., 2016). Whereas strategic management tools provide valuable insights, they may not be sufficient in today's complex and uncertain business world. Effective strategic decision-making requires a broader perspective that incorporates elements of agility, adaptability, and foresight. Equally concerning, cognitive rigidities may constrain practitioner appropriation of traditional tools in the absence of sufficient metacognition and behavioural adaptivity (Schoemaker et al., 2018).

Although strategic management tools provide excellent frameworks for dealing with turbulent contexts, whether they define and direct decisions depends on how they are used, the capacity to synthesise insights from several various tools, interpret weak signals, and react proactively depends not only on having access to appropriate strategic frameworks but also on cognitive and organisational capability to convert them into actionable decisions. Thus, the next section discusses the imperative of strategic decision-making by factoring in how leaders navigate uncertainty, manage complexity, and make high-risk decisions in VUCA environments.

2.4. Strategic Decision-Making

2.4.1. Definition and Nature of Strategic Decisions

The flux and complexity of today's business environment have profoundly reshaped conceptions of strategy. Driven by a surge in volatility within the business world, understanding strategy nowadays demands examining and understanding how strategic thinking, decision-making processes, and organisational outcomes intertwine. Traditional decision-making research has concentrated on how individuals choose between alternatives, specifically how they identify the "best" or "right" option based on rational analysis (Noyes et al., 2017). This view is embodied in the concept of homo economicus introduced by Mill (1836) in describing the rational and self-interested individual who makes decisions aimed at maximising personal utility, puts forth three assumptions about decision-makers: (1) They have complete information about all possible alternatives and outcomes; (2) They can detect even minute differences between choices; and (3) They rationally weigh options to maximise subjective expected utility.

Alternatives are assumed comparable on a common dimension that enables the weak ordering of preferences and the identification of the optimal choice. Consequently, traditional models portray decision-making as a purely cognitive process of individual calculation grounded in principles of logic, self-interest, and accuracy. Conversely, although decision-making lacks consensus on what constitutes a “strategic” decision (Hickson, 1987; Nutt & Wilson, 2010; Khalifa, 2021), it recognises the influence of more complex cognitive, social and contextual factors. Rather than seeing decisions as simply the output of linear information processing, the strategic perspective acknowledges they often emerge gradually through conflict and negotiation among coalitions of decision-makers with diverse interests and backgrounds (Mintzberg et al., 1976).

Strategic decision-making refers to important choices that set the overall direction for an organisation and its future market position (Elbanna et al., 2020). These decisions tend to be complex, made under uncertainty, and involve significant resources and stakeholder interests (Eisenhardt & Zbaracki, 1992). Simon (1957) introduced the concept of "bounded rationality" to reflect how cognitive limitations shape decisions under uncertainty. Given it is impossible to consider all alternatives and future scenarios, decision-makers employ heuristics and set "satisficing" threshold targets. Additionally, the strategic view sees decisions as shaped by cultural, political and emotional considerations beyond cost-benefit calculations. Sensemaking and social construction processes play a key role, with decision criteria and preferences developing through interactive dialogue rather than existing a priori (Weick, 1969). Consequently, strategic decisions often reflect ongoing efforts to negotiate divergent interpretations and social alignments rather than purely objective computational outcomes.

Decision-making within organisations exists along a continuum of complexity regarding the magnitude and scope of consequences (Ansoff et al., 2019). Simon (1977) originally delineated three tiers consisting of strategic, tactical, and operational choices. At the organisational apex, strategic decisions, also labelled top-down decisions, substantially determine resource allocation priorities, distribution of firm capital, and the adapting of structures to match evolving environmental demands (Butler et al., 2018). Haslam and Shenoy (2018) contend that strategic decisions are formulated at the senior levels of an organisation and disseminated throughout the hierarchy for implementation and that discussions of strategic decision-making by leaders generally refer to a top-down approach as the predominant mechanism. Tactical decisions, according to Mirabeau and Maguire (2019), occupy a middle managerial bandwidth, entailing measurable trade-offs in efficiency, continuity, and flexibility to support strategic aims. Haslam and Shenoy (2018) typify decisions as originating internally within the organisation rather than being imposed from higher hierarchical levels and subsequently disseminating outward, thereby influencing the organisation's structure and its interactions with the external environment. Common choices involve business process changes, human resource policies, adoption of information systems, departmental goal setting, and defusing strategy into departmental domains. Lastly, operational decisions, according to the authors, manifest at the frontline level, also referred to as bottom-up emergence. These micro-level decisions and actions aggregate over time to generate broader organisational patterns and strategic outcomes. Though local and decentralised, they enact strategy on the ground, bridging intended plans with realised results. However, middle-out decision-making differs from bottom-up. This approach involves collecting input from lower levels of the organisation and then elevating it to higher tiers, generally before formal evaluation and decision-making (Haslam & Shenoy, 2018). It consists primarily of structured rule-based protocols and programmed responses based on routine training (Martin, 2021). Such decisions are typically repetitive and predictable, allowing for efficiency and consistency in execution.

A vast and growing scholarly literature supports that decision taxonomy depends heavily on relativity (Scherpereel, 2006). In other words, the criteria and methods used to classify decisions can vary depending on the specific situation, environment, or perspective. This idea is supported by a substantial and expanding body of academic research, indicating that decision-making is not a one-size-fits-all process but is instead highly dependent on relative factors such as context, timing, and individual or organisational circumstances (Scherpereel, 2006; Sullivan-Taylor & Branicki, 2011). Rosenzweig (2013) corroborates this view by stating that the dimensions of control and performance are pivotal in distinguishing different types of decisions. When these dimensions are combined, they outline four distinct categories of decisions, as illustrated in Figure 2.32 below.

Figure 2.32 *The Four Types of Decisions*

Note. *Developed by Rosenzweig (2013). HBR.*

Rosenzweig's four types of decisions offer a compelling categorisation of decisions into four distinct types, each shaped by varying degrees of control and performance. This view aligns seamlessly with established decision-making theories in the literature, providing a lens through which to analyse strategic choices. The first field of 'making judgments and choices' includes decisions characterised by low control and low performance. It suggests that decision-makers exhibit biases like loss aversion and overvalue specific outcomes, influencing routine judgment and choice decisions. This scenario, aligning with the prospect theory (Kahneman & Tversky, 1979) and examining how people make decisions under risk and uncertainty, often necessitates reliance on heuristics and bounded rationality, as posited by Simon (1957). Executives in such situations must navigate uncertainty with limited information, frequently leading to satisficing rather than optimising outcomes.

In the second field of 'influencing outcomes', decisions are marked by high control but low performance. Here, decision-makers can exert control over outcomes, such as project deadlines. Positive thinking and optimism are critical in shaping these decisions. This aligns with the rational choice theory, which posits that individuals make decisions by maximising utility, assuming they have high control over outcomes. This field is also consistent with the concept of strategic intent articulated by Hamel and Prahalad (1989), where leadership and vision play key roles in steering outcomes despite initial performance constraints. This is anchored in the literature that underlines the importance of visionary leadership in shaping strategic trajectories under uncertain conditions. The 'placing competitive bets' field involves decisions with high performance but low control, thus reflecting the strategic management literature on risk-taking and competitive advantage and conforming with game theory (von

Neumann & Morgenstern, 1944), notably discussed by Porter (1980) when explaining that success depends on outmanoeuvring rivals. Firms in this quadrant must make calculated bets to seize market opportunities to leverage core competencies and dynamic capabilities as described by Teece, Pisano, and Shuen (1997). Lastly, the 'managing for strategic success' field represents decisions with both high control and high performance. This draws from the resource-based view (Barney, 1991), where firms achieve sustained competitive advantage by leveraging valuable, rare, inimitable, and non-substitutable resources. Effective strategic management in this regard involves aligning resources and capabilities with market demands to ensure long-term success.

Rosenzweig's framework integrates well with existing strategic decision-making theories, offering a rich understanding of how different types of decisions impact organisational success. This categorisation enriches the theoretical purview along with providing practical insights for executives navigating complex strategic environments. However, a counterargument is submitted by Gavetti (2012) where the author articulates that unlike routine personal choices which are typically referred to as operational decisions, or game theory scenarios with defined possibility spaces, real-world strategic dilemmas involve assessing dynamic market contexts, evaluating multiple stakeholders' interests, and harnessing various organisational resources and capabilities in the pursuit of competitive advantage. This multidimensional process unfolds over extended periods, subject to emergent internal and external constraints and unintended consequences that continually reshape the decision space. Accordingly, the understanding of strategic decision-making inherently involves consideration of strategy as dynamic, continuously responding to changing environments over time, rather than optimisation within static conditions (Smith, 2014; Sinnaiah et al., 2023). In this perspective, effective strategising for decision-making involves not just reacting to discrete events but also flexibly adapting to accelerated and nonlinear change pathways (Arend, 2020; Blundo et al., 2021). This is where Heraclitus noted several centuries ago that change is indeed the only constant. (Kahn, 2004). The overarching insight is that the very game of change is changing itself; it may be no longer possible to rely on predictable linear extrapolation for strategic planning and decision-making.

2.4.2. Characteristics of Strategic Decision-Making

Strategic decisions are typically non-routine and complex and have long-term implications for an organisation's direction and performance (Sinnaiah et al., 2023). Within this turbulent environment, reductionist models falter while executives struggle to reconcile analytical insights with instinctive risk-taking, balancing cogitation with conviction to forge a strategic direction amidst complexity (Carmody-Bubb, 2023). Qualitative judgement melds with quantitative data, scenarios, and probabilistic thinking as leaders feel their way forward as much as they think their way through muddy waters. Through iterative cycles of action and reflection, they may distil some elusive wisdom about correct courses based on imperfect information and intelligence.

Leiblein et al. (2018) purport that strategic decisions are uniquely characterised by both high levels of control and competitive performance requirements, distinguishing them from more common decisions studied in much behavioural research. As elucidated by the authors in an insightful narrative on bridging theory and practice, executives making strategic choices face the challenge of shaping ambiguous futures under uncertainty, committing substantial capital, and binding organisations to paths that determine competitive positioning and performance trajectories. The authors further argue that various perspectives can be adopted in the realm of decision-making. Decisions may be made by individuals or leaders within organisations; other decisions are isolated events, while others are part of a sequential process, where the outcomes of one decision inform and enhance subsequent ones. In contrast, routinised operational decisions lend themselves to structured approaches based on stable rules, strategic choices call for versatility in toggling between cold calculus to diagnose environments and disciplines like game theory to probe rivals' motivations, warm persuasion to enrol stakeholders and mobilise resources, resolute conviction to make leaps and maintain strategic commitment despite uncertainty, and ruthlessness to outmanoeuvre competitors, all while reckoning with one's own cognitive limitations (Rosenzweig, 2013). This agility enables resilient navigation towards ambitious strategic visions.

Within the field of management science, the term "strategic" holds paramount importance. The term 'strategic' may encompass two primary aspects: the decision-making process involved in formulating a strategic plan, which serves as a blueprint for action, and the subsequent implementation of this plan, often referred to as the "roadmap" (Lesca & Lesca, 2014). Both aspects embed the critical role of time; the formulation of a strategic plan is a time-intensive process, and its execution may span several years, extending into the future. Consequently, anticipation emerges as a fundamental prerequisite for effective strategic management. The primary objective is to assist managers in their decision-making processes, particularly those involving strategic information. These decisions form the cornerstone of strategic management.

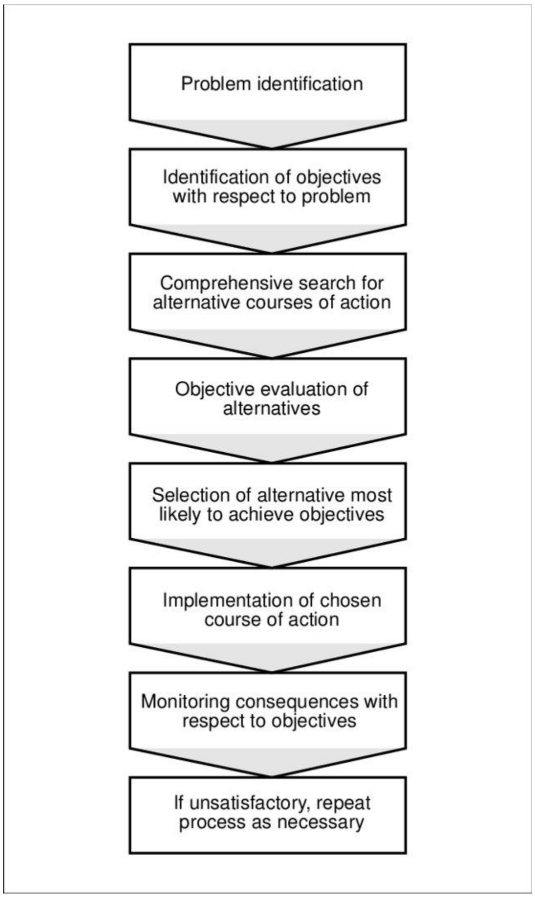
Effective strategic decision-making is heavily reliant on the availability and utilisation of pertinent strategic information, which is generated by one or more information systems. Consequently, there is a significant interdependence between the strategic management of an organisation and the management of its information systems (Galliers et al., 2020). Information systems that provide timely, relevant data on internal operations and the external environment enable leaders to conduct more robust analysis regarding market trends, emerging opportunities and threats, resource allocation tradeoffs, and scenario planning (Szukits & Móricz, 2023; Xu & Quaddus, 2013). A critical inquiry often posed by managers pertains to the current and future strengths of their organisations (Lesca & Lesca, 2014). This line of questioning is pivotal as it informs the decision-making processes essential for ensuring organisational success both in the present and future contexts. Since strategic strength is fluid in nature, it is a proactive search-and-know process for newly emerging drivers of change within the organisational environment. Ferreira et al. (2018) submit that the prerequisite for such drivers to be integrated into strategic decision-making in sustaining the competitive edge of an organisation is the early detection of such drivers and their indicative signals.

In further describing the strategic decision-making context confronting contemporary organisations, an emerging body of scholarship highlights the complexity, uncertainty and temporal dimensions that distinguish strategic choices from routine operational decisions (Shepherd & Rudd, 2014; Kunisch et al., 2017). These decisions unfurl in turbulent environments with limited information availability and perpetually mutating conditions that defy ceteris paribus assumptions underpinning rational economic models (Vecchiato, 2012; Gavetti et al., 2007). Each strategic scenario presents novel constraints on the firm's problem space, resources, and decision latitude. Consequently, decision-makers cannot rely on stable rules or previously validated models to inform evidence-based choices but rather must exercise experiential judgement in assessing probable impacts amidst uncertainty over an extended timeframe in recognition of systemic ripple effects across interconnected organisational elements (Elbanna & Child, 2007). As a case in point, Haslam and Shenoy (2018) propose a discovery-led approach to strategic decision-making. They argue that decisions should be based on a balance of what is known, what is unknown, and what is assumed (i.e., thought to be known). However, managers ought to avoid performing tightly controlled experiments in an obsessive pursuit of the nature of truth. These temporally bounded decision premises carry significant performance implications that may either sustain competitive positioning or severely compromise organisational viability if misjudged or poorly implemented (Teece et al., 2019). The longevity of strategic commitments heightens vulnerability to unforeseeable events outside the firm's control, which can suddenly reshape contextual drivers and inflection points across planning horizons measured in years or decades, especially in capital-intensive industries. Greve (2013) emphasises that the consequences of strategic decisions often only fully emerge over lengthy intervals, as intended and unintended effects compound.

2.4.3. Traditional Rational Models of Strategic Decision-Making

Traditional rational models of strategic decision-making, often rooted in economic theory, present a structured and sequential approach to navigating complex choices. These models, such as the classic SWOT analysis or Porter's Five Forces, emphasise a systematic evaluation of alternatives based on comprehensive data analysis, clear objectives, and presumed ability to accurately predict outcomes (Mintzberg et al., 1976).

Figure 2.33 *Rational Decision-Making Model*



Note. *Proposed by Heracleous (1994).*

However, while seemingly appealing in their structured rationality, these models often fail to account for the complexities inherent in real-world strategic decision contexts (Kahneman & Tversky, 1979). A burgeoning corpus of research highlights numerous limitations. First, the underlying assumptions of perfect information, stability, and predictability rarely hold in dynamic business environments, rendering the models' outputs questionable (Smith, 2020). Furthermore, the rigid sequence of analyses struggles to enable the rapid, iterative adaptation frequently inflicted by unexpected developments or shifting market forces, thus stymying organisational agility and responsiveness (Lee & Jones, 2022). Additionally, the prioritisation of quantifiable metrics risks eclipsing key qualitative factors, like leadership approaches or cultural dimensions, which strategists increasingly recognise as integral to optimal choice evaluation (Williams & Park, 2021). Lastly, the very rationalistic foundations fail to capture the irrational tendencies of human cognition, with biases skewing information flows and judgments even amongst executives (Kahneman & Tversky, 1979). Hence, while ostensibly sensible in controlled conditions, growing evidence reveals the practical deficiencies of these orderly models relative to the intricacies of real-world strategy settings.

Typically, traditional rational models prescribe a systematic, analytical approach to strategic decisions based on objective data collection and utility-maximising choices. However, behavioural decision theory indicates the influence of psychological, social and emotional factors on decision-making processes and outcomes (Barnard, 1938; Cyert & March, 1963; Kahneman, 2003). For instance, heuristics, referring to those intuitive judgements and mental shortcuts that decision-makers resort to in order to simplify a somewhat complex and ambiguous situation, are generally deemed swift and useful, yet can lead to judgment errors and biases (Bingham & Eisenhardt, 2011). Similarly, past experiences shape executives' vision of strategic issues and acceptable solutions, acting as an interpretive filter that may blind them to emerging threats or opportunities that differ from the patterns they recognise (Narayanan et al., 2011). Intuition and 'gut feel' also permeate strategic decisions, interweaving rational deliberation with emotional reactions to risk and moral considerations around stakeholder impacts (Hodgkinson et al., 2009). Group dynamics within top management teams further complicate decisions, as groupthink tendencies stifle dissent while consensus imposes conformity pressures on members (Amason, 1996). Such behavioural aspects interact with contextual factors in shaping strategic decision pathways. As Pettigrew (2014) expounds, overt rational sequencing of evidentiary inputs, alternative evaluation and choice selection becomes entangled with covert political processes, framing struggles, confirmation biases and other socio-cognitive dynamics as executives navigate uncertainty, ambiguity and time constraints.

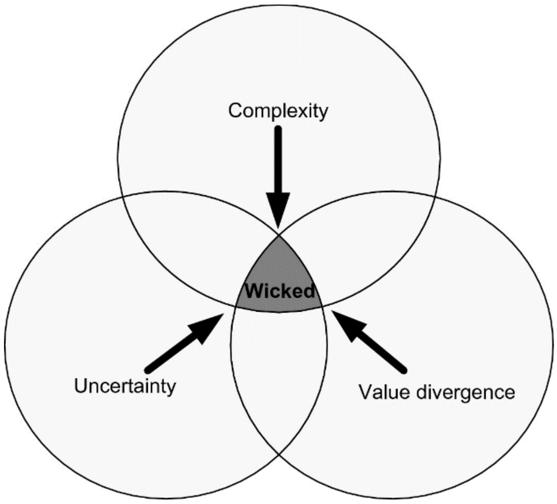
Beyond the rational versus behavioural dichotomy, multicriteria decision-making (MCDM) evolved in a multi-dimensional and integrated schema able to treat the complexity of realistic decision-making contexts far more adequately. MCDM explicitly allows an explanation of complex trade-offs that are often integral to strategic decisions, where multiple, often conflicting criteria must be considered simultaneously (Guitouni & Martel, 1998). In this respect, neither single objective measures nor subjective group consensus adequately conveys the plurality of performance dimensions prioritised by diverse stakeholders (Butler et al., 1997). While the difficulty in MCDM approaches always remains in the codification and structuring of these complex trade-offs, the process of evaluation of alternatives becomes more transparent and rigorous. These methods go beyond mere single-objective optimisation simplicity and integrate numerous criteria, thus giving the decision-maker knowledge about Pareto-optimal solutions-outcomes, at which there can be no improvement in one of the criteria without worsening performance in another (Sahoo & Goswami, 2023). This would enable decision-makers to understand the diverse priorities of different constituencies more clearly and then find solutions that correspond as closely as possible to the multiplicity of relevant criteria. Moreover, MCDM tools allow for the investigation of choice scenarios considering uncertainty; hence, it has an added capability of analysing trade-offs even when information is incomplete or preferences are vague. By so doing, they facilitate a more subtle and flexible approach to decision-making than either a purely rational or behaviourally oriented model. Still, strategic decisions have to bear an even greater amount of flexibility, given the dynamic and multi-dimensional nature of stakeholder interests and performance indicators to be weighed and negotiated. In this respect, MCDM provides a general framework rather than a simple decision support technique aimed at enhancing the quality of choices in complex situations by explicitly integrating and weighting a plurality of perspectives and objectives.

The formal incorporation of financial and non-financial metrics, short-term profits and long-term capabilities, stakeholder utilities, and both quantifiable and intangible factors into an aggregated objective function aims to capture the complex balance of strategic decisions using MCDM techniques (Ishizaka & Nemery, 2013). This enables transparency about value tensions that rational models often obscure through monetisation while tempering the emotional biases that can distort group decisions. However, critiques note that some MCDM techniques still camouflage incommensurate understandings of value behind technical architecture, while belief systems permeate the criterion selection and weighting processes (Munoz et al., 2014). The embedded, politically contested nature of strategy is obscured. Thus, while constituting an advance, MCDM remains bounded by its expert-driven technicism and presentations of unitary organisational intent. Calls persist for approaches that reconcile multidimensional modelling, behavioural cognition, ethical contestation, and adaptive implementation, as strategy emerges through ongoing discourse between organisational actors (White, 2006). While MCDM may shine in structuring decision-making over various criteria, it may fall short in a high level of unpredictability and rapid change (Taherdoost & Madanchian, 2023). Another critical limitation is that, based on predetermined criteria and preferences, MCDM may underperform in rapidly adjusting or being updated by the developing context, according to the authors. Since the priorities of decision-makers are assumed to be fixed, this might result in suboptimal choices. Although comprehensive, MCDM methods do not have the fluidity and dynamism characteristic of decisions requiring continuous review and adaptation within volatile conditions. (Štilić & Puška, 2023).

2.4.4. Contemporary Challenges of Strategic Decision-Making in the VUCA Context

The complexity and interconnectedness of strategic challenges facing modern organisations are increasingly recognised in contemporary management scholarship (O'Shannassy, 2021; Bridoux & Stoelhorst, 2022). The term "wicked problem," originally coined by Rittel and Webber (1973) in the context of urban planning, has been increasingly applied to the realm of strategic management. Camillus (2008) posits that executives are increasingly confronted with strategic challenges that exhibit characteristics of wicked problems for which traditional strategic planning methodologies are inadequate, successfully turning strategic management upside down (McMillan & Overall, 2016). These problems are characterised by their resistance to clear definition, their interconnectedness with other issues, and the absence of clear-cut solutions (Camillus, 2008).

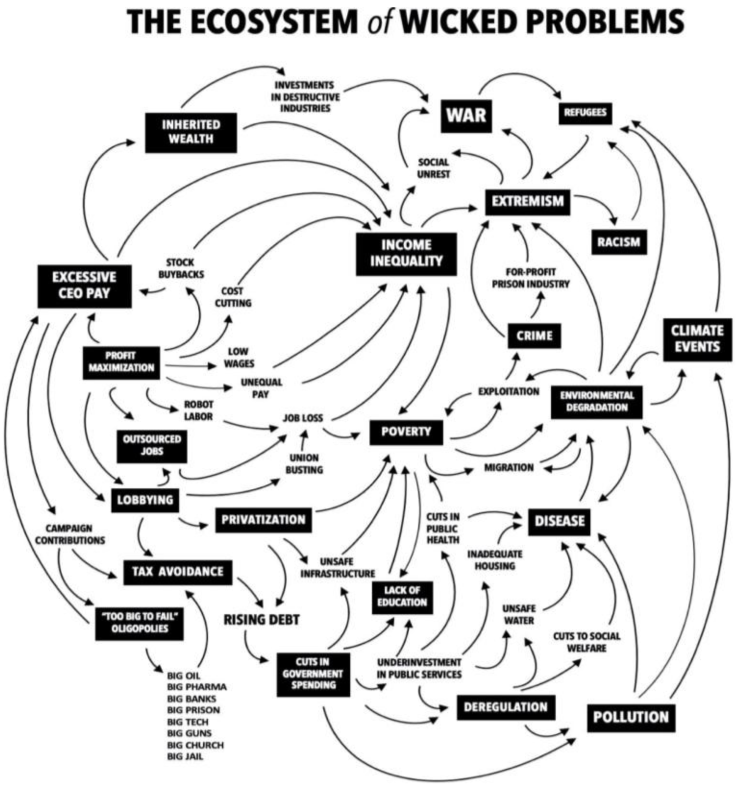
Figure 2.34 *The Rise of 'Wicked Problems' – Uncertainty, Complexity and Divergence Dimensions*



Note. *Wicked problems in public policy (Head, 2022).*

Figure 2.34 presents the interconnected challenges encountered in strategic decision-making, with Head (2022) providing a plausible explanation of how complexity, uncertainty, and value divergence collectively render strategic problems untenable. Kolko (2012) previously expounded on the complexity of wicked problems in strategic decision-making by identifying four primary contributors: incomplete or contradictory knowledge, multiple stakeholders with diverse perspectives, significant economic implications, and the interconnection of the problem with other issues. The complex characteristics of wicked problems frequently lead to organisational discord, confusion, and stakeholder anxiety (Conklin, 2006; Dentoni et al., 2018). Empirical evidence further indicates a rising prevalence of wicked problems in strategic decision-making in recent years. A survey by Neumeier (2009) among executives identified various strategic challenges that correspond with the traits of wicked problems. Challenges include the need to balance long-term objectives with immediate demands, forecast returns on innovation, and align strategy with customer experience. The survey results demonstrate a transition towards increasingly complex and interconnected strategic issues that traditional management techniques cannot readily address (Neumeier, 2009). Sarkar and Kotler (2019) effectively mapped the intricate and interrelated framework of socioeconomic, political, and environmental challenges that shape a system of wicked problems, as shown in Figure 2.35. They illustrate the multi-causal characteristics and cyclical interactions that contribute to the persistence and intractability of these issues. Their analysis emphasises that addressing these problems in isolation is likely to be ineffective without considering the wider social and economic context. Sarkar and Kotler (2019, 2025) advocate for solutions anchored in collective action and community involvement, wherein stakeholders share responsibility for the problem-solving process. Instead of isolating and treating the symptoms of these interrelated crises, this model highlights the requirement for creative and collaborative ways among governments, corporations, and civil society to address their root causes.

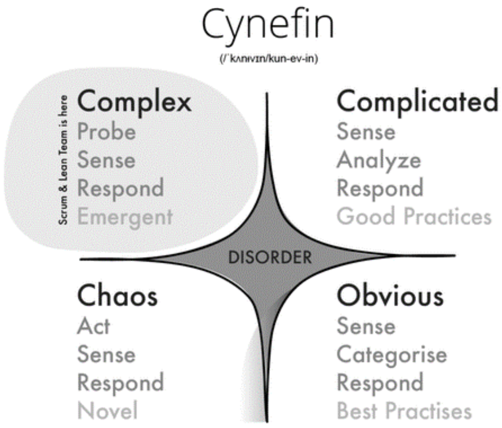
Figure 2.35 *The Ecosystem of Wicked Problems*



Note. *Proposed by Sarkar & Kotler, 2019, 2025.*

Strategic concerns may change over time due to a variety of factors, including but not limited to geopolitical tensions, technological development, globalisation, and sociological changes. Due to industrial convergence and the emergence of disruptive technologies, the strategic environment has grown even more convoluted. Businesses face competition from all angles as the boundaries between sectors become more porous (Hacklin et al., 2025). This tendency is more pronounced in sectors that have been considerably impacted by digital transformation since information technology has disrupted long-standing value chains and business models (Bharadwaj et al., 2023). Labelling strategic challenges as wicked problems may lead to significant alterations in organisational decision-making processes. It is suggested that strategy creation and implementation should adopt more adaptive and collaborative ways as opposed to linear and analytical methods (Head & Alford, 2015). Furthermore, it emphasises the importance of developing organisational capacities that enable companies to effectively navigate complexity and uncertainty (Teece, 2007) rather than depending on conventional decision-making frameworks and tools from the early 1900s, which may be inadequate for addressing modern strategic issues. In light of this, Haslam and Shenoy (2018) call attention to the need for and importance of problem definition in strategic decision-making, emphasising the risks associated with solving the wrong problem. Their work builds upon the foundational concept of "wicked problems" and extends it to address the challenges of problem formulation in an increasingly complex and rapidly changing business environment. The authors argue that the contemporary world is characterised by unprecedented flux, resulting in a propagation of unknowns that organisations must navigate. This observation aligns with the concept of "unknown unknowns," famously articulated by Kurtz and Snowden (2003) in their Cynefin framework which seeks to offer a habitat for executives' decision-making that was relevant to the particular situation under investigation, appreciating that different situations had different habitats, together with an additional central one of disorder.

Figure 2.36 *Classes of System Problems (System Cynefin Domain)*

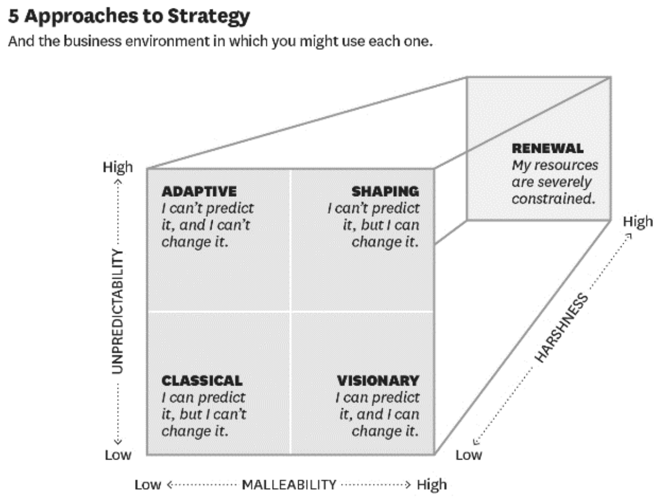


Note. *The new dynamic of strategy: Sensemaking in a complex and complicated world (Kurtz & Snowden, 2003).*

On the one hand, the Cynefin framework, as described by Kurtz and Snowden (2003), provides a typology of decision-making contexts based on the nature of the relationship between cause and effect. The framework identifies four primary habitats: obvious, complicated, complex, and chaotic, with a fifth central domain of disorder. In the simple or obvious habitat, marked by known knowns, the relationship between cause and effect is clear and predictable. Here, Kurtz and Snowden advocate the application of best practices (Kurtz & Snowden, 2003). This aligns with traditional strategic management approaches that assume a high degree of environmental stability and predictability (Mintzberg, 1994). The complicated habitat, dealing with known unknowns, needs careful consideration. Cause and effect exist but may not be obvious or may not have a single solution. The authors recommend using expertise and planning scenarios in this context (Kurtz & Snowden, 2003). This fits the concept of dominant logic in strategic situations where analysis and expertise help by acting as cognitive filters in strategic decision-making (Bettis, 2004). This habitat corresponds to strategic situations where analytical approaches and expert knowledge can be effectively applied (Bettis & Prahalad, 1995). The complex habitat, characterised by unknown unknowns, presents a significantly different challenge. In this context, cause-and-effect relationships can only be discerned retrospectively due to the high degree of interconnectedness and dynamism. The authors advocate for emergent practices in this habitat, aligning with literature on complexity theory and chaos theory in strategic management (Levy, 1994; Stacey, 1995). Finally, the chaotic habitat represents situations where the relationship between cause and effect is unclear and rapidly changing. Snowden proposes a novel practice approach that emphasises quick, decisive action followed by retrospective reflection (Kurtz & Snowden, 2003). This resonates with literature on strategic decision-making in high-velocity environments (Eisenhardt, 1989).

Complementing Snowden's framework, Reeves et al. (2015a) propose a matrix for determining appropriate strategic approaches based on two key variables: predictability and malleability. Their framework, developed at the Boston Consulting Group, offers four broad strategy styles corresponding to different combinations of these variables.

Figure 2.37 *BCG Strategy Matrix*



Note. *Developed by Reeves et al. (2015a).*

The "classical" strategy style, typified by high predictability and low malleability, aligns closely with traditional strategic management approaches. This style is most applicable in stable, mature industries where established strategic frameworks and concepts can be effectively applied (Ansoff, 1965; Porter, 1980). In contrast, the adaptive strategy prioritising organisational flexibility and rapid response capabilities associates more closely with the realities of turbulent environments. Its emphasis on iterative experimentation and continuous learning enables organisations to remain agile in the face of unforeseen challenges. However, this approach is not without its limitations; the constant recalibration it demands can strain organisational resources and potentially lead to strategic incoherence if not carefully managed (Kurtz & Varvakis, 2016; Andersen et al., 2019).

The “shaping” strategy represents a supplementary proactive stance, wherein organisations attempt to actively influence their competitiveness. This approach appears to be seemingly powerful and requires substantial resources and market influence to execute effectively. In turbulent environments, the ability to shape market dynamics can provide a significant competitive advantage. However, the feasibility of this approach is often contingent upon an organisation's size, market position, and available resources, potentially limiting its applicability to smaller or less established entities (Agazu & Kero, 2024; Hagel et al., 2008). The Visionary approach, supported by its long-term orientation and focus on transformative innovation, presents both opportunities and risks in turbulent environments. This compelling vision can galvanise organisational efforts and potentially reshape entire industries. Nonetheless, the inherent unpredictability of turbulent markets increases the risk of strategic misalignment. The success of this approach hinges on the organisation's ability to accurately anticipate future market conditions, a difficult challenge in highly dynamic environments. Lastly, the “renewal” strategy focuses on organisational resilience and resource optimisation. It is particularly relevant for entities facing severe constraints or existential threats. This approach may appeal to organisations seeking survival in times of crisis, but its predominantly defensive posture may limit an organisation's ability to capitalise on emerging opportunities in turbulent markets (Florez-Jimenez et al., 2024).

The taxonomy of strategic approaches submitted by Reeves et al. (2015b) in the context of a turbulent environment lends itself to the argument that no single strategy offers a universal remedy for the challenges of modern business circumstances. Instead, the optimal approach likely involves a judicious synthesis of elements from multiple strategic paradigms. For instance, organisations might benefit from adopting an adaptive core strategy to maintain flexibility and simultaneously incorporate elements of the shaping approach to proactively influence their competitive environment where possible.

Both the Cynefin framework and the BCG strategy styles matrix contribute to a growing body of literature that emphasises the contingent nature of strategic decision-making (Fredrickson, 1984). These frameworks challenge the notion of a one-size-fits-all approach to strategy and stress the need for organisations to develop a selection of strategic approaches and the capability to deploy them appropriately based on environmental conditions. Furthermore, the efficacy of each strategic approach is heavily reliant upon organisational characteristics and environmental factors. Larger organisations with substantial resources may be better positioned to pursue shaping or “visionary” strategies to leverage their market influence to create favourable conditions. Conversely, smaller, more agile entities might find greater success with an “adaptive” approach that capitalises on their ability to pivot rapidly in response to environmental changes.

The management of black swan events, highly improbable occurrences with severe consequences (Taleb, 2008), adds another layer of significant decision challenges in turbulent and unpredictable environments. Aven (2015) contends that conventional risk management approaches often fail to account for these extreme outliers, leaving organisations vulnerable. The author advocates for a shift towards resilience-based strategies that emphasise organisational adaptability and rapid response capabilities rather than attempting to predict and prevent all possible disruptions. The navigation of fluid competitive settings adds further complexity to strategic decision-making in such turbulence. Teece and Leih (2016) posit that dynamic capabilities, the ability to sense, seize, and reconfigure resources in response to environmental changes, are indispensable for sustained competitive advantage in such settings. Despite this, developing and maintaining these capabilities requires significant organisational investment and cultural shifts, each presenting its own set of challenges. Moreover, the interconnected nature of global markets in VUCA environments amplifies the domino and ripple effects of strategic decisions. Kunisch et al. (2017) show how the temporal dimensions of strategic change have become more compressed; hence, management requires leaders to balance short-term adaptability with long-term vision in increasingly shorter cycles. This temporal compression exacerbates the difficulty of making well-informed strategic choices, as the consequences of decisions may manifest more rapidly and unpredictably than in more stable environments.

Building on the challenges presented by the increasingly turbulent and dynamic environments, strategic decision-making needs a profound overhauling of the organisational mindset and capabilities. Traditional rational models, predicated on predictability and linear analysis, are starkly evident in their inability to effectively address the complex, interconnected, and evolving nature of wicked problems. Behavioural decision theory, although it acknowledges the agency of human factors in shaping decision-making processes, nonetheless falls short in providing a comprehensive framework for navigating turbulence and uncertainty. The integration of cognitive and social psychological insights, although valuable, fails to fully account for the dynamic interplay between organisational, environmental, and contextual factors that underpin strategic decision-making in such settings.

Alternative models like MCDM offer a more relatable approach to decision-making, one that acknowledges the multiplicity of factors and stakeholders involved, but their reliance on technical expertise and assumptions of unitary organisational intent limit their practical applicability in contexts characterised by a myriad of competing interests and uncertain environmental conditions. In contrast, the Cynefin framework and the BCG strategy styles matrix highlight the contingent nature of strategic decision-making, stressing the need for organisations to develop a diverse repertoire of approaches and the capacity to deploy them in a context-dependent manner.

In the overarching view, despite its centrality in organisational decision-making, traditional strategic management frameworks in this field often fail to offer the adaptability and foresight needed in highly volatile, uncertain, complex and ambiguous settings. Many influential strategic models assume stability and predictability, using past data, long-term plans, and linear causality (Mintzberg et al., 1998). However, the turbulence of VUCA environments challenges these assumptions and renders inflexible and static strategies inadequate. Thus, the key prominence of strategic management for organisational direction is limited by its struggle to provide appropriate responsiveness and insight under VUCA conditions. Reformulating management strategy to address VUCA dynamics remains an important challenge.

A key limitation is that conventional strategic management prioritises structured analysis and long-term forecasting, both undermined by rapid, unpredictable market shifts (Teece et al., 2016). Volatility erodes the reliability of strategic predictions, uncertainty limits the applicability of historical insights, and complexity overwhelms traditional decision-making models. Furthermore, in ambiguous settings where causal links are unclear and multiple interpretations exist, developing effective strategies becomes even more difficult (Bennett & Lemoine, 2014). While dynamic capabilities theory (Teece, 2007) tries to tackle these issues by promoting organisational agility and adaptability, firms often lack the real-time insights needed to implement such flexibility well. Without a way to continuously gather, analyse and act on emerging intelligence, organisations risk making delayed or misinformed strategic choices. Along similar lines, the increasing prevalence of wicked problems, black swan events, and the rapid pace of change in such environments need even more sophisticated and adaptive approaches to strategic decision-making.

Given these shortcomings, CI emerges as a vital complement to strategic management. CI offers real-time insights, anticipatory decision-making, and a structured approach to navigating VUCA complexity. CI can address the gaps left by traditional strategy approaches to equip firms with a more proactive and informed response to environmental uncertainty. The potential for CI to enhance strategic decision-making in turbulent conditions underscores its value as a complement to established strategy frameworks. The CI's ability to offer timely insights and adaptability empowers organisations to effectively navigate volatility, uncertainty, complexity and ambiguity. The next section delves deeper into examining the role of CI in navigating turbulent and dynamic environments, exploring its definition, processes, and strategic value. The next section explores how CI enhances strategic decision-making to address the gaps left by traditional approaches and equip firms with a more proactive and informed response to environmental uncertainty.

2.5. Competitive Intelligence (CI)

2.5.1. The Context of Intelligence in Competitive Intelligence

This section on CI assumes a central role within the overarching framework of this dissertation. Conceptualised as an analytical process devoted to gathering and analysing information about competitors, market dynamics, and external threats, CI emerged as a foundational pillar that underpins informed strategic decision-making (Cavallo et al., 2020). The infusion of environmental insights proves particularly indispensable in navigating VUCA, where outpaced traditional strategic planning models grow vulnerable to external turbulences. Far from an isolated tactic, CI occupies an integrative position at the nexus between external intelligence gathering and internal organisational intelligence, hence serving as a critical transmission channel that keeps the organisational worldview permeable to emerging realities.

To better understand CI, it is essential to first unpack the meaning of "intelligence" within this specific context. According to the Oxford Dictionary, intelligence is defined in two key ways: 1) *the ability to acquire and apply knowledge and skills* and 2) *the collection of information of military or political value* (Oxford Dictionary of English, 2010). The first definition characterises intelligence as the capacity to acquire and deploy knowledge and skills. The second is a more specialised definition that frames intelligence as data collection to inform military and political operations, a usage that may evoke espionage undertones. The word 'competitive', on the other hand, means, according to the Oxford Dictionary, *as good as or better than others of comparable nature* (Oxford Dictionary of English, 2010). The fusion of the intelligence duality with the notion of 'competitive' logically spawns the theoretical foundations for CI. The term "intelligence gathering" is frequently espoused within contemporary CI discourse (Sahin & Bisson, 2020). However, this locution, which is similar to the concept of strategy, is arguably more germane within military contexts, wherein intelligence denotes clandestinely garnered information provided to policymakers by governmental agencies (Baylis et al., 2019). By contrast, prevailing definitions within CI scholarship conceptualise intelligence more expansively as any actionable information furnishing organisations with a competitive advantage (Prescott & Miller, 2002). CI thus involves proactive research of market trends, competitor behaviours and other external dynamics to inform strategic foresight and decision-making (Amarouche et al., 2015; Bulger, 2013). Sharp (2009) expounds that robust CI harnesses extensive information flows as input for analysis aimed at yielding optimal strategic recommendations. By comprehending emergent market pressures in granular detail, CI enables fact-based, objective insights concerning current and projected industry forces that empower executives to formulate strategies aligned with external realities (Calof & Breakspeare, 1999). The integral role of CI in creating informed organisational strategy is thus well-established in the literature.

It is axiomatic that the core premise of CI maintains substantial theoretical overlap with environmental scanning approaches in strategic management, with both processes centred on assimilating and analysing external data to enrich decision-making (Ramírez & Selsky, 2016). Yet, despite the surface commonalities, several factors distinguish CI's value contribution relative to precedential analytics paradigms. Most critically, CI exhibits a more targeted focus on illuminating dynamics explicitly tied to competitive positioning, benchmarking, and opportunity recognition. Essentially, CI moves beyond descriptive scanning to channelling analytical assets directly towards those signals with implications for competitive strategy (Du Toit, 2015). Søilen (2017) demonstrates how CI leverages advanced computational techniques to parse volumes of data to derive timely inferences unavailable to conventional qualitative models. Likewise, Marín et al. (2022) underline CI's assimilation of unstructured data sources using next-generation semantics and machine learning algorithms. Researchers contend that these structural advantages in both technological apparatuses and analytic focus significantly augment strategy development compared to traditional scanning approaches. Specifically, enhanced environmental clarity regarding competitive blind spots and inflection points manifests in tangible strategic outputs such as improved pricing models, personalised customer solutions, and disruptive growth opportunities.

Nonetheless, one may argue that given the dominant feature of intelligence in CI is heavily related to the vital role of information quality and its source, CI practitioners may sometimes be tempted to sidestep rules and resort to unethical methods to access sensitive data and information. For a practice to persist, it needs to achieve technical or social value, do good or look good (Kennedy & Fiss, 2009). This argument may be defensible to some extent, especially since CI overtly borrows techniques from the military and uses similar patterns of thinking, such as defeating the enemy in a "business-as-war" context (Fleisher & Blackhorn, 2013). Consequently, intelligence in CI has often been misunderstood as a sort of business espionage (Colakoglu, 2011). Proponents of CI claim that it involves the ethical collection of information (Adeyelure et al., 2018; Anica-Popa & Cucui,2009; Hirvensalo, 2004; Saayman et al., 2008; SCIP, 2024). On the contrary, sceptics allege that CI may not be valuable unless it is characterised by the use of distinctive sources and mediums not readily available to competitors or has distinctive capabilities that are difficult to imitate in terms of information collection (Markovich et al., 2022). This argument appears to be sustainable in the sense that it corroborates the idea of Baylis et al. (2019) about the secrecy and value of information that distinguishes government-level information from business-level information. Undoubtedly, the government-level information far outweighs the individual-level information in value because of its national interest characteristics. For national threats, the means-ends rationality principle applies to safeguard the interest of a country by all means possible. This could hint at the concept of Machiavellianism in the context of strategy; The information type, source and medium may justifiably not be bound by rules or ethics. Unlike business level-information which is, ipso-facto, delimited by the data protection act (GOV.UK, 2020), Competition law (GOV.UK, 2019) and other industry-related regulations. Although this may undermine the role of information in CI, hence upending the whole CI practice, Fuld (1995) claims that even though companies have equal access to information, only the ones capable of turning such information into actionable intelligence will be the ones to win the game.

Much of the criticism that CI attracted relates to the ability of intelligence in the context of CI to obtain idiosyncratic data and information to create CI value (de las Heras-Rosas & Herrera, 2021). Two variables, in particular, have been questioned: (1) the source of information and (2) the medium used to obtain that information, both of which need to be ethical. However, from one perspective, in terms of the first variable, McGonagle & Vella (2002) report in a case for CI that 80% of the information needed by organisations to understand their market and competitors and to make key decisions is already public. From another perspective, the second variable has raised concerns among many CI researchers (Anica-Popa & Cucui, 2009; Fleisher & Bensoussan, 2003). They cast a critical eye on the notion that the internet, being the most significant source of information for CI, can confer a competitive advantage, considering that competitors also have affordable access to this information source and medium. As a consequence, these challengers express scepticism about classifying CI as a new discipline (Calof et al., 2015).

Intelligence, within the context of CI, is a multilayered concept. Fernandes and Juan (2019) contend that the concept of intelligence extends beyond the external dimensions of organisations where it has traditionally been applied, it must also encompass the internal domain referred to as organisational intelligence that includes the core operational functions, the flexibility in resource allocations, the critical nature of systems architecture, and the insights derived from management. Accordingly, Liebowitz (2006) previously qualified organisational intelligence as the critical component of CI, incorporating the internal collective knowledge, skills, and capabilities of an organisation to effectively process, interpret, and use information for strategic decision-making. Building on this concept, research has highlighted the importance of fostering an environment conducive to developing and leveraging organisational intelligence within the context of CI (Madureira et al.,2023), particularly alluding to the integration of CI into organisational management processes.

The nurturing of a culture that promotes knowledge sharing, collaboration, and continuous learning among employees is essential for the development of organisational intelligence (Leidner & Becerra-Fernandez, 2008). Almost all intelligence definitions in CI literature refer to the military cycle of intelligence (Gilad, 2015; Hoppe, 2015; Pellisier & Nenzhelele, 2013; Muller, 2006; Juhari & Stephens, 2006; Shiner, 1989; Treviño & Weaver, 1997), namely data and information gathering, information analysis and intelligence dissemination. However, Phythian (2013) presents a compelling argument regarding the intelligence cycle, which underpins the core of CI. The intelligence cycle involves educating decision-makers on requirements for information, collecting relevant data, evaluating the data for reliability, analysing their significance, disseminating the resulting intelligence product to decision-makers, and then restarting the process by passing the decision-makers updated requirements to the collectors. Phythian (2013) suggests that this cycle presents a paradox, as it has become an almost unquestioned theological concept despite its limitations in accurately representing the way contemporary intelligence is organised and proceeds. As a result, the author calls for a more critical approach to the concept of the intelligence cycle.

The debate surrounding the intelligence dichotomy in CI can be traced back to seminal works in the field. Porter (1980) emphasised the importance of gathering and analysing information about competitors to gain a strategic advantage. However, Kahaner (1996) cautioned against the use of unethical means to acquire such information, stressing the need for a balanced approach that respects legal and moral boundaries. Lately, Vriens and Søilen (2014) have explored the ethical dimensions of CI, proposing a framework that integrates ethical considerations into the CI process. In that respect, any effort at a comprehensive understanding of the concept of intelligence within the domain of CI necessarily depends on an understanding of its historical evolution, which is presented in the succeeding section on CI Etymology. Such a study lays the groundwork for contextualising the evolution of the discipline over time, thereby stressing milestones and theoretical developments relevant to its current framework.

2.5.2. Competitive Intelligence Etymology

2.5.2.1. Historical Evolution of Competitive Intelligence

Throughout history, the meaning of CI has varied among different individuals. Historical incidences describe the evolution of CI since the concept of monitoring competition and competitive forces was initiated by the first American director of marketing in 1920 (Johari et al., 2006). Some scholars argue that CI is as old as conflict itself, tracing its origins back to c. 1000 B.C. (Phytian, 2013). In this context, historical speculators claim to identify instances of CI in religious texts from c. 1000 B.C., which describe situations where military intelligence was used for various decision-making processes (conquest of Canaan). This was followed by Wickham in the c. 1500s, who was sent to China to gather intelligence that would enhance England's economic and military competitiveness. The highly dispersed body of knowledge characterising the concept of CI has generated numerous meanings and understandings (Soilen, 2015).

Prescott (1999) was among the first to propose a structured model that outlines the evolutionary development of CI within organisations. His model identifies a progression through four key phases: (1) Reactive CI, as conceptualised by Prescott (1999), is characterised by ad hoc and event-driven information gathering. It is characterised by episodic intelligence gathering triggered primarily by competitive crises or specific market events. During this embryonic stage, organisations lack formalised intelligence processes, instead relying on impromptu data collection that often emerges as a direct response to competitive pressures rather than as part of a deliberate strategic approach. (2) proactive CI, involving formal processes and regular analysis. As organisations recognise the limitations of such ad hoc approaches, they frequently progress toward proactive CI. Here, one observes the emergence of structured intelligence protocols, regular analytical processes, and dedicated resources allocated specifically to competitive monitoring. The intelligence function begins to anticipate informational needs rather than merely responding to them after the fact. (3) networked CI, marked by organisation-wide intelligence sharing and collaboration. This phase represents a significant qualitative shift wherein intelligence activities transcend departmental boundaries to become a distributed organisational capability. This phase is distinguished by cross-functional collaboration, systematic knowledge sharing, and the development of intelligence networks that span various organisational units to strengthen a collective intelligence consciousness throughout the enterprise. And (4) embedded CI, which is considered the most advanced phase where intelligence becomes a core strategic capability integrated into decision-making at all levels. At this level of maturity, CI transforms from a distinct function into a pervasive organisational capability that informs decision-making processes at all levels. Intelligence considerations become reflexively incorporated into strategic deliberations, operational planning, and tactical execution.

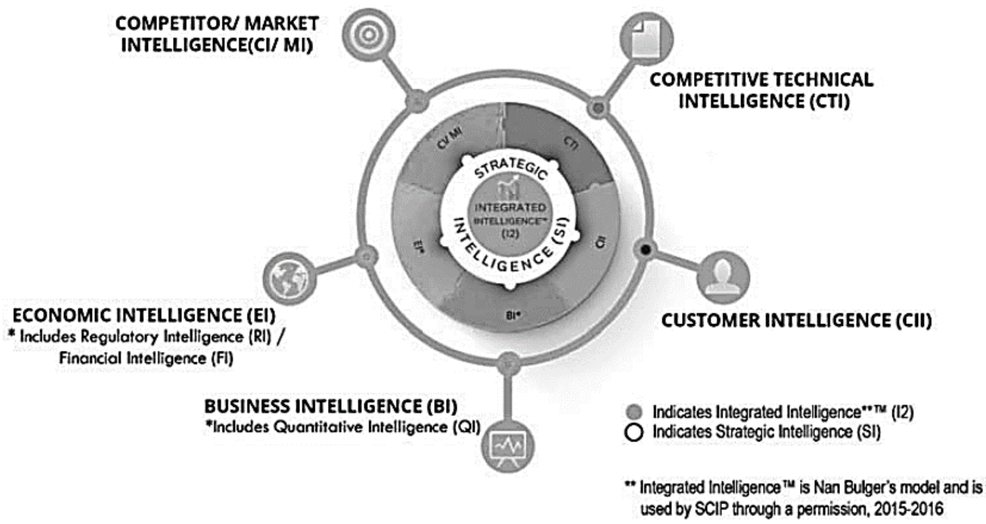
Prescott's developmental framework continues to offer researchers and practitioners a significant theoretical lens through which to assess and understand the evolutionary trajectory of CI capabilities within organisational settings. Its enduring relevance stems from its ability to capture the progressive institutionalisation of intelligence as a strategic organisational resource.

Building upon and refining this progression, Madureira (2023b) presents a contemporary empirical validation of CI's evolutionary stages using a data-driven approach. His model not only confirms earlier notions of phased development but also introduces new dimensions, such as the integration of design thinking and digital intelligence capabilities as indicators of CI maturity. Madureira's work is especially relevant in today's volatile and data-saturated environments as it offers a refined understanding of how CI evolves from a fragmented practice to a dynamic, anticipatory, and value-generating discipline. Together, these models provide a valuable framework for contextualising the empirical and theoretical developments discussed throughout this thesis, particularly as they relate to CI's growing role in managing uncertainty and complexity.

From the point of view of Bulger (2016), the CI field has undergone significant evolution since its emergence approximately three decades ago. The discipline's origins can be traced back to the founding of the Strategic Consortium of Intelligence Professionals (SCIP), a non-profit organisation that initially focused on developing assessments and conducting research to help organisations gain and maintain a competitive edge. These early CI efforts relied heavily on the Fuld intelligence cycle framework (Fuld, 1995) and focused on producing "actionable intelligence" through the triangulation of primary research, human intelligence (HUMINT) techniques, and secondary research (Bulger, 2016). Nevertheless, according to the same author, the CI function often operates in isolation from other critical decision-influencing functions such as customer insights, predictive forecasting, strategic planning, and marketing (Bulger, 2016). This siloed approach, coupled with confusion surrounding the definition of intelligence and CI's optimal placement within the organisational structure, led to the struggle or failure of some CI functions, while others developed unique "homegrown systems" to meet their companies' needs (Bulger, 2016).

As the discipline matured, it became evident that intelligence dispersed across various parts of the organisation was not being fully employed. Fuld (1995) claimed that "*80% of a company's intelligence is internal to the company*", accenting the importance of increased information sharing and collaboration (as cited in Bulger, 2016). Additionally, questions emerged regarding whether CI was tactical or strategic in nature (Bulger, 2016). In recent years, the confluence of globalisation, abundant accessible data, accelerated innovation cycles, and the necessity for comprehensive decision support systems in dynamic markets has driven the transformation of CI into a more advanced and integrated discipline known as "integrated intelligence" or "integrated CI" (Bulger, 2011).

Figure 2.38 *The Integrated Intelligence™ Model*



Note. *Proposed by Bulger (2011).*

The combination of data from several information sources forms an integrated information model that examines the business environment as a whole. These intelligence pools include information about businesses, customers, the economy, markets, competitors, and technical developments in the competitive environment. This model suggests that by integrating data from many sources, one can obtain a clearer picture of the market's present and future conditions. Efforts in integrated intelligence synthesise diverse inputs to produce suggestions that create competitive advantage through action. Another point that could be of relevance when further and more fully elaborating on the CI domain is Gardner's theory of multiple intelligences, dating from 1983 (Gardner, 1983), which gives weight to types of intelligence and their incorporation, from linguistic to interpersonal. This theory thus draws parallels to the concept that Bulger used in 2011 to support her integrated intelligence model. Bulger's (2016) seminal work, as a result, presents a transformative approach to synthesising diverse intelligence streams within an organisation to enhance strategic decision-making. However, despite its promising framework, the model is not without its limitations, which warrant critical examination.

First, the implementation of an integrated intelligence model is inherently resource-intensive. It requires considerable investments of time, personnel, and financial resources. The complex process of integrating insights from various intelligence pools, such as economic intelligence, market intelligence, competitor intelligence, competitive technical intelligence, business intelligence, and customer insights, demands substantial organisational commitment (Bulger, 2016). For many organisations, particularly those with constrained resources, the challenge lies in justifying and allocating the necessary investments to develop and sustain such a comprehensive intelligence function. Second, a critical impediment to the success of the integrated intelligence model is the pervasive existence of organisational silos. These silos often foster a culture of inertia, insularity and resistance to change, which can significantly impede the collaborative efforts required by an integrated intelligence approach (Bulger, 2016). Overcoming these entrenched barriers demands a profound shift in organisational culture and mindset, a transformation that is neither swift nor straightforward. The reluctance to dismantle established silos and embrace a more collaborative paradigm remains a challenge. Third, the effectiveness of the integrated intelligence model is heavily reliant on the quality and integration of data from diverse sources. Challenges such as poor data quality, inconsistencies in data formats, and the complexities of integrating data from disparate systems can severely undermine the model's effectiveness (Whang et al., 2023). Ensuring the reliability and usability of intelligence outputs takes robust data management and integration strategies. Organisations must invest in these foundational elements to safeguard the integrity of their intelligence processes. Fourth, the successful deployment of an integrated intelligence model demands a broad spectrum of skills, including data analysis, market research, CI, and strategic thinking (Paiuc, 2024). However, the availability of individuals possessing these multifaceted capabilities is limited. The scarcity of such talent poses a significant challenge, compelling organisations to either invest heavily in training and development programmes or face the risk of inadequate expertise undermining their intelligence efforts. Fifth, the integrated intelligence model is fundamentally designed to strengthen long-term strategic decision-making and competitive advantage (Bulger, 2016). Yet, organisations frequently grapple with immediate operational pressures that can detract from the focus and resources needed to develop an integrated intelligence function. Striking a balance between addressing urgent short-term priorities and committing to long-term strategic objectives remains a delicate and persistent challenge.

Lastly, one of the more elusive aspects of the integrated intelligence model is the quantification of its impact and return on investment (ROI). The benefits of enhanced decision-making and competitive advantage, while potentially profound, are not always readily apparent or quantifiable (Bulger, 2016). This ambiguity can make it difficult for organisations to justify the continued investment in integrated intelligence initiatives. Developing clear metrics and performance indicators to assess the effectiveness of these efforts is sine qua non for demonstrating their value and securing ongoing support.

2.5.2.2. Defining Competitive Intelligence

The Society of Competitive Intelligence Professionals (SCIP), rebranded as the Strategic Competitive Intelligence Professionals in 2021 and most recently rebranded as Strategic Consortium of Intelligence Professionals (SCIP) in 2024, is widely recognised as a preeminent authority in the field of CI. SCIP boast a substantial body of research, disseminated through its peer-reviewed academic journal, the 'Competitive Intelligence Review', which was established in 1990. The conceptualisation of CI, as per SCI professionals, has undergone several revisions over time. The most recent definition posits that "*CI is a discipline that empowers organisations to mitigate strategic risks and maximise revenue opportunities" (SCIP, 2024)*. This is accomplished by incorporating a comprehensive understanding of the operational environment's past, present, and prospective future developments (SCIP, 2024). The evolution of some prior CI definitions in the SCIP webpage, as reported by various scholars, is delineated in Table 2.1.

Table 2.1 *Evolution of Earlier Definitions of CI according to SCIP*

Year	CI definition	Source
2017	The process of legally and ethically gathering and analysing information about competitors and the industries in which they operate to help your organisation make better decisions and reach its goals	scip.org, 2017
2011	The process of monitoring the competitive environment and analysing the findings in the context of internal issues for decision support	scip.org, 2011
2004-2005	A systematic and ethical programme for gathering, analysing, and managing external information that can affect your company's plans, decisions and operations	scip.org, 2005 scip.org, 2004

Comparing the SCIP's most recent CI definition with earlier definitions, one can extrapolate that the concept of CI has evolved to become more comprehensive and strategic (Madureira, 2023b). The focus has shifted from merely gathering and analysing information to using this information to reduce strategic risk and increase revenue opportunities. The emphasis on understanding past, present, and future scenarios in the operational environment suggests a more proactive and forward-looking approach to CI.

Moving beyond the professional definitions provided by SCIP, the academic community also offers a plethora of interpretations of CI. Notably, a comprehensive study conducted by Madureira et al. (2021) sought to unify the field of CI under a single, common understanding. This involved a meticulous examination of a substantial corpus of 2518 publications, categorised into thirteen types, using a variety of rigorous scientific methodologies. The results revealed a definition that aligns with the above-mentioned SCIP's definition and found that "*CI is the process, and forward-looking practices used in producing knowledge about the competitive environment to improve organisational performance*" However, subsequent work by the same authors (Madureira et al., 2023b) appears to slightly diverge from the initially proposed unified definitions to incorporate the mindset of design thinking (DT) and reemphasising aspects of the traditional definition that CI involves gathering, analysing information about the competitive environment to enhance firm performance (Madureira et al., 2019). A parallel endeavour was previously undertaken by Pellissier & Nenzhelele (2013), who also sought to unify the CI definition and concluded that CI is the process or practice that produces and disseminates actionable intelligence by planning, ethically and legally collecting, processing, and analysing information from and about the internal and external or competitive environment to assist decision-makers in decision-making and to confer a competitive advantage to the enterprise.

These works collectively contribute to the ongoing discourse on the definition and scope of CI in the academic literature. However, given that the majority of definitions that have emerged over time primarily differ in virtue of semantics and emphasis (Wright et al., 2009), it prompts an important question. Does the definition proposed by the authors introduce a novel perspective addressing the challenges faced by the CI field, or is it merely a bibliographic consolidation distinguished only by its semantics and emphasis? Sharp (2009) formerly proposed a definition of CI (CI) that highlighted its comprehensive nature and orientation toward informed action. Specifically, Sharp conceptualised CI as incorporating knowledge and foreknowledge pertaining to the full range of factors in a firm's business environment, ultimately enabling data-driven organisational strategy and decision-making. Knowledge encompasses recognised information and contexts from the past that inform understandings of historical trends and relationships, thereby establishing an evidentiary baseline.

As per Sharp (2009), foreknowledge consists of insights, signals, projections, and prognostications focused on probable near-term scenarios and developments. By integrating retrospective and prospective intelligence across the complete set of internal and external variables with potential material impacts, Sharp's definition positions CI as a critical capability for anticipating and navigating strategic uncertainties. This contemporaneous approach to surfacing and leveraging business insights for adaptation and advantage emphasises CI's core value in driving actionable analytics across the enterprise. Nevertheless, it is believed that the concept of knowledge has always been part of CI since its onset and has continued to be exhibited in later studies, although the field of CI nowadays has matured beyond knowledge management. For example, Fleisher and Blenkhorn (2003) conclude that CI is the ultimate aspiration of knowledge management (KM), a conclusion that directly challenges the pervasive but specious argument that CI is a subdiscipline of KM.

Figure 2.39 *Integrating CI and KM into Knowledge-Based Strategy*

Evolutionary Phase of Knowledge Theory	Functional discipline	Purview	Knowledge Characteristics
WAVE #3	Competitive Intelligence	Future Business Models	• Exploration of new external knowledge that will secure future competitive advantage • Building and testing strategy prototypes • Developing disconcerting hypotheses • Discovering disconfirming evidence
WAVE #2	KM - focus on tacit knowledge	Current Business Models	• Exploitation of existing internal knowledge that temporarily sustains the current source of competitive advantage • Fine-tuning current strategy • Knowledge embedded in company processes and activity systems
WAVE #1	KM – focus on explicit knowledge	Past Business Models	• Codification of previously generated knowledge • Knowledge that has essentially been appropriated/imitated by every firm in the industry • Knowledge that has already or will soon lose its ability to generate competitive advantage • Necessary but insufficient competitive parameters - hygiene factors • Knowledge required for operational excellence

Increasingly Sustainable Competitive Advantage

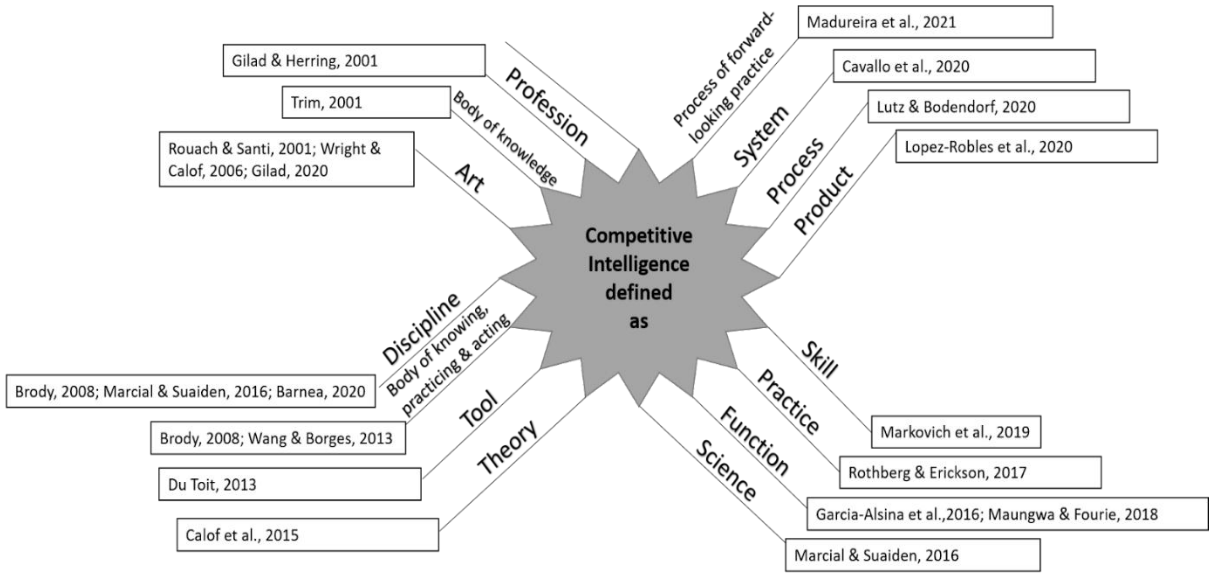
Note. Fleisher and Blenkhorn (2003)

The authors propose an organised construct for knowledge-based strategy and submit that CI should be regarded as the adaptive evolutionary capacity required for future business success, while KM should be viewed as the capability required for the regulation of internal functions that are necessary for the successful execution of the firm’s current business model. In other words, CI's role is to warn organisations about environmental turbulence that may require redirecting the focus of KM processes from the current business model to new or modified business models. Simply put, CI acts as an early warning system that assists an organisation in detecting and responding to external changes, while KM manages the internal knowledge needed to operate and adapt the business model efficiently.

Differing from the above discussion, Gilad (2001) took a different stance and provided an incisive critique of conventional CI practice, arguing that the field requires fundamental re-conception beyond informational support services. The author contends that overly bureaucratic CI units, mired in basic data collection and environmental scanning activities, ultimately diminish organisational viability without advancing strategy (Gilad, 2001). Specifically, Gilad contends that the raison d'être of intelligence pivots on elucidating uncertainty, not simply accumulating inert signals (2001). As with military intelligence, insights must directly shape preparations and contingencies against threats actively working counter to one's interests. Consequently, the author advocates reorienting corporate CI culture around risk orientation rather than treating competitors and channel partners as passive entities. This requires analysts to adopt the mindset that competitive advantage requires constant reinforcement in zero-sum markets.

Much of the academic literature on the CI definition exhibits both polysemy, associated with two or more related meanings (Madureira, 2021; Vicente & Falkun, 2017), and synonymy, which has the same meaning as other terms (López-Robles et al., 2020). This condition engendered entanglement of meanings and synonyms and created confusion of CI with other fields (López-Robles et al., 2019), such as environmental scanning (Oraee et al., 2020), competitor intelligence (Fuld, 1985), market intelligence (Kohli et al., 1993), marketing intelligence (McGonagle, 2016) and even economic intelligence (Franco et al., 2011). Fleisher and Blenkhorn (2003) contend that practices falling under the guise of CI often overlap with other functional areas. Correspondingly, Hoppe (2015) and Solberg-Søilen (2016) inquired and examined whether CI can be considered a scientific field provided that academics and professionals of CI have been unable to agree on what dimensions, concepts or material are covered by their own field of study. Figure 2.40 portrays the wide array of CI categorisations followed by a table delineating the associated definitions from the literature with corresponding authors and dates ranging from 2001 to 2021.

Figure 2.40 *Compilation of CI Definitions from 2001-2021 with Authors*



Note. *Adapted from multiple scholarly works.*

The figure below illustrates the diverse array of CI definitions found in the literature, with corresponding authors and dates ranging from 2001 to 2021.

Table 2.2 *Categorisation and Definitions of CI by Various Authors*

Author(s)	Year	CI categorise as	Defined as
Gilad	2001	Profession	Systematic collection and analysis of information about competitors' activities and general business trends to further the goals of an organisation.
Trim	2001	Body of Knowledge	Identifying and analysing the external environment to support strategic decision-making.
Rouach & Santi	2001	Art	Integration of CI into organisational processes for improved strategic outcomes.
Wright & Calof	2006	Theory	Integration of CI into organisational processes for improved strategic outcomes.
Gilad	2020	Art	Integration of CI into organisational processes for improved strategic outcomes.
Brody	2008	Discipline	Continuous monitoring of the business environment and the importance of actionable insights.
Marcial & Suaiden	2016	Discipline	Continuous monitoring of the business environment and the importance of actionable insights.

Barnea	2020	Discipline	Continuous monitoring of the business environment and the importance of actionable insights.
Wang & Borges	2013	Body of knowing, practicing, and acting	CI provides a competitive edge by transforming raw data into strategic knowledge.
Du Toit	2013	Tool	Emphasises the role of technology and data analytics in CI.
Calof et al.	2015	Theory	Emphasises the role of technology and data analytics in CI.
Garcia-Alsina et al.	2016	Function	Integration of CI with other business functions and the need for a more holistic approach.
Maungwa & Fourie	2018	Function	Integration of CI with other business functions and the need for a more holistic approach.
Madureira et al.	2021	Process of forward-looking practice	Strategic role of CI in navigating complex and uncertain business environments, focusing on agility and adaptability.
Cavallo et al.	2020	System	Strategic role of CI in navigating complex and uncertain business environments, focusing on agility and adaptability.
Lutz & Bodendorf	2020	Process	Strategic role of CI in navigating complex and uncertain business environments, focusing on agility and adaptability.
López-Robles et al.	2020	Product	Strategic role of CI in navigating complex and uncertain business environments, focusing on agility and adaptability.
Markovich et al.	2019	Skill	Importance of CI in innovation and supporting competitive strategies.
Rothberg & Erickson	2017	Practice	Importance of CI in innovation and supporting competitive strategies.

In synthesis, CI is a field with many interpretations (Madureira et al., 2021; Franco et al., 2011). An extensive review of CI literature reveals a plethora of definitions; however, despite the specifics, CI definitions have evolved over time. The core notion of CI as a systematic process that ethically and legally collects, analyses, and disseminates actionable external intelligence to inform strategic decisions and provide a competitive advantage has remained consistent across the literature.

2.5.3. Imperative of Competitive Intelligence for Strategic Management in the VUCA Era

The integration of CI with strategic management represents not merely an incremental improvement in organisational practice but rather a fundamental paradigm shift needed by the evolving nature of business conditions. As Bennett and Lemoine (2014) astutely observe, the VUCA paradigm has irrevocably transformed the terrain upon which strategic decisions are made, thus making conventional approaches increasingly obsolete. This transformation demands a corresponding evolution in strategic methodologies, with CI emerging as a critical catalyst for this adaptation.

Traditional strategic frameworks developed during periods of comparative market predictability exhibit significant structural limitations when confronted with contemporary business realities. The SWOT analysis, PESTLE framework, and Porter's Five Forces were once the bedrock of strategic planning and currently increasingly represent what Teece (2018a) describes as "analytical straightjackets" that constrain rather than enhance decision-making in dynamic environments. These tools, with their emphasis on point-in-time assessment and linear causal relationships, fundamentally misalign with the non-linear and networked nature of modern competitive ecosystems (D'Aveni et al., 2010). In contrast, CI offers a methodological orientation that is inherently sympathetic to VUCA conditions. Rothberg and Erickson (2017) demonstrate how CI's systematic approach to environmental scanning assists in the identification of weak signals and emergent patterns that static analyses frequently overlook. This dynamic perspective enables what Helfat and Peteraf (2015) term "strategic foresight", involving the capacity to anticipate competitive shifts before they manifest as market disruptions, thereby converting environmental uncertainty into strategic opportunity. Empirical evidence increasingly supports this theoretical position. Calof et al. (2018) document how organisations that employ advanced CI practices demonstrated 37% higher accuracy in predictive market assessments compared to those relying solely on traditional strategic frameworks. Similarly, Dishman and Calof's (2008) longitudinal analysis reveals that firms that integrate CI into strategic processes exhibit significantly enhanced adaptability during periods of market turbulence, with measurable improvements in both strategic agility and decision quality. Moreover, CI addresses what Ramirez and Wilkinson (2016) identify as the "anticipatory gap" in conventional strategic thinking, that is, the failure to adequately prepare for alternative futures. By systematically processing diverse information streams and identifying patterns of strategic significance, CI enables what McGrath (2013) terms "discovery-driven planning," where strategy evolves through continuous learning rather than periodic planning cycles.

The integration of CI into strategic management represents an evolutionary imperative rather than an optional enhancement. In environments marked by accelerating change and increasing interconnectedness, organisations that lack solid intelligence capabilities risk strategic obsolescence, which may lead to a form of institutional myopia that leaves them vulnerable to disruptive forces they failed to anticipate. The integration of CI with strategic management may lead to what Teece et al. (2016) describe as a "dynamic capability" of the highest order, one that fundamentally reconfigures how organisations sense, seize, and transform in response to environmental change.

Despite its considerable merits, however, it would be intellectually disingenuous to present CI as a panacea for strategic management challenges in VUCA environments. CI undoubtedly represents a significant advancement in addressing the limitations of traditional strategic frameworks. However, it faces its own set of constraints that require careful consideration. As Søilen (2017) cautions, CI remains constrained by inherent methodological limitations, including potential confirmation bias in data interpretation, the challenge of distinguishing signal from noise in information-saturated environments, and the persistent difficulties in measuring its direct contribution to organisational performance.

2.5.4. Limitations and Challenges of CI in VUCA Environments

At the core of the CI approach to strategy lies a fundamental assumption that by leveraging a suite of sophisticated analytical tools, executives can predict the future of any business with sufficient accuracy to confidently chart a clear strategic course (Fleisher & Bensoussan, 2003). However, this premise raises critical questions when confronted with the realities of an increasingly VUCA environment. In such contexts, where the very nature of information is dynamic and rapidly evolving, can any amount of analysis truly enable reliable predictions of the future? When the sheer volume and velocity of data become overwhelming, does the organisation risk succumbing to analysis paralysis, potentially distorting the strategic decision-making process? Furthermore, if organisational decision-makers struggle to formulate the right questions before tasking CI practitioners with data gathering and analysis, or if the insights gleaned by them are misinterpreted by those in leadership positions, can the CI approach effectively support strategic choices? These concerns strike at the heart of the limitations of traditional CI in navigating the challenges posed by turbulent environments. As Solberg Söilen (2022) astutely observed, it is imperative to recognise that technology, while a valuable aid in the process, does not inherently explain the underlying causes of events and rarely contributes to a genuine comprehension of the facts. Similarly, statistical and data analysis, though useful in describing what has transpired, falls short of illuminating the complex mechanisms and rationales behind the observed phenomena. Moreover, in the CI domain, information serves as the bedrock upon which insights and strategic decisions are built. As Sharp (2009) astutely posits, if information is indeed the core of intelligence, and not all information is created equal, then the critical question that arises is what constitutes the right information? This query gets at the core of a fundamental challenge faced by CI professionals, who often struggle with the difficulty of precisely identifying the information they require to effectively support decision-makers (Calof et al., 2017; Sewdass & Du Toit, 2014).

Regardless of the numerous definitions of CI emphasising the systematic collection and analysis of information, a closer examination of the CI literature reveals a notable gap in the articulation of robust information-collecting strategies (Bulger, 2016). This lacuna becomes particularly pronounced in the context of turbulent environments, where the very nature of the phenomena under investigation may be ambiguous, complex, and rapidly evolving (Bennett & Lemoine, 2014; Schoemaker et al., 2018). In such circumstances, CI professionals may find themselves in a quandary, resorting to collecting vast amounts of information in the hope that it will sufficiently support decision-makers (Fleisher & Bensoussan, 2015). However, this approach is fraught with pitfalls, as it can lead to information overload, analysis paralysis, and a distorted understanding of the strategic landscape (Merendino et al., 2018; Rouach & Santi, 2001). Recent cognitive investigations conducted by Kleinberg and Marsh (2023) validate the notion that an excess of information, even in modest quantities, can disrupt effective decision-making. The authors assert the principle of 'less is more' to show that decision-makers can arrive at accurate choices when guided by causal relationships conveyed through textual descriptions or visual diagrams. This initial phenomenon gives rise to two interconnected challenges. A priori, CI professionals may encounter difficulties in formulating precise questions to guide their information-gathering efforts due to the inherent ambiguity within turbulent environments (Burt et al., 2017; Johansen & Euchner, 2013). A posteriori, even when the appropriate questions are posed, the complex nature of the business environment can hinder the discovery of clear and actionable answers (Millar et al., 2018; Reinmoeller & Ansari, 2015).

Drawing from the case studies investigation conducted by the researcher for this study (Appendix 2), which compares CI tools across a diverse set of cases, it has been found that the practice of CI has witnessed significant advancements aimed at reinforcing its role in both scientific and business contexts. However, in practical implementation, CI remains closely intertwined with established disciplines and methodologies such as strategic management, knowledge management and data analytics. As it stands, the CI field is yet to be widely acknowledged as an independent field; instead, it remains fundamentally rooted in the traditional intelligence cycle, drawing extensively from strategic management tools and other related domains to execute its functions (Cavallo et al., 2020; Calof & Wright, 2018; Bulger, 2016). This assertion gains empirical support from the CI case studies findings, which reveal that CI professionals predominantly rely on strategic management tools (40%), marketing and market research tools (32%), research methods (13%), business analytics and forecasting tools (12%), knowledge management (2%), and patent analysis (1%).

Table 2.3 *Distribution of CI Tools by Category Based on Fourteen Case Studies*

Category	Tool	Count	%	Total % per Category
Strategic Management	SWOT	14	8.05	**40%**
	Porter's Five Forces	14	8.05	
	PESTLE Analysis	14	8.05	
	Environmental Scanning	14	8.05	
	Benchmarking	8	4.60	
	Scenario Planning	6	3.45	
Marketing and Market Research	Competitor Profiling	14	8.05	**32%**
	Market Segmentation	14	8.05	
	Product Life Cycle	14	8.05	

	Surveys and Questionnaires	13	7.47	
Research Methods	Interviews	10	5.75	**13%**
	Focus groups	9	5.17	
	Delphi method	4	2.30	
Business Analytics and Forecasting	Trend Analysis	10	5.75	**12%**
	Blind Spot Analysis	9	5.17	
	Technology Forecasting	1	0.57	
Knowledge Management	Knowledge management	4	2.30	**2%**
Innovation & Technology Management	Patent analysis	2	1.15	**1%**

Note. *Findings from CI case study analysis (refer to Appendix* 2 *for more details).*

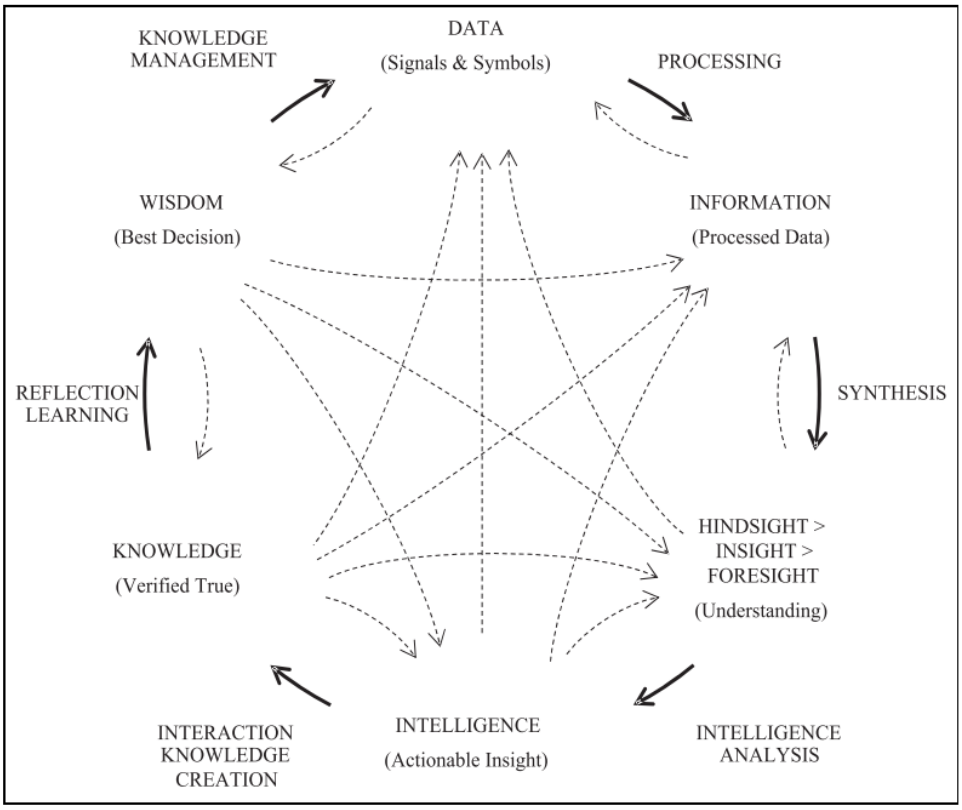
This reliance on the traditional strategy tools within the CI field, as demonstrated by these case studies, raises legitimate questions about the field's own premise and distinctiveness. The integration of tools such as SWOT analysis, PESTLE analysis, and Porter’s Five Forces within the CI framework is well-established; however, these tools were originally designed to address stable and relatively predictable environments (Fleisher & Bensoussan, 2015; Mezhevov et al., 2022). In the context of dynamic and turbulent environments, the effectiveness of these tools is increasingly questioned. SWOT and PESTLE analyses, while providing structured frameworks for assessing internal and external factors, suffer from inherent static limitations. As Niehaus et al. (2024) argue, SWOT's simplistic categorisation often fails to capture interdependencies characteristic of turbulent environments. Similarly, Planellas (2019) notes that given the extremely broad and highly complex activity, PESTLE analysis may struggle to account for the rapid changes and complex interactions among macro-environmental factors, rendering its insights potentially obsolete shortly after completion.

Porter's Five Forces, instrumental in understanding industry structure, faces criticism for its assumption of relatively stable competitive forces. Dobbs (2014) highlights its inadequacy in addressing industry convergence and disruptive innovation, phenomena increasingly common in VUCA contexts. This limitation stresses the requirement for dynamic models able to adapt to fluid competitive contexts. Likewise, environmental scanning and benchmarking, though valuable for monitoring external factors and comparing performance, respectively, are hampered by their reliance on periodic reviews and historical data. Albright (2014) notes the challenge of information overload in environmental scanning. Meanwhile, Stefanell (2023) emphasises the rapid obsolescence of benchmarks in volatile markets. These shortcomings point to a critical need for real-time and forward-looking analytical approaches.

Scenario planning and trend analysis, designed to address uncertainty and identify patterns, also face limitations in their ability to keep pace with rapid changes. Derbyshire and Wright (2017) report the subjective nature of scenario development, while Chermack et al. (2019) discuss the potential irrelevance of historical trends in predicting future events in VUCA environments. These are useful tools but need to be complemented by other techniques that may enhance real-time changes and weak signal detection. Again, the development of competitor profiling and knowledge management systems is supposed to build insight into the competitive dynamics and allow firms to exploit organisational knowledge, which is challenged by the constantly shifting market players and integration of multi-sourced data. Dishman and Calof (2008) describe the resource-intensive nature of maintaining up-to-date CI, while Ferraris et al. (2019) mention the challenges of enabling rapid knowledge retrieval in dynamic contexts. Patent analysis and Geographic Information Systems (GIS), though they provide meaningful insights in specific domains, face limitations in their applicability to rapidly changing environments. Ernst (2003) observes the lag in patent data availability, while Li et al. (2016) focus on the challenges of integrating GIS with real-time data sources. While powerful in their respective areas, these tools need to be adapted to turbulent environmental demands. Social Media Intelligence (SOCMINT) also appears to be more responsive since it reflects market trends in real-time. However, Stieglitz et al. (2018) mention several issues that make it less reliable due to misinformation, disinformation, and the inability to integrate these insights into conventional CI tools.

A recent study by Madureira et al. (2023a) has made a substantial contribution to the empirical validation and theoretical development of CI, thereby contributing to the significant enhancement of the conceptual clarity and methodological rigour of this construct. Through a meticulous mixed-methods approach, which integrates both qualitative and quantitative analytical techniques and includes computer-aided text analysis and artificial intelligence methods, the authors have provided a valuable characterisation of CI. The incorporation of cutting-edge methodologies, including computer-aided text analysis and artificial intelligence methods, has enabled a more precise and profound insight into the CI phenomenon. A notable strength of this study rests in its extensive empirical foundation, which is grounded in 61 in-depth interviews with CI subject matter experts. This robust dataset not only addresses the limitations identified in prior studies, mainly small sample sizes and insufficient triangulation, but also offers a rich and textured understanding of the construct of CI. It has enabled the authors to distil the essence of CI with the insights and expertise of these specialists, thus bringing new light to the underlying dynamics and mechanisms.

Figure 2.41 *CI Product Lifecycle*

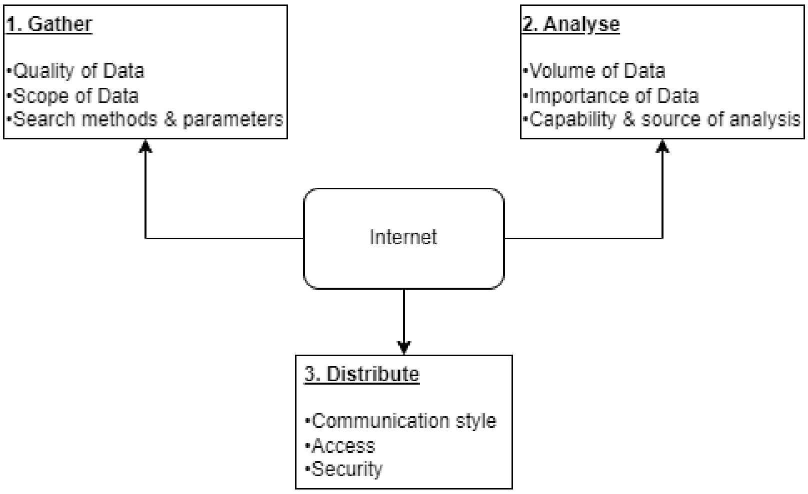


Note. Madureira et al. 2023a

The CI construct developed and tested by Madureira et al. focuses on intelligence that is systematic, networked, and capable of being acted upon. What strikes most about this construct is the integration of insights from the whole competitive environment, both from the internal and external perspectives. Such a holistic perspective is considered to be essential for strategic alignment and effective decision-making. However, there remains a conspicuous need to test and apply this framework in real-world settings to validate its efficacy across different industries and dynamic market conditions. The model undoubtedly presents a solid theoretical foundation for CI; still, practical implementation is key to determining its true value. Additionally, the iterative processes of reflection, learning, and feedback illustrated in the model point to the necessity of adapting CI strategies in response to evolving business particularities. This adaptability will ensure that intelligence not only provides actionable insights but also contributes to continuous organisational learning and strategic agility.

Overall, the sober reality is that the CI skills and capabilities of yesteryear, which were once effective in obtaining scarce and valuable information, have been diluted by the vast amount of data and information now abundantly available on the Internet. This abundance exerts its influence at every stage of the CI process, as illustrated in Figure 2.42.

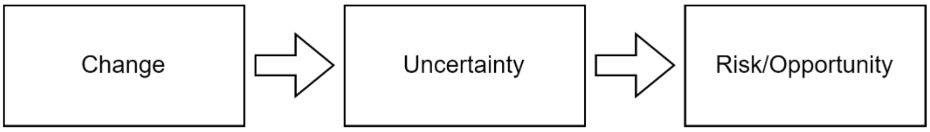
Figure 2.42 *Forces Impacting the Relationship of the Internet to the CI Process*



Note. *Adapted from (Fleisher & Blenkhorn, 2003).*

The access to and speed of how information is disseminated today across multiple platforms are stupendous. Today, intelligent web platforms for business intelligence, data management and workflow represent a modern and sound alternative to gaining free and state-of-the-art competitive insights. For instance, scaidata.com, a modern big data analytics platform for real-time business and CI analytics, data management, and automation, helps extract a wide range of insights. This platform combines the power of business intelligence and data management and integrates with companies' SQL databases and data warehouse to give real-time access. These platforms have effectively supplanted the initial tasks performed by CI professionals, particularly in the realms of data collection and benchmarking. Technological advancement has democratised access to information and allowed the systematic collection of data on human interaction. Today, data is collected in gigantic amounts, with sophisticated algorithms supportive of its extraction, cleaning, and processing to make it ready for real-time decision-making. These can be taught unsupervised to arrive at evidence-based decisions. Presently, analysts universally have access to the same open-source information, significantly altering the value of the once-exclusive competitive advantage held by CI practitioners. Traditionally, this advantage stemmed from privileged access to information, limited to a select group, whether through elicitation techniques (Oleszkiewicz, 2016), human intelligence (HUMINT) methods (Hartwig et al., 2014), data obtained via regulations like the Freedom of Information Act (FOIA), or simply through education, membership, or organisational affiliations. Within this frame of reference, Gilad (2015) claimed that CI is an approach to looking at how the organisational context is evolving. This entails detecting trends and patterns of risks and opportunities early enough to allow the organisation to adjust or, in the worst-case scenario, modify its strategy. The author posits that CI serves as an approach to understanding the evolving organisational setting, which needs to include early detection of trends, risks, and opportunities to enable organisations to adapt or, in dire circumstances, revise their strategies.

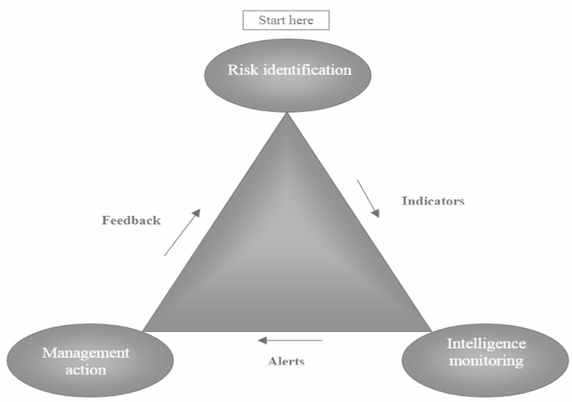
Figure 2.43 *Flow Chart of Risk/Opportunity Causal Chain*



Note. *Gilad (2004)*.

This fundamental purview of CI distinctly sets it apart from other data-related and research activities conducted by CI professionals. According to Gilad (2015), information does not always lead to insight, and conversely, insight does not always stem from information. Unfortunately, a significant number of businesses and executives conflate the two, resulting in detrimental effects on their performance. Gilad (2001, 2015) asserts that CI is not merely about data collection, marketing research, or knowledge management. Instead, CI revolves around risk assessment rather than information acquisition. The author further solidifies this perspective by highlighting common pitfalls. Many businesses either squander substantial resources on massive databases or research endeavours that yield no actionable insights. Alternatively, they hastily hire junior marketing or information specialists, relegating CI to a tactical product level. In doing so, they miss out on the true value of CI as a catalyst for strategic transformation. Gilad's focus on addressing risk within CI led to the development of the concept of early warning using CI to anticipate market shifts, control risk, and create powerful strategies (Gilad, 2004). In his work, the author introduces an early warning system tool represented by the following early warning triangle.

Figure 2.44 *The Competitive Early Warning Triangle*



Note. *Gilad (2004)*.

The three steps in the competitive early warning (CEW) framework begin with the identification of broad areas of strategic risks and opportunities, proceed through monitoring for early signs, and end with inducing management action. Each of these three steps is important. Gilad claims that companies excel in one or two of the steps but not all three, and the result is that performance still falls short. At times, a business unit may come close to having a good CEW approach, but if the corporation lacks one, the result is failure at the business portfolio level. Gilad's approach to integrating risk into the CI discipline appears to be fundamentally sound, as nearly all business failures originate from risks in the business environment (ICAEW Insights, 2023). Risk permeates every facet of human endeavour, spanning both personal and professional domains and exerting its influence on individuals, groups, organisations, and entire nations.

The inherent hazards of life are universally acknowledged, compelling individuals and organisations to adopt prudent responses to risk. Consequently, risk management has assumed heightened significance across various spheres of existence. Besides, risk-based approaches have gained prominence in diverse activities, including auditing, remuneration, regulation, legislation, pricing, testing, oversight, and decision-making (Hillson, 2019). However, it is essential to recognise that the term 'risk' carries differentiated meanings within different contexts and has undergone evolutionary shifts over time, leading to question the very conventional model of risk management and its relevance in a VUCA situation (Kuznik, 2016). When VUCA constitutive elements conspire together, it is imperative to reassess risk in a whole new light, putting a premium on flexibility and proactivity rather than rigidity and reactivity formulaic methods (Fridgeirsson et al., 2021a). If organisations are to navigate the complexities of the marketplace today and absorb, as much as possible, the shock from unanticipated disruptions, it may indeed be increasingly relevant for them to undergo a paradigm shift toward far more flexible and volatile risk governance. This requires a fundamental change to adopt methodologies capable of coping with modern-day challenges and ensuring not only enhanced organisational resilience but also proactive decision-making in conditions of uncertainty, one that leverages real-time data analytics, scenario-based planning, and ongoing surveillance.

In this context, the concept of a VUCA environment becomes particularly pertinent. Organisations must develop strategies strong enough to withstand the multidimensionality of VUCA conditions. This means embracing agility, adopting innovation, and continuously reassessing strategic directions to remain competitive and resilient. This would, in turn, make them more prepared for and able to respond to the inevitable volatility, uncertainty, complexity, and ambiguity that characterise modern business realities.

2.5.5. Gap Statement

Despite the extensive scholarly discourse on navigating turbulent environments, existing SMTFs remain inadequate in fully addressing the challenges posed by VUCA conditions. Whereas the strategy process school has significantly contributed to our understanding of adaptive strategic responses, its theoretical models, ranging from emergent strategy (Mintzberg, 1994) to contextualist approaches (Pettigrew, 1992), were largely developed in contexts of moderate uncertainty. Consequently, these models do not fully account for the extreme volatility, ambiguity, and interdependencies that characterise contemporary organisational environments. More recent approaches, such as VUCA

Prime (Johansen, 2007), TUNA (Gordon, 2018), and BANI (Cascio, 2020), attempt to conceptualise these complexities, yet they remain largely heuristic and lack empirical validation, making them insufficient as actionable frameworks for decision-makers operating in highly unpredictable environments.

A critical limitation of existing SMTFs is their fragmented approach to environmental complexity, often treating volatility, uncertainty, complexity, and ambiguity as isolated variables rather than interwoven forces that demand a holistic response. This conceptual gap has led to a persistent struggle among organisations to integrate long-term strategic planning with real-time environmental sensing. CI has emerged as a valuable complementary tool in bridging this divide to provide firms with structured mechanisms to anticipate market shifts, analyse competitor behaviour, and enhance strategic agility (Calof & Wright, 2018). However, despite its contributions, CI itself has limitations. It is frequently constrained by its operational focus, which lacks the strategic coherence necessary to drive long-term competitive advantage (Bulger, 2016). Furthermore, current CI models tend to emphasise responsive intelligence gathering rather than proactive sensemaking, which reinforces the need for an integrative framework that aligns intelligence-driven insights with strategic foresight.

This study addresses this critical gap by developing a novel integrative framework called the SCI framework, which synthesises the strengths of SMTFs and CI to provide a structured yet adaptive approach to managing VUCA environments. Unlike existing frameworks, SCI moves beyond intelligence collection by embedding dynamic capabilities that enable organisations to translate insights into strategic action. By bridging the divide between strategic formulation and execution, SCI equips decision-makers with a more coherent, empirically grounded, and practically relevant tool for navigating uncertainty, complexity, and ambiguity in an increasingly volatile world. This research, therefore, offers both theoretical advancement and practical utility, positioning SCI as a necessary evolution in strategic management thinking.

Conceptual Framework

3.1 The VUCA Chain Reaction Effect

3.1.1. Theoretical Foundation

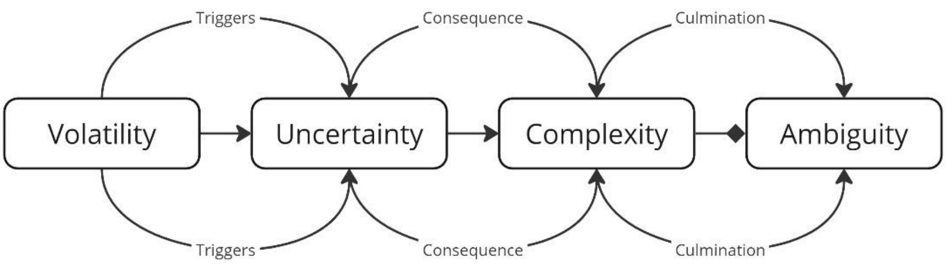
In the pursuit of developing a framework to address the challenges posed by VUCA environments, it is imperative to establish a solid theoretical foundation. As Whetten (1989) emphasises, the construction of any meaningful theoretical framework needs a clear conceptual lens through which phenomena can be examined and understood. However, the extant literature on VUCA demonstrates a significant gap in the comprehension of how these elements manifest and interact within organisational contexts (Bennett & Lemoine, 2014; Millar et al., 2018). This paucity of understanding presents a noticeable obstacle to the development of practical and theoretically grounded frameworks. As Suddaby (2014) argues, the absence of a well-defined conceptual underpinning can lead to the creation of frameworks that lack explanatory power and practical utility. In the case of VUCA, the literature has predominantly treated its components as discrete entities and failed to demonstrate any connection between its constitutive parts or the order of intensity and impact on organisational dynamics (Millar et al., 2018; Taskan et al., 2022). In recognition of this critical gap, this research posits that before embarking on the development of a comprehensive framework for navigating VUCA environments, it is essential to conceptualise the complex interplay of VUCA elements. This necessity aligns with Cornelissen's (2017) assertion that theoretical advancement often requires the development of new conceptual models that can bridge existing knowledge gaps and provide novel insights into complex phenomena.

To address this imperative, this study introduces the VUCA Chain Reaction Effect (VUCA CRE) as a conceptual model. The VUCA CRE serves as a theoretical construct designed to illuminate the cascading and interconnected nature of VUCA elements to provide a lens through which their collective impact on organisational environments can be systematically analysed and understood. This approach is consonant with Gioia and Pitre's (1990) call for the development of metatheoretical perspectives that can integrate disparate streams of research and provide a synthesised understanding of complex organisational phenomena. This research establishes the territory of and lays the groundwork for the subsequent development of an SCI framework through conceptualising the VUCA CRE. The VUCA CRE acts as the conceptual scaffold upon which the SCI framework is constructed. It ensures that the resulting framework is firmly rooted in a theoretically sound understanding of VUCA dynamics. This approach aligns with Bacharach's (1989) assertion that robust theoretical frameworks must be built upon clearly articulated conceptual foundations that specify the relationships among key constructs.

In essence, the conceptualisation of the VUCA CRE represents a critical step in advancing the understanding of VUCA environments and developing effective strategies for navigating them. It provides the necessary conceptual lens through which the complexities of VUCA can be examined, understood, and ultimately addressed through the proposed SCI framework. The VUCA CRE is proposed as a conceptual model to address the VUCA conceptual gap comprehensively, as opposed to the treatment of each VUCA element separately, which leads to four different isolated and disconnected scenarios. VUCA CRE intends to fill this gap by advancing the idea that VUCA is an integrated phenomenon with four interrelated dimensions. That is, volatile events act as triggers that introduce sudden changes, leading to increased uncertainty. When volatility introduces unexpected changes, it creates uncertainty by making it difficult to predict what will happen next. This uncertainty complicates decision-making processes. The uncertainty stemming from volatility adds layers of complexity, as organisations must now deal with numerous interacting elements and variables, making the situation more difficult to manage. The compounded effects of volatility, uncertainty, and complexity culminate in ambiguity, where organisations struggle to make sense of the situation and determine the best course of action.

Integral to VUCA CRE is the idea that volatility acts as the initial catalyst, setting off a series of reactions that lead to increased uncertainty. This uncertainty, in turn, generates complexity, ultimately resulting in ambiguity. This cascading effect can be visualised in Figure 3.1.

Figure 3.1 *Dominant Path for the Chain Reaction*

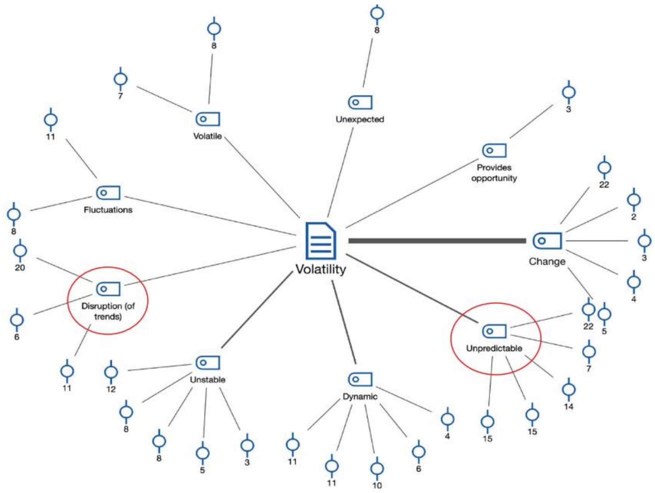


Note. *Made by the Author.*

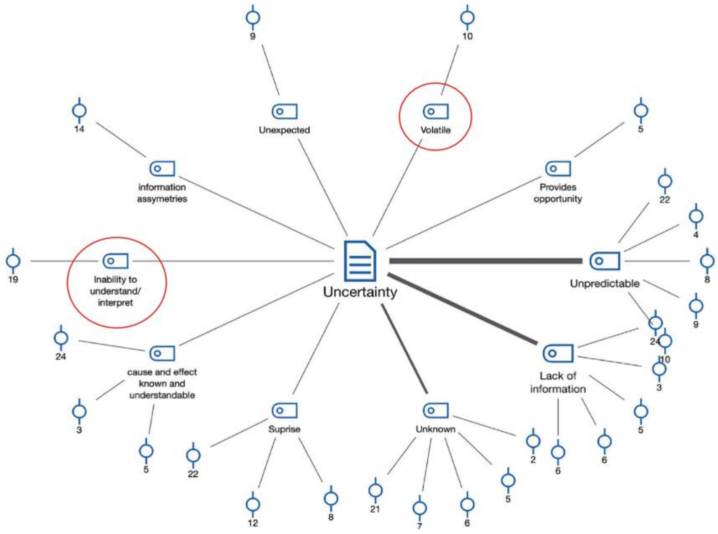
A key aspect of this conceptual model is the premise that each VUCA element serves as a catalyst, amplifying the effects of its successors and culminating in a compounded impact on organisational decision-making and strategy formulation. This approach is fundamentally grounded in the seminal works of Taskan et al. (2022), which aim to clarify the conceptual map of VUCA, as explained in the literature section. The authors found that volatility is linked to uncertainty, uncertainty is linked to complexity, and ambiguity encapsulates all the previous VUCA elements.

Table 3.1 Taskan et al.'s (2021) VUCA Conceptual Map

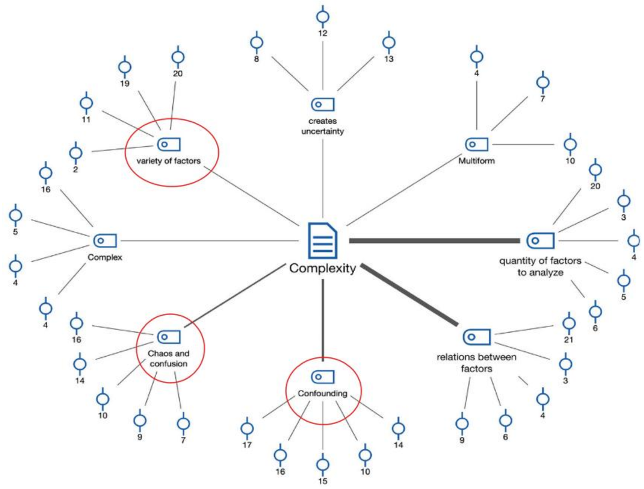
Volatility



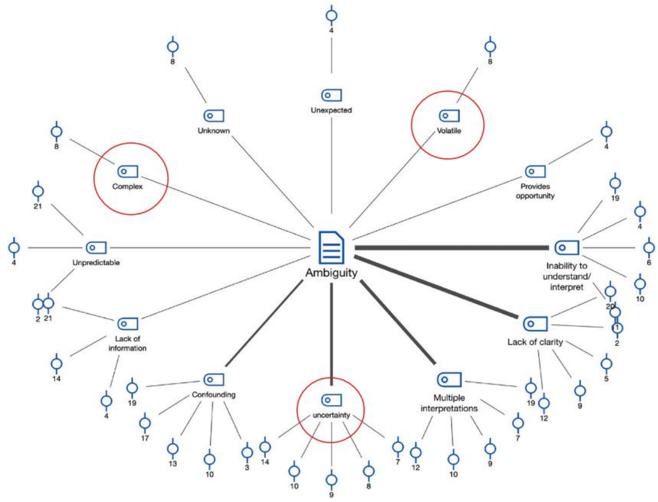
Uncertainty



Complexity



Ambiguity



Note. *The red circles represent VUCA elements building on and amplifying each other to explain the chain reaction effect proposed in this work. At each dimension, the same keywords are found.*

Based on the concept analysis maps provided by Taskan et al. (2021), one can construct a logical narrative for the VUCA CRE. On the one hand, volatility is characterised by rapid and unpredictable changes; it highlights key aspects such as "disruption of trends", which may serve as a fundamental trigger that propels organisations into the turbulent waters of VUCA environments. On the other hand, "unpredictable" in volatile environments leads directly to uncertainty, which is marked by a lack of information and the unpredictable nature of events. The concept map also mentions "inability to interpret" and "volatile" as key elements, both circled for emphasis in Table 3.1. This suggests that uncertainty stems from the difficulty in interpreting volatile changes and predicting future outcomes. The unpredictability of volatile events creates an environment where cause-and-effect relationships become unclear, therefore leading to increased complexity. Complexity is characterised by the interconnectedness of multiple factors. The concept map highlights "variety of factors" and "interconnectedness" as essential elements, both circled in Table 3.1. This indicates that as uncertainty increases, the number of variables and their interactions grow, making the situation more complex. The "quantity of factors to analyse" increases, leading to potential confusion and difficulty in decision-making. Ambiguity has been found to encompass all the previous VUCA elements, including volatility, uncertainty, and complexity, all circled for emphasis in Table 3.1. This stands as a strong indication of its role as the culmination of the VUCA chain reaction effect.

In constructing the VUCA chain reaction effect, one can see how each element builds upon and amplifies the effects of the previous one. Volatility introduces rapid and unpredictable changes. These changes lead to uncertainty as future outcomes become harder to predict. Uncertainty increases complexity by multiplying the factors and interactions to consider. Finally, this results in ambiguity, where a clear interpretation of the situation becomes challenging. This narrative demonstrates how VUCA elements are not isolated phenomena but interconnected in a cascading manner, each amplifying the challenges presented by the previous element. This conceptualisation provides a lens through which this research aims to build the SCI framework.

3.1.2. Conceptualising the Interconnectedness of VUCA Elements

The VUCA CRE is proposed as a conceptual model to typify the complex interrelationships among volatility, uncertainty, complexity, and ambiguity in organisational environments. This theoretical construct addresses a significant void in the extant VUCA literature by delineating the dynamic and cascading nature of these elements, transcending their conventional treatment as discrete phenomena. The VUCA CRE model posits a linear progression that reflects the sequence of the VUCA acronym itself while acknowledging the potential for more complex interactions in real-world scenarios. Indeed, a burgeoning corpus of scholarship has begun to recognise the need for a more integrated approach to understanding VUCA. To illustrate, Millar et al. (2018) argue that the individual VUCA elements should not be viewed in isolation but as interconnected facets of a dynamic environment. This perspective aligns with systems thinking in organisational studies, which emphasises the importance of understanding the interactions between components rather than studying them in isolation (Schwaninger, 2018). Noticeably, Millar et al. (2018) contend that divorcing volatility, uncertainty, complexity, and ambiguity from their co-constitutive interplays raises a fragmented intelligibility of organisational environments. Their call for an inclusive conceptual architecture that maps the recursive interactions and feedback loops among VUCA elements dovetails with a systems-based understanding of organisational ecosystems characterised by complex interdependencies and emergent phenomena.

The conceptualisation of VUCA interconnectedness begins with Volatility as the initial trigger event. Volatility, defined by rapid and unpredictable changes, sets the stage for the other VUCA elements to manifest. As Bennett and Lemoine (2014) note, volatile environments are marked by frequent and dramatic shifts that occur with increasing speed. These volatile conditions create a ripple effect, leading to increased uncertainty in the organisation's environment. Uncertainty, in turn, stemming from the inability to predict outcomes in a volatile environment, further compounds the challenges organisations face. Vecchiato (2015) argues that uncertainty is not merely a byproduct of volatility but an amplifier of its effects, as it erodes the value of traditional forecasting and planning methods. This erosion of predictability sets the stage for increased complexity in organisational decision-making processes. Complexity emerges as organisations deal with an increasing number of interconnected variables and stakeholders in their operational environment. Uhl-Bien and Arena (2018) posit that complexity in VUCA environments is evidenced by non-linear interactions and feedback loops that defy simple cause-and-effect analysis. This complexity, in turn, contributes to the final and perhaps the most challenging aspect of VUCA: Ambiguity.

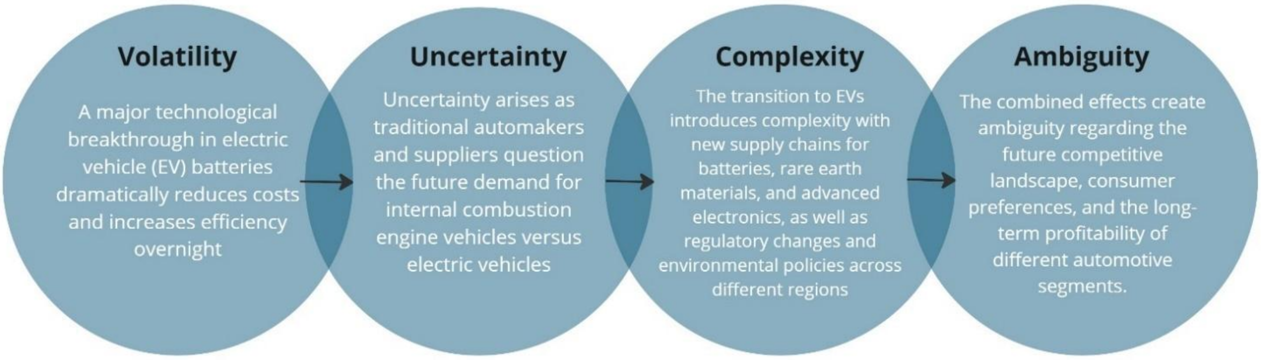
Ambiguity represents the climax of the VUCA elements, where the combined effects of volatility, uncertainty, and complexity create a situation in which clear interpretations of environmental signals become exceedingly difficult. Ramirez et al. (2015) argue that ambiguity in VUCA contexts is identified by the presence of multiple, often conflicting, interpretations of events and their potential outcomes. This state of ambiguity is further exacerbated by the constant interplay of the other VUCA elements. As a result, one may contend that the interconnectedness of VUCA elements is not merely additive but also synergistic. Each element amplifies and is amplified by the others, thus creating a dynamic system that challenges traditional management approaches. Even though recent empirical studies have begun to provide modest evidence for the interconnected nature of VUCA elements. For instance, Saleh and Watson (2017) found that organisations facing high levels of volatility were more likely to experience increased uncertainty and complexity in their decision-making processes. Similarly, Taskan et al. (2021) demonstrated that the presence of ambiguity in organisational environments was strongly correlated with higher levels of perceived volatility and uncertainty. However, the extant literature on VUCA has predominantly conceptualised it as a construct comprising four distinct and disjointed dimensions (Bennett & Lemoine, 2014; Mack et al., 2016; Millar et al., 2018) which has led to the development of isolated examples and strategies for each VUCA component, potentially overlooking the coactive and compounding effects of these elements in real-world scenarios. Figure 3.2 illustrates this trend.

Figure 3.2 *Typical VUCA Illustration with Four Disjointed Examples*

Note. *Adapted from Benette & Lemoine (2014).*

This compartmentalised approach depicted in Figure 3.2 may also lead to the development of siloed strategies that fail to address the holistic nature of VUCA challenges. As Teece (2018) notes, effective organisational responses to VUCA environments require dynamic capabilities that can sense, seize, and reconfigure resources in response to rapidly changing conditions across all dimensions simultaneously. Furthermore, treating VUCA elements in isolation may result in overlooking critical feedback loops and amplification effects that can exponentially increase the complexity of strategic decision-making (Uhl-Bien & Arena, 2018). The development of four separate and unrelated scenarios, as seen in Figure 3.2, can place organisations in a risky position that obscures their strategic focus and potentially undermines their ability to build an integrative and adaptive capacity necessary for thriving in truly VUCA environments. This scattered approach may eventually lead to suboptimal resource allocation and a diminished capacity to anticipate and respond to the compounding effects of interrelated VUCA challenges. In response to this limitation, this research proposes a paradigm shift in VUCA conceptualisation, positing that the VUCA phenomenon should be viewed as a singular, integrated construct with four interconnected dimensions. This perspective aligns with systems thinking approaches to strategic management and in organisational studies (Kunc, 2024), which affirms the importance of understanding phenomena as interconnected wholes rather than as collections of discrete parts (Schwaninger, 2019), therefore permitting organisations to identify emergent behaviours and adapt strategies dynamically, rather than being limited by siloed thinking. Figure 3.3 illustrates the application of systems thinking to a VUCA scenario, hence paving the way for VUCA CRE.

Figure 3.3 *Unified VUCA Illustration of a Single Connected Scenario across all Four VUCA Dimensions*



Note. By the author

The proposed conceptualisation in Figure 3.3 signifies that volatility is manifested through a major technological breakthrough in electric vehicle (EV) batteries, dramatically reducing costs and increasing efficiency overnight. Such a disruptive innovation acts as a trigger event, setting in motion a chain of VUCA effects. This volatile event precipitates uncertainty as traditional automakers and suppliers struggle with questions about the future demand for internal combustion engine vehicles versus electric vehicles (EV). Such uncertainty is compounded by the difficulty in predicting consumer adoption rates, government policies, and the pace of infrastructure development for EVs. The shift to EVs brings significant complexity, as automakers must build entirely new supply chains for batteries, rare materials, and advanced components. This complex transition becomes even more uncertain due to constantly changing regulations and environmental policies in different markets. The combined volatility, uncertainty, and complexity spark deep ambiguity about the future structure of the industry, consumer demand, and profitability of segments. This ambiguity has high equivocality, where the same information can have multiple meanings (Weick, 1995). With so many unknowns and conflicting interpretations, automotive firms struggle to create effective strategies amidst the turbulence.

This VUCA scenario illustrates the cascading and reinforcing nature of volatility, uncertainty, complexity and ambiguity in organisational environments. A single triggering event, the battery breakthrough, initiates a snowball effect where each VUCA element fuels the others in an amplifying loop. This conceptualisation aligns with recent organisational research emphasising more dynamic and process-oriented perspectives (Taskan et al., 2022; Niehaus & Mocan, 2024; Mhlanga & Dzingirai, 2024). Rather than static variables, VUCA dynamics emerge through complex interactions over time (Antonacopoulou, 2018). Mapping the causal chains and feedback processes between VUCA elements provides greater insight into how organisational environments evolve. This process-based view demonstrates the need for adaptive responses that consider both short and long-term effects in navigating VUCA turbulence.

3.1.3. Implications and Limitations of the VUCA Chain Reaction Effect on 'Strategising'

The conceptualisation of the VUCA CRE as a dynamic and interconnected process has profound implications for organisational strategising in contemporary business environments. This perspective, which aligns with the scholars' plea mentioned in chapter two, literature review section, calls for a paradigm shift in strategic thinking, moving beyond traditional and linear approaches to strategy formulation towards more adaptive and resilient models. The cascading nature of VUCA elements, as elucidated by the VUCA CRE, demands a recalibration of strategic processes, tools, and capabilities to effectively navigate the compounding challenges of VUCA.

One of the primary implications of the VUCA CRE on strategising is the need for increased strategic agility. As Teece et al. (2016) discuss, organisations operating in VUCA environments must develop dynamic capabilities that allow for rapid sensing, seizing, and reconfiguring in response to emerging challenges and opportunities. The VUCA CRE model also suggests that these capabilities must be even more finely tuned to address not just individual VUCA elements but their cumulative and amplifying effects. Such a proposition supports recent research by Ludviga Kalvina (2023), who found that organisations with higher levels of strategic agility and resilient capabilities (anticipation, coping and adaptation) were better equipped to navigate the escalating uncertainties of the COVID-19 pandemic.

Arguably, the linear progression proposed by the VUCA CRE model may be perceived as an oversimplification of the complex as elements within a system may influence each other in a reciprocal, circular and networked manner according to the systems theory (Vernon et al., 2015), however, it offers a structured approach to understanding VUCA elements that are often missing in current literature. Distilling the essence of VUCA dynamics mirrors established strategic management frameworks that employ linear components to illuminate multifaceted phenomena. In actuality, foundational approaches, including Porter's Value Chain (Porter, 1985) and Kaplan and Norton's Balanced Scorecard (Kaplan & Norton, 1992, pp. 71–79), reduce complexity to explain value creation and strategic measurement. Like these seminal models, the VUCA CRE framework crystallises key elements and relationships to enhance understanding of the dominant pattern of manifestation (Volatility → Uncertainty → Complexity ⇒ Ambiguity). Though inevitably sacrificing some details, this approach creates an accessible mental model for practitioners grappling with VUCA's challenges. As with all models, the VUCA CRE lens should complement rather than substitute immersive engagement with real-world complexity. Nevertheless, its singular and linear perspective furnishes a clearer orientation amidst turbulence for managers seeking to maintain strategic coherence.

Thus, owing to its unique approach, VUCA CRE represents the first conceptualisation of its kind to advance the understanding of the VUCA construct as interrelated elements rather than segregated components. This signifies a notable evolution in VUCA theory, moving from a static and siloed perspective towards an integrated system lens. The formal modelling of these cascading effects provides a cohesive, dynamic and practical understanding for diagnosing and navigating complex business settings. It enables organisations to trace VUCA issues back to root causes, set leading indicators, and target intervention points earlier in the VUCA CRE sequence to mitigate downstream impacts. This view forms the foundational premise for the SCI framework proposed in this study, hence directly addressing the central research question: "How can a SCI framework, grounded in the understanding of the VUCA Chain Reaction Effect, enable organisations to enhance strategic decision-making and navigate the intricacies of volatile, uncertain, complex, and ambiguous environments?"

The VUCA CRE model demonstrates originality by proposing a more in-depth and systematic exploration of the distinct components of VUCA and their interrelationships, which holds significant implications for both theory and practice. It offers a novel perspective that has been overlooked in the literature and provides a structured approach to understanding the cascading effects of VUCA elements. In the meantime, it acknowledges that theories, by their very nature, are simplified representations of reality with inherent limitations (Giere, 2004). The value of the VUCA CRE model lies in its ability to provide an original and clear conceptual framework for understanding and responding to VUCA challenges.

3.2 The SCI Framework

3.2.1. Foundations and Key Components of the SCI Framework

The contemporary business setting is heavily characterised by unprecedented levels of interconnectedness and rapid technological advancement (Thomas, 2023); as a result, organisations find themselves surrounded by perpetual vulnerabilities. This state of constant exposure to potential disruptions and unforeseen challenges mandates a paradigm shift in strategic thinking and risk management practices (Anbumozhi et al., 2020). The traditional approach of periodic risk assessments and static strategic planning is deemed insufficient to ensure organisational resilience and competitive advantage in an era defined by VUCA (Seif Zadeh et al., 2021). The concept of constant vulnerability is not merely a cautionary stance but a fundamental recognition of the dynamic nature of modern business ecosystems. As Taleb (2012) posits, systems that fail to acknowledge and adapt to their inherent vulnerabilities are not only susceptible to failure but also miss opportunities for growth and innovation that arise from environmental stressors. This frame of reference resonates with the resource-based view of strategic management (Barney, 1991), which emphasises the importance of developing unique, valuable, and difficult-to-imitate capabilities as a source of sustained competitive advantage. Under these circumstances, the SCI framework may offer a unique approach and tools to address VUCA following a sequential process where each stage builds upon the insights gained from the previous stages inspired by VUCA CRE presented earlier.

The SCI framework represents an integration of strategic management, organisational theory, and complexity sciences to address the intertwined challenges of navigating uncertainty. Drawing on foundations from systems theory (Bertalanffy, 1968), dynamic capabilities (Teece et al., 1997), scenario planning (Schoemaker, 1995), uncertainty categorisation (Courtney et al., 1999), and CI (Prescott & Miller, 2001), this multidimensional framework offers both conceptual cohesion and practical structure for firms contending with contemporary VUCA challenges. In particular, the SCI framework places a focus on holistic rather than linear analysis of contemporary strategic ecosystems, drawing on general systems theory (GST) (Lopreato & von Bertalanffy, 1970) advocating for holism, hierarchy, equifinality and feedback, therefore offering a foundational understanding of various complex systems such as ecosystems, organisations, economies and environment. When it comes to understanding and dealing with turbulence, it considers interdependencies and reciprocal interactions between players to be vital. The framework also incorporates dynamic capabilities theory (Teece, 1977), stressing the organisation's need to continuously sense ambiguous signals, seize fleeting opportunities in times of volatility and reconfigure assets and operations in response to uncertainty. This function shares commonalities with CI. Scenario planning further enables the SCI framework to mitigate uncertainty by devising and evaluating diverse plausible futures that illuminate strategic options. Additionally, the use of Courtney et al.'s (1999) uncertainty categorisation enriches the diagnosis process for volatility by distinguishing between clear, alternate future, and true uncertainty. This added depth in decoding uncertain dynamics pushes strategy beyond oversimplified readings. Finally, CI principles provide the foundation for gathering, analysing and disseminating actionable intelligence to drive agility and foresight across the organisation. Table 3.2 delineates the main components of the SCI framework, objectives, key process, tool and output.

Table 3.2 *Foundations and Key Components of the SCI Framework*

Components of the SCI framework	Objective	Key Process	Tool	Output
Volatility phase	Identify key vulnerability topic (KVT)	Vulnerability analysis	WEF strategic intelligence map (World Economic Forum, 2024)	Prioritise and select the vulnerability
Uncertainty phase	Categorise the vulnerability into four-tier uncertainty	Four-level uncertainty categorisation	Courtney et al.'s (1999) four levels of uncertainty	Structured analysis of four potential future scenarios
Complexity Phase	Model interconnections and dependencies	Complexity mapping	The Kumu platform is based on the complexity mapping principle	Complexity Modelling Map (CMM)

			of Castellani and Hafferty (2008)	
Ambiguity phase	Synthesise insights and formulate strategies	7-step approach to strategy formulation	Based on several authors' concepts detailed in Table 3.4 below	Actionable VUCA strategic initiatives

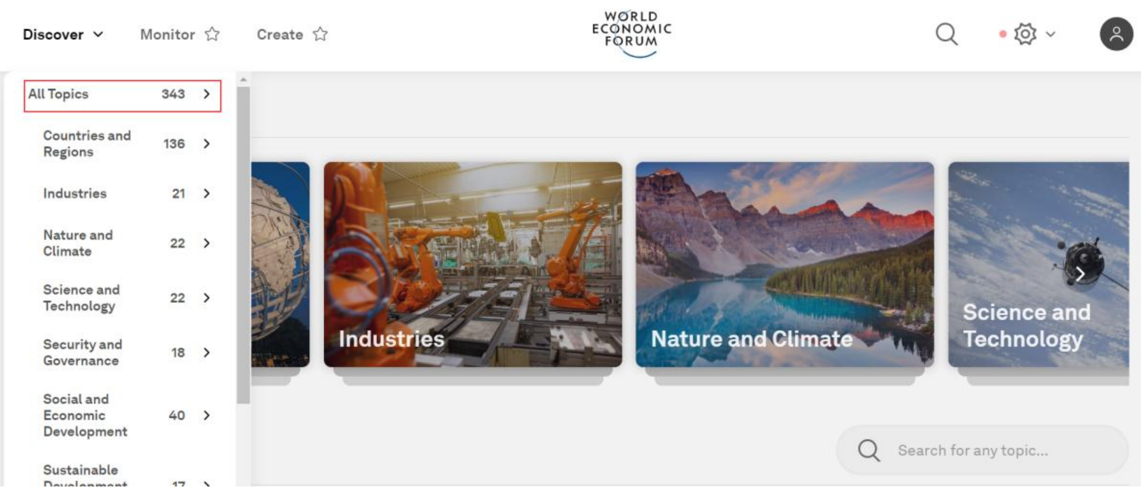
3.2.2. Operationalising the Strategic Competitive Intelligence Framework for Strategising

3.2.2.1. Volatility

The SCI framework assumes that organisations navigating VUCA scenarios have sensed a sudden shift in the market, such as, but not limited to, technological disruptions, regulatory changes, geopolitical events, supply chain disruptions, competitor actions, social trends or any other sources related to the organisation, where information remains incomplete, and the problem's dimension are yet to be fully explored. This means that information is lacking, and the problem and its different dimensions are yet to be explored and tackled. In other words, the theme of concern is known, but the problem, its source, and development are unknown.

The analysis begins with identifying the key vulnerability topic (KVT) at the volatility segment using the World Economic Forum's strategic intelligence map, a strategic knowledge platform that includes information and a suite of digital tools for more than three hundred and forty topic areas (World Economic Forum, 2024) covering key strategic insights and contextual intelligence on the key global issues, trends, and risks shaping the world today. It explores and monitors the issues and forces driving transformational changes.

Figure 3.4 *WEF Strategic Intelligence Platform*



Note. *From the latest update by the World Economic Forum (WEF) platform (2024).*

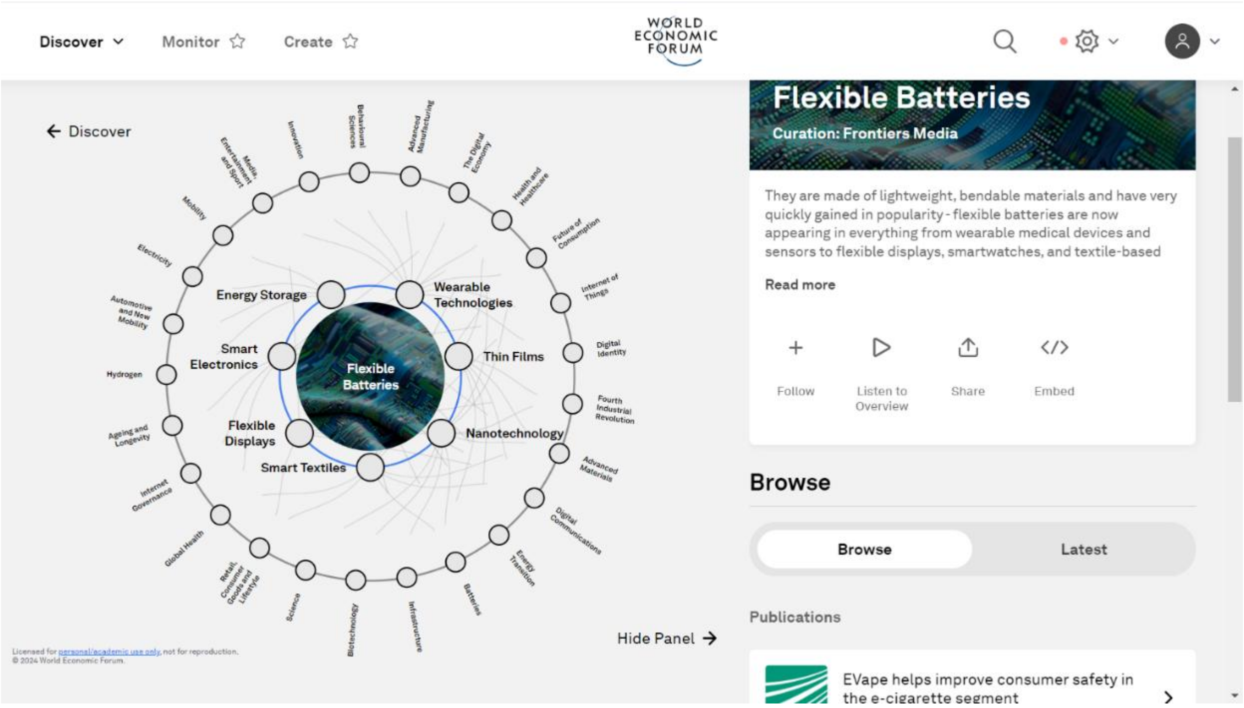
The strategic intelligence map serves as a dynamic and interactive platform for analysing the complex interplay between global economies, industries, and critical challenges. This tool, developed in collaboration with leading universities and international organisations, allows for the exploration of transformative forces shaping diverse fields, such as, but not limited to, climate change, artificial intelligence, the Fourth Industrial Revolution, global health, cybersecurity, economic inequality, and sustainable development. Continuously updated to reflect emerging strategic issues, the map offers in-depth insights into various topics, connecting users with relevant expert publications, multimedia resources, datasets, events, initiatives, and key stakeholders. Several key features underpin the map's functionality, as shown in Table 3.3.

Table 3.3 *Key Features of the WEF Strategic Intelligence Map*

Key Feature	Description
1. Issue mapping	The map provides an interactive visualisation of various global issues and their interconnections. Users can explore how different issues, such as climate change, income inequality, or cybersecurity, are related and how they impact one another.
2. Trend Tracking	The map tracks key global trends, such as the rise of emerging markets, the shift towards renewable energy, and the increasing importance of data and digital technologies. Users can analyse the drivers, implications, and potential scenarios for these trends.
3. Risk Assessment	The map includes a comprehensive risk assessment framework that identifies and analyses the major global risks, such as geopolitical tensions, financial crises, or pandemics. Users can assess the likelihood and potential impact of these risks and explore mitigation strategies.
4. Stakeholder engagement	The Strategic Intelligence Map is designed to facilitate collaboration and engagement among various stakeholders, including governments, businesses, civil society organisations, and academia. Users can access expert insights, participate in discussions, and contribute their own viewpoints on the issues.
5. Customisable Monitoring	The map allows users to create personalised dashboards that focus on the issues, trends, and risks most relevant to their interests or areas of work. This enables users to quickly access the information they need and tailor the platform to their specific needs.

Figure 3.5, for instance, showcases the World Economic Forum's strategic intelligence map centred on "Flexible Batteries" as a KVT. The map illustrates the interconnected nature of this technology with various related fields and industries.

Figure 3.5 *Example of Strategic Intelligence Map showing the 'Flexible Batteries' as Key Vulnerability Topic (KVT)*



At the core, the KVT 'Flexible Batteries' in the example in Figure 3.5 are linked to several key areas such as Energy Storage, Wearable Technologies, Thin Films, Nanotechnology, Smart Textiles, Flexible Displays, and Smart Electronics. This visual representation effectively demonstrates how flexible battery technology intersects with and influences multiple sectors. It highlights the potential for a wide-ranging impact. The right side of Figure 3.5 provides curated content about the KVT's flexible batteries. This curated text offers a quick overview of the technology's current applications and importance. Essentially, the bottom of the image shows a section for "Publications", which offers access to high-quality, relevant research and articles. This section includes a list of papers from reputable universities and peer-reviewed journals to provide users with authoritative and current information on the topic.

The WEF's strategic intelligence map embodies the convergence of several pivotal concepts that have shaped strategic management's understanding of how organisations navigate complex and dynamic environments. Fundamentally, the map operationalises foundational strategic foresight concepts. Drawing on Aguilar's (1967) environmental scanning research, the framework supplies a structured visualisation to holistically track key sectors, forces, and trends. As per Ansoff's (1975) weak signals theory, mapping connections between disparate data points facilitates early detection of low-intensity shifts that may amplify over time. The synthesis of trends and themes within an integrated framework reveals subtle interdependencies, hidden patterns, and emergent opportunities that might otherwise go unnoticed. This perspective significantly enhances an organisation's capacity for strategic foresight, echoing the findings of Rohrbeck and Gemünden (2011), who reported the importance of early recognition of change and the development of more resilient and long-term strategies.

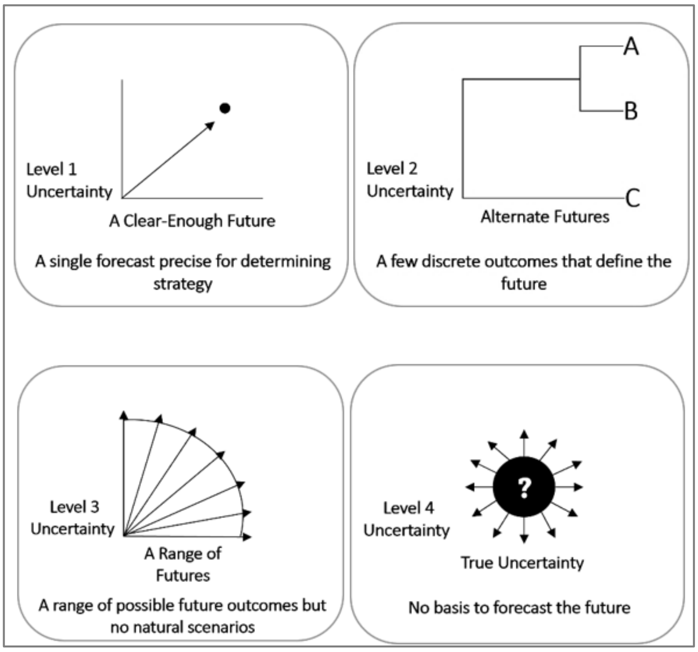
The systematic mapping promotes higher-level comprehension of the business ecosystem and market directions to inform better executive strategy and decision-making. Rather than isolated data, it produces strategic insight and foresight for increased organisational resilience. Additionally, the map's architecture aligns seamlessly with Senge's (1990) emphasis on systems thinking theory for organisational learning. The visualisation of connections between diverse domains promotes a holistic comprehension of market dynamics per Senge, rather than siloed linear causality. As professionals interpret interdependencies between forces, their perspective evolves from narrow, event-driven responses to broader ecosystem-wide ones. Such an understanding of complexity contributes to the development of "dynamic capabilities" stressed by Teece et al. (1997). With deeper systemic insight, organisations can better sense shifting conditions, rapidly reorient internal resources and seize emergent opportunities. The map thus catalyses an organisational mindset shift; by illuminating relationships between external forces, it nurtures a more sophisticated, nimble and proactive strategy in addressing volatility. Companies progress from responding tactically to changes toward scanning the horizon, discerning patterns and driving strategic evolution. Moreover, the mapping aligns with Nonaka and Takeuchi's (1995) research on knowledge creation for organisational learning. It drives the externalisation of tacit insights across functions and combines explicit knowledge from different domains, leading to an interdisciplinary knowledge exchange that promotes intelligence capabilities per Nonaka and Takeuchi. The approach also holds significant relevance for competitive technical intelligence, as emphasised by Ashton and Klavans (1997). With technologies rapidly evolving, firms must continuously sense developments across various industries, understand connections, synthesise learning and integrate insights to remain competitive.

Lastly, the map's ability to reveal unexplored connections between different domains resonates with Kohnen's (2006) Blue Ocean Strategy as it enables the identification of uncontested market spaces and areas of potential demand generation, hence supporting organisations in transcending conventional competitive paradigms and supporting the development of innovative value propositions. This capacity for promoting strategic differentiation positions the map as a critical tool in the pursuit of market disruption and value innovation.

3.2.2.2. Uncertainty

Once a KVT is identified, such as 'flexible batteries', the next critical step is to address the uncertainty it represents. The strategic intelligence map reveals multiple connections between the KVT and various nodes, including Energy Storage, Wearable Technologies, Thin Films, Nanotechnology, Smart Textiles, Flexible Displays, and Smart Electronics (Figure 3.5). Each of these interconnected areas presents a distinct set of challenges and opportunities. The organisation's task is to strategically explore these vulnerabilities that most closely align with its industry position, core competencies and strategic objectives. This exploration should consider both the potential threats and opportunities that each vulnerability presents. It should also prioritise and select the vulnerability to be explored in the ensuing uncertainty segment. Therefore, the uncertainty segment of the SCI framework serves as a bridge that links the identification of KVT in the volatility phase to the more detailed analysis of the complexity phase. The core segment of this phase is based on the four levels of uncertainty proposed by Courtney et al. (1999), which categorises uncertainty into four distinct levels as depicted in Figure 3.6 below.

Figure 3.6 *Four Levels of Uncertainty*



Note. *Adapted from Courtney et al. (1999).*

According to Courtney et al. (1999), at level one, a clear-enough future, the future is sufficiently predictable to develop a single forecast precise enough for strategy formulation, this aligns with known-knowns. While some residual uncertainty exists, it does not significantly affect strategic decisions. At level two, alternate futures, the future can be described as one of a few discrete scenarios; this aligns with know-unknowns. Analysis cannot identify which outcome will occur, but it can establish probabilities for each potential future state. At level three, a range of futures, a variety of potential futures, can be identified, but no natural discrete scenarios emerge; this aligns with Unknown-knowns. Instead, a limited number of key variables define a range of possible outcomes, but the actual outcome may lie anywhere within this range. Lastly, at level four, true uncertainty, multiple dimensions of uncertainty interact to create an environment that is virtually impossible to predict. This aligns with unknown unknowns, where it is challenging to identify the relevant variables, let alone forecast their potential outcomes. When an organisation identifies a potential vulnerability, such as the emergence of smart textiles, a comprehensive assessment of the uncertainties associated with this disruption is essential. The application of the four-level uncertainty model developed by Courtney et al. (1999) furnishes a vigorous mechanism for categorising these uncertainties and formulating appropriate strategic responses. This approach moves beyond mere survival in the face of disruption and enables organisations to leverage uncertainty as a catalyst for growth and innovation.

Courtney et al.'s (1999) uncertainty categorisation model at level one is characterised by a "clear-enough future," which facilitates the identification of discernible trends. In the context of smart textiles, for example, this could manifest as the increasing integration of flexible batteries into textiles, reflecting a burgeoning market demand for renewable technologies in health monitoring and sportswear, or the presence of established regulatory frameworks for wearable electronics. These trends represent a relatively predictable future and provide a foundation for strategic planning with a high degree of certainty. Level Two includes "alternate futures" and acknowledges the emergence of a limited set of discrete scenarios. For instance, scenario (A) might predict the rapid adoption of breakthrough technology in flexible batteries, leading to widespread integration into mainstream clothing lines and healthcare systems. Conversely, scenario (B) could envision a more niche application with the adoption of limited to specialised fields like the military or extreme sports, potentially hindered by consumer concerns or the emergence of competing energy-harvesting technologies.

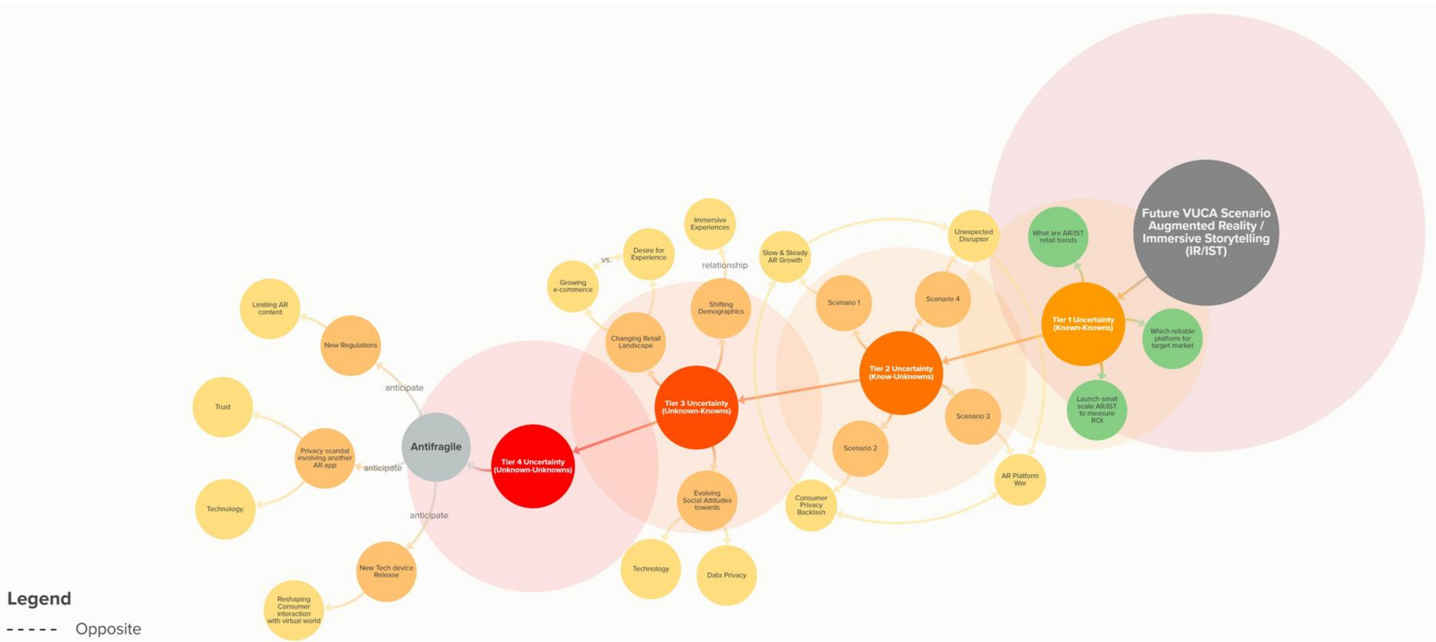
Level Three, "a range of futures," deals with a broader spectrum of possibilities without clearly explained scenarios. In this vein, market penetration of smart textiles with flexible batteries could range from a marginal 5% to a significant 50% within a decade. Similarly, battery life, cost, and regulatory responses could fluctuate across a wide spectrum to impact adoption rates and strategic decisions. Finally, Level Four confronts organisations with fundamental uncertainties that defy prediction, otherwise labelled as a 'black swan' event (Taleb, 2008). Extending the previous illustration, the potential discovery of revolutionary materials or energy storage principles could render existing flexible battery technology obsolete. Unforeseen health consequences associated with prolonged exposure to battery-powered clothing could trigger a seismic shift in public perception and regulatory settings. Similarly, radical changes in fashion trends or societal norms regarding technology-integrated clothing could turn strategic forecasts moot. Geopolitical events add another layer of complexity with the potential to disrupt supply chains of rare materials essential to flexible battery production.

The systematic analysis of these levels of uncertainty enables organisations to develop targeted strategies that balance confident investment in clear trends with preparation for less predictable outcomes. This approach allows for the creation of adaptable strategies that can navigate the complex scene of technological innovation and market dynamics in the smart textiles and flexible battery sectors. A table template is offered in Appendix 2 to guide the process of uncertainty categorisation for any given vulnerability within a KVT. It helps structure the analysis and ensure an extensive consideration of each uncertainty tier. Building upon the multilevel analysis of uncertainties surrounding smart textiles and flexible batteries or any other relevant topic to the organisation, the complexity phase now seeks to map and model the complex web of interconnections between these identified uncertainties, market forces, technological advancements, and broader societal trends to create an all-inclusive understanding of the dynamic ecosystem in which strategic decisions must be made.

3.2.2.3. Complexity

At the complexity level, the four distinct levels of uncertainty will be modelled into a systems map to capture the interconnection of the four uncertainty tiers using the KUMU platform or any other suitable application. This approach synthesises several strands of strategic management and systems thinking literature, including the complexity mapping principle of Castellani and Hafferty (2008), which offers an innovative way to operationalise theoretical concepts in practical and visually compelling fashions.

Figure 3.7 *Example of Complexity Modelling of the Four Uncertainty Levels Visualised in a Systems Map*



Note. *The author is using the KUMU platform (2024). The full interactive systems map can be found here.*

The use of KUMU or any other related systems mapping platforms as epistemological tools for knowledge creation and representation allows for the externalisation of tacit knowledge about uncertainties and their relationships (Nonaka & Takeuchi, 1995). This approach aligns with the principles of systems dynamics (Forrester, 2013) and earlier concepts in complexity theory as applied to strategic management (Stacey, 1995). Visual mapping of the interconnections between different levels and types of uncertainties helps in understanding the complex, non-linear relationships representing the essence of strategic environments (Senge, 2006). The power of this approach lies in capturing how these different levels of uncertainty interact within the same system. For example, a Level One uncertainty about increasing the integration of flexible power sources (solid connection) might lead to a Level Two uncertainty about adoption rates. These adoption scenarios could then influence a Level Three uncertainty about market penetration rates. All of these could be potentially disrupted by a Level Four uncertainty like the discovery of a revolutionary new energy storage technology. The visual representation of these interactions permits the systems map to illustrate how certain elements provide a foundation for analysing less certain ones. Different scenarios (Level Two) can lead to varying ranges of outcomes (Level Three). Highly uncertain factors (Level Four) can potentially reshape the entire system, including elements that seem more certain. This approach, however, is not without its challenges. The effective use of KUMU for this purpose requires a high level of analytical skill and a moderate understanding of both the technological platform and the strategic context. Moreover, the visual complexity of the resulting maps may pose interpretative challenges, particularly for stakeholders not well-versed in systems thinking.

3.2.2.4. Ambiguity

Finally, the last element of VUCA, ambiguity, arises from a lack of clarity and the presence of multiple interpretations surrounding the potential impact of the KVT on the organisation. It represents the apex of the analytical process that synthesises and builds upon the insights gained from preceding stages of environmental scanning, pattern recognition, and complexity modelling. This culminating phase serves as the strategy execution and implementation to address ambiguity. To effectively manage ambiguity, this research proposes a seven-step approach grounded in the literature that focuses on translating insights into action and continuously refining the strategy based on real-world feedback and changing circumstances. Table 3.4 summarises these steps.

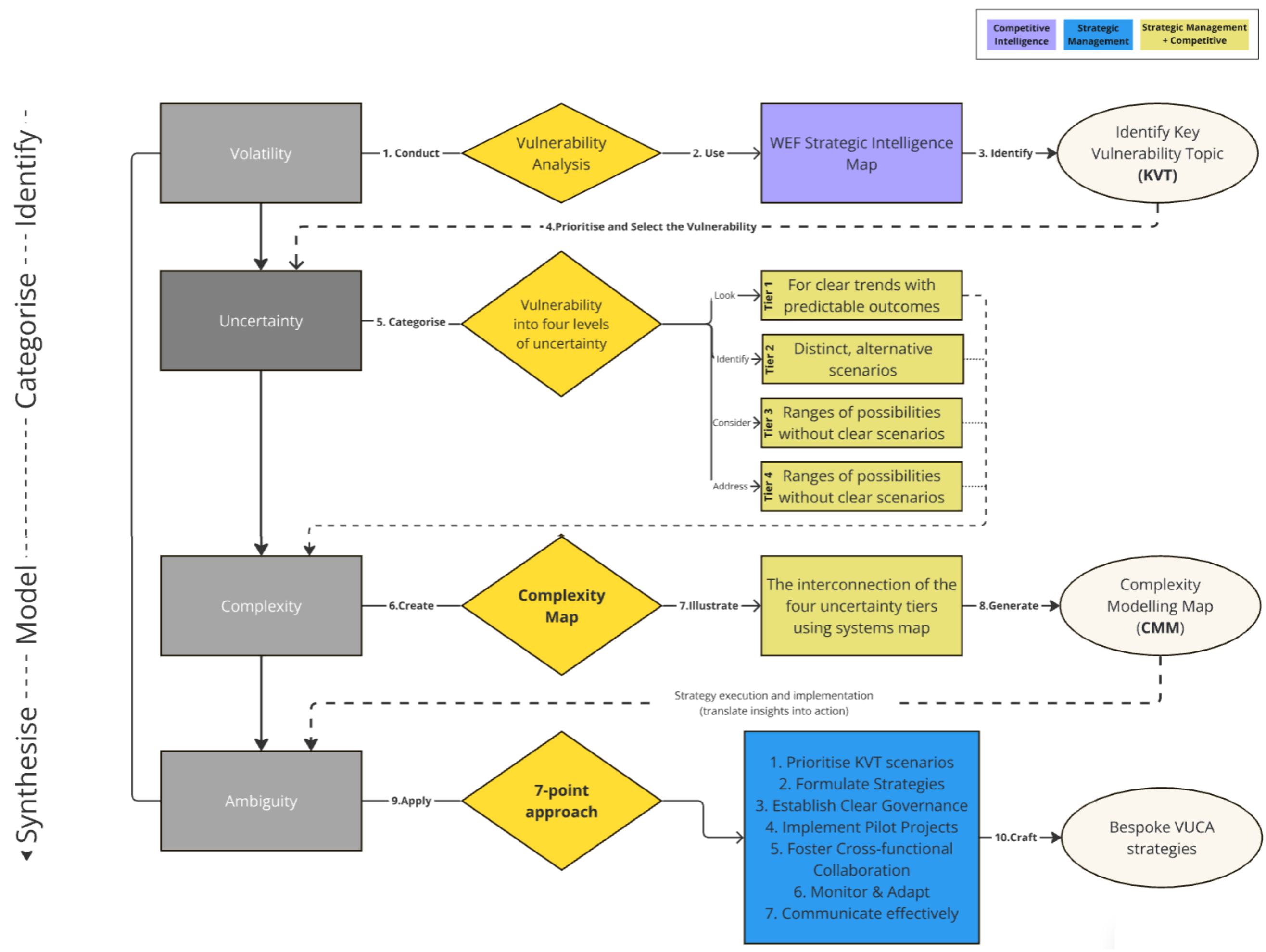
Table 3.4 *Seven-step approach to translating insights into action at the ambiguity level*

Step	Description	Alignment with the Literature
1. prioritise KVT scenarios	Evaluate identified KVT scenarios and prioritise those with greatest impact.	The framework's foundation in prioritising KVT scenarios aligns with the seminal work of Schoemaker (1995) on scenario planning, which emphasises the importance of focusing on high-impact, plausible futures. This initial step serves as a critical filter, allowing organisations to allocate cognitive and material resources efficiently in an environment characterised by high uncertainty and potentially infinite possibilities. Moreover, it resonates with the concept of "strategic issue management" proposed by Ansoff (1980), enabling organisations to identify and prioritise weak signals that may evolve into significant strategic challenges or opportunities.
2. Formulate Strategies	Develop strategies for each prioritised KVT scenario to capitalise on opportunities while mitigating risks.	Echoes the concept of strategic optionality as proposed by Trigeorgis and Reuer (2019). This approach enables organisations to develop a portfolio of strategic responses, enhancing their adaptive capacity in the face of ambiguity. It represents a departure from traditional, linear strategic planning models, acknowledging the non-ergodic nature of complex systems in which many organisations operate (North, 1999).
3. Establish Clear Governance	Define clear roles, responsibilities, and decision-making processes for KVT's scenario strategy implementation.	The emphasis on clear governance structures draws from organisational ambidexterity theory (O'Reilly and Tushman, 2013), recognising the need for both stability and flexibility in managing emergent strategic issues. This step is critical in creating an organisational architecture capable of absorbing and responding to the ambiguity inherent in KVTs, aligning with the principles of requisite variety in cybernetic management theory (Ashby, 1984).
4. Implement Pilot Projects	Test KVT strategy effectiveness by launching small-scale pilot projects.	The implementation of pilot projects as a means of strategy testing aligns with the principles of discovery-driven planning (McGrath and MacMillan, 1995) and the emerging field of experimentation in strategy (Camuffo et al., 2020). This approach allows for real-world experimentation and learning, critical in domains where theoretical models may be insufficient due to the novelty and complexity of the challenges represented by KVTs.
5. Foster Cross-functional Collaboration	Promote collaboration and coordination among various functions and departments in addressing KVTs.	The focus on cross-functional collaboration is grounded in the knowledge-based view of the firm (Grant, 1996), recognising that addressing complex strategic topics requires the integration of diverse knowledge domains. This collaborative approach is particularly vital given the often-interdisciplinary nature of contemporary strategic challenges, which may span technological, social, economic, and environmental domains.

6. Monitor & Adapt	Monitor and track progress on KVT strategies, identify areas of improvement, and adapt strategies as needed.	The emphasis on continuous monitoring and adaptation reflects the principles of dynamic capabilities as articulated by Teece et al. (1997) and further developed by Teece (2007). This step acknowledges the need for organisations to sense and seize opportunities in rapidly changing environments, ensuring that strategies remain relevant and effective. It also incorporates elements of organisational learning theory (Argote & Miron-Spektor, 2011), facilitating the continuous refinement of strategic responses to KVTs.
7. Communicate effectively	Maintain clear and transparent communication with all stakeholders during the KVT strategy implementation process.	The focus on effective communication aligns with stakeholder theory (Freeman, 1984) and sensemaking in organisations (Weick, 1995). This step is critical in managing the potential disruption and uncertainty that KVTs may bring to various organisational stakeholders, fostering a shared understanding of complex strategic issues.

The SCI framework, as delineated in this study, provides a methodical approach to navigating the intricate realities of VUCA. Through a systematic progression via the interconnected phases of volatility, uncertainty, complexity, and ambiguity, organisations can synthesise disparate data points and qualitative observations into actionable strategic foresight.

Figure 3.8 *Initial Conceptual SCI Framework*



Note. *By the author.*

The framework conceptualisation begins with identifying key vulnerability topics (KVTs) within the volatility phase, establishing a foundation for subsequent analysis. The uncertainty phase then applies a detailed categorisation of these vulnerabilities across four distinct levels of uncertainty, supporting an astute understanding of their predictability and potential impact. Building upon this foundation, the complexity phase models the complex interrelationships between these uncertainties, generating a full-spectrum representation of the competitive ecosystem. Culminating in a seven-step strategic approach, the ambiguity phase translates accumulated insights into concrete organisational action. This approach synthesises a continuum of activities, from the precise articulation of the strategic question to the implementation and ongoing monitoring of the chosen bespoke strategy. This ensures that the intelligence meticulously gathered throughout the SCI process is effectively leveraged for organisational decision-making.

The strength of the SCI framework lies in its structured approach, offering a seamless understanding of how to start navigating volatility. It allows making sense of VUCA and acknowledging it as an existing interconnected series of cascading steps rather than viewing it as an abstract concept. Furthermore, the framework's integration of multiple theoretical perspectives, ranging from systems thinking to scenario planning and the cultivation of dynamic capabilities, provides a solid foundation for addressing the multipronged challenges inherent to modern business environments. The effective synthesis of rigorous analysis with creative strategic thinking stimulates the SCI framework capabilities in equipping organisations with the necessary tools not merely to survive but to thrive within uncertain and complex markets. The proactive identification and mitigation of potential risks within the SCI framework boosts the cultivation of organisational resilience and adaptability amidst the challenges posed by VUCA. This approach assists organisations in transcending reactive responses to unfolding events, allowing them to develop an anticipatory and strategic methodology to effectively navigate the intricacies of VUCA.

In the end, the VUCA CRE serves as the backbone of the SCI framework as it provides a powerful theoretical lens for understanding and addressing the challenges posed by VUCA. The recognition of the interconnected nature of these elements and the development of proactive strategies for managing them using the SCI framework allows organisations to position themselves for success in an increasingly turbulent world.

Research Methodology

4.1. Paradigm of Inquiry in the Mixed-Method Research

Research paradigms can be differentiated based on their philosophical foundations: ontology, epistemology, and methodology. Erciyes (2020) states that these paradigms lead to varying interpretations of what constitutes theory. In positivist and post-positivist approaches, theory is viewed as a set of statements that link abstract concepts with observable data, allowing for the formulation and rigorous testing of hypotheses. On the other hand, critical theory, constructivist and participatory paradigms adopt an interpretive stance towards theory (Howell, 2016). These latter approaches highlight the interconnection between the act of interpretation and the subject being studied, emphasising the contextual nature of understanding the phenomenon.

Conversely, this research adopts a pragmatic paradigm to guide its mixed-methods inquiry into the development and validation of a contextually grounded SCI framework for navigating VUCA environments. Different from interpretivism, constructivism, critical theory and other paradigms, the pragmatic paradigm prioritises the research question and its practical implications over strict adherence to a single philosophical school of thought (Creswell & Plano Clark, 2018). It embraces methodological flexibility and acknowledges the fact that there are many different ways of interpreting the world and conducting research to investigate reality and that a combination of different approaches may provide a broader understanding of the phenomena being investigated, thus allowing researchers to draw upon the strengths of both quantitative and qualitative approaches to best address the research problem (, 2014). Table 4.1 summarises the prevalent paradigms of inquiries and their main features.

Table 4.1 *Summary of Features of the Three Main Paradigms of Inquiry*

Paradigm	Ontology (Nature of Reality)	Epistemology (Nature of Knowledge)	Methodology
Positivism	- Objective, singular reality exists independently of human perception. - Reality can be observed and measured directly.	- Knowledge is objective, value-free, and derived from empirical observation. - Focus on uncovering universal laws through scientific methods.	- Quantitative methods dominate. - Emphasis on experiments, surveys, and statistical analysis to test hypotheses.
Post-Positivism	- Reality exists but can only be known imperfectly. - Recognises that all observation is fallible.	- Knowledge is probable and subject to revision. - Aims to approximate truth while acknowledging limitations and biases.	- Primarily quantitative but open to qualitative methods. - Use of empirical evidence and hypothesis testing, with a critical approach to data.
Interpretivism (Constructivism)	- Reality is socially constructed and subjective.	- Knowledge is co-constructed through interaction between the	- Primarily qualitative methods. - Focus on in-depth

	- Multiple realities exist, shaped by individual experiences and interactions.	researcher and participants. - Emphasis on understanding the meanings people attach to their experiences.	interviews, case studies, ethnography, and narrative analysis.
Critical Theory	Social, political, and cultural power structures shape reality. - Often focuses on societal inequalities and oppression.	- Knowledge is not objective; power relations influence it. - Seeks to challenge and transform societal structures.	- Qualitative methods with a critical perspective. - Emphasis on critical ethnography, participatory action research, and discourse analysis.
Feminist Paradigm	- Reality is influenced by gender and power relations. - Recognises the importance of gendered experiences in shaping reality.	- Knowledge is situated and partial, reflecting marginalised perspectives. - Emphasises the importance of reflexivity and inclusivity in research.	- Qualitative methods are common. - Focus on narrative analysis, feminist ethnography, and participatory approaches that centre women's voices.
Critical Realism	- Reality is complex, layered, and stratified. - There are observable phenomena and underlying structures that are not directly observable.	- Knowledge is an interpretation of reality that seeks to uncover underlying mechanisms. - Recognises that knowledge is fallible and context-dependent.	- Often employs mixed methods. - Combines qualitative and quantitative methods to explore both surface-level phenomena and deeper structures.
Transformative Paradigm	- Reality is shaped by social, political, and economic power dynamics. - Emphasises issues of oppression and social justice.	- Knowledge is constructed within the context of power relations and aims to empower marginalised groups. - Research is often a form of activism.	- Mixed methods or qualitative methods. - Participatory action research, community-based research, and other collaborative approaches.
Pragmatism	- Reality is not fixed but is influenced by human actions and experiences. - Focuses on what works in practice rather than on a singular, objective reality.	- Knowledge is practical, useful, and based on what works. - Emphasises the utility and effectiveness of knowledge for solving problems. - Open to multiple perspectives and forms of evidence.	- Methodological flexibility is key. - Uses both qualitative and quantitative methods, chosen based on their ability to address the research question and achieve practical outcomes.

Positivism is a philosophical theory that postulates a single objective reality that exists independently of the researcher, and it maintains that knowledge unfolds through observation, measurement, and establishing causal relationships, usually using quantitative methods. This perspective can thus be viewed as influential in this research, for quantitative methods such as a survey in phase one and the proof-of-concept evaluation in phase two, where identification of patterns and evaluation of the framework occur. These methods indicate a desire for some level of generalisability and objective measurements concerning the effectiveness of the SCI framework. Nevertheless, this research acknowledges the subjective and context-dependent nature of VUCA experiences, which conflicts to some extent with positivism's assumption of objective reality. Furthermore, the primary aim of this research is to develop a practical framework, not to uncover universal laws governing VUCA navigation. Pragmatism's focus on problem-solving and context-specific solutions aligns better with this goal. The mixed-method approach, including qualitative data, stresses the importance of subjective experience in terms of the impact of VUCA on respective industries and the tools used to navigate VUCA, along with the co-constructed knowledge, which goes beyond positivism's emphasis on value-free observation. Table 4.2 below furnishes an understanding of where this research stands.

Table 4.2 *Positioning the Research within the Pragmatic Paradigm*

Research Key Features	Pragmatism Stance	Position of this research
Ontology	Pragmatism avoids taking a definitive stance on the nature of reality (ontology). It acknowledges multiple realities shaped by individual and social constructs (Morgan, 2013).	This research focuses on the very real challenges of navigating VUCA environments, acknowledging that different organisations and individuals may experience and interpret these challenges in diverse ways. This aligns with a relativist ontology, where reality is subjective and context-dependent.
Epistemology	Pragmatism embraces a transactional epistemology, where knowledge is not merely discovered but actively constructed through the interaction between the researcher and the researched (Creswell & Plano Clark, 2011).	The mixed-methods approach reflects this transactional view. This research is not seeking a single "truth" about navigating VUCA but aims to co-construct knowledge through the integration of diverse perspectives – from literature, surveys, case studies and proof-of-concept evaluation of the SCI framework in a simulated context.
Methodology	Pragmatism advocates for methodological pluralism, employing whatever methods are best suited to address the research question and generate practical knowledge (Johnson & Onwuegbuzie, 2004).	This research uses both quantitative and qualitative methods (mixed methods) to exemplify this flexibility. It leverages the strengths of each approach, quantitative data to identify patterns and trends, qualitative data to gain an in-depth understanding and context, and the SCI framework to adapt accordingly.

This research takes a pragmatic approach that prioritises addressing the practical challenge of navigating VUCA environments over adhering to any one philosophical paradigm (Quinn Patton, 2015).

In line with pragmatism, the methodology embraces pluralism; it leverages both quantitative (e.g. structured survey questionnaires) and qualitative (e.g. open-ended survey questions, online interactive workshop) methods to comprehensively understand the research problem and develops a vigorous and actionable strategic decision-making framework (Johnson & Onwuegbuzie, 2004). Furthermore, this research aims to generate practical solutions and tools that equip practitioners to effectively navigate VUCA contexts, recognising the significant real-world implications of ineffective VUCA navigation for organisational performance (Cherryholmes, 1992). The pragmatic emphasis on real-world applicability and consequences underpins the goal of developing a framework that mitigates the risks of VUCA environments (Rorty, 1999).

4.2. Research Philosophy and Approach

The quest to bridge the chasm between theory and practice stands as a significant endeavour within management research. The integration of theory and practice can seem disconnected but fundamentally seeks to produce actionable knowledge (Dresch, 2016). Whereas theory consists of conceptual frameworks abstracted from empirical evidence, the purpose is to provide models that inform real-world decision-making and guide effective practice. Practice refers directly to behaviours, processes, and outputs enacted in organisational contexts. Yet, observations of practice lend themselves to theorisation by revealing systemic patterns amenable to conceptual modelling (Embley & Thalheim, 2011).

Abductive reasoning, moving iteratively between the inductive development of theoretical propositions and the deductive application of theories, enables valid explanations and impactful prescriptions for managers. Integrating these spheres, management scholarship expounds theoretical lenses to interpret practical challenges as well as explores practical implications of theoretical perspectives. The paradigmatic foundations for this approach are pragmatic epistemologies which prioritise intersubjective verification and utility-based notions of truth (Driggers & Boyles, 2023). The pragmatic orientation aligns with calls for evidence-based and practice-focused management research that can address contemporary organisational issues and meaningfully influence workplace outcomes.

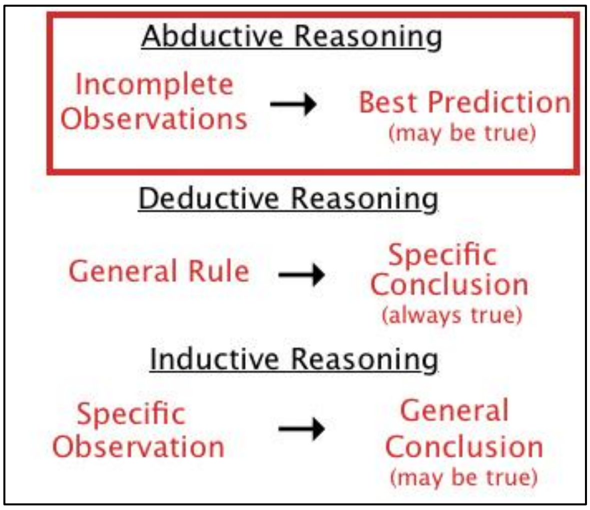
This section sets the grounds for this research in a pragmatist epistemology, acknowledging that knowledge is constructed through both theoretical understanding and practical experience (Creswell & Creswell, 2018). It recognises that the dynamic and multifaceted nature of VUCA environments necessitates a research approach that bridges the divide between theoretical models and real-world organisational challenges (Dewey, 1929). Pragmatism as a philosophical stance stands as a pertinent and valuable paradigm for mixed-method research on organisational processes (Kelly & Cordeiro, 2020). Researchers who adopt a pragmatic stance focus on practical outcomes and action-oriented solutions while also choosing methods that best address their research questions, whether qualitative, quantitative, or a combination of both (Wilson, 2010). It provides researchers with a realistic compass, a lodestar guiding their inquiries toward practical and tangible understandings of real-world phenomena (Quinn Patton, 2015). In so doing, it deftly sidesteps the metaphysical quagmires that entangle truth and reality. Rather than embarking on abstract ontological quests, pragmatists immerse themselves in the empirical currents of existence (Frápolli, 2023).

The pragmatist perspective emphasises interrogating the value and meaning of research data through the examination of its practical consequences (Morgan, 2014). This aligns well with the study's aim to develop, evaluate and validate a practical framework for navigating VUCA environments. By foregrounding ‘knowing’ and ‘learning’ as dynamic processes rather than inert abstractions, the research seeks to wield transformative potential upon practice itself (Biesta, 2010). This perspective assumes heightened relevance within the tumultuous terrain of VUCA environments, where adaptability and perpetual learning emerge as lifeblood, nourishing the survival and evolution of individuals and organisations alike.

From a methodological viewpoint, pragmatic epistemology recognises that organisational processes are complex and dynamic (Kelly & Cordeiro, 2020). Even carefully planned actions within an organisation can lead to varied outcomes over time and in different parts of the organisation. Researchers, therefore, need flexible techniques to investigate these types of processes. Pragmatism suggests that researchers embrace different methods and methodologies based on their usefulness in linking real-world practice to theory rather than questioning the inherent validity of certain approaches. Pragmatic inquiry takes into account that people within an organisation can experience organisational changes and actions differently. It encourages researchers to adapt their techniques to these complex settings and perspectives rather than taking a rigid approach (Onwuegbuzie & Leech, 2005). The goal is to select investigative methods that effectively connect observations of actual organisational practices to the development of theories about those practices (Kelemen & Rumens, 2012). Incidentally, while pragmatism frequently entails the integration of deductive and inductive logic, it readily incorporates abductive reasoning where appropriate in addressing research dilemmas (Aliseda, 2006). Rather than adhering to strict epistemic doctrines, the pragmatic orientation privileges methodological and theoretical pluralism, embracing whatever combination of reasoning modes enables effective inquiry given the specifics of the research problem.

Pragmatism’s flexible philosophical foundations provide latitude to traverse diverse paradigms and analytically eclectic techniques as needed to derive fruitful solutions to situated real-world challenges (Frankel Pratt, 2016). The emphasis lies in the consequence of inquiry for ameliorative action, not fealty to abstract logico-epistemological principles. Hence, abduction finds a natural home within the toolkit of the pragmatic researcher, as it offers a generative reasoning mode well-suited to developing provisional hypotheses that can inform practical problem-solving (Kaushik & Walsh, 2019). Abduction has been underemphasised relative to its deductive and inductive complements; pragmatism helps resuscitate its value in linking theoretical conjecture with empirical warrants to produce novel remedial possibilities.

Figure 4.1 *Abductive Reasoning in Business Research Methodology*



Note. *Dudovskiy (2012).*

There is a distinct necessity for research that extends beyond the mere description or assessment of theories. Despite the abundance of literature on VUCA, it fails to offer practitioners practical and applicable solutions. To resolve this, a novel approach is needed. The SCI framework, as a designed artefact, can be perpetually enhanced through iterative methods that are consistent with the principles of design science research (DSR) (Hevner et al., 2004). For such research methodology to be effective, it needs the application of an abductive reasoning process to move iteratively between data collection, analysis, and artefact refinement (Tavory & Timmermans, 2014). Unlike deductive reasoning, which tests pre-existing theories, or inductive reasoning, which derives general conclusions from specific observations, abduction seeks the most plausible explanation for surprising or unexpected findings (Fann, 1970). In the context of this research, the "surprising finding" emerges from the identified gap in existing literature, which is significantly represented by the lack of a comprehensive framework to guide strategic decision-making within VUCA environments. Abductive reasoning is key in this research design as the use of a mixed-methods approach carried out in two distinct phases makes it possible to iteratively observe, infer insights, and refine the analysis. Specifically, the observations gathered through the distribution of survey questionnaires in phase one led to new inferences and ideas about the research questions. Those inferences can then be further investigated and compared with and refined in phase two by collecting additional observations. This continuous cycle of observation and inference enabled by the phased mixed-methods design allows the researchers to progressively deepen their understanding through abductive reasoning rather than following a static and linear process; the development of insights occurs dynamically and cyclically (Järvelä et al., 2019).

The research begins by gathering data on professionals' experiences with VUCA, its current impact on their respective industries, their current VUCA awareness, approaches and tools used to counter VUCA, and perceived shortcomings. This data, collected through surveys in phase one and then compared to case studies' data from the literature, forms the initial set of "surprising facts" that require explanation. The development of the initial SCI framework is, therefore, an act of abduction, an attempt to create the most plausible explanation for the observed gap and propose a potential solution. The iterative nature of abductive reasoning comes to the forefront in phase two. The initial framework, developed through abduction, is not taken as a definitive answer but as a working hypothesis, a provisional idea used as a starting point for further exploration and refinement. Subsequently, feedback from practitioners, gathered through an online interactive questionnaire and workshop, helps refine and adapt the framework to make it more contextually relevant and practically applicable. This refinement process, driven by further observation and analysis, exemplifies the cyclical nature of abduction. Therefore, abductive reasoning underpins the entire research process, from identifying the research gap to developing, refining, evaluating and validating the SCI framework. This approach allows the research to remain dynamic and responsive to real-world complexities and ensures that the final artefact, namely the SCI framework, is not only theoretically sound but also practically valuable for professionals navigating the turbulent waters of VUCA environments.

4.3. Research Design and Strategy

4.3.1. Research Methods for Strategic Management

As a domain of scholarly inquiry, strategic management has undergone a profound evolution over the past three and a half decades. Emerging from the applied "business policy" and "business planning" work of the early 1960s (Andrews, 1971; Ansoff, 1965), foundational strategic management scholarship was prescriptive and normative, focused on imparting actionable knowledge to practitioners rather than pursuing theoretical advances. Constrained by this practical orientation, early research relied primarily on inductive methods like single-firm case studies aimed at developing immediately applicable frameworks versus systematically deriving new scientific insights (Eisenhardt, 1989; Yin, 2014). However, as the field progressed, deductive theorising and hypothesis testing became more prevalent, modelled on the paradigms of economics and sociology to enhance academic legitimacy (Guala, 2005; Engel & Schutt, 2017). This methodological shift enabled more rigorous causal analysis but also created a disconnection from managerial realities (Dagnino & Cinici, 2015). There have thus been growing calls for engaged scholarship incorporating abductive reasoning to develop theory iteratively grounded in practice. Strategic management has also expanded its interdisciplinary scope, and it currently integrates perspectives from neurology, psychology, anthropology, political science, and other social science disciplines to address firm behaviour. Yet, even as methodological and topical diversity multiplied, the underlying objective of generating actionable strategic knowledge has remained unchanged since its inception. The field today faces the perennial challenge of producing relevant applied insights while continually advancing theoretical knowledge.

The field of strategic management underwent rapid expansion after the publication of seminal works like Schendel and Hofer's Strategic Management in 1979, the launch of the Strategic Management Journal in 1980 and the establishment of the Strategic Management Society in 1981 (Dagnino, 2012). As the field's reputation grew in management spheres, so too did its theoretical and empirical sophistication. In an effort to establish the nascent area as a rigorous scientific discipline, early scholars looked beyond inductive case studies towards deductive methods like the structure-conduct-performance paradigm that enabled generalisable and causal theories explaining firm and industry competitiveness (Rumelt et al., 1994). Consequently, the 1980s and 1990s saw a widespread embrace of multivariate statistical tools and hypothesis testing using large-scale secondary datasets (Van de Ven, 2007). However, later theoretical developments like the resource-based view (Barney, 1991; Peteraf, 1993) and dynamic capabilities perspective (Teece et al., 1997) uncovered the limitations of these methods in examining heterogeneous internal firm factors. The study of idiosyncratic, intangible resources and capabilities was ill-suited to large-sample econometric techniques, spurring calls for more qualitative, contextual approaches (Danneels, 2002; Seth et al., 2009) even as the field continued advancing methodological pluralism. Nonetheless, despite the ebbs and flows in prevailing methods, strategic management has retained its underlying objective of producing theoretically robust yet practically relevant insights on sources of competitive advantage while navigating enduring tensions between scientific generalisation and contextual specificity.

Table 4.3 *Path of Methods Used in Strategic Management Research (1969-2010s)*

	1960s and 1970s	*1980s*	*1990s*	*2000s*
Name of field	Business policy or business planning	Strategic management	Strategic management	Strategic management
Dominant frameworks or perspectives	Long-range planning SWOT analysis PIMS studies	Structure-conduct-performance paradigm	Resource-based view Knowledge-based view	Resource-based view Knowledge-based view Evolutionary and behavioral perspectives
Type of methods preferably used	Qualitative	Quantitative	Quantitative	Quantitative and qualitative
Specific technique(s) typically used	Single case study	Statistical analysis	Econometric analysis	Multiple case study Statistical and econometric analyses Discourse analysis Mixed methods Multilevel inquiry

Priem et al. (2013) informed that contemporary strategic management scholarship has moved beyond the narrow theoretical frames and methods of the past towards the integration of diverse perspectives and the development of advanced theoretical models. This reality has prompted calls for more methodological plurality, with inductive qualitative approaches drawing on foundational social science disciplines being used alongside deductive, economics-rooted models (Bergh & Ketchen, 2011; Wang et al., 2012). Echoing Hoskisson et al.'s (1999) prediction that the complexity of strategic issues would drive greater methodological variety, there is now recognition that strategy researchers lack solid guidance on methods (Vaara & Whittington, 2012; Jarzabkowski et al., 2015). The emerging imperatives of impacting both theory and practice require balancing academic rigour with practical relevance (Nachum et al., 2022).

4.3.2. Designing and Executing Mixed Methods in Strategic Management Research

Contemporary strategic management dilemmas feature complex questions that require detailed examination, made intractable within discrete quantitative or qualitative paradigms. This complexity surfaces the constraints of methodical monism (Tănăsescu, 2019), which is based on the requirement that science should be grounded on experience and not on a speculative-idealistic principle. In response, a pragmatic epistemology manifests, embracing methodological pluralism through mixed methods research. This orientation integrates the respective strengths of quantitative and qualitative approaches and leverages their combined power in a single paradigm of inquiry (Creswell & Plano Clark, 2018). Mixed methods research, integrating quantitative and qualitative approaches within a single study, has rapidly gained recognition as a distinct methodological movement over the last few decades (Teddlie & Tashakkori, 2009). Although combinations of qualitative and quantitative data have long occurred ad hoc (Plano Clark, 2010), formal conceptualisations of mixed methods on methodological and philosophical levels emerged in the 1980s (Bryman, 2022). As such, mixed methods research has transitioned from an unnamed practice to a coherent methodological approach possessing a distinct identity (Denscombe, 2008).

Moving beyond qualitative and quantitative binaries, mixed methods leverage the interplay of inductive and deductive reasoning across diverse data types to foster deeper insights. This pluralistic orientation enables the holistic investigation of complex research problems situated in social realities featuring multiple intersecting continuums (Teece, 1997). Hence, mixed methods have become increasingly articulated as the third seminal research paradigm in providing systematic ontological, epistemological, and procedural principles for integrative inquiry (Teddlie & Tashakkori, 2009). Mixed methods thereby transcend the binaries of research tradition, forging a holistic methodology suited to complex research problems. With philosophical foundations in pragmatic epistemologies, mixed methods offer systematic techniques for collecting, analysing, and integrating quantitative and qualitative data within a single study or sustained line of inquiry. Harnessing the complementarity of diverse data forms enables deeper insights than those accessible within singular paradigms; mixed methods research thus heralds the advent of methodological maturity within the social sciences.

In line with this paradigm, this research adopts a two-phased, mixed-methods design to investigate the gap between existing tools for navigating VUCA environments and the needs of practitioners, culminating in the development and evaluation of the SCI framework. This strategy promotes an extensive examination of the study issue by using the advantages of both qualitative and quantitative methodologies (Johnson & Onwuegbuzie, 2004). The iterative design process, informed by abductive reasoning, enables the ongoing enhancement of the framework via empirical input and the development of theoretical insights (Tavory & Timmermans, 2014).

4.3.3. Suggested Research Design and Rationale

Identifying methodological designs suited to address posed research questions represents one of the most intellectually demanding facets of scholarly inquiry (Edmondson & McManus, 2007). Rarely is there a straightforward if-then relationship where particular questions mechanically map to specific methods. Although such simplistic advice is occasionally proffered, it tends to overpromise the certainty with which existing knowledge can prescribe solutions for novel problems (Klag & Langley, 2012). The genesis of every research is the research questions, which stem from three predominant sources: real-world problems, a researcher's interests, or extant discipline-based theories, with the latter considered most prestigious yet likely the least common (Vogt et al., 2012). However, initial research questions typically undergo refinement through a review of relevant literature to serve several critical purposes. First, the literature review aids in transforming broad interest areas into specific, novel questions positioned within scholarly discourse (Webster & Watson, 2002). Second, it delineates boundaries between resolved issues and persisting knowledge gaps to justify the value-add of new inquiries (Torraco, 2005). Third, prior work indicates methodological opportunities and pitfalls, steering the researcher toward rigorous designs that fit the purpose (Boote & Beile, 2005). In essence, the literature review enables scholars to build upon and extend past accomplishments rather than vainly reinventing existing wheels or retreading previously falsified assumptions (Kuhn, 1962). It channels efforts toward fertile questions addressable through appropriate methods vetted by disciplinary precedent. Thus, while research questions may derive from diverse sources, the iterative process of situating such inquiries within established literature and refining them through consistent review is indispensable.

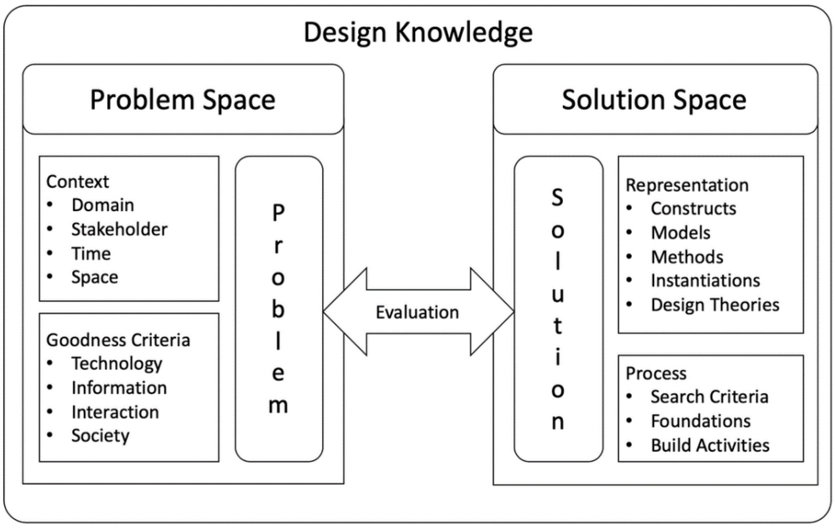
This research applies a Design Science Research (DSR) methodology to create and evaluate the SCI framework aimed at providing organisations with the tools and procedures necessary to successfully use strategy and CI in navigating VUCA environments. The design science research method (DSRM) (Simon, 1988) is defined as research that creates a novel and intentional product to tackle a broad problem and assesses its effectiveness in resolving such issues (Venable & Baskerville, 2012, p. 142). Over the past five decades, design research has undergone major paradigmatic shifts in its scientific and empirical foundations. In the 1960s and 1970s, initial efforts focused on defining design science as a distinct field situated between problem-solving and scientific inquiry (Hubka & Eder, 2012; Simon, 1996). Researchers grappled with adapting scientific methods and processes to the context of design with the aim of developing knowledge and techniques that better reflected the design's blend of artefact, methodology, and cognition. This pioneering work drove the emergence of "design science" that seeks to integrate scientific rigour within practice-oriented design.

In the 1990s, efforts emerged to unify the disparate design research paradigms under the umbrella term “design research,” more holistically capturing theoretical, empirical, and practical inquiry facets (Friedman, 1970). This reflected growing impetuses towards integration across previously siloed research communities and approaches, alongside strengthening cross-pollination between academia and industry. These unification events have catalysed the most recent shifts since the 2000s, a resurgent drive to consolidate design research’s multidisciplinary scope through enhancing methodological and philosophical rigour (Dorst, 2015). Manifestations include focused development of field-specific techniques (Ball & Ormerod, 2000), prioritising rigour in theory building and testing (Dorst, 2008) and increasing formalisation of design research methodologies (Blessing & Chakrabarti, 2014). At the confluence of these developments lies a pivotal milestone, coalescing the role of experimentation within the maturation of empirical design scholarship. The elucidation of the experimental design's value for knowledge production sustained the field's ability to navigate complex epistemic challenges undergirding applied, theoretically generative, and practically relevant inquiry.

The pursuit of impactful research often necessitates a structured approach, particularly when the goal is to develop practical solutions for complex real-world problems. DSR, with its emphasis on artefact creation and evaluation, offers a congruent framework for such endeavours. This becomes particularly relevant in the context of addressing the strategic challenges posed by VUCA environments. The core thrust of DSR knowledge is the iterative and interconnected nature of problem and solution space bridged by continuous evaluation (Figure 4.2). This cyclical process ensures that the designed artefact, namely the SCI framework, remains relevant, rigorous, and effective in addressing the identified problem. DSR aligns with the purpose of this research in the sense that it is problem-driven, which makes it inherently pragmatic. That is, the research is motivated by a practical problem, the lack of effective tools for navigating VUCA environments, identified through a gap in the literature and confirmed by the preliminary research survey. Firstly, DSR begins with a concrete, context-specific problem, in this case, the lack of a robust framework for navigating VUCA environments. This aligns with the core tenet of pragmatism, which prioritises inquiry based on what works well in practice rather than philosophical abstraction (Morgan, 2014; Rorty, 1999). Secondly, DSR allows for methodological pluralism, drawing on qualitative, quantitative, and mixed methods as needed to solve the problem at hand. This reflects the pragmatist stance that methods should serve the problem, not the other way around (Johnson & Onwuegbuzie, 2004). Thirdly, DSR requires continuous evaluation of outcomes, which mirrors the pragmatist view that the value of knowledge lies in its usefulness and real-world consequences. In this study, the SCI framework was empirically tested through practitioner feedback, interactive scenario testing, and iterative refinement, which makes its development deeply pragmatic in orientation.

In addition to its pragmatic alignment, DSR is also naturally abductive in its reasoning structure. As discussed in section 4.2, the research cycles between theorising, empirical observation, artefact creation, and refinement. This reflects the abductive reasoning process, which seeks the most plausible explanation for observed phenomena and iteratively improves understanding through engagement with data (Tavory & Timmermans, 2014). Unlike deductive approaches that begin with theory or inductive ones that emerge solely from data, abduction enables researchers to generate provisional hypotheses grounded in practice, as exemplified by the development of the SCI framework. A central "surprising fact" motivating this research was the notable absence of a comprehensive decision-making tool for navigating VUCA. The SCI framework is, therefore, not a static artefact but an abductively informed response, refined through iterative engagement with empirical findings and practitioner input.

Figure 4.2 *DSR Design Knowledge*



Note. *vom Brocke et al. 2020.*

Within the DSR paradigm, the bifurcation between issue space and solution space in Figure 4.2 fairly reflects the dichotomous inquiry moving over many exploratory and generative stages. Effective research design vitally relies much on a deep awareness of the issue context before attempting resolutions (Maedche et al., 2019), an awareness that is captured in phase one of the survey.

4.3.3.1. Phase One: Problem Identification and Preliminary Insights

Phase one of this research represents the problem space in the DSR design knowledge, and it is anchored not only in the literature diagnosis to determine the problem but also confirmed by the structured survey questionnaires. VUCA has indeed become an increasingly pervasive feature of the global business environment and represents a tumultuous challenge requiring more dynamic and agile approaches to strategic management across industries (Bennett & Lemoine, 2014). Traditional linear planning models pertaining to strategic management and CI are often inadequate for effectively navigating VUCA conditions. This context stresses the urgency of developing capabilities in strategic CI (SCI) to support complex strategic decision-making (Fleisher & Bensoussan, 2015). Second, the problem space also calls for the inclusion of stakeholders' perspectives to contextualise the challenge. This opportunity offers a complementary endeavour to grasp the stakeholders' lived reality to inform the research, thus allowing the unearth of essential elements that may elude capture through a mere literature review.

The DSR design knowledge depicted in Figure 4.2 above provides a blueprint that informs every step in the development of the SCI framework. For example, within the problem space, the context quadrant encompasses the '*domain*' of Strategic Management and CI in VUCA environments. This domain reflects the necessity for organisations to adapt their strategies to the volatile, uncertain, complex, and ambiguous nature of today's business requirements. Furthermore, the '*stakeholder'* identifies CI professionals and CMs as the key actors. The '*time'* situates the research in the contemporary business environment, which is marked by rapid technological advancements, globalisation, geopolitical instability, and economic volatility, emphasising the urgency of addressing these challenges. Lastly, the '*space'* highlights the globalised and interconnected markets where organisations operate. These markets demand a strategic framework that is both adaptable to diverse industries and applicable across various geographical locations to ensure that organisations can effectively navigate the complexities of the global business environment.

The following quadrant in the picture delineates the 'goodness criterion,' which requires a precise description of what defines a successful solution in the context of constructing the SCI framework. These criteria guide the design and execution of solutions to guarantee they successfully tackle the issues presented by VUCA situations. Goodness criteria hinge on the use of 1) *'technology'*, which imposes that a successful solution must incorporate advanced strategic intelligence tools and technologies to address the insufficient integration of VUCA elements in existing approaches. It should overcome limitations in handling real-time data and offer user-friendly frameworks for strategic decision-making. This translates to the necessity for specialised, technology-enabled solutions that can capture the details of each VUCA element. 2) 'Information' requires that the solution should systematically prioritise key intelligence topics (KIT), efficiently extract relevant information from vast data sets, and ensure that this information is accurate, timely, and actionable. It must address issues such as data fragmentation and inconsistencies in information quality to support strategic decision-making in VUCA environments. 3) *'Interaction'* implies that the solution must be user-friendly, intuitive, and easily adopted by both CMs and CI professionals. It should include clear guidelines, visual aids, and interactive elements that facilitate strategic decision-making. This criterion underlines the importance of a framework that is both theoretically sound and practically applicable. 4) Finally, *'society'* mandates that the solution must promote ethical CI professionals and CMs practices, address concerns such as data privacy, misinformation, and bias, and consider the societal impact of strategic decisions made using the framework. This criterion recognises the ethical implications of strategic decision-making in VUCA environments, especially in a globalised and interconnected world.

Table 4.4 *Contextualised Breakdown of Design Knowledge Elements Tailored to the SCI Framework at Problem Space Level*

Segment	Category	Sub-category	Description	Example
Problem Space	**Context** (Specific challenges of strategic management and CI in VUCA)	**Domain**	The specific area or field that the research focuses on	Strategic Management and CI
		Stakeholder	The individuals or groups who have a stake in the research or are affected by its outcomes.	CMs and CI professionals operate in rapidly changing market conditions characterised by VUCA. When designing the framework, it is important to consider their existing practices, challenges, and expectations.
		Time	The temporal context or timeframe in which the research is relevant.	The research is particularly relevant in the current business conditions, characterised by rapid technological advancements, globalisation, geopolitical instability, and economic volatility, all contributing to heightened VUCA (Ciravegna et al., 2023)
		Space	The spatial context or setting where the research is applicable.	The spatial context is globalised and interconnected markets where information flows rapidly, competition is fierce, and organisations need to adapt quickly to survive and thrive (Birshan et al., 2023)
	Goodness Criteria (What constitutes a successful solution within the problem context?)	**Technology**	Identifies the technological challenges, limitations, or gaps that your solution needs to address.	A successful solution must use advanced strategic intelligence tools to address the insufficient integration of VUCA elements, overcome the limitations of existing CI technologies in handling real-time data, and provide a user-friendly framework for strategic decision-making.
		Information	Outlines the information-related challenges that the solution must address to be considered successful.	The solution should effectively and systematically prioritise key intelligence topics and relevant information from vast amounts of data; ensure information is accurate, constantly updated, timely, and actionable; and resolve issues such as data fragmentation and inconsistencies in information quality to support strategic decision-making in VUCA environments.
		Interaction	Defines the user experience and usability challenges that the solution must overcome.	A successful solution must be user-friendly, intuitive, and easily adopted by CMs and CI professionals. It must also include clear guidelines, visual aids, and

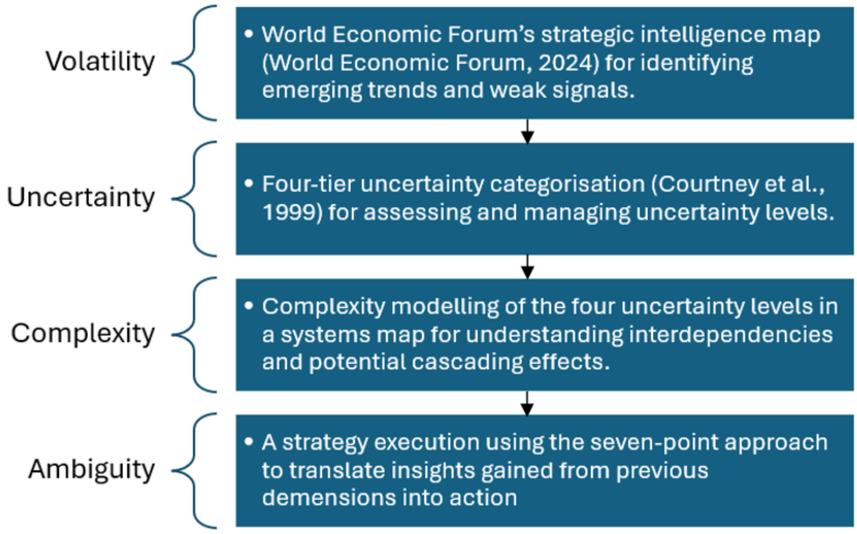
				interactive elements that facilitate strategic decision-making.
		Society	Highlights the ethical and societal challenges that must be addressed for the solution to be considered responsible and effective.	The solution must promote ethical CI practices, address issues like data privacy, misinformation, and bias, and consider the societal impact of strategic decisions made using the framework.

4.3.3.2. Phase Two: Framework Development and Evaluation

In designing solutions tailored for this emerging imperative, a critical initial step is identifying and understanding key stakeholder groups, including specialists who will use the frameworks and tools being developed. This stakeholder mapping provides a rationale for a purposive, non-probability sampling approach (Oliver, 2006). Rather than random selection, purposive sampling selectively recruits specialised participants based on judgements of which groups satisfy the necessary criteria and possess the requisite knowledge to provide meaningful insights on the research issues. Typically, these samples are relatively small enough to feasibly conduct an in-depth inquiry (Douglas, 2022).

For an SCI framework to achieve relevance, adoption and impact, focusing on user-specific needs is imperative. Core stakeholder groups comprise practicing Chartered Managers and CI professionals dealing with VUCA contexts and seeking enhanced technical processes amidst market turbulence and dynamism. Developing an accurate picture of these stakeholders' challenges, existing practices, and requirements will drive a user-centred experience to the SCI framework design. Phase two corresponds to the solution space, which, in practice, represents the tangible and conceptual components that are essential for crafting the SCI framework as the potential solution. As shown in Figure 4.2, the 'constructs' quadrant in the solution space represents the relationship between VUCA dimensions and CI processes for intelligence gathering. It employs the World Economic Forum's (2024) strategic intelligence map for weak signal detection, strategic agility, organisational learning, and risk management in VUCA. The framework should explicitly address the interconnected and cascading nature of VUCA elements, as highlighted by the 'VUCA Chain Reaction Effect' proposed in this research. This conceptual understanding ought to be embedded within the framework's structure and operationalisation. *'Models'* draws from the seminal work of Taskan et al. (2022) related to the VUCA conceptual map to depict the conceptual cascading interplay of VUCA elements. The resulting VUCA chain reaction effect (VUCA CRE) model should guide the framework's design and application as it provides a visual representation of the dynamic interplay between VUCA elements to aid in understanding their cascading impact and informing the development of targeted strategies. With concerns to the 'methods', the SCI framework integrates specific interlocked steps, each featuring a specific tool to address each VUCA element sequentially, as portrayed by figure 4.3 below.

Figure 4.3 *Interconnected SCI Framework Strategies for Tackling Each VUCA Dimension*



Note. *By the author.*

The *'instantiation'* element within the solution space materialises by presenting participants with a real-world VUCA scenario, reflecting the VUCA case study of the GlobalGoods corporation. Participants are invited to navigate and solve this scenario using their preferred tools and then compare their approach with the structured approach offered by the SCI framework. This instantiation provides a practical demonstration of the framework's application, effectiveness and validity.

In the *'design theories', the framework follows the principles of 'VUCA-aligned design theory '* (Johansen & Euchner, 2013) and Information processing theory (IPT) (Miller, 1956). The first reflects the cascading effect as outlined by Taskan et al. (2022) to ensure the framework systematically tackles each VUCA element in a structured manner while recognising their interconnections. The second concerns a bespoke structure that is specifically adapted to the VUCA concept. This dual integration serves to align the framework with established theories of cognition and decision-making. Table 4.5 describes key constituent elements within the Problem and solution Spaces to scaffold rigorous research inquiry.

Table 4.5 *Contextualised breakdown of design knowledge elements tailored to developing the SCI framework at the solution space level*

Segment	Category	Sub-category	Description	Example
Solution Space	**Representation** (Tangible and conceptual components of the SCI framework)	**Construct**	The key concepts or elements within the framework that define its structure and purpose	Key constructs include the relationship among VUCA dimensions, CI processes for intelligence gathering using the WEF strategic intelligence map, weak signal detection, strategic agility, organisational learning, and risk management in VUCA.
		Models	Visual or theoretical models are used in the framework to represent complex ideas or relationships.	The conceptual cascading interplay of VUCA elements using Taskan et al. (2022) VUCA conceptual map. As a result, the VUCA chain reaction effect (CRE) is developed.
		Methods	The specific methods or techniques used within the framework to achieve its objectives.	Based on CRE, the SCI framework is conceptualised by integrating the following approaches. For Volatility: World Economic Forum's strategic intelligence map (World Economic Forum, 2024) For Uncertainty: Four-tier uncertainty categorisation (Courtney et al., 1999) For Complexity: Complexity modelling of the four uncertainty levels in a systems map Seven-point approach to translate insights into action
		Instantiation	Real-world applications or case studies that illustrate the framework in action.	Participants will be presented with a real-world VUCA scenario. They will then be invited to navigate and solve this scenario using their preferred tools. Subsequently, a demonstration, through video guidance, will show them how the SCI framework can effectively address the same VUCA challenge.
		Design Theories	The theoretical foundations inform the framework's design and ensure its effectiveness.	In its design, the framework follows the principle of 'VUCA-aligned design theory', reflecting the cascading effect inspired by the work of Taskan et al. (2022). This design approach ensures that the framework systematically addresses each VUCA element in a structured way while recognising its interconnected nature.

				The design principle complements the information processing theory (IPT) by providing a bespoke structure tailored to the VUCA concept itself.
	Process (Steps of designing, developing, demonstrating, evaluating, and communicating the artefacts)	**Search Criteria**	The criteria used to guide the literature review and research process ensure that relevant knowledge is integrated into the framework.	The literature review focuses on identifying existing frameworks used in the VUCA context, best practices, and research findings related to CI, strategic management in VUCA, and decision-making under uncertainty.
		Foundations	The theoretical underpinnings and justification for the framework's design choices.	Resource-based view (RBV) theory (Barney, 1991) Dynamic capability (DCT) theory (Teece et al., 1997) Knowledge-based view (KBV) theory (Grant, 1996) Complexity theory (Weaver, 1948) Signal detection theory (SDT) (Ingleby, 1967)
		Build Activities	The iterative steps are taken to develop, test, and refine the framework.	Initial pilot testing with CMs and CI professionals. Incorporating feedback from Genially-based validation. This is the interactive platform where participants experience real-world VUCA examples and watch video guidance on how the SCI framework operates in navigating VUCA. Conducting further iteration based on the final user input

The Problem Space dimensions provide analytical anchors to clarify core challenges and contextual complexities motivating this endeavour comprehensively. Including success criteria for each problem component features precise needs and desired outcomes to orient solution ideation. Subsequently, the solution space classification outlines structural areas requiring tailored frameworks, techniques and representations to address the stipulated problem imperatives. The clarity of alignment between problem insights and solution requirements reinforces the integral symbiosis between these knowledge domains for enacting impactful design science research. Overall, this schema offers scaffolding to explain the problem ecosystem and derive cogent solutions by coordinating epistemic activities across philosophical, theoretical, methodological, and practical facets. The resulting coherence between problem framing, solution finding, and artefact generation promotes systematic progress from inquiry to intervention.

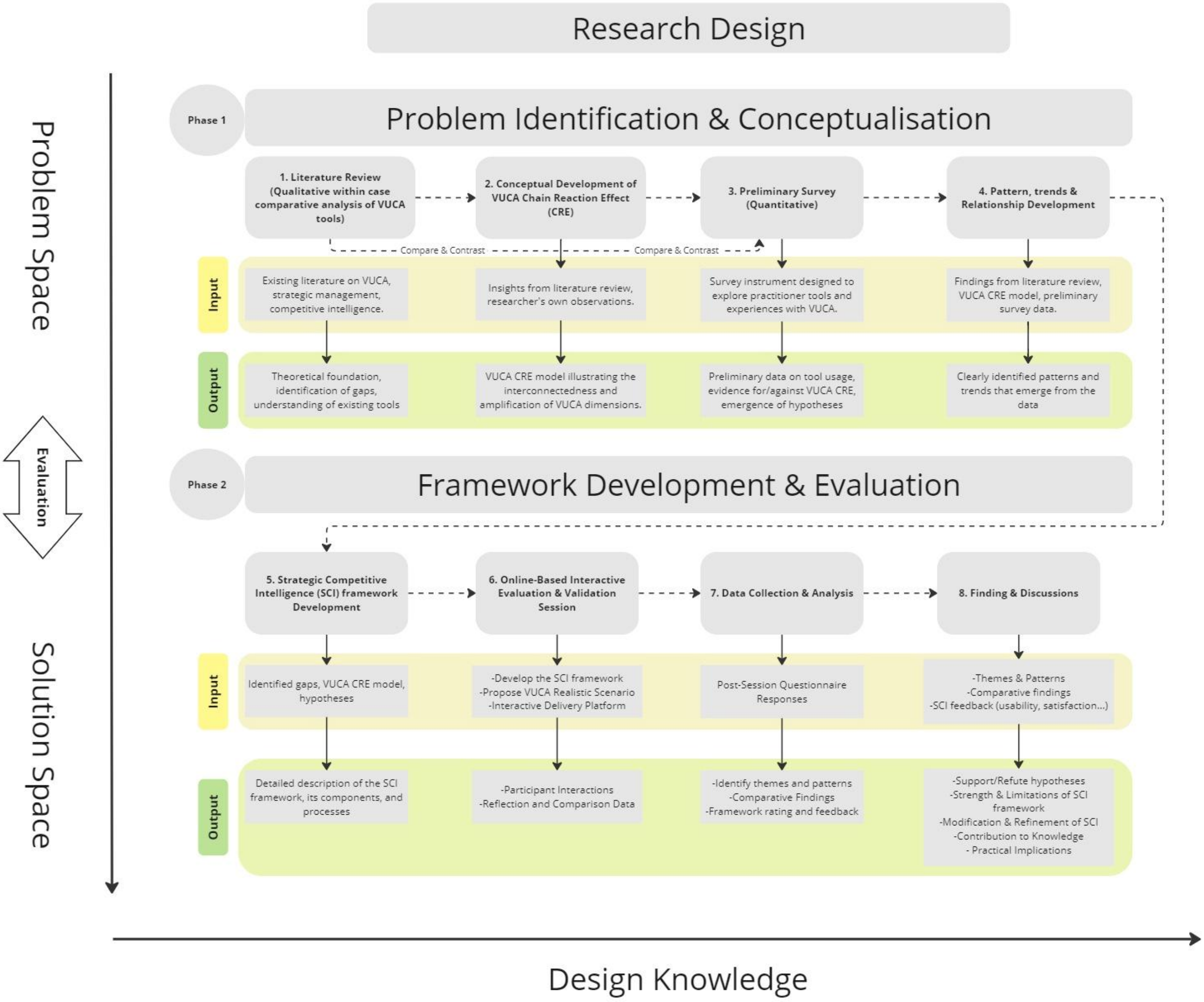
Table 4.6 Evaluation of Key Features and Benefits of the SCI Framework

Segment	Sub-category	Description	Example
Evaluation	**Relevance**	The framework's ability to address the specific challenges and needs of stakeholders ensures it is fit for its purpose.	**Addressing specific challenges:** The SCI framework tackles the main challenge of lacking comprehensive tools for navigating VUCA environments. Existing tools were deemed inadequate, but the SCI framework, with its focus on the VUCA Chain Reaction Effect and AITTs, offers a targeted solution. **Meeting stakeholder needs:** The framework was developed based on the needs of CI professionals and CMs, with feedback from surveys and interviews shaping its practical, user-friendly design. Features like simplified templates and practical guides directly address concerns raised by participants about the framework's complexity.
	Rigour	The conceptual soundness and theoretical grounding of the framework ensure it is robust and reliable.	**Conceptual soundness**: The SCI framework is grounded in established theoretical frameworks from strategic management, CI, and complexity theory. The integration of concepts such as the resource-based view, dynamic capabilities, and sensemaking provides a robust theoretical foundation, ensuring the framework's conceptual soundness. **Theoretical Grounding:** The VUCA Chain Reaction Effect is a theory-based model that explains the dynamic interaction of VUCA elements, enhancing the framework's ability to develop targeted strategies. Its focus on proactive intelligence and strategic foresight aligns with

			signal detection theory to identify weak signals of emerging trends.
	Efficacy	The framework's effectiveness in improving decision-making outcomes provides tangible benefits to users.	**Improved decision-making outcomes:** The comparative analysis of perceived effectiveness scores in Phase Two, Segment Two, revealed that the SCI framework consistently outperformed participants' existing tools in navigating a real-world VUCA scenario. This suggests that the framework's structured approach, guided by the VUCA Chain Reaction Effect and the integration of AITTs, enhances strategic decision-making capabilities. **Tangible Benefits:** Participants' qualitative feedback highlighted several tangible benefits of using the SCI framework, including a clearer understanding of VUCA interdependencies, a more organised approach to information gathering and analysis, and a more robust set of strategic recommendations. For instance, multiple participants noted that the SCI framework "provides a comprehensive and practical step-by-step approach to tackle VUCA, explaining interdependencies well."
	Usability	The ease with which the framework can be adopted and integrated into existing practices ensures it is practical and user-friendly.	**Ease of Adoption:** The framework's modular design and integration with the WEF strategic intelligence map may provide an easy starting point, facilitating its adoption into existing organisational practices. **Practical and user-friendly:** Initial feedback noted the framework's complexity, but simplified templates, practical guides, and an interactive application may address these concerns.

In this spirit, the exploratory nature underpinning this research is based on two distinct yet interconnected phases along with an evaluation phase to establish the relevance, rigour, efficacy and usability of the framework. Phase one focuses wholly on the problem space, an essential foundation for responsive framework development. Three facets drive extensive upfront problem inquiry: (1) Contextual immersion to grasp strategic management challenges induced by VUCA turbulence; (2) Stakeholder analysis identifying user level of awareness, needs and practices; (3) Benchmarking criteria that define artefact success. This front-loaded investment in problem explanation scaffolds phase two's transition into the Solution Space. With analytical spotlights trained squarely on the problem ecosystem, phase two systematically mobilises those insights to architect tailored frameworks. The solution space transformation involves: (1) Concretising concepts, models, methods and prototypes; (2) Embedding design choices within established theoretical paradigms; (3) Adhering to a rigorous build sequence including reused knowledge, transparent logic and iterative refinement. Yet the critical bridge between both spaces is ongoing evaluation, proving the artefact's real-world functionality while driving continual enhancements based on applied feedback. This validation trajectory demonstrates the framework's needs-centricity, scientific credibility, and performance viability amidst contextual VUCA turbulence. Hence, recursive evaluation catalyses impactful problem-solving. Therefore, this research's structure mirrors the philosophical gravity of deeply understanding a problem before solving it while fortifying solutions through authentic co-development with stakeholders (Johannesson & Perjons, 2021). This problem-inspired, user-centred spirit steers the endeavour from conception to culmination. Figure 4.4 depicts the overall research design sustained by the DSR methodology.

Figure 4.4 *The Overall Research Design*



Note. *By the author*

4.4. Sampling and Recruitment Strategy

4.4.1 Target Population

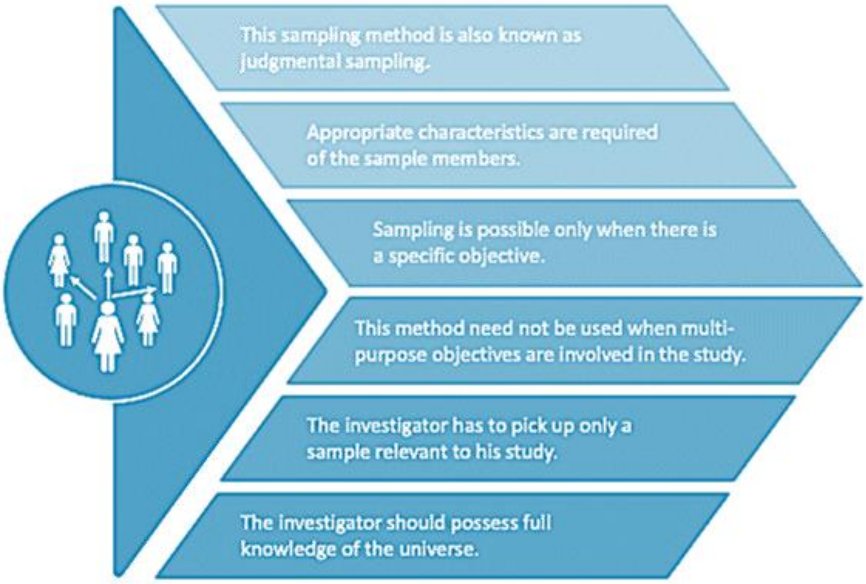
The research question typically includes a more detailed specification of the precise units or entities that the study aims to gain knowledge about (Grønmo, 2019). The research question related to this research hinges on examining how a tailored SCI framework can enhance strategic decision-making effectiveness for organisations navigating VUCA. To address this question, there is a requirement to access insights from decision-makers operating within VUCA contexts. Chartered Managers (CMs) offer this frontline perspective given their direct responsibility for strategic choices under uncertainty as part of their organisational management roles. Meanwhile, CI professionals possess specialised expertise in intelligence gathering and analysis techniques to inform strategic planning and decision-making. Comparing findings across these groups holds the promise to illuminate differences in approaches between those using bespoke methods versus more ad-hoc decision-making frameworks. This will indicate whether the SCI framework equips organisations to better anticipate, interpret, and respond to VUCA dynamics.

This research strategically focuses on CMs and CI professionals as twin linchpins to investigate the role of the SCI framework in enhancing decision-making under VUCA. This targeted population affords manifold benefits aligned with the study's aims. Firstly, both cohorts actively navigate strategic complexities within their organisational roles, thus enabling grounded insights into real-world VUCA challenges (Giovanni, 2013). Secondly, a comparative analysis between groups with and without formal CI training illuminates distinctions in approaches and uncovers whether and how a systematic SCI framework confers performance advantages versus ad-hoc methods (Babatunde & Adebisi, 2012). This empirical juxtaposition tests assumptions on the value the SCI framework delivers in mitigating VUCA risks (Juhari & Stephens, 2006). Thirdly, the researcher's access to the memberships of the Chartered Management Institute (CMI) and Strategic Consortium Intelligence Professionals (SCI professionals) grants sample diversity spanning diverse industries, geographies, and organisational contexts. This strengthens external validity and generalisability (Collis & Hussey, 2013). Moreover, the leverage of these professional affiliations assists in participant recruitment and enhances research credibility within these communities. Targeting experienced and strategic-level managers ensures that data is grounded in complex decision-making (Mintzberg, 1973). Meanwhile, it acknowledges potential biases from dual memberships and implements mitigation strategies of transparency, objectivity, external validation and preserving rigour (Bero & Grundy, 2016). Eventually, such a selection and comparative approach can yield multifaceted insights into SCI's impacts on decision-making acuity amidst open-ended turbulence.

4.4.2. Sampling Techniques

A critical initial phase in developing solutions addressing emerging strategic needs is identifying and deeply understanding the key stakeholders who will employ the frameworks and tools produced through the research. The stakeholder mapping in the preceding section provides a rationale for a purposive, non-probability sampling approach (Oliver, 2006). In contrast to random selection, purposive sampling selectively recruits specialised participants based on judgements of which groups satisfy essential criteria and possess the requisite knowledge to provide meaningful insights on the research issues. Typically, such samples are relatively small, which increases the feasibility of conducting a detailed inquiry.

Figure 4.5 *The Essence of Purposive Sampling*



Note. *Adapted from Robinson (2023).*

As a non-probability technique, purposive sampling centres the deliberative selection of information-rich cases over representativeness (Etikan et al., 2016; Palinkas et al., 2015). This provides concentrated access to insights from well-positioned cohorts versus probabilistic generalisability. The strategic recruitment of CMs and CI professionals confers multiple benefits. Firstly, targeting frontline strategic decision-makers such as CMs and CI experts furnishes "ground truth" perspectives on navigating VUCA. Secondly, comparing groups with and without specialised training enables a rich interpretation of process and performance differences (Juhari & Stephens, 2006). Lastly, these cohorts' specialised qualifications and experiences prime extensive exploration of the complexities of decision-making under VUCA conditions.

To implement this approach, the inquiry deploys purposive sampling to recruit information-rich participants able to provide grounded insights on navigating strategic complexity. Explicit inclusion/exclusion criteria ensure that recruited cohorts directly exemplify core competencies and experiences vital for addressing the research aims (Palinkas et al., 2015). For CMs, criteria demand demonstrated qualifications and multi-year track records in senior strategic roles. This filters for experts with firsthand leadership experience manoeuvring VUCA. Meanwhile, CI professionals must evidence active engagements by applying intelligence to inform high-stakes decisions. This criterion ensures their demonstrable proficiency in strategic sense-making, environmental scanning, and threat/opportunity identification amidst turbulence.

Table 4.7 *Summary of the inclusion/exclusion criteria of two targeted populations*

Group	Inclusion Criteria	Exclusion Criteria
Group 1: CI professionals (SCIP professionals Members)	**Active SCI professionals Membership:** Participants must be current members of SCI professionals, indicating their engagement with the field of CI. - **Experience in Strategic Decision-Making:** Participants should have demonstrable experience in applying CI principles and practices to inform strategic decisions within their organisations. - **Commitment to Two-Phase Participation:** Similar to Group 1, participants must be willing and able to participate in both research phases.	- **Inactive SCI professionals Membership:** Individuals who are not current members of SCI professionals will be excluded. Student or associate members are also excluded.
Group 2: CMs (CMI chartered members)	- **Chartered Manager (CMgr MCMI) Status:** Requires a management qualification at degree level/equivalent OR a minimum of 5 years of management experience. - **Fellow (FCMI) Status:** Requires a management qualification at degree level/equivalent AND a minimum of 10 years of management experience, three of which must be at a strategic level. - **Commitment to Two-Phase Participation:** Participants must be willing and able to participate in both phases of the research: (1) the initial survey and (2) the subsequent framework development, evaluation and validation workshops.	**CMI Membership Levels below Chartered Manager:** Student, Affiliate, and Associate members will be excluded as they may not possess sufficient experience in strategic-level decision-making.

These adopted inclusion/exclusion criteria ensure the selection of participants with relevant expertise and experience to enable a focused comparison of their decision-making approaches. A comparative juxtaposition of these cohorts' decision-making approaches, one guided by professional CI training versus more ad-hoc methods, represents a keystone inquiry objective. This purposive recruitment concentration promises a rich explanation of process differences and performance impacts (Juhari & Stephens, 2006). Given the specialised knowledge required to understand the details of VUCA and its impact on strategic decision-making, a purposive sampling approach is deemed more appropriate than probabilistic sampling, which prioritises representativeness over in-depth insights from specific expert groups (Wiśniowski et al., 2020). Although inherently limited in generalisability, the targeted selection of specialised experts supplies extensive qualitative insights into decisional challenges and SCI solutions under VUCA. Mitigating risks of subjectivity through transparency, consistent criteria, and data triangulation helps preserve analytical integrity (Bero & Grundy, 2016).

4.4.3. Recruitment Strategies

A two-pronged recruitment approach was developed to access the target populations of CMs and CI professionals. For CMs, initial contact was made with the Chartered Management Institute's (CMI) London regional support team requesting assistance in participant outreach from their membership database (Appendix 3). However, due to privacy and consent limitations raised by CMI, an alternative engagement pathway was collaboratively proposed using CMI's LinkedIn community group. A participation invitation post was shared within this group to elicit voluntary responses from qualified members (Appendix 4). Meanwhile, the recruitment of CI professionals leveraged the researcher's existing involvement in the SCI professionals' Workplace platform. A dedicated sub-group titled "PhD Research Survey" was created with selected SCI professional members sent invitations to join (Appendix 5 and Appendix 6) based on the criteria of inclusion mentioned in Table 4.7 above. This notification summarised the research focus and participation requirements to allow informed decisions on volunteering. However, the researcher encountered low participation from CI professional members, which prompted the researcher to establish direct contact with each member via email. The primary objective was to centralise recruitment through a digital platform as a way to enable enrolled members to easily access participatory documents, such as consent forms and information sheets, as the next step in engagement. Despite the challenge of low participation, the researcher successfully reached the targeted CI professional's participant threshold.

Across both cohorts, recruitment emphasised invitation to participate (Appendix 7), informed consent (Appendix 8), participant information sheet (Appendix 9), confidentiality and flexibility. All participants could freely rescind responses or withdraw from the research at any time. This ethical approach sought to establish trust, transparency, and empowered decision-making regarding involvement. Follow-up communications were personalised based on individual engagement levels to direct members to additional resources while reaffirming voluntary participation. This versatile outreach and relationship-building strategy aimed to recruit specialised and invested cohorts highly qualified to inform this inquiry's aims.

4.4.4. Sample Size and Rationale

As delineated in the previous section, this study employs a purposive sampling method to identify and select participants who are likely to provide rich and in-depth insights into the application of the VUCA Chain Reaction Effect (VUCA CRE) and, subsequently, the SCI framework in organisational contexts. This method is often used when the population being studied is too small, too difficult to access, or too heterogeneous to use probability sampling methods (Hassan, 2022). The target population for this study includes senior executives, strategists, and decision-makers from a diverse range of industries and sectors who have experience navigating VUCA challenges in their respective organisations.

Given the complexity of the research design, which involves two phases, a qualitative exploration followed by a framework evaluation and validation, the sample size was determined based on a combination of theoretical and practical considerations. In Phase One, a sample size of 20-40 participants is considered sufficient for achieving data saturation in qualitative research, as recommended by Guest, Bunce, and Johnson (2006) and Morse (2000). This sample size allows for the identification of common themes and patterns across a diverse range of experiences and perspectives and can also enable an in-depth exploration of individual cases. After considering the inclusion and exclusion criteria (table 4.7), the researcher settled on a number of 32 participants (16 CMs and 16 CI professionals) in phase one. In Phase Two, the focus is on the framework validation and evaluation; a larger sample size of 50-70 participants was targeted to ensure adequate statistical power and representativeness. However, given the interlinked nature of both phases (problem identification and framework development and validation) and the commitment required from participants, the actual sample size achieved was lower than the initial target. This is because the continuity between the two phases mandates that participants from phase one also participate in phase two to ensure consistency in data and governance of the experimental process across the study's longitudinal timeline. In other words, the actual sample size in phase two was ultimately limited to the number of participants involved in phase one, which was 32 participants (16 CMs and 16 CI professionals). The groups that participated in phase one also took part in phase two. Hoekstra et al. (2018) emphasised that involving the same groups across different phases allows for continuity, shared understanding, and efficient knowledge translation. It improves the quality, conduct, and reporting of research partnership literature. To mitigate potential attrition and ensure the validity of the findings, the sampling strategy prioritises the selection of participants who are most likely to remain engaged throughout the entire research process. This involves identifying individuals with a strong interest in the topic. While this approach may limit the overall sample size, it helps to ensure the quality and depth of the data collected, as well as the meaningful engagement of participants in the framework development and evaluation phase.

The decision to proceed with a smaller sample size is supported by research indicating that valuable insights can be gleaned from a limited number of participants, particularly when the focus is on understanding complex, context-specific phenomena. For example, Crouch and McKenzie (2006) argue that small sample sizes in qualitative research can nurture close engagement with participants, enabling the researcher to gain a deeper understanding of their experiences and perspectives. Similarly, in the context of the framework development, evaluation and validation, several scholars have demonstrated the feasibility of conducting meaningful analyses with smaller sample sizes. For instance, Smith and Little (2018) highlight the value of small-sample studies in providing proof-of-concept evidence and generating hypotheses for future research. They argue that small sample experiments, when designed and executed rigorously, can yield meaningful insights into the mechanisms and boundary conditions of a given phenomenon. Moreover, the use of mixed methods in this study helps to compensate for the potential limitations of a smaller sample size by allowing for the triangulation of findings across qualitative and quantitative data sources. As noted by Creswell and Plano Clark (2018), the integration of multiple methods can enhance the validity and credibility of research findings even when the sample size is relatively small.

While the smaller sample size may limit the generalisability of the findings to the broader population, it is important to note that the primary aim of this study is to provide an in-depth, contextualised understanding of the VUCA CRE and the SCI framework rather than to generate statistically representative conclusions. The insights gained from this study can serve as a foundation for future research with larger sample sizes and more diverse populations. In retrospect, the purposive sampling method and sample size used in this study are justified by the specialised knowledge required from participants to understand the particulars of VUCA and its impact on strategic decision-making, the complexity of the research design, the need for participant commitment across two phases, and the prioritisation of in-depth context-specific insight over broad conceptualisation. The decision to prioritise quality over quantity in the sample selection is supported by research (Etz & Arroyo, 2015) that substantiates the value of small sample studies in generating meaningful findings and informing future research directions beyond statistical power. The use of a methodological orthodoxy that prioritises qualitative approaches within mixed methods (Hesse-Biber, 2010) enhances the validity and credibility of the results, hence alleviating the potential drawbacks of a limited sample size.

4.5. Pilot Study

4.5.1. Objectives and Rationale of the Pilot Study

Conducting a pilot study constitutes a primordial preparatory phase, serving as an experimental "trial run" to refine myriad logistical and methodological elements before full-scale research implementation (Kim, 2010; Leon et al., 2011). This inquiry's pilot study possesses several interlinked objectives.

Firstly, evaluating the survey instrument's lucidity, intelligibility, comprehensiveness and relevance based on user feedback (Collins, 2003). This includes assessing question clarity, response option quality, and survey length and mitigating participation fatigue. Secondly, the pilot scrutinises the feasibility and functionality of deployed data collection techniques, including the online survey platform and recruitment pathways (Doody & Doody, 2015). Thirdly, the pilot anticipates unforeseen challenges across language, comprehension, analytical methods, ethical dimensions, or interpretive biases needing rectification (Hazzi & Maldaon, 2015). Fundamentally, the pilot enables rigorous calibration of research components to optimise validity and reliability (van Teijlingen et al., 2001). The concentration on troubleshooting at the preliminary stages preserves downstream resource allocations for the expanded study (Tickle-Degnen, 2013). Additionally, the enhancement of participant experiences through iterative refinements maintains engagement momentum (Qian et al., 2024).

This pilot will recruit a relatively small but adequately representative sample of both CMs and CI professionals, reflecting the full study's parameters. Meticulous analysis of key feedback areas such as cognition, affect, and trust will guide necessary modifications to streamline the participation process ahead of the primary research phase.

4.5.2. Pilot Study Design and Execution

The pilot study followed a systematic design approach, recognising the value of scaled rehearsals for fine-tuning before the full research rollout (Eldridge et al., 2016; Tickle-Degnen, 2013). To reflect the blueprint of the full study, the pilot applied mixed-method techniques for a detailed evaluation based on end-user perspectives (Rodriguez, 2016). A purposive sample of five experts, spanning scholarly and practitioner orientations, was recruited to leverage snowball sampling. This cross-section encompassed doctoral supervisors and business and management lecturers, crystallising multi-vantage feedback on procedural sensibility and instrumentation relevance (Hazzi & Maldaon, 2015). Key recommendations actualised include clarifying niche terminology, enhancing question lucidity, streamlining responses, right-sizing duration, and removing non-essential items. Such meticulous calibrations embody "design thinking" for participatory architecture and uphold principles of empathy, accessibility, precision, and pragmatism (Dorst, 2015).

The pilot effectively met its core objective of rigorously testing and optimising the study's instruments. Incorporating extensive user-centred feedback on cognition, emotion, and motivation early on ensures the main research will be more relevant and resonate with the target audience (Doody & Doody, 2015). Overall, the systematic execution of the pilot improves the quality of the instrument design and enhances its validity, reliability, and likelihood of adoption.

4.5.3. Insights, Findings, Learning and Refinement from the Pilot Study

The pilot study furnished valuable insights and feedback and led to several important adjustments and refinements in the research methodology and questionnaire design. These changes were implemented to enhance the clarity, relevance, and effectiveness of the study. The key learnings and subsequent refinements are depicted in Table 4.8 below.

Table 4.8 *Key Insights, Findings, Learnings and Refinements Based on Pilot Study*

Phase	Category	Improvements/Adjustments
Phase 1: Survey Questionnaire - Problem Identification	1. Questionnaire Structure and Content	a) VUCA Knowledge Section -Enhanced clarity in defining VUCA elements to ensure respondents have a clear understanding before answering questions. - Added questions to assess the perceived impact of VUCA elements on the respondent's organisation and industry. - Items were included to gauge the priority given to VUCA elements in strategic planning.
		b) VUCA Impact Section - Expanded to include more detailed questions about the frequency and nature of VUCA challenges faced by organisations. - Added items to assess the perceived preparedness of organisations to navigate VUCA pressures. - Incorporated questions to identify specific aspects of operations impacted by VUCA dynamics.
		c) Tools for Managing VUCA section - Refined questions to better distinguish between comprehensive VUCA management tools and specific tools for individual VUCA elements. - Added items to assess the effectiveness of tools in identifying early or weak signals of VUCA challenges. - Included questions to gather information on specific instances where tools succeeded or failed in addressing VUCA challenges.
	2. Questions Formulation and Scales	- Standardised rating scales across questions for consistency and ease of analysis. - Improved the wording of questions to reduce ambiguity and enhance clarity. - Added more open-ended questions to capture qualitative insights and specific examples from respondents.
	3. Alignment with Research Objectives	- Removed the "Wicked Problems" section as it was deemed not entirely necessary or aligned with the key aims of the research. - Focused the questionnaire more tightly on the core research objectives: assessing VUCA knowledge and impacts, evaluating existing tools, identifying limitations, and gathering perspectives on potential improvements.
	4. Response Options and Data Collection	- Expanded response options in multiple-choice questions to capture a wider range of potential answers. - Added instructions and examples to guide respondents in providing more detailed and relevant information, especially for open-ended questions.
	5. Theoretical Framework Integration	- Introduced a question about the potential need for a 'VUCA chain reaction effect to align with the research's theoretical framework and gather perspectives on this proposed approach.

	6. Respondent Experience	- Streamlined the questionnaire to reduce completion time and respondent fatigue. - Improved the logical flow of questions to enhance the respondent experience and encourage thoughtful responses.
Phase 2: Interactive Video-based survey – Framework Evaluation and Validation	1. Survey Format and Accessibility	- A text version of the survey was created to complement the video-based format and enhance accessibility for participants who prefer written content. - Transcripts for each video and a consolidated version of all concepts were made available for download.
	2. Content Clarity and Structure	- The VUCA model, its elements, and questions were provided in written format to supplement the video content. - Definitions and approaches related to each VUCA element were reviewed for clarity and distinctiveness. - Multiple-part questions were broken down into single questions to improve clarity and ease of response.
	3. Theoretical Framework Refinement	- The linear chain effect relationship between V-U-C-A was critically examined. While acknowledging potential nonlinear interactions, the researcher defended the linear approach as a novel perspective that aligns with the VUCA acronym and offers a simplified yet valuable representation for analysis. - The researcher committed to critically evaluating different relationships among VUCA elements (e.g., bidirectional, circular, networked) in the analysis phase.
	4. Model Evaluation	- Specific evaluation questions for each element of the model were considered in addition to the overall usefulness evaluation. - The researcher planned to include a well-detailed section on limitations, challenges, and barriers to implementing the proposed model.
	5. Survey Design and Participant Engagement	- To ensure participants view all video content, the 'Answer question' button was concealed until after the cumulative duration of the four videos had passed. - The survey design was adjusted to allow participants to resume from where they left off to accommodate those who might need additional time to complete the study.
	6. Methodological Consideration	The researcher acknowledged the potential for different responses between participants who view the videos and those who do not and highlighted the importance of ensuring all participants engage with the full content.

	7. Theoretical Contribution	- The possibility of adopting a nonlinear VUCA model as a contribution to the field was considered, with the potential to explore various influence relationships between VUCA elements without changing the acronym.

These refinements emerged from pilot participant dialogues and preliminary data patterns, embedding stakeholder perspectives into a user-centred research framework (Simkus, 2023). This approach reflects the principles of engaged scholarship, where instrumental upgrades address constituent needs in ethical, relevant, and meaningful ways (Van de Ven, 2007). The adjustments enhance the questionnaire's scope and analytical utility and ensure alignment with the study's complex research objectives. Through a reorganisation of its content and structure in accordance with its research objectives, the primary study seeks to provide uniform insights on VUCA knowledge, its effects, and organisational readiness while simultaneously identifying ways to enhance system readiness.

4.6. Survey Design and Administration

4.6.1. Objective and Purpose

In phase one, the inquiry deploys a multi-method online survey targeting CMs and CI professional practitioners across contexts. Aligned with preliminary problem identification and conceptualisation, the survey addresses a key epistemic objective in the exploratory phase by examining contemporary VUCA impacts and organisational preparedness challenges (Edmondson & McManus, 2007). The survey architecture encompasses three interconnected objectives: Evaluating VUCA familiarity levels, auditing perceived impacts of VUCA on operations and decisions, and appraising existing practices and tools used for tackling VUCA (refer to Appendix 10 for details on Phase One of the survey). Composite findings will inform analytical priorities for framework development by revealing pain points and performance gaps.

Several complementary design elements enhance both the sophistication and trustworthiness of the study. Granular Likert scales provide a balance between brevity and depth across constructs and enable triangulation of statistical insights to take place with qualitative self-reports to reveal process patterns and system leverage points (Vannette & Krosnick, 2019). Targeted CI professionals and CMs prompts are used to uncover technical details, while explicit grouping questions allow for stratified analyses by key factors without overwhelming participants. Skip logic ensures item relevance is fluidly adjusted, and randomised question rotations help reduce ordering effects. The survey operationalises engaged scholarship ideals through accessibility, rigour and praxis integration (Van de Ven, 2007). The aim is to generate actionable intelligence regarding strategic preparedness for increasing VUCA pervasiveness across global business ecosystems. Once the analysis reveals key pain points and opportunities, the second phase of the inquiry will shift from problem identification to solution development.

On the other hand, the primary objective of Phase Two of the survey is to develop and evaluate the SCI framework as an integrative approach to VUCA challenges in contemporary business environments. This phase aims to:

1. Assess the practical applicability and effectiveness of the SCI framework in real-world VUCA scenarios.

2. Compare the SCI framework's approach with existing tools and methodologies used by business professionals in addressing VUCA challenges.

3. Gather insights and feedback from experienced professionals to refine and enhance the SCI framework.

4. Evaluate the framework's ability to provide strategic insights and recommendations in complex business situations.

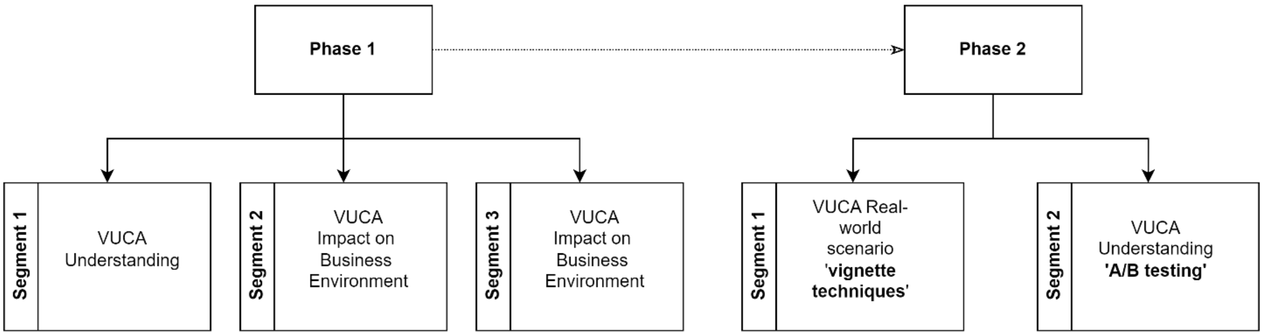
5. Determine the perceived value and potential adoption of the SCI framework among business management professionals.

This research phase plays a key role in aligning with the broader research objectives. Its primary focus is to evaluate and validate the theoretical foundations of the SCI framework through practical application. The interactive engagement with participants aims to identify potential gaps or areas for improvement in the framework. Specifically, it assesses the framework's effectiveness in addressing each VUCA element, both individually and collectively. Additionally, it explores how the SCI framework can enhance strategic decision-making in VUCA contexts. The qualitative and quantitative data collected during this phase will inform refinements and ensure the framework's robustness and practical utility.

4.6.2. Survey Layout

This research used a carefully designed survey instrument to gather in-depth intelligence on practitioners' understanding of and experiences with the VUCA environment. The survey not only maps the current VUCA tool but also captures practitioners' perspectives on the proposed safe-to-fail SCI framework.

Figure 4.6 *Survey layout*



Note. *By the Author.*

The survey is deployed in two phases, with the first phase dedicated to problem identification and generating preliminary insights. Phase One consists of three distinct yet interlinked segments. The first segment looks at how familiar participants are with the concept of VUCA and its key elements to establish a baseline understanding of their knowledge. The second segment explores how participants perceive VUCA's impact on their business environment and decision-making to allow them to understand the broader context in which they are operating. The third and final segment of Phae One examines the tools and techniques participants use to manage VUCA-related challenges to extrapolate common practices and identify any potential gaps in their approach. The logical flow within Phase One progresses from a general assessment of VUCA awareness to a more specific exploration of its impact and the tools used to manage it. This sequential structure ensures that participants are guided through a coherent line of inquiry that provides an overarching picture of their current VUCA preparedness.

Phase Two then shifts to framework development and evaluation, which consists of a single section designed as an interactive workshop. This section immerses participants in a realistic VUCA scenario and then introduces them to the SCI framework. In its first segment, participants navigate the scenario using their existing tools and then explore the same scenario using the introduced SCI framework. They then provide feedback on the framework's effectiveness, usability, and potential improvements in segment two. Serving as an interactive approach, this section aims for a dynamic and engaging evaluation of the framework to capture both quantitative and qualitative insights using data gathered from phases one and two. According to the DSR method, this represents moving from problem identification to solution exploration and evaluation to foster a deeper engagement with the SCI framework to enable participants to experience its practical application and provide valuable feedback for its refinement.

Table 4.9 *Survey Structure for Assessing VUCA in Phase One and Designing a Solution in Phase Two*

Phase #	Section	Purpose	Content	Question Types	Example Questions
Phase 1	Segment 1: VUCA Knowledge	To assess respondents' understanding of VUCA elements and their relevance to their organisation.	Definitions of VUCA, perceived impact on organisation and industry, strategic priority of VUCA elements.	Multiple-choice, Likert scale, open-ended	"How would you rate your organisation's understanding of VUCA?"
	Segment 2: VUCA Impact	To evaluate the frequency, nature, and preparedness of the organisation in facing VUCA challenges.	Frequency of VUCA challenges, preparedness levels, operational impact.	Multiple-choice, Likert scale, ranking questions	"How often does your organisation face VUCA challenges?"
	Segment 3: Tools for Managing VUCA	To explore the tools used for managing VUCA and assess their effectiveness.	Types of tools, effectiveness in identifying weak signals, instances of success or failure.	Multiple-choice, Likert scale, case study examples	"Which tools has your organisation used to manage VUCA?"
Phase 2	Segment 1: Navigating a Real-World VUCA Scenario	To assess respondents' ability to apply existing tools and strategies in a realistic VUCA context.	A detailed description of a real-world VUCA scenario relevant to the participants' industries. The scenario should present a complex challenge involving multiple interconnected VUCA elements.	Multiple-choice, open-ended, scenario-based questions, ranking of strategic options	How would you approach the task of identifying emerging VUCA trends and weak signals in the consumer goods sector?
	Segment 2: SCI Framework Evaluation	To evaluate the perceived effectiveness, usability, and relevance of the SCI framework in addressing the real-world VUCA scenario. To gather feedback for framework refinement.	Introduction and explanation of the SCI framework, including its key concepts, stages, and tools. Participants are guided through the application of the SCI framework to the same real-world VUCA scenario presented in Segment 1.	Likert scale (effectiveness, usability, relevance), open-ended feedback, comparative analysis (SCI framework vs. existing tools)	On a scale of 1 to 5, how strongly do you agree or disagree with the following statement: The SCI framework offers a more comprehensive and effective approach to navigating VUCA challenges

4.6.3. Question Design, Types and Rationale

Phase one of the survey employed a multi-phased question development process to ensure the creation of an instrument capable of effectively capturing aspects of VUCA within contemporary business contexts. This approach prioritised clarity, relevance, and alignment with overarching research objectives. The foundation for question design was established through an extensive review of seminal literature on VUCA, strategic management, and CI. This theoretical grounding captures works from renowned scholars in the field to enable the identification of key themes, constructs, and potential measurement approaches. Table 4.10 offers a consolidated and cohesive overview that presents a summary of key academic literature addressing various aspects of VUCA, strategic management, CI, and organisational strategy. Each entry links the core insights of these works to specific survey questions to illustrate their relevance in examining how organisations navigate the complexities of VUCA environments.

Table 4.10 *Consolidated Overview Linking Phase One's Survey Question to Academic Literature*

Research Area	Author(s) and Year	Key Findings/Insights	Related Survey Questions
VUCA Framework	Bennett & Lemoine (2014)	Define VUCA and describe challenges associated with each component, offering practical insights for management.	Section I: (a, b, f, g), Section II: (a, b)
BEVUCA in Business Contexts	Saleh & Watson (2017)	Investigate the impact of BEVUCA (Beyond VUCA) on business excellence, emphasising the need for adaptive strategies.	Section I (a, c), Section II (d, f), Section III (g, k)
		Analyse how BEVUCA impacts supply chain management, stressing the need for flexibility and foresight.	Section I (e), Section II (f, g), Section III (h, l, m)
Exponential Organisational Models	Marchese et al. (2020)	Taming VUCA with exponential organisational models.	Section III (d, e, k, l)
Conceptual Map of VUCA	Taskan et al. (2022)	Provide a systematic review of the VUCA framework, offering insights into the interplay between volatility, uncertainty, complexity, and ambiguity and their implications for organisational analysis and strategy.	Section I (a, b, c), Section II (f, g), Section III (d, e, f)
Management of VUCA in Industry 4.0	Mohanta, Nanda and Patnaik (2019)	Explore the management of VUCA through machine learning techniques within the industry 4.0 paradigm, highlighting how advanced analytics can enhance decision-making in volatile, uncertain, complex, and	Section II (g), Section III (a, e, j, l)

		ambiguous environments.	
Innovation in VUCA Context	Abidi & Nakagawa (2018)	Examine innovation in VUCA within emerging markets, focusing on how Tunisian firms adapted post-revolution.	Section I: (c, d, f), Section II: (d, g)
Dark Side of Expatriation in VUCA	Bader et al. (2019)	Study the challenges and crises affecting expatriates in VUCA contexts, including global mobility and strategy.	Section II: (f, g), Section III: (h, j, k, m)
Managing VUCA	Baran & Woznyj (2020)	Offer insights on how to identify and mitigate challenges in a VUCA environment.	Section III: (a, f, k, n)
Strategic Flexibility	Brozovic (2018)	Explores strategic flexibility and its role in managing change within VUCA environments.	Section II: (c, g), Section III: (k, m, n)
Competitive Intelligence	Calof & Wright (2008)	Discuss CI practices, providing insights into its application in strategic decision-making.	Section III: (f, g, j, k)
Competitive Intelligence Practices	Calof et al. (2018)	Analyse the CI practices of European firms to navigate VUCA environments.	Section III: (a, b, e, j, k)
Scenario Planning Theory	Chermack (2005)	Examines scenario planning theory to develop hypotheses for decision-making in uncertain environments.	Section III: (h, j, l)
Managing External Complexity	Child & Rodrigues (2011)	Discuss how organisations engage with external complexity in the face of uncertainty and ambiguity.	Section III: (a, c, e, g)
Innovation in New Contexts	Cooper et al. (2023)	Investigate strategic management and innovation in emerging contexts to navigate challenges.	Section III: (e, f, g, l)
Management Innovation in VUCA	Millar et al. (2018)	Highlight management innovation strategies to thrive in VUCA environments and provide recommendations for managers.	Section I: (f, g), Section II: (d, g), Section III: (c, d, f, g, p)
Industry 4.0 and VUCA	Jaiswal et al., 2024	Explore Industry 4.0 in the context of VUCA, circular economy, and	Section II (g), Section III (m)

		sustainable development goals.	
Strategic Alignment and VUCA	Sarwar (2023)	Develop a conceptual framework focusing on strategic alignment capability and VUCA.	Section III (c, d)
Discourse Analysis and VUCA	Wuryaningrum et al. (2023)	Focus on reframing for the VUCA era in discourse analysis.	Section III (f, j)
Knowledge Management and VUCA	Pujianto et al. (2023)	Discuss knowledge management systems in building coastal community economic resilience in the VUCA era.	Section III (c, e, m)
Navigating IT in VUCA	Majewski et al. (2023)	Investigate how IT companies navigate in the VUCA era.	Section I (g, h), Section III (b)
Situational Leadership and VUCA	Sarjito (2023)	Integrate situational leadership with VUCA to formulate adaptive and responsive policies.	Section I (g), Section III (k)
Leadership and Business Strategy in VUCA	Kuncoro & Thaha (2023)	Discuss leadership and business strategy in the VUCA world.	Section III (a, g, k)
Coordination and Strategy in VUCA	Widodo et al. (2023)	Study coordination and strategic planning's impact on organisational performance in the VUCA era.	Section II (c, e), Section III (m, n)
Innovative Strategising for VUCA	Astapov (2023)	Discuss innovative strategising for sustainable development.	Section III (e, f)
Upskilling and Reskilling in VUCA	Achoki (2023)	Investigate upskilling and reskilling for a VUCA world.	Section III (k, l)
Educational Technology in VUCA	Odabasi & Bülbül (2023)	Discuss the repositioning of educational technology in the VUCA world.	Section III (g)
Women's Entrepreneurship in VUCA	Welly et al. (2023)	Analyse the role of socio-cultural support and financing for women entrepreneurs in the VUCA era.	Section III (g, m)
Business Innovation and adaptation in VUCA	Majchrzak (2023)	Studies innovation in the business services sub-sector in Poland.	Section I (g, h), Section III (k)
Management in a Changing Reality	Osbert-Pociecha (2023)	Examines management in a dynamically changing reality.	Section II (f, g), Section III (b)

Managerial Approaches in VUCA	Gaule et al. (2023)	Study managerial approaches for business model application in VUCA environments.	Section III (e, l)
Cost Competitiveness in VUCA	Boopathi & Kautish (2024)	Analyses cost competitiveness, customer focus, and sustainability in the VUCA automotive market.	Section III (g, k)
Strategic Flexibility in VUCA	Yawson et al. (2024)	Study strategic flexibility analysis in organisational adaptation to VUCA.	Section III (c, m)
Organisational Ambidexterity in VUCA	Fernández-Pérez de la Lastra & Sánchez-Gardey (2024)	Discuss organisational ambidexterity and reconceptualisation for the VUCA international context.	Section III (g, l)
Foresightedness in VUCA	Jaiswal et al. (2024)	Study innovative firms' foresightedness in a VUCA world.	Section III (g, l)
Capacity-Building in VUCA	Hernández (2023)	Explore capacity-building and community change on a college campus in a VUCA world.	Section III (f, k)
Modeling Uncertainty as Ambiguity	Ilut & Schneider (2022)	Review modelling uncertainty as ambiguity.	Section I (b), Section II (c, e)
Strategic Alignment Capability	Sarwar (2023)	Studies strategic alignment capability in healthcare.	Section III (f, g)
Strategies for Resilience in VUCA	Salun & Zaslavska (2024)	Discuss strategies for resilience in VUCA environments.	Section II (c, f, g), Section III (e, f, j, k)
VUCA Strategy for Security Management	Hordienko et al. 2023	Focus on VUCA strategy for security management.	Section III (c, d, e, j, k, l)
Supply Chain Strategy in VUCA	Jantapoon & Saenchaiyathon (2023)	Discuss supply chain strategy in the VUCA world.	Section II (a, b), Section III (g, j)
Entrepreneurial Firms in VUCA	Gandhi & Joshi (2023)	Explore entrepreneurial firms and their sustainability in a VUCA world.	Section I (c, d, f), Section II (g), Section III (a, b, e, g, k)
Fast-Track Implementation in VUCA	De Moura et al. (2023)	Focus on the implementation of projects in the VUCA environment.	Section II (e, g), Section III (b, d, e, j)
Exponential Organisational Models	Marchese et al. (2020)	Taming VUCA with exponential organisational models.	Section III (d, e, k, l)

The design of the survey instrument prioritised clarity, neutrality, and alignment with the research objectives. Each question was carefully crafted to ensure unequivocal language and avoid technical jargon wherever possible. In instances where specialised terminology was unavoidable, such as the acronym "VUCA," clear and concise definitions were provided within the survey instrument itself. To mitigate potential bias and promote neutrality, questions were carefully worded to avoid leading respondents towards predetermined answers. For example, when assessing the perceived impact of VUCA elements, a balanced Likert scale ranging from "No impact" to "Significant impact" was employed to allow respondents to express a full spectrum of perspectives without feeling steered towards a particular response.

The relevance and comprehensiveness of the collected data were ensured by directly mapping each question to specific research objectives. This deliberate alignment is evident throughout the survey in Appendix 10. For instance, questions within Phase One, Segment One directly address the objective of assessing participants' familiarity with VUCA concepts (closed-ended questions). In Phase One, Segment Two, questions are destined to gauge VUCA's impact on participants' business environment (close-ended and open-ended questions), while questions in Phase One, Segment Three evaluate the perceived effectiveness of existing VUCA management tools (close-ended and open-ended questions). To maintain respondent engagement and capture diverse facets of the research objectives, the survey employed a variety of question types. These included Likert scales (e.g., 5-point scales for assessing impact and frequency), multiple-choice questions (e.g., for gauging familiarity with specific VUCA concepts), and open-ended questions (e.g., for eliciting detailed examples of VUCA-related challenges encountered by respondents). Finally, to facilitate a logical flow and enhance respondent focus, questions were grouped into thematic segments: "VUCA Knowledge," "VUCA Impact on Business," and "Tools for Managing VUCA." Such a thematic organisation aimed to provide a clear and intuitive structure for participants as they navigated through the survey instrument.

To enable a rich understanding of the complex phenomena under investigation, the survey predominantly employed 5-point Likert scales for measuring the intensity, frequency, and perceived effectiveness of various VUCA-related aspects. This deliberate methodological choice was made for several reasons. Firstly, a 5-point scale strikes a balance between providing sufficient granularity in respondent choices without overwhelming them with an excessive number of response options. This balance is key for ensuring both the quality of the collected data and the overall respondent experience. Secondly, the use of Likert scales entails robust statistical analysis compared to simpler binary or categorical scales. Specifically, it enables the calculation of descriptive statistics, such as means and standard deviations and provides a clear picture of the distribution and central tendencies within the data. Finally, maintaining consistency in the scale structure across different sections of the survey enables easier comparison and analysis of responses related to distinct yet interconnected constructs.

This consistency enhances the interpretability of the findings and strengthens the overall robustness of the research design. For instance, the impact of various VUCA elements was measured using a scale ranging from 1 ("No impact") to 5 ("Severe impact"). Similarly, the frequency of encountering specific VUCA-related challenges was assessed using a scale from 1 ("Never") to 5 ("Very frequently"). This consistent approach to measurement across different constructs ensures a coherent and rigorous analytical approach for the study.

A critical consideration in survey design is striking a balance between the need for comprehensive data collection and the potential for respondent fatigue (Fass-Holmes, 2022). To address this challenge, the estimated completion time for this survey was kept between 20 and 30 minutes, a duration determined through pilot testing and informed by best practices in survey research. Several strategies were employed to manage the survey length while maintaining the depth and rigour of the data collected. Firstly, skip logic (Couper, 2008) was implemented to streamline the respondent experience. This functionality ensured that participants were only presented with questions relevant to their previous responses, reducing unnecessary burdens and enhancing overall efficiency. Secondly, open-ended questions were strategically interspersed throughout the survey to break up the potential monotony of scaled questions and maintain respondent engagement. These qualitative sections provided opportunities for participants to elaborate on their experiences and offer richer insights beyond the confines of pre-defined response categories. Thirdly, progress indicators were incorporated to provide respondents with a clear sense of their progression through the survey. This visual cue helps manage expectations and reduces the likelihood of participants feeling overwhelmed or disengaged. Additionally, the option to save and return to the survey later was offered, recognising that respondents may have time constraints and need to complete the survey in multiple sessions.

To further mitigate respondent fatigue, several additional measures were implemented. Questions were thoughtfully ordered from general to specific, allowing participants to ease into more complex topics gradually, a technique known as the funnel approach, which has been shown to enhance respondent engagement and reduce cognitive burden (Bradburn et al., 2015). This approach reinforces a sense of flow and reduces cognitive overload. Furthermore, a variety of question types were employed to maintain respondent interest and minimise the potential for repetitiveness, a strategy supported by evidence that varying question formats can help sustain attention and improve data quality (Tourangeau et al., 2000). Finally, clear section breaks with concise explanations were included throughout the survey. These breaks serve as mental pauses for respondents and provide valuable context shifts to enhance the overall clarity and coherence of the survey instrument, a technique recommended for reducing respondent fatigue and maintaining focus (Dillman et al., 2014).

Phase Two of the study diverges from traditional survey designs towards embracing an inventive and interactive approach to evaluating the SCI framework. This innovative methodology facilitated by a dedicated web platform sought to create an immersive, asynchronous workshop experience for participants. In contrast to traditional tool assessment methods, this strategy aimed to elicit more interactive and interesting comments. The decision to adopt an interactive asynchronous approach for phase two was primarily driven by the need to accommodate participants from various countries. Notably, many CI professionals were based in the USA. By opting for this approach, the researcher aimed to provide a convenient, seamless, and encouraging way for all participants to actively engage in the study. Furthermore, the researcher aims to break away from conventional methods and explore state-of-the-art online approaches for organising workshops that bring together participants from diverse geographical locations. The development of questions for this phase was a multidimensional process. A realistic VUCA scenario (refer to Appendix 11 for details) embedded within the consumer goods sector was specifically designed to reflect the complex and interconnected challenges inherent in real-world VUCA environments. Key characteristics of this VUCA scenario were anchored in the literature, as shown in Table 4.11.

Table 4.11 *Foundations of VUCA Scenario Development Based on Literature*

VUCA Element	Key Characteristics	Description	Relevant sources
Volatility	Rate of Change	Rapid and unpredictable changes that impact stability.	Bennett & Lemoine (2014) Taskan et al. (2022) (Vidal, 2023) (Baran & Woznyj, 2020)
	Instability	Frequent fluctuations in key variables force a short-term focus.	
	Market Dynamism	Sudden shifts in market conditions or resource availability.	
Uncertainty	Lack of Predictability	Inability to foresee future outcomes due to incomplete information.	Millar et al. (2018) Taskan et al. (2022) (Horstmeyer, 2020)
	Ambiguity of relationships	Unclear cause-and-effect relationships complicate decision-making.	
	Information Gaps	Missing or unreliable data that hinders accurate forecasting.	
Complexity	Interconnectedness	Multiple interconnected factors affect each other in unpredictable ways.	Snowden & Boone (2007) Taskan et al. (2022) (Kumar & Modi, 2022)
	Diverse Factors	Numerous elements contribute to the situation, requiring comprehensive understanding.	
	Nonlinear Outcomes	Small changes lead to large, unforeseen consequences due to interdependencies.	
Ambiguity	Lack of Clarity	Vague or conflicting information leads to multiple interpretations.	Johansen (2012) Taskan et al. (2022)

Novelty	Situations with no precedent, making existing models or solutions inapplicable.	(Cernega et al., 2024)
Unclear Context	Poorly defined context complicates understanding and decision-making.	

To effectively convey this scenario and the SCI framework, the research harnessed the power of an interactive communication platform rich with multimedia content (Mwombeki et al., 2024). This included instructional videos, interactive diagrams, and guided walkthroughs, all crafted to enhance user engagement and understanding. Prior to launch, the researcher ensured relevance, clarity, and effectiveness in evaluating the SCI framework through this platform. This approach was deemed innovative and was commended during the pilot testing. Finally, the platform underwent thorough usability testing (Lazar, 2017) to guarantee smooth navigation, clear instructions, and an optimal user experience across a variety of devices and browsers.

The design of the questions themselves was guided by a need to balance open-ended exploration with structured evaluation. The initial set of questions (1-5) adopted an open-ended format, allowing participants to freely apply their existing knowledge and tools to navigate the presented VUCA scenario. This provided valuable insights into current practices to establish a baseline for subsequent comparisons with the SCI framework. Subsequent questions were strategically structured to guide participants through a systematic thought process, progressing from initial trend identification to the formulation of strategic recommendations (Creswell & Creswell, 2018). This deliberate mirroring of the step-by-step approach inherent in the SCI framework enabled a structured and insightful comparison. Following the presentation of the SCI framework, a dedicated set of questions (1-3) focused on capturing both quantitative and qualitative feedback regarding its perceived effectiveness. To further encourage critical reflection, participants were explicitly asked to compare their initial, unaided approach with the structured approach offered by the SCI framework.

To capture different dimensions of this evaluation, the survey employed a combination of open-ended questions and a 5-point Likert scale. Open-ended questions were primarily used during the initial scenario navigation phase to capture detailed and qualitative insights into participants' thought processes and problem-solving approaches. The 5-point Likert scale, ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"), was employed in the framework evaluation section to quantify agreement levels with statements related to the SCI framework's effectiveness. Open-ended follow-up questions were strategically integrated to provide context and depth to the quantitative Likert scale ratings, eliciting specific examples, improvement suggestions and diversified perspectives.

Several innovative aspects distinguished this approach from traditional survey designs. The VUCA scenario, for instance, was presented through a dynamic blend of text, graphics, and short video clips to harness an engaging and realistic experience for participants. Participants were also guided through the complexities of the SCI framework via interactive elements, allowing for self-paced exploration and an in-depth understanding of its components. Four dedicated videos, each focusing on a specific VUCA element, demonstrated the practical application of the SCI framework within the context of the scenario and offered a constructive visual and auditory learning experience. The platform included clickable elements to let users interact with the content as they worked through the framework exploration, therefore promoting a dynamic and perceptive assessment process.

To mitigate potential fatigue associated with the interactive nature of the survey, several design considerations were implemented. The interactive platform adopted a modular design with clear breakpoints, allowing participants the flexibility to complete the survey in multiple sessions if needed. The survey design incorporates several features to enhance participant experience. Firstly, a navigation bar functionality has been integrated to allow participants to review previous information. This feature provides them with a clear sense of their progression through the survey. Additionally, it enables participants to manage their time effectively by easily navigating to specific sections. Furthermore, participants are prompted to input their names once at the beginning of the survey. They then have the flexibility to choose between completing the interactive survey in one continuous session or returning later. Their session progress is automatically saved on their device to ensure a seamless and user-friendly experience. This variety aimed to maintain participant interest and reduce fatigue. Based on insights gathered during pilot testing, the estimated completion time for the survey was 25-40 minutes. This longer duration, compared to phase one, was deemed justified by the interactive and immersive nature of the experience. Phase two seeks to provide a deep, multidimensional testing of the SCI framework by adopting this creative, participatory approach. The strategic combination of open-ended exploration, guided reflection, and comparative assessment allowed for a comprehensive assessment of the framework's effectiveness in navigating VUCA challenges. Simultaneously, the carefully designed interactive elements ensured high engagement and a thorough understanding of the framework among participants.

4.6.4. Survey Platforms and Administration

This study used a two-phased methodology for data collection according to the principles of design science research (DSR), acknowledging that different research aims need customised methodological strategies. Each phase used a distinctive online platform selected to correspond with the varied objectives and activities of that phase. Phase one focused on gathering quantitative and qualitative data through a structured survey questionnaire and leveraged the widely accessible and user-friendly Google Forms platform. This choice was driven by several factors. Firstly, the user-friendly design of Google Forms enabled the researcher to efficiently create and maintain the survey while ensuring accessibility for participants on several devices. Secondly, Google Forms, as part of the university's online resources, offered a safe platform for the collection and storage of potentially sensitive research data in accordance with institutional data security standards. Finally, the integrated data visualisation and analysis capabilities of Google Forms enabled the first examination of the survey replies. The finished survey questionnaire, enhanced by insights from the pilot research, was hosted on the university's Google Forms platform. Unique links to the survey were generated and disseminated to participants using the recruitment strategies detailed in the preceding methodological section. Participants accessed and completed the survey online, with responses automatically collected and compiled within the platform.

In contrast, Phase Two transitioned to a more qualitative and collaborative approach centred around the development, evaluation and validation of the SCI framework. To achieve this, Genially, a secure web-based platform for interactive content production, was deliberately chosen. Genially's strength lies in its capacity to nurture engaging and dynamic workshop-style experiences. Its intuitive interface allows for the creation of visually appealing and interactive presentations incorporating multimedia elements, animations, and interactive elements that enhance participant engagement and understanding. Crucially, the platform supports real-time collaboration to enable participants to contribute actively to the framework development and evaluation process within the online workshop environment. Furthermore, Genially's integrated forms and data collection tools allowed for seamless integration of data gathering within the interactive workshop flow.

The Genially platform also hosted a dedicated interactive presentation that guided participants through several key stages. The presentation begins with an overview of the research, thanking participants for their contribution in phase one and introducing the initial draft of the SCI framework. Participants were then guided through the framework's components and relationships using interactive elements, allowing them to explore the framework dynamically and engagingly. Leveraging Genially's collaborative features permitted participants to provide their feedback on the framework, suggest improvements, and actively contribute to its refinement. Integrated forms within the Genially presentation helped to gather open-ended responses and ideas as well as organised input on certain framework components.

The deployment of these two distinct online platforms ensured an optimal approach for each data collection phase. Google Forms provided a secure and efficient solution for the quantitative survey in phase one, and Genially facilitated an interactive and engaging workshop experience for the qualitative framework development, evaluation and validation in phase two. This combined approach maximised data richness, participant engagement, and eventually, the validity and impact of the research findings.

4.7. Data Collection

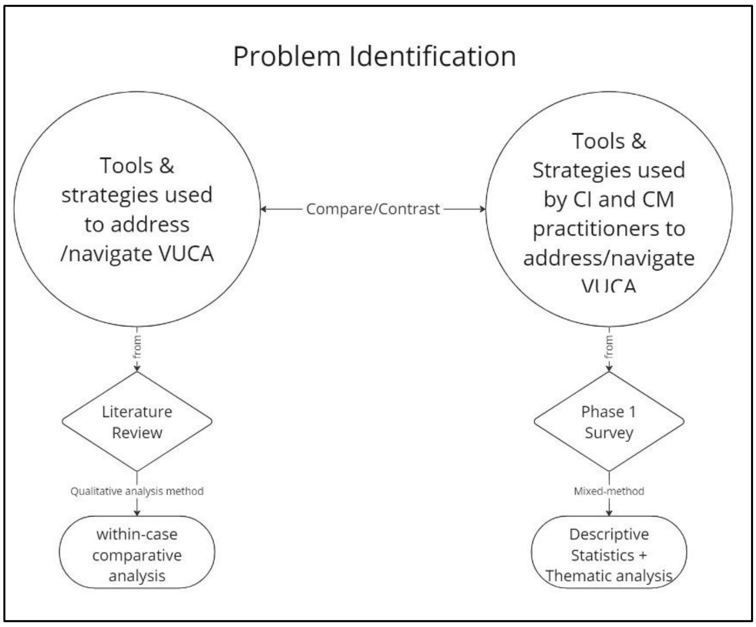
To accomplish its goals, this study incorporates primary and secondary data sources strategically via an effective data-gathering procedure. This method is important for studying how the SCI framework might improve strategic decision-making in VUCA settings. Primary data, collected directly from participants, forms the cornerstone of this investigation. As detailed in the preceding methodological sections, this collection unfolds in two distinct phases. Phase one employs a quantitative-dominant mixed-method approach, using a structured survey questionnaire hosted on the Google Forms platform. This survey, disseminated to CMs and CI professionals, gathers data on their perceptions, practices, and experiences related to VUCA environments. Phase two transitions to a more qualitative-dominant mixed-method approach to engage the same set of participants of phase one in an interactive online workshop enabled through the Genially platform. This workshop centres around the collaborative development, evaluation and validation of a practical framework for leveraging SCI in navigating VUCA challenges. Complementing the primary data, the literature review section includes an analysis of secondary data, specifically examining published case studies within the fields of CI and strategic management. The chief objective is to compare, contrast and triangulate the tools used in both fields. The researcher aims to identify gaps and limitations in existing tools, specifically their ability to address VUCA challenges. This analysis fulfils two objectives: first, it reinforces the need for a tailored VUCA framework; and second, it uncovers any supplementary tools used by both surveyed groups that may not have been expressly referenced in the case studies or questionnaires.

The chosen data collection process embraced in this inquiry is necessary for achieving the research objectives in several key ways. Initially, the triangulation of data, which integrates primary data from practitioners with insights obtained from secondary data analysis, supports the credibility, validity, and depth of the conclusions (Quinn Patton, 2015). This perspective is also deemed to strengthen the robustness of the research outcomes. Secondly, the within-case comparative analysis (refer to Appendix 2) of secondary data gathering enhances the connection between theoretical frameworks and practical applications, guaranteeing that the produced SCI framework is both theoretically sound and practically applicable. Finally, the extensive data gathering method, including both primary and secondary sources, offers the necessary depth and breadth of material to adequately answer the study objectives.

4.8. Data Analysis

In line with the methodological architecture adopted, the analysis of the quantitative data gathered through the online survey from CMs and CI professionals forms a critical pillar of phase one. This analysis is guided by a dual purpose: to uncover descriptive patterns, trends, and relationships within the data and to establish connections with the insights derived from the literature review, particularly when it comes to the tools employed to address or tackle VUCA-related scenarios.

Figure 4.7 *Methodological Triangulation for Problem Identification in VUCA Strategies: A Comparative Analysis of Literature Review and Survey Data*



Note. *By the author.*

Phase one analysis principally focuses on descriptive statistics and pattern identification. Descriptive statistics is leveraged to provide theme-based analysis underpinned by four key themes embedded within the survey. This includes measures of central tendency (e.g., mean, median), dispersion (e.g., standard deviation, range), and frequency distributions that will be used to provide a richer understanding of the data. However, it is noted that while descriptive statistics is traditionally associated with quantitative data, it can also play a role in mixed-method research by integrating qualitative insights (Teddlie & Tashakkori, 2009; Creswell & Clark, 2017), particularly when it comes to identifying tools and strategies to address and navigate VUCA used by participants.

Table 4.12 Four Key Themes of Phase One Survey and their Corresponding Analysis Methods

Theme of question	Description	Analysis method
VUCA Awareness (VA)	Assessing the level of awareness and understanding of VUCA characteristics among participants.	Descriptive statistics (mean, median, standard deviation, range, and frequency distributions)
VUCA Impact on Business Environment (VIBE)	Examining participants' perceptions of how VUCA affects their respective business environments and decision-making processes.	Descriptive statistics (mean, median, standard deviation, range, and frequency distributions) + Comparative thematic analysis.

Current Tools to Address VUCA (CTAV)	Identifying and categorising the tools and techniques currently employed by CI professionals and CMs to address VUCA-related challenges.	Descriptive statistics (mean, median, standard deviation, range, and frequency distributions) Comparative analysis of the survey results with findings from the literature case studies.
Need for a New Tool (NNT)	Analysing participants' perspectives on the adequacy of existing tools and the potential need for a new tool specifically designed for navigating VUCA environments.	Descriptive statistics (mean, median, standard deviation, range, and frequency distributions)

To enhance the depth of insights gained during phase one, the researcher aims to connect the findings from this initial data collection with relevant insights gleaned from the existing literature. In particular, findings from phase one pertaining to the tools employed by participants will be compared and contrasted with the insights gleaned from the within-case comparative analysis conducted in the literature review as portrayed in Figure 4.7. This comparative analysis will focus on identifying areas of alignment and dissonance between the tools and strategies identified in the literature as effective for navigating VUCA environments and those currently employed exclusively by CI practitioners, as revealed in the survey data. CMs did not require such a triangulation approach because of the inherent nature of their role using well-established frameworks and tools, unlike CI professionals who, given the nature of their function, may resort to a variety of different intelligence tools to inform decision-making. This comparative approach aims to analyse the reasons behind any discrepancies between theory and practice to reveal potential barriers to implementing theoretically sound approaches and to identify opportunities for improvement within the CI professional cohort. The current bridging of theory and practice is deemed essential to ensure that the developed SCI framework is both theoretically grounded and practically relevant.

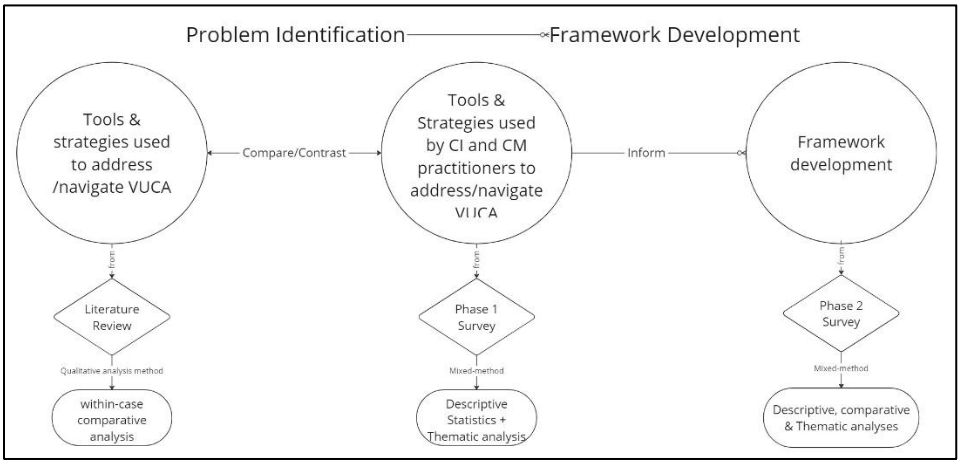
In phase two, the first segment entails immersing participants in a VUCA scenario. In this context, open-ended questions are posed, making qualitative content analysis the preferred method for systematically examining text data derived from these open-ended survey questions. Responses will be coded to uncover underlying themes, patterns, and categories. The subsequent segment encounters a mix of closed-ended and open-ended questions. For the closed-ended questions, a descriptive statistic will be used, while the open-ended ones will be analysed using thematic and content analysis. Table 4.13 provides a concise summary of two distinct segments related to Phase Two, including their respective questions and the analysis methods employed for each.

Table 4.13 Overview of Phase Two Segments and Corresponding Analysis Methods

	Question	Type	Analysis method
Segment 1 **Navigating real-world VUCA Scenario**	1) How would you approach the task of identifying emerging VUCA trends and weak signals in the consumer goods sector?	Open-ended	Qualitative thematic & Comparative analyses
	2) What tool (s), methodology or technique (s) would you recommend GlobalGoods Corp to use to detect these signals?	Open-ended	
	3) Without specific indicators, consider what types of trend (s) could potentially disrupt or create opportunities for GlobalGoods Corporation.	Open-ended	
	4) How might the shift (s) identified in your previous answer impact GlobalGoods corporation's business?	Open-ended	
	5) What strategic recommendations would you make for GlobalGoods Corp to stay resilient and agile in the face of uncertain and evolving market dynamics?	Open-ended	
Segment 2 **Effectiveness evaluation of SCI framework**	1) On a scale of 1 to 5, how strongly do you agree or disagree with the following statement: The SCI framework offers a more comprehensive and effective approach to navigating VUCA challenges?	Closed-ended	Quantitative descriptive statistics
	2) Please provide specific examples or reasons for your rating	Open-ended	Thematic Analysis
	3) Based on your professional experience and insights gained from the Global Goods Corporation scenario, what suggestions or improvements would you propose to enhance the SCI framework's effectiveness in helping organisations better navigate VUCA environments?	Open-ended	Qualitative content analysis

Next, Figure 4.8 below illustrates the complete methodological triangulation process used to identify and address VUCA-related challenges to develop a strategic framework. It begins with a literature review and a survey to compare tools and strategies used by CI (with added within-case analysis) and CMs practitioners. Insights from this comparison inform the development of a new framework refined through further survey analysis using mixed methods, including descriptive, comparative, and thematic analyses. This approach integrates multiple data sources to ensure a full understanding of the problem and robust framework development.

Figure 4.8 *Methodological Triangulation for VUCA Strategy Analysis and Framework Development: A Comparative and Mixed-Method Approach*



Note. By the author

4.9. Ethics Approval

This doctoral thesis was executed in strict accordance with the ethical protocols and governance structures mandated by the University of Portsmouth. Prior to research initiation, a research proposal underwent rigorous ethical scrutiny by the University of Portsmouth's designated Ethics Committee. This proposal encompassed a meticulous evaluation of potential ethical concerns, detailed procedures for obtaining informed consent, data protection strategies, and measures to guarantee participant confidentiality and anonymity. Before the commencement of the study, a detailed ethics application was submitted to the University's Ethics Committee for review. This proposal included a detailed assessment of potential ethical risks, the procedures for recruiting participants and obtaining informed consent, data protection strategies, and measures to ensure the confidentiality and anonymity of participants. Ethics approval (appendix 12) was granted under the aegis of the University's ethical governance framework, which aligns with the principles of integrity, accountability, and respect for persons (University of Portsmouth, 2024). The approval process ensured that the research was conducted in a manner that protected the rights and welfare of all participants in accordance with both national regulations and the University's ethical standards.

Data management protocols adhered to the highest standards of security and confidentiality, complying fully with the stipulations of the Data Protection Act 2018 and the General Data Protection Regulation (GDPR). Furthermore, this research did not involve any interaction with vulnerable populations. Notably, all participants were provided with comprehensive information regarding the nature and objectives of the research, procedure, and potential impacts. Participants were explicitly informed that their participation was entirely voluntary and no financial compensation or other incentives were offered, that they had the right to withdraw from the study at any point without prejudice, and that there were specific procedures governing the use of their data.

The ethical Integrity of the research process was continuously monitored throughout the study duration to safeguard both the credibility of the research findings and the dignity and well-being of all participants. For instance, no personally identifiable information was collected, used, or disclosed at any stage of the study. This ensured complete anonymity and confidentiality for all participants, further safeguarding their privacy and upholding the ethical integrity of the research process.

4.10. Validity and Reliability

4.10.1. Definition

The methodological rigour of the research instrument holds profound implications for the legitimacy of the study's findings. As Siegle (2015) notes, validity reflects the capacity of the analytical approach to accurately capture the intended focus of inquiry to measure what it proposes to measure. It speaks to the alignment between the theoretical framing that guides the examination and the operationalisation of the measurement tools themselves. Reliability is considered a complementary dimension: the consistency and stability of results over the repetition of the investigative process (Heale & Twycross, 2015). A relatable research mechanism would yield high levels of concordance in findings if investigations are conducted repeatedly within a similar framework (Bashir & Marudhar, 2018). Thus, validity pertains to conceptual precision and coherence, whereas reliability reflects process dependability, repeatability and standardisation. Together, they undergird research integrity. Demonstrating methodical validity and reliability is foundational to substantiating the insights derived from systematic scientific investigation.

According to Pries-Heje and Baskerville (2008), the validity of design science research must be established from the evaluation of the developed artefacts. When evaluated, these artefacts must show that they satisfy the required conditions to achieve the desired and expected objectives, that is, that they fully accomplish their function (Pries-Heje & Baskerville, 2008). Chakrabarti (2010) suggests that some validation methods lack sufficient empirical foundations. However, validity is a key factor in supporting the research and facilitating its practical application. Accordingly, Flint and Mentzer (1997) submit that the validity of research can be characterised as a set of procedures that are used to ensure that the research conclusions can be safely asserted.

As a validation method, design science research considers a set of procedures that ensure that the results generated by the artefact are derived from the internally designed environment and the external environment for which it was developed (Dresch, 2016). As a result, the following steps are proposed: (i) accurately and explicitly define the internal environment, the external environment, and the objectives, (ii) define how the artifact should be tested, and (iii) describe the mechanisms that will generate the results to be controlled or monitored.

Research grounded in design science, according to Tremblay et al. (2010), cannot simply concentrate on the evolution of the artefact; it should show that the artefact can be effectively used to solve real problems. Complementarily, Drech (2016) argues that while a planned evaluation phase for the created artefact is essential, partial evaluations throughout each level of the design science research process guarantee alignment with the major study goals. Based on five different strategies, observational, analytical, experimental, testing, and descriptive, Hevner et al. (2004) provide a typology of artefact assessment. Expanded in Table 2, these groups provide a complete methodological toolset for thorough artefact assessment in design science research, including procedures and strategies catered to every evaluative approach.

Table 4.14 *Methods and Techniques for Evaluation of Artifacts*

Form of evaluation	Proposed methods and techniques
Observational	*Case study elements*: study the existing or created artefact in depth in the business environment Field study: Monitor the use of the artefact in multiple projects
Analytical	*Static analysis*: examine the structure of the artefact for static qualities Architecture Analysis: Study the fit of the artefact in the technical architecture of the complete technical system *Optimisation*: Demonstrate the optimal properties inherent to the artefact or demonstrate the limits of the optimisation in the artefact behaviour *Dynamic analysis*: study the artefact during use to evaluate its dynamic qualities (e.g., performance)
Experimental	*Controlled experiment*: Study the artefact in a controlled environment to determine its qualities (e.g., usability) Simulation: execute the artefact with artificial data
Testing	*Functional test (black box)*: implement the artefact interfaces to discover potential failures and identify defects *Structural test (white box)*: perform coverage tests of some metrics for implementing the artefact (e.g., execution paths)
Descriptive	*Informed argument*: use the information of knowledge bases (e.g., relevant research) to construct a convincing argument about the utility of the artefact

	Scenarios: Construct detailed scenarios for the artefact to demonstrate its utility

Note. *Adapted from Hevner et al. (2004, p. 86)*

4.10.2. Construct Validity and Reliability in Alignment with VUCA Construct

Establishing a congruent and solid construct validity represents an essential precursor for meaningful inquiry, centring on the conceptual precision and accuracy of measurements in capturing intended concepts (Trochim & Donnelly, 2008). This research employs a multipronged strategy affirming validity to create confidence in the resultant findings. The in-depth review of existing literature served as the foundation for establishing construct validity. This involved delineating definitions and dimensionality of key concepts, including strategic management, CI, VUCA environments, and strategic decision-making, followed by a thorough examination of existing strategies, tools, frameworks and approaches to pave the way for a deeper understanding of these constructs.

Additionally, the survey instruments underwent iterative refinements based on pilot feedback to ensure questions accurately reflect the intended constructs, thus, minimising vagueness and maximising the accuracy of measurement. To further strengthen the validity and reliability of the survey instrument defining the problem space subject of this research, a Cronbach's Alpha (α\alphaα) method was used to measure the internal consistency and reliability of test questions. The assessment of reliability in survey instruments is essential for validating that the set of items used consistently measures the intended construct across different samplings of the population (Taber, 2018). In this context, the three main constructs forming the pillars of survey questions in phase one were tested to measure their reliability. (i) VUCA Knowledge, (ii) VUCA impact on the business environment and (iii) Tools and techniques for managing VUCA. It is worth mentioning that Cronbach's alpha specifically measures numerical or quantitative scales. Hence, it has only been applied to questions that produce numeric data, such as those using Likert scales (Tavakol & Dennick, 2011). This means that qualitative questions which generate open-ended or categorical responses were not included in the calculation of Cronbach's alpha (Gliem & Gliem, 2003). Consequently, the reliability of the survey is evaluated based solely on the consistency of the quantitative items, as these are the questions that provide the necessary numeric data for this type of analysis (Ursachi et al., 2015).

Table 4.15 *Application of Cronbach's Alpha for Assessing Internal Consistency and Reliability of Quantitative Survey Questions*

Construct	Initial Dataset	Steps in computing Cronbach's Alpha	Results
i) VUCA Knowledge	**Number of Respondents (n)**: 16 **Number of Item (N) questions**: 20 **Sum of Variances:** $(\sum_{i=1}^{N} \sigma_i^2)$ 12.617 (approximately) **Total Variance of the Sum of Scores** (σ_t^2) 141.267 (approximately)	Formula: $\alpha = \frac{N}{N-1}\left(1 - \frac{\sum_{i=1}^{N}\sigma_i^2}{\sigma_t^2}\right)$ Plug in values: $\alpha = \frac{20}{20-1}\left(1 - \frac{12.617}{141.267}\right)$ $\alpha = \frac{20}{19}\left(1 - \frac{12.617}{141.267}\right)$ Calculation of the inner fraction: $\frac{12.617}{141.267} \approx 0.0893$ Calculation of the alpha: $\alpha = \frac{20}{19} \times (1 - 0.0893)$ $\alpha = \frac{20}{19} \times 0.9107 \approx 0.958$	**High Reliability (α ≥ 0.90: Excellent)** The computed Cronbach's alpha was approximately **0.958**. This high value indicates that the items in the VUCA knowledge construct are highly correlated and, thus, reliably measure the same underlying concept.
ii) VUCA impact on the business environment	**Number of Respondents (n)**: 16 **Number of Item (N) questions**: 35 **Sum of Variances:** $(\sum_{i=1}^{N} \sigma_i^2)$ 27.746 (approximately) **Total Variance of the Sum of Scores** (σ_t^2) 386.163 (approximately)	Formula: $\alpha = \frac{N}{N-1}\left(1 - \frac{\sum_{i=1}^{N}\sigma_i^2}{\sigma_t^2}\right)$ Plug in values: $\alpha = \frac{35}{35-1}\left(1 - \frac{27.746}{386.163}\right)$ $\alpha = \frac{35}{34}\left(1 - \frac{27.746}{386.163}\right)$ Calculation of the inner fraction: $\frac{27.746}{386.163} \approx 0.0719$ Calculation of the alpha: $\alpha = \frac{35}{34} \times (1 - 0.0719)$ $\alpha = \frac{35}{34} \times 0.9281 \approx 0.955$	**High Reliability (α ≥ 0.90: Excellent)** The calculated Cronbach's alpha for the "VUCA Impact on Business Environment" construct is approximately **0.955**. This high value suggests that the items in this construct have excellent internal consistency, indicating that they reliably measure the impact of VUCA on the business environment.

iii) Tools and techniques for managing VUCA	**Number of Respondents (n)**: 16 **Number of Item (N) questions**: 27 **Sum of Variances:** $(\sum_{i=1}^{N} \sigma_i^2)$ 21.564 (approximately) **Total Variance of the Sum of Scores** (σ_t^2) 483.729 (approximately)	Formula: $\alpha = \frac{N}{N-1}\left(1 - \frac{\sum_{i=1}^{N} \sigma_i^2}{\sigma_t^2}\right)$ Plug in values: $\alpha = \frac{27}{27-1}\left(1 - \frac{21.564}{483.729}\right)$ $\alpha = \frac{27}{26}\left(1 - \frac{21.564}{483.729}\right)$ Calculation of the inner fraction: $\alpha = \frac{27}{26} \times (1 - 0.0446)$ Calculation of the alpha: $\alpha = \frac{27}{26} \times (1 - 0.0446)$ $\alpha = \frac{27}{26} \times 0.9554 \approx 0.992$	**High Reliability (α ≥ 0.90: Excellent)** The calculated Cronbach's alpha for the "VUCA Impact on Business Environment" construct is approximately **0.992**. This high value suggests that the items in this construct have excellent internal consistency, indicating that they reliably measure the impact of VUCA on the business environment.

The decision to test Cronbach's alpha on a subset of the total population, specifically the CI professionals representing half of the respondents, was made after careful consideration and is methodologically justified. This approach stems from the inherent characteristics of the survey instrument and the participant groups, coupled with practical considerations inherent in research design. Firstly, it is important to acknowledge that the survey instrument itself is identical in content and structure for both CI professionals and CMs. This homogeneity is paramount as it implies that the survey items are designed to measure the same underlying constructs across both groups. This aligns with the understanding that when survey items are consistent and intended to measure the same constructs, the reliability measured in one subgroup can be reasonably generalised to similar subgroups within the same population (Tavakol & Dennick, 2011). Secondly, practical considerations in research often require strategic decisions regarding data analysis. While conducting reliability analyses on the entire dataset is ideal, limitations such as response rates or resource constraints sometimes lead researchers to focus on representative subsets. In this instance, the size of the CI professional subset (n=16) is deemed adequate for conducting reliable Cronbach's alpha analysis, aligning with Field's (2018) recommendation that a sample size of 10-30 is generally sufficient for this purpose, contingent upon the number of items and the expected reliability.

4.10.3. Content Validity in Alignment with the Conceptual Framework

Aligning with the "descriptive" category within Hevner et al.'s (2004) framework for artefact evaluation, this research establishes content validity through a gap analysis. This analysis is grounded in an extensive review of the literature and constructs a compelling argument for the utility of the developed artefact, resulting in a dedicated SCI framework. The research demonstrably highlights the absence of existing frameworks that comprehensively address the multifaceted challenges of VUCA environments, focusing instead on isolated aspects. This identified gap stresses the need for and potential value of the proposed SCI framework. Furthermore, the use of a realistic VUCA scenario with constructs drawn from the literature and presented in the interactive online workshop during which participants gave their feedback about its usability, effectiveness and any potential drawbacks, align with the user input aspect where workshops could be used to help build and refine the framework, thus taking into account the user needs and perspectives.

Furthermore, the research leverages user input to ensure the framework's practical relevance and applicability. Echoing Hevner et al.'s (2004) emphasis on user engagement, the research design incorporates an interactive online workshop wherein participants engage with a realistic VUCA scenario constructed from elements identified within the literature. Such an interactive exercise provides a platform for participants to offer feedback on the framework's usability, perceived effectiveness, real-time evaluation and potential limitations. This iterative feedback loop, which directly integrates user perspectives, is deemed instrumental in refining the framework and ensures its alignment with the needs of practitioners navigating the complexities of VUCA environments.

4.10.4. Addressing and Mitigating Key Sources of Bias in the Research Process

To ensure the methodological integrity of this research, specific attention was given to identifying and mitigating potential sources of bias. In line with the examiner's recommendation, this section outlines how risks related to observer bias, participant bias, confirmation bias, and attrition bias were addressed throughout the research process.

Observer bias represents a challenge in qualitative research that manifests when researchers' preexisting beliefs, theoretical orientations, or expectations subtly permeate the processes of data collection, interpretation, and dissemination. This phenomenon, which Denzin (2017) characterises as "the shadow self of the researcher," threatens the integrity of findings by potentially imposing predetermined narratives onto participants' lived experiences. The risk becomes particularly acute during the interpretive phase of qualitative responses and when attempting to align emergent themes with established theoretical frameworks such as the SCI framework. The reflexive turn in social science research has heightened awareness of this methodological challenge. As Finlay (2002) argues in her seminal work on reflexivity, "The researcher's subjectivity operates not as a liability but as an analytical resource when properly acknowledged and examined" (p. 531). This perspective suggests that observer bias cannot be eliminated entirely but must be conscientiously managed through rigorous methodological safeguards.

To mitigate these risks, a structured and transparent coding framework has been implemented to allow for a systematic engagement with textual data while maintaining analytical rigour. Creswell and Poth (2018) emphasise that such frameworks should be "flexible enough to capture emergent insights yet structured enough to facilitate analytical coherence" (p. 196). The inductive generation of qualitative themes prior to their mapping onto theoretical constructs further preserves the authenticity of participants' contributions, a practice that Maxwell (2013) endorses for its capacity to resist "theoretical colonisation" of data.

Participant bias may also represent a methodological challenge that can profoundly compromise the validity and reliability of research findings. This phenomenon encompasses several distinct behavioural patterns, each with unique implications for data integrity. Social desirability bias, where respondents modify their answers to align with perceived social norms. This confirms what Nederhof (1985) describes as "the systematic distortion of self-reported measures resulting from the desire to present oneself favourably" (p. 264). Acquiescence bias manifests as the tendency to agree with statements regardless of content, while satisficing behaviour reflects what Krosnick and (Marsden & Wright, 2010) characterised as "the deployment of cognitive shortcuts to reduce the cognitive burden of survey completion" (p. 265). These potential distortions impose methodological countermeasures implemented at multiple levels of research design. The voluntary and anonymous nature of participation serves as a foundational safeguard, and it creates what Tourangeau and Yan (2007) term "psychological distance" between participants and perceived judgment, resulting in diminishing the motivation to present socially acceptable responses. This approach aligns with Bradburn, Sudman, and Wansink's (2004) observation that "anonymity creates conditions under which respondents feel empowered to express authentic rather than performative attitudes" (p. 139). The explicit reassurance that no correct or incorrect answers exist represented an attempt to neutralise what Schwarz (1999) identifies as "the implicit demand characteristics of research contexts" (p. 97). Such reassurances function to disrupt the implicit hierarchical relationship between researcher and participant that might otherwise invite strategic response patterns. This practice corresponds with Fisher's (1993) recommendation to establish conversational norms that privilege authentic expression over perceived alignment with researcher expectations" (p. 303).

This focus on authentic communication aligns with broader strategies aimed to enhance participant engagement, such as the use of methodologically diverse question formats including Likert scales, open-ended inquiries, and scenario-based items, embodies what Dillman, Smyth, and Christian (2014) describe as "tactical heterogeneity designed to maintain cognitive engagement" (p. 178). This approach disrupts the potential for mechanical response patterns while simultaneously providing methodological triangulation through varied data streams. The integration of skip logic further enhances this engagement by creating what Galesic and Bosnjak (2009) term "an adaptive questioning environment responsive to individual participant circumstances" (p. 358). Furthermore, the provision for asynchronous completion with the capacity to resume at the point of interruption addresses what Rolstad, Adler, and Rydén (2011) identify as a "response burden, that is the perceived difficulty and fatigue associated with survey participation" (p. 571). This feature recognises that participant fatigue can induce satisficing behaviours which compromise data quality. As Holbrook, Green, and Krosnick (2003) note, "Rushed or fatigued respondents demonstrate increased acquiescence, decreased cognitive elaboration, and greater susceptibility to framing effects".

Collectively, these risks were mitigated through the design of the instruments and the research process where participation was entirely voluntary and anonymous; respondents were reassured that there were no right or wrong answers; and the surveys used varied formats (Likert scales, open-ended questions, scenario-based items) with skip logic to sustain participant engagement. Additionally, participants could complete the survey asynchronously and resume where they left off to reduce fatigue and rushed responses.

Finally, confirmation bias stands as the insidious tendency to selectively attend to, interpret, and prioritise evidence that validates preexisting theoretical commitments while marginalising contradictory data, which represents what Nickerson (1998) characterises as perhaps the most pervasive and potentially distorting bias in research (p. 175). This cognitive predisposition threatens the epistemic integrity of scientific inquiry by potentially transforming the research process into an exercise in self-validation rather than genuine discovery. As Kahneman (2011) submits in his analysis of cognitive biases, "The confirmatory bias of our information search is powerful not because we are deliberately perverse but because it maintains our sense of coherence and intellectual order".

To counteract this methodological vulnerability, the SCI framework was developed iteratively, using empirical findings to challenge and refine initial assumptions. Unexpected or contradictory results were treated not as anomalies but as opportunities for insight, consistent with abductive reasoning (Tavory & Timmermans, 2014). Data from surveys, literature, and interactive validation were triangulated, and open-ended responses were coded before the theory was applied to avoid retrospective fitting.

4.11. Limitations of the Research Methodology

The core thrust of the methodological design is to comprehensively address the research questions and acknowledge inherent limitations. These limitations primarily originate from the research design and scope, potentially impacting the generalisability and interpretation of the findings. Firstly, the purposive sampling method employed, though effective in gathering in-depth insights from specialised experts such as CI professionals and CMs, intrinsically limits the generalisability of the findings to broader populations of managers. In the meantime, the selection criteria, though necessary for addressing the research questions, introduce a degree of sampling bias, potentially limiting the transferability of the findings to contexts beyond the specific characteristics of the participant group.

Secondly, the qualitative data collected during phase two, particularly the open-ended responses elicited during the interactive workshops, are inherently subjective. Despite being valuable for gaining rich and contextual insights, they may inevitably be shaped by individual biases, experiences, and interpretations. This subjectivity, while acknowledged, introduces a degree of interpretive opacity that must be considered during analysis. Thirdly, the use of a single, albeit realistic, VUCA scenario within the interactive workshop, though offering a common ground for discussion and feedback, may not fully cover the diverse and many-sided nature of challenges encountered within real-world VUCA environments. This singular scenario, despite being grounded in existing literature, may not fully represent the complex and context-specific demands of navigating VUCA across different industries, organisational structures, and geographic locations. However, it is important to recognise the focused scope of this research. The study primarily concentrates on the development, evaluation and validation of the SCI framework as a potential tool for navigating VUCA environments. It does not delve into exploring alternative solutions or approaches, nor does it claim to offer an exhaustive examination of all factors contributing to effective decision-making within VUCA contexts. As such, recognising these limitations is considered essential for framing the research findings within a realistic context and, most importantly, does not invalidate the study's contributions but rather draws attention to potential avenues for future research to expand upon and refine the insights generated.

Research Data Analysis, Interpretation and Discussion

5.1. Introduction to the Analysis

This research employed a mixed-methods approach for both phases. This implies a dual analytical lens to extract meaningful insights from both quantitative and qualitative data sources. This section outlines the specific methods and processes used to analyse the data collected in both phases of the research and highlights how these analytical techniques led to the identification of key patterns, trends, and relationships that ultimately underpin the research findings. Quantitative and Qualitative data gathered in phase one through the structured survey questionnaire disseminated via Google Forms were analysed using both descriptive and thematic methodologies. Descriptive statistics includes measures of central tendency (mean, median, mode), dispersion (standard deviation, range), and frequency distributions providing a detailed overview of participant responses, thus illuminating patterns in VUCA awareness, perceived level of impact of VUCA on the business environment, and the effectiveness of tool used to face VUCA challenges. This will be followed by a thematic analysis to uncover underlying qualitative themes such as, but not limited to, recent VUCA challenges faced by participants and the nature of specific tools used to address VUCA challenges.

Then, a comparative analysis juxtaposes these empirical findings with insights derived from a within-case comparative analysis of case studies identified through the literature review. This approach empowers the identification of convergences and divergences between established theoretical frameworks and real-world practices and enlightens potential obstacles that hinder the implementation of theoretically sound approaches while simultaneously revealing opportunities for refinement and innovation. Phase two of this research engaged in a comprehensive analysis of mixed data procured through an interactive online workshop hosted on the Genially platform. This analysis employed a triple methodological approach, integrating thematic, comparative and descriptive techniques to ensure a compatible examination of the data.

5.2. Data Preparation

5.2.1. Data Cleaning

The quantitative and qualitative data obtained from this research underwent a data-cleaning stage to ensure the analyses were both accurate and reliable. Given that the two data sources were significantly different, the cleaning processes had to be tailored accordingly for each type. Quantitative data, downloaded from Google Forms in CSV format, was imported into Microsoft Excel for cleaning and analysis. An initial inspection of the dataset was conducted to examine its structure, variable types, and completeness. Excel's functions such as IF, VLOOKUP, COUNTIF and conditional formatting were used to identify and address missing data and inconsistencies. This included a thorough review of variable labels, response options and the identification of any missing data patterns. Missing values identified as empty cells within the dataset were addressed through mean imputation for Likert-scale items. This approach was deemed appropriate given the low proportion of missing data (less than 5% for all quantitative items) and the random nature of the missing data patterns to ensure minimal impact on the overall data distribution. Logical consistency checks were also performed to identify and rectify any contradictory responses to related questions to enhance data integrity further.

5.2.2. Data Transformation

Data transformation was deemed necessary to enable analysis. For example, each Likert scale responses were consolidated into a table that categorises the number of participants who rated their understanding at each level, from "No understanding" to "Expert level understanding" or from "No influence" to "Extreme influence" and similar items. This transformation from individual responses into summarised categories permitted a more transparent and more efficient comparison of the distribution of responses between the two groups. The data grouping in this manner aided in the overall analysis of participants' understanding. Hence, patterns, trends and relationships within the dataset became more apparent. The following table presents question types and counts them in both phases of the research.

Table 5.1 *Quantitative and Qualitative Question Distribution across Phases One and Two*

Type of Question	**Phase I**				**Phase II**			
	1. VUCA Knowledge	2. VUCA impact on the business environment	3. Tools and techniques for managing VUCA	**Total**	Navigating VUCA scenario	Effectiveness evaluation	Improvement Feedback	**Total**
Number of quantitative questions	8	7	9	24	-	-	1	1
Number of qualitative questions	-	1	9	10	5	1	-	6
Totals	8	8	18	**34**	5	1	1	**7**

5.3. Analytical Approach

The initial stage of analysis leverages descriptive statistics to paint a picture of the quantitative data. This involves calculating the mean, median, mode, standard deviation, and frequencies for Likert-scale questions. This sheds light on the VUCA concept awareness within the samples, the perceived current and future impact of VUCA on organisational performance and operations, perceived preparedness levels, prioritisation of VUCA in strategic planning, and the effectiveness of existing tools, techniques and strategies used to address VUCA. Simultaneously, the qualitative data drawn from open-ended questions is subjected to thematic analysis. This process involves deep diving into the responses, systematically categorising and coding data segments to unearth recurring themes and patterns. The idea is to distil rich, context-specific insights into participants' experiences, anticipated challenges and opportunities, and perceived gaps in existing approaches to navigating VUCA. The strength of this mixed-methods approach lies in its ability to triangulate findings. Through comparing, contrasting, and integrating the insights derived from both quantitative and qualitative analyses, a deeper understanding of the data emerges, allowing for a detailed understanding and insightful interpretation of the VUCA landscape as perceived by the participants.

Significantly, this research adopts a contingent analysis approach. Should the Phase One data analysis reveal a lack of a shared mental model of VUCA as a significant impediment to effective navigation, a deeper exploration is undertaken, namely, examining variations in understanding across individuals from both groups, assessing its impact on strategic decision-making and exploring potential solutions in line with the design science research (DSR) methodology principle. This process promotes the conceptualisation of the chain reaction effect (CRE), which allows for a unified and modular VUCA perception and understanding. This work will weave a compelling narrative, highlighting key themes, patterns, and trends substantiated by illustrative quotes and statistical data. Importantly, it will culminate in actionable recommendations for organisational practice and future research.

5.4. Results of the Analysis

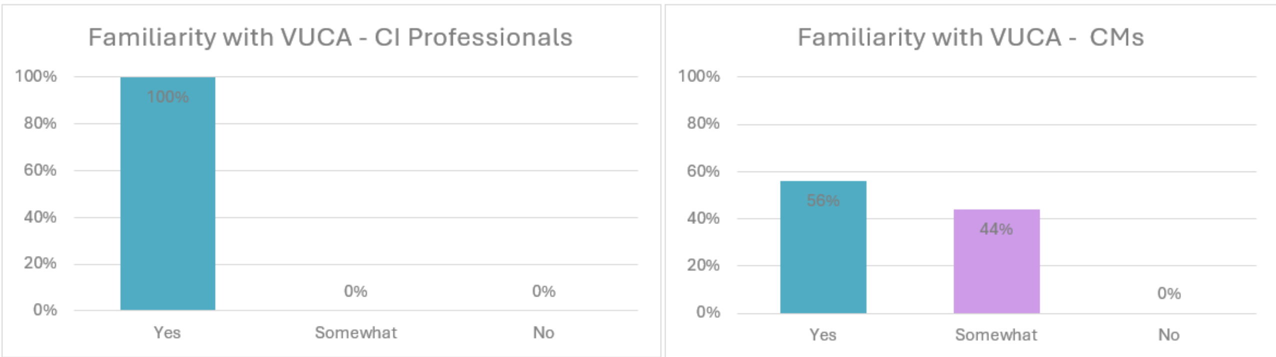
5.4.1. Phase One: Quantitative Analysis

This analysis and the resulting findings related to the survey from the first phase are intended to help the researcher better understand the problem space, which is in line with the research design adopted for this study. The survey aims to provide insights into three main areas: 1) Gauge the understanding and knowledge of VUCA among the two main groups that are the subject of this research, namely CI professionals and CMs to help establish whether participants are familiar with the VUCA phenomenon being examined, otherwise, the research risks being irrelevant. 2) Capture VUCA's influence and impact on the respective companies and industries of the participants. This area is important for confirming that VUCA does indeed impact the organisations or sectors studied to justify efforts to create a solution. 3) Identify the tools and techniques currently used by participants to address VUCA to reveal whether these tools effectively target VUCA; if not, it informs how a proposed solution could better address the phenomenon. CI professionals and CMs groups were surveyed separately, and an in-depth statistical and metrics analysis was conducted and generated for each group. However, to summarise key insights and distil meaningful patterns, trends, and relationships, a consolidated statistical analysis of the two groups is provided below.

5.4.1.1. Familiarity with the VUCA Concept

The findings start by revealing a pervasive familiarity with and understanding of the VUCA concept across both groups. CI professionals exhibit a unanimous (100%) familiarity with the term. This reflects a deeply ingrained awareness of VUCA's implications. Similarly, the CMs group demonstrates a high degree of familiarity, albeit with a slightly lower range in the depth of understanding in comparison to CI (56% fully familiar and 44% somewhat familiar). This suggests that while awareness is high, the depth of familiarity varies. As such, opportunities for enhancing comprehension and fostering a shared mental model of VUCA within organisations should be explored.

Figure 5.1 *Survey Responses on Familiarity with VUCA within CI And CMs*

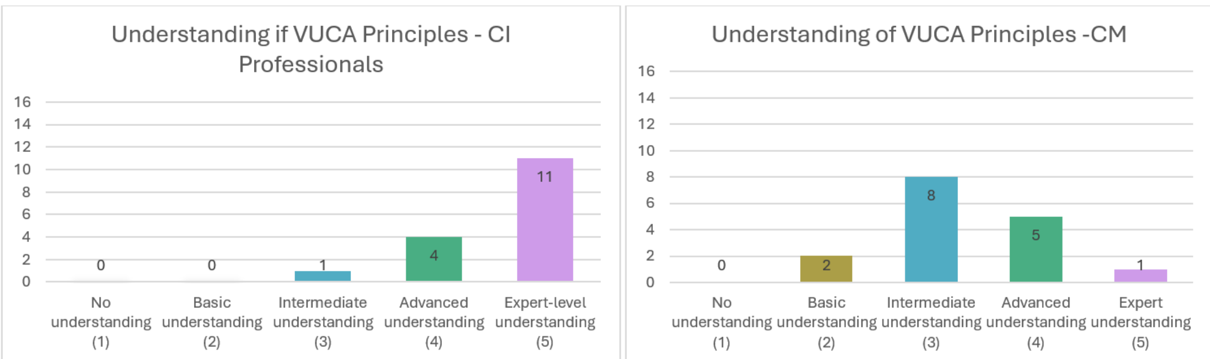


Note. *Author's survey results (2024).*

5.4.1.2. Understanding VUCA Principles

When it comes to understanding VUCA principles, in other words, what each term entails, 73% of the CI group consider themselves "Expert level," while 50% of the CMs group place themselves at an intermediate level, with no one from both groups having "no understanding."

Figure 5.2 *Survey Responses on Understanding VUCA Principles within CI Professionals and CMs*



Note. *Author's survey results (2024).*

The following formula is used to calculate the depth of knowledge for each group.

$$\text{Weighted Average} = \frac{\sum(\text{Score} \times \text{Number of Respondents})}{\sum(\text{Number of Respondents})}$$

CI professionals:

$$\text{Weighted Average} = \frac{(1 \times 0) + (2 \times 0) + (3 \times 1) + (4 \times 4) + (5 \times 11)}{0 + 0 + 1 + 4 + 11}$$

$$\text{Weighted Average} = \frac{(0) + (0) + (3) + (16) + (55)}{16} = \frac{74}{16} \approx 4.625$$

CMs:

$$\text{Weighted Average} = \frac{(1 \times 0) + (2 \times 2) + (3 \times 8) + (4 \times 5) + (5 \times 1)}{0 + 2 + 8 + 5 + 1}$$

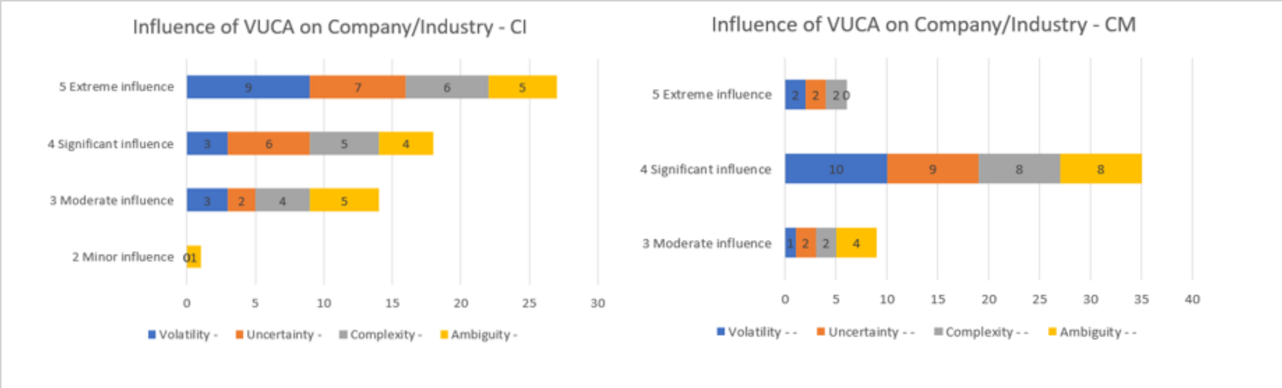
$$\text{Weighted Average} = \frac{(0) + (4) + (24) + (20) + (5)}{16} = \frac{53}{16} \approx 3.31$$

Both groups demonstrate an above-average level of understanding of what different VUCA terms entail. CI professionals demonstrate a higher depth of knowledge (4.6 on a 5-point scale) with a strong concentration of participants at the expert level, whereas CMs have a more varied distribution (3.31 on a 5-point scale) with a significant portion of respondents at the intermediate level. These results suggest the relevance of the chosen sample to participate in this research.

5.4.1.3. Influence and Impact of VUCA on Industry and Company

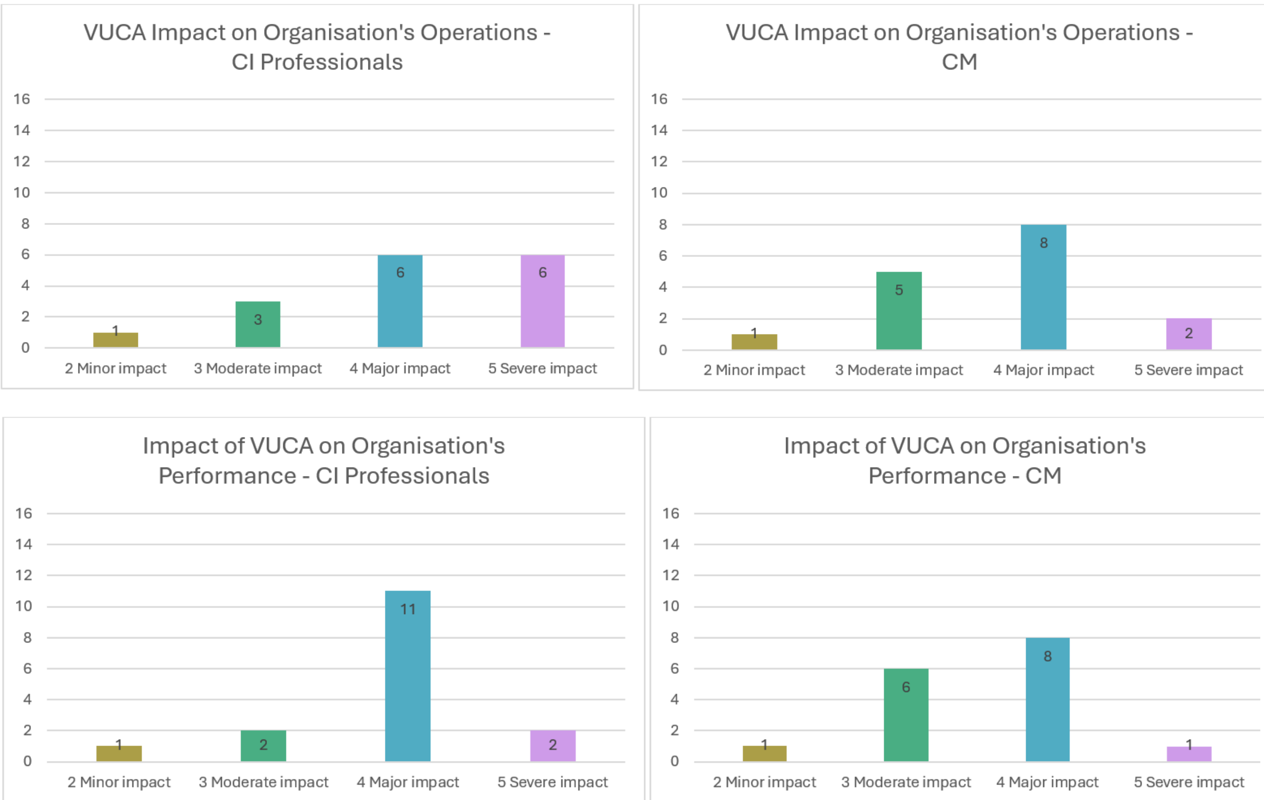
Further examination reveals a consistent narrative regarding the influence of VUCA on organisational and industry realities. 75% of CI professionals and 82% of CMs see VUCA as having an extreme to significant influence on their companies and industries. Volatility and uncertainty (47% emerge as particularly potent forces, consistently rated as having a major to severe impact on both operational dynamics [CI mean score = 4.06 and CMs mean score = 3.69] and overall performance [CI mean score = 3.88 and CMs mean score = 3.56].

Figure 5.3 *Survey Responses on the Influence of VUCA on Company and Industry (CI Professionals and CMs)*



Note. *Author's survey results (2024).*

Figure 5.4 *Survey Responses on VUCA's Impact on Organisational Operation and Performance*



Metric	CI professional			Chartered Managers		
	Mean	Median	SD	Mean	Median	SD
Impact of VUCA on Organisation Operations	4.06	4.0	0.90	3.69	4.0	0.77
Impact of VUCA on Organisation Performance	3.88	4.0	0.70	3.56	4.0	0.70

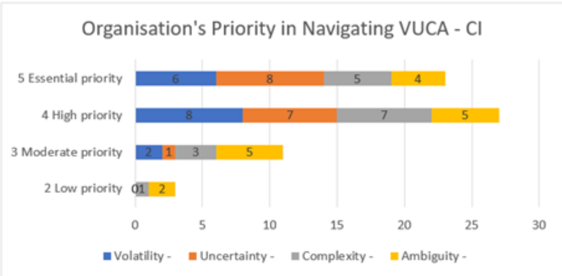
Note. *Author's survey results (2024)*

The CI professionals group perceives a higher level of VUCA impact on their operations (4.06 impact level) compared to the CMs group (3.69 impact level). The CI professionals group leans more toward a severe impact compared to the CMs group. This might suggest that CI professionals' operations are more sensitive to or more heavily affected by VUCA elements than CMs' operations. Along similar lines, the CI professionals' group (3.88 impact level) perceives a slightly higher impact of VUCA on their organisation's performance compared to the CMs group (3.56 impact level). Both groups recognise a significant impact, but the CI professionals group feels this impact more acutely, which suggests that VUCA elements may have a more pronounced effect on the performance metrics within the CI professionals' group than in the CMs group. This might reflect different operational or strategic challenges faced by these two groups under VUCA conditions.

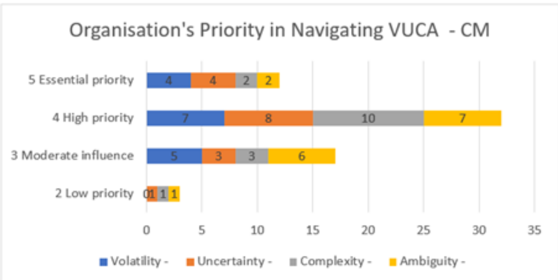
5.4.1.4. Priority in Navigating VUCA

Navigating VUCA appears to be a high priority for both groups, although to a slightly varying degree. The analysis confirms that navigating VUCA elements is a high priority in strategic analysis and planning for organisations across CI professionals and CMs, with some notable differences in emphasis. For example, the data reveals that CI professionals generally assign a higher priority to navigating the elements of VUCA compared to CMs.

Figure 5.5 *Survey Responses on Priority in Navigating VUCA within CI and CMs*



Category / Metric - CI	Mean	Median	Mode	Standard Deviation
Organisation Priority in Navigating Volatility	4.25	4.0	4	0.66
Organisation Priority in Navigating Uncertainty	4.38	4.5	5	0.78
Organisation Priority in Navigating Complexity	4.00	4.0	4	0.87
Organisation Priority in Navigating Ambiguity	3.69	4.0	3	0.98



Category / Metric - CM	Mean	Median	Mode	Standard Deviation
Organisation Priority in Navigating Volatility	3.94	4.0	4	0.75
Organisation Priority in Navigating Uncertainty	3.94	4.0	4	0.83
Organisation Priority in Navigating Complexity	3.81	4.0	4	0.73
Organisation Priority in Navigating Ambiguity	3.63	4.0	4	0.78

Note. *Author's survey results (2024)*

CI professionals exhibit higher mean scores across all VUCA dimensions (mean volatility = 4.25, mean uncertainty = 4.38, mean complexity = 4.00, mean ambiguity = 3.69) compared to CMs (mean volatility = 3.94, mean uncertainty = 3.94, mean complexity = 3.81, mean ambiguity = 3.63). This suggests that CI professionals' organisations generally place higher priority on VUCA navigation in strategic analysis and planning. The greatest disparity is observed in navigating uncertainty ($\Delta = 0.44$) and volatility ($\Delta = 0.31$).

5.4.1.5. Importance of Tailored Tools in Navigating VUCA

Interestingly, acknowledging the substantial influence and impact of VUCA on both groups' organisations and the priority it occupies in strategic analysis and planning, both CI professionals and CMs express a strong consensus regarding the critical importance of implementing tailored tools and strategies specifically designed to address VUCA-related complexities.

Figure 5.6 *Survey Responses on the Importance of Specific VUCA Tools within CI Professionals and CMs*

Metric	CI professionals			Chartered Manager		
Importance of implementing tools and strategies specifically aimed at navigating VUCA	Mean	Median	SD	Mean	Median	SD
	4.69	5.0	0.58	4.50	5.0	0.61

Note. *Author's survey results (2024).*

The data compares the importance of implementing VUCA-specific tools and strategies between CI professionals ($n = 16$) and CMs ($n = 16$). CI professionals rated this slightly higher (mean = 4.69, sd = 0.58) than CMs (mean = 4.50, sd = 0.61). Both groups shared a median score of 5.0, indicating the high importance of implementing tools and strategies specifically aimed at navigating VUCA. The small difference in means (0.19) and similar standard deviations suggest a high level of agreement both within and between groups on the significance of VUCA-oriented strategies in professional practice.

5.4.1.6. Need for VUCA-Specific Tools and Techniques

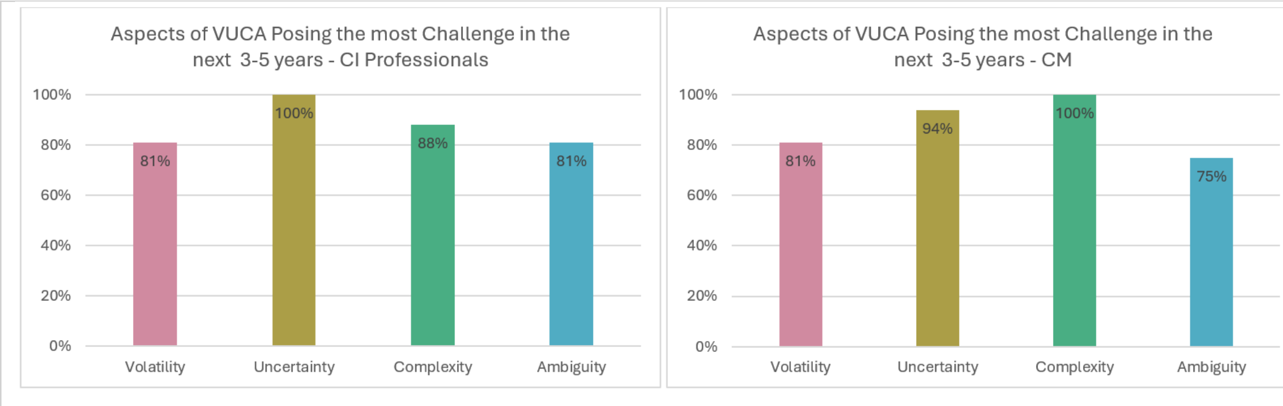
The subsequent analysis reveals the reasons behind the important need for VUCA-specific tools and strategies. Firstly, both groups recognise the frequent occurrence of VUCA and its evolving intensity in their business settings, with CMs showing a bit more variability in their responses. The acknowledgement of increased VUCA intensity is slightly higher among CI professionals (mean of 4.4, SD of 0.75) compared to CMs (mean of 4.2, SD of 0.68). This indicates that CI professionals are more sensitive to changes in the business environment, possibly due to their roles that require constant monitoring of external and internal threats.

Table 5.2 *Metric Analysis of Primary Drivers for the Necessity of VUCA-Specific Tools*

Category/metric	CI professionals				Chartered Managers			
	Mean	Median	Mode	Standard Deviation	Mean	Median	Mode	Standard Deviation
Frequency of organisations facing VUCA	4.2	4.0	4	0.65	4.1	4.0	4	0.70
Acknowledgment of increased VUCA intensity	4.4	4.5	5	0.75	4.2	4.0	4	0.68
Anticipating the most challenging VUCA dimension in 3 – 5 years	4.1	4.0	4	0.72	4.0	4.0	4	0.73
Degree of Challenges VUCA elements pose to your organisation	3.9	4.0	4	0.85	3.8	4.0	4	0.82
Preparedness of organisations to deal with VUCA	3.5	3.0	3	0.88	3.6	3.5	3	0.76
Tools effectiveness in predicting VUCA	3.8	3.5	4	0.77	3.7	3.5	4	0.75
Need for a structured approach to understand and manage BUCA	4.3	4.0	4	0.70	4.2	4.0	4	0.72

Secondly, both CI professionals and CMs expect VUCA to continue to pose significant challenges in the coming years (3-5 years). The average ranking derived from Figure 5.7 below indicates the intensity of VUCA in the following order: Uncertainty (97%), Complexity (94%), Volatility (81%) and Ambiguity (78%) for both groups combined.

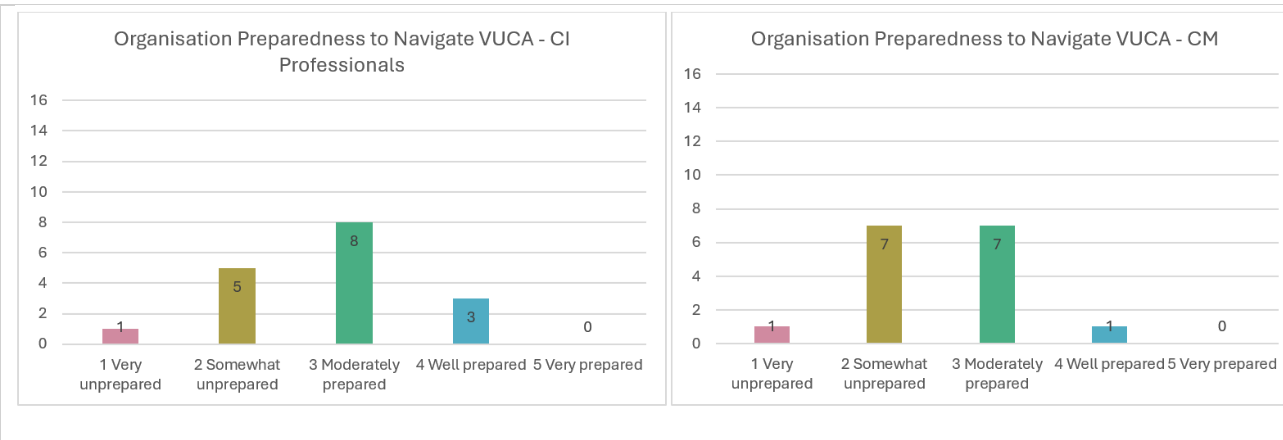
Figure 5.7 *Survey Responses on VUCA-Challenging Aspects in the Next 3-5 years by CI professionals and CMs*



Note. *Author's survey results (2024).*

The slightly higher variability among CMs suggests that their expectation of these challenges might depend more on their specific industry contexts or personal experiences. The close mean scores (4.1 for CI and 4.0 for CMs) indicate a shared concern, though CI professionals may perceive the threat as slightly more immediate or severe. Thirdly, both groups recognised the challenges posed by VUCA (CI mean score = 3.9 and CMs mean score =3.8), with CMs showing slightly less variability (sd = 0.82) in their perceptions than CI professionals (sd = 0.85). This might indicate a more uniform organisational experience with VUCA challenges among CMs, whereas CI professionals experience these challenges in a more diverse range of intensities, possibly due to the varied environments in which they operate. Fourthly, both groups feel moderately prepared for VUCA, with CMs slightly more confident in their preparedness (mean = 3.6 and sd = 0.76) than CI professionals (mean = 3.5 and sd = 0.88). However, the higher variability among CI professionals suggests that some organisations in this group may feel particularly unprepared, highlighting a potential gap in readiness that might need to be addressed through more tailored strategies or resources.

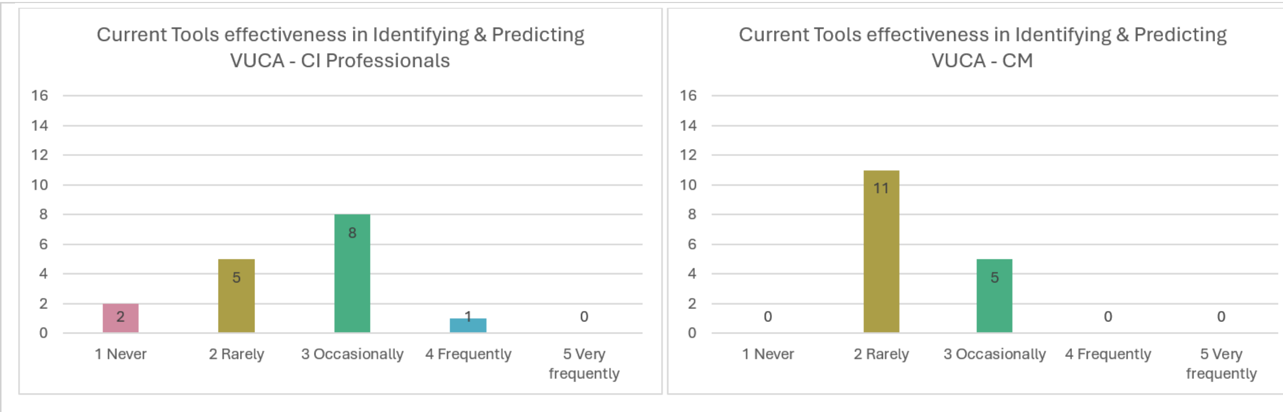
Figure 5.8 *Organisational Preparedness to Navigate VUCA by CI Professionals and CMs*



Note. *Author's survey results (2024).*

Fifthly, both groups find their current tools somewhat effective but not sufficient for managing VUCA. CI professionals give the effectiveness of current tools in predicting a mean of 3.8 (sd = 0.77), indicating that while the tools are somewhat effective, they are not fully adequate, with moderate variability in this assessment. On the other hand, CMs report similar scores, with a mean of 3.7 (sd = 0.75) for the effectiveness of their current tools in identifying and predicting VUCA, suggesting similar views on the effectiveness of current tools as the CI group, though with slightly less variability.

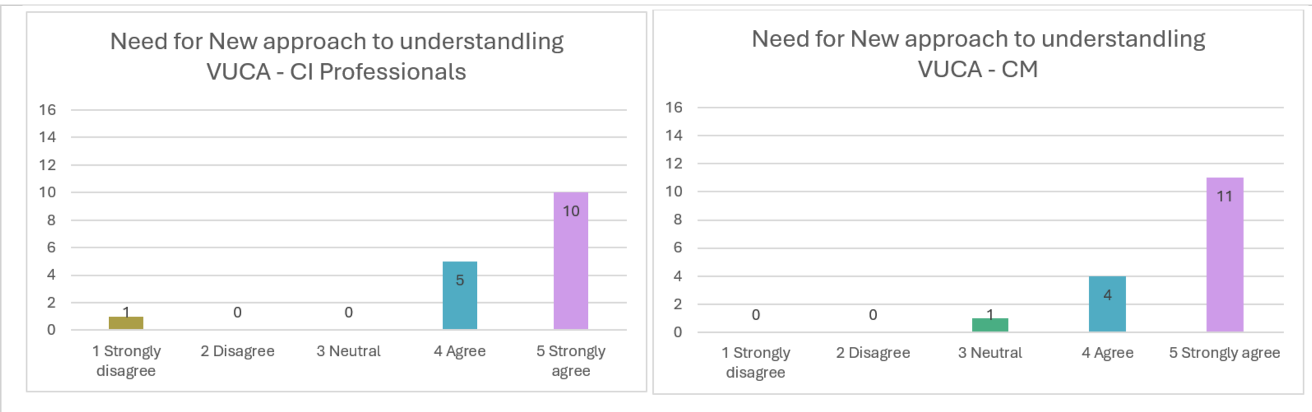
Figure 5.9 *Effectiveness of Tools in Identifying and Predicting VUCA by CI Professionals and CMs*



Note. *Author's survey results (2024).*

Sixthly, both CI professionals and CMs agree on the urgent need for more structured approaches to understanding and managing VUCA, with nearly identical mean scores. CI professionals strongly expressed this need with a mean score of 4.3 and a standard deviation of 0.70 and CMs with a mean score of 4.2 and a standard deviation of 0.72, hence reflecting a similarly strong consensus.

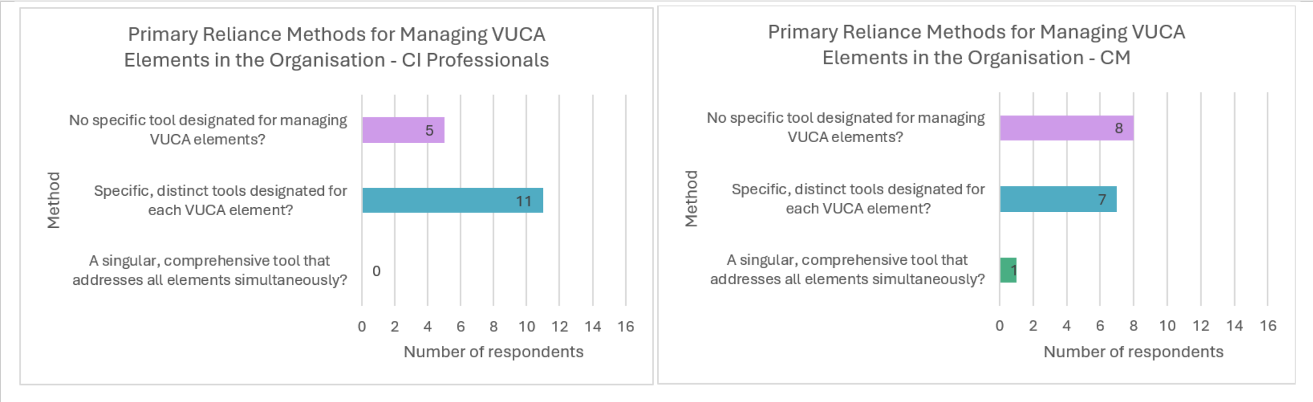
Figure 5.10 *Survey Responses on the Need for a New Approach to Understanding VUCA by CI and CMs*



Note. *Author's survey results (2024).*

Finally, when asked about the primary reliance method for managing VUCA, none of the CI professionals (0 out 16) report using a singular comprehensive tool to address all VUCA elements simultaneously, while 1 out of 16 CMs claim to do so. In contrast, 11 out of 16 CI professionals use distinct tools for each VUCA element, compared to 7 out of 16 CMs. Additionally, 5 out of 16 CI professionals and 8 out of 16 CMs report not using any specific tools designated for managing VUCA elements.

Figure 5.11 *Survey Responses on the Primary Reliance Method for Managing VUCA by CI and CMs*



Note. *Author's survey results (2024).*

A joint analysis for both groups (CI and CMs) reveals that the majority (56%) rely on distinct tools tailored to each VUCA element, followed by 41% who report having no specific tool designated for managing VUCA elements, while only 3% appear to use a single, comprehensive tool that addresses all VUCA elements simultaneously.

5.4.1.7. Perceived Effectiveness of Tools to Navigate VUCA Dimensions

Following the self-selection of tools deemed instrumental for navigating each dimension of VUCA by both groups, participants engaged in a structured evaluation of tool effectiveness. In recognition that practitioners often deploy distinct tools for each VUCA dimension (except for one single CMs who claims to use a comprehensive tool), the survey design allowed participants to assess the effectiveness of their chosen tools across all VUCA dimensions and acknowledge the potential for multi-dimensional utility inherent in certain tools. This approach allows for a detailed understanding of how tool selection and perceived effectiveness vary across the various challenges posed by VUCA environments.

The analysis of volatility management tools reveals that Visualping, a website to monitor competitors, seems to rank the highest as the most effective tool, with a score of 5 out of 5 in the list of tools used by CI professionals. This suggests that it is perceived as highly effective in managing Volatility, possibly due to its specific features or capabilities that directly address the unpredictable nature of volatile environments. A group of tools including scenario analysis, discovery, optimality, simulation super-cycle, scenario planning, wargaming and simulation all scored 4.0. These tools are seen as very effective, though not quite as high as Visualping. Tools like active, thorough, what-if debates, real-time market monitoring, Aqute intelligence, statistical modelling, environmental scanning, and other instances of scenario analysis all scored 3.0, making them moderately effective. In contrast, advanced analytics and horizon scanning seem to rank the highest in the list of tools used by CMs, as seen in Figure 5.12.

Figure 5.12 *Survey Responses on Ranking and Rating of Tools for Navigating Volatility by CI Professionals and CMs*

CI Professionals	Mean	Median	Mode	Standard Deviation
Volatility	3.50	3.5	3	0.760
Uncertainty	2.57	2.5	2	1.016
Complexity	2.07	2	1	1.207
Ambiguity	2.14	2	1	1.292

Chartered Mangers	Mean	Median	Mode	Standard Deviation
Volatility	3.18	3	3	0.4045
Uncertainty	2.09	2	2	0.8312
Complexity	1.45	1	1	0.5222
Ambiguity	1.27	1	1	0.4671

Note. *Author's survey results (2024).*

Analysis of tool effectiveness to navigate volatility, as perceived by CI professionals, reveals a trend of moderate effectiveness. Both groups rate the tools to navigate volatility as moderately effective, with CI professionals reporting a slightly higher mean score (3.50) than CMs (3.18). This suggests that while neither group finds the tools exceptionally effective, CI professionals might perceive a slightly greater positive impact. Moreover, it is noted that tools designated to navigate volatility also prove useful for managing the other dimensions of VUCA, albeit with somewhat reduced effectiveness in both groups. CMs exhibit significantly less variation in their ratings as evidenced by a much lower standard deviation (0.4045) compared to CI professionals (0.760). This suggests a higher degree of agreement among CMs regarding the effectiveness of these tools. CI professionals, on the other hand, display more diverse experiences and perceptions, potentially due to variations in the specific tools used or the contexts in which they are applied.

When it comes to uncertainty, the examination of the perceived effectiveness of tools used to address it by CI professionals and CMs reveals intriguing similarities and distinctions between the two groups (Figure 5.13). The line chart reveals a clear preference for specific tools among CI professionals. Risk assessment, superiority analysis, environmental scanning, predictive analytics, and horizon scanning all received the highest rating (4 on a 5-point scale). This suggests that these tools are perceived as particularly effective in addressing uncertainty within their domain. In contrast to CI professionals, CMs show a more gradual and consistent decline in perceived tool effectiveness. While "technology sensing" is ranked highest (4), other tools like scenario planning and real-time consumer tracking panels are perceived as relatively effective as well (3 on the scale).

Figure 5.13 *Survey Responses on Ranking and Rating of Tools for Navigating Uncertainty by CI Professionals and CMs*

CI professionals	Mean	Median	Mode	Standard Deviation
Volatility	2.70	3	3	0.675
Uncertainty	**3.36**	**3**	**3**	**0.674**
Complexity	1.91	2	2	0.831
Ambiguity	1.45	1	1	0.934

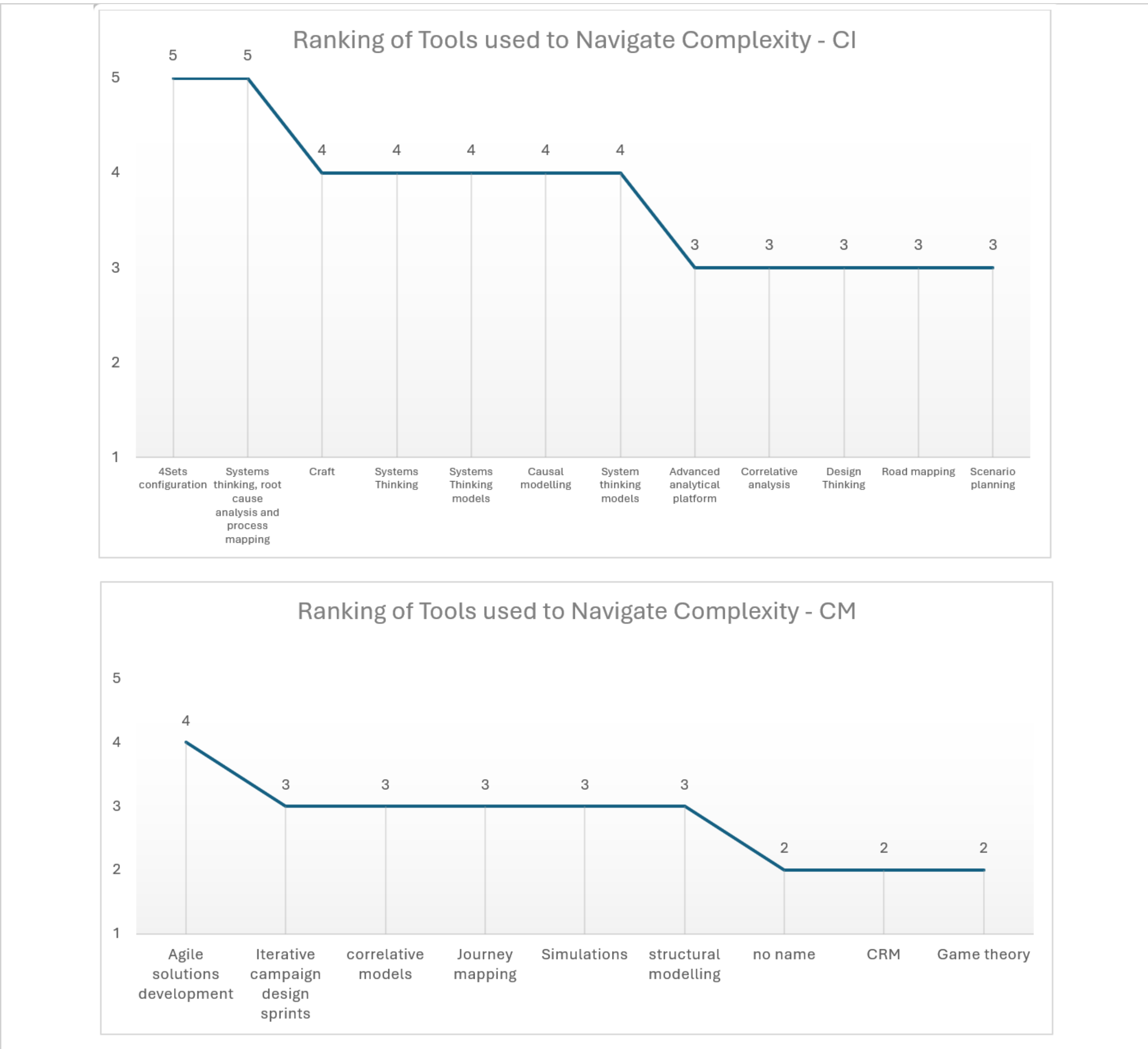
Chartered Managers	Mean	Median	Mode	Standard Deviation
Volatility	2.00	2	2	0.707
Uncertainty	2.85	3	3	0.555
Complexity	1.77	2	2	0.725
Ambiguity	1.62	1	1	0.768

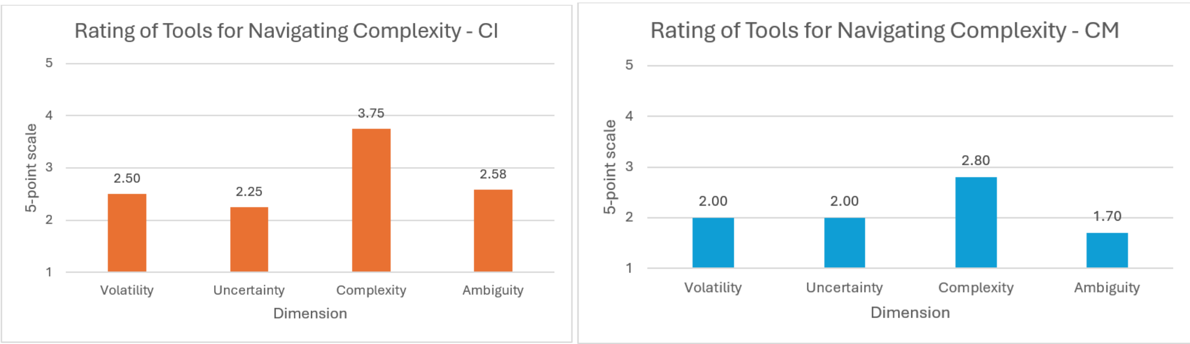
Note. *Author's survey results (2024).*

The high concentration of top-rated tools in the line chart aligns with the higher mean score (3.36) and relatively lower standard deviation (0.674) observed in the descriptive statistics. This reinforces the notion that CI professionals find a select group of tools particularly effective for uncertainty management, leading to higher overall satisfaction. In the CMs' case, the more gradual decline and lower top score in the line chart correspond to the lower mean score (2.85) and moderate standard deviation (0.555). This pattern suggests a more even distribution of perceived effectiveness across a wider range of tools with no clear "winners" emerging. The score of both remains within the "moderately effective" range, and the difference suggests potential variations in tool familiarity, application, or the nature of uncertainty encountered. However, interestingly, both groups exhibit similar levels of consistency in their ratings as indicated by comparable standard deviations (0.674 for CI professionals and 0.555 for CMs). This suggests a relatively homogenous perception of tool effectiveness within each group despite the difference in mean scores. The differences in tool rankings stress the importance of considering the specific needs and contexts of each professional group. CI professionals potentially dealing with data-heavy uncertainties gravitate towards analytical and forecasting tools. CMs facing broader strategic uncertainties might find value in a wider array of tools encompassing scenario planning, consumer insights, and emerging technologies.

With respect to complexity, in the line charts in Figure 5.14, CI professionals demonstrate a clear preference for structured thinking methodologies and modelling techniques, as evidenced by the high ranking (4 or 5 on a 5-point scale) of tools like “4sets,” “Systems thinking, root cause analysis and process mapping,” “Craft,” “Systems Thinking,” “Systems thinking models,” and “Causal modelling.” This aligns with their higher mean score of 3.75 for complexity management tools and indicates a generally positive perception of their effectiveness. The standard deviation of 0.754 suggests some variation in individual experiences, which is visually represented by the drop in rankings for tools after “Causal modelling.”

Figure 5.14 *Survey Responses on Ranking and Rating of Tools for Navigating Complexity by CI Professionals and CMs*





CI Professionals	Mean	Median	Mode	Standard Deviation
Volatility	2.67	3	3	0.651
Uncertainty	2.42	2.5	3	0.669
Complexity	**3.75**	**4**	**3**	**0.754**
Ambiguity	2.5	2	2	0.674

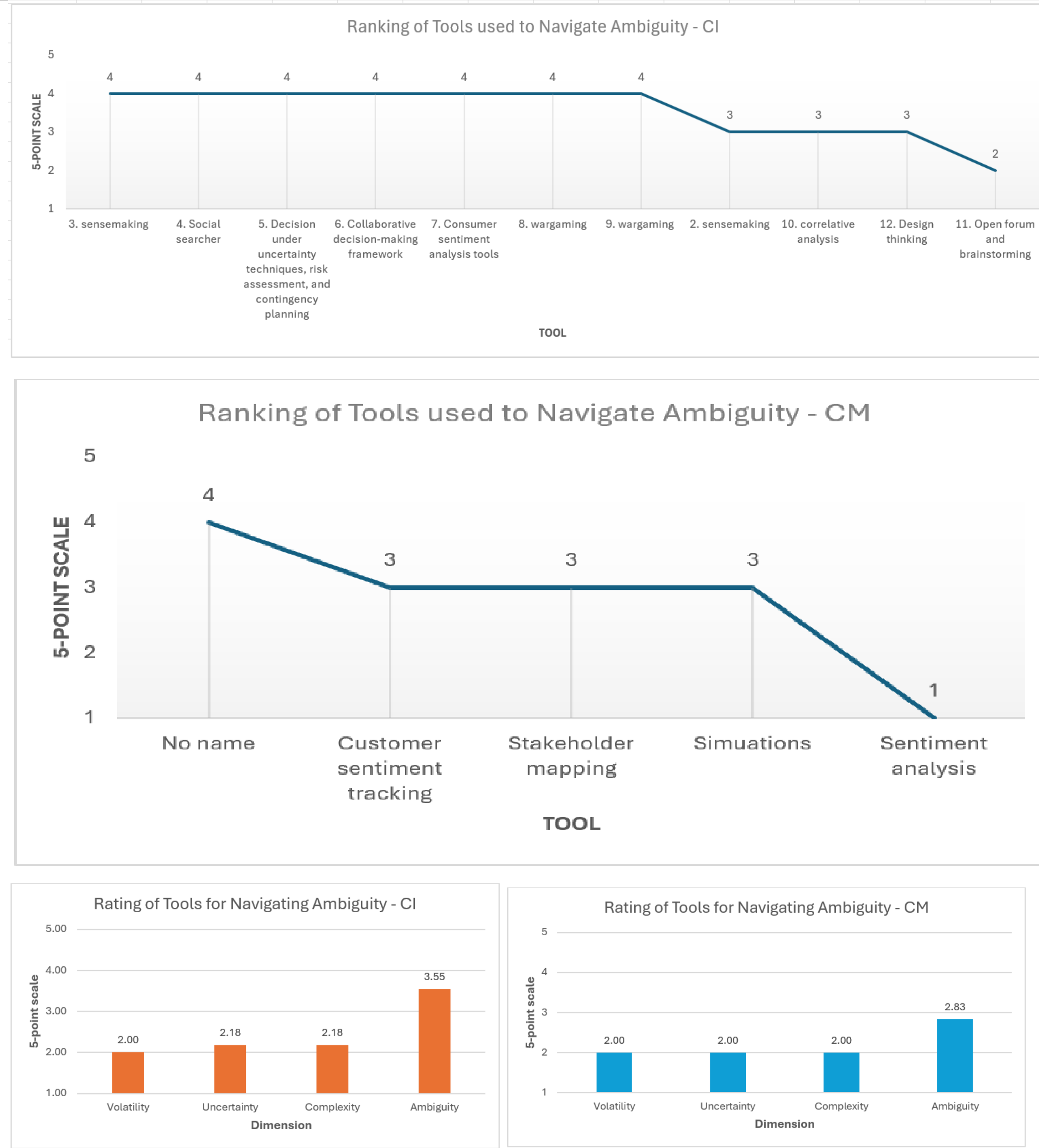
Chartered Managers	Mean	Median	Mode	Standard Deviation
Volatility	2.00	2	1	1.054
Uncertainty	2.00	2	2	0.816
Complexity	**2.8**	**3**	**3**	**0.632**
Ambiguity	1.7	1.5	1	0.823

Note. *Author's survey results (2024).*

In contrast, CMs exhibit a flatter ranking curve, with most of their chosen tools clustered around a score of 3. This suggests a more even distribution of perceived effectiveness across a broader range of tools, including "agile solutions development," "iterative campaign design sprints," "correlative models," and "journey mapping." This pattern is consistent with their lower mean score of 2.8 and notably lower standard deviation of 0.632, indicating less variation in perceived effectiveness compared to CI professionals. The tools ranked lower on the scale for CMs, such as "CRM" and "game theory," with a score of 2, might indicate less familiarity or applicability in their specific contexts.

Both CI professionals and CMs perceive their tools as moderately effective in navigating complexity but with room for improvement. CI professionals show a slightly higher overall satisfaction (mean score of 3.75) and a preference for structured methodologies and modelling. CMs report lower overall effectiveness (mean score of 2.8) and apply a more diverse set of tools with less consensus on highly effective options. This suggests that while both groups find some value in current tools, neither group seems to consider them entirely sufficient for addressing complexity. The data indicates a need for further tool development, refinement, or exploration of alternative approaches to enhance their ability to navigate complex situations effectively. Finally, the analysis for ambiguity reveals distinct patterns in tool preference and perceived effectiveness. CI professionals exhibit a strong preference for a cluster of tools, all receiving a rating of 4 on a 5-point scale, including "sensemaking," "social searcher," "decision under uncertainty techniques," and "collaborative decision-making framework." This preference for structured approaches aligns with their mean score of 3.55 for ambiguity management tools, indicating a relatively high perceived effectiveness. However, the standard deviation of 0.688 suggests some variation in individual experiences reflected in the drop in rankings for tools like "correlative analysis" and "design thinking" to a score of 3.

Figure 5.15 *Survey Responses on Ranking and Rating of Tools for Navigating Ambiguity by CI Professionals and CMs*



CI Professionals	Mean	Median	Mode	Standard Deviation
Volatility	2	2	2	0.632
Uncertainty	2.18	2	2	1.079
Complexity	2.18	2	2	0.751
Ambiguity	**3.55**	**4**	**4**	**0.688**

Chartered Managers	Mean	Median	Mode	Standard Deviation
Volatility	2.00	1.5	1	1.265
Uncertainty	2.00	1.5	1	1.265
Complexity	2.00	2	1	1.095
Ambiguity	**2.83**	**3**	**3**	**0.983**

Note. *Author's survey results (2024).*

CMs, on the other hand, show a steeper decline in perceived tool effectiveness, with only one unnamed tool receiving a top score of 4. Their remaining tools, including "customer sentiment tracking," "stakeholder mapping," and "simulations," cluster around a score of 3, while "sentiment analysis" receives a low score of 1. This pattern is consistent with their lower mean score of 2.83 and a standard deviation of 0.983, which indicates a less consistent and generally lower perceived effectiveness of tools for navigating ambiguity. Although CI professionals appear more satisfied with their tools for managing ambiguity compared to CMs, neither group seems to consider their current tools entirely sufficient. The presence of lower-ranked tools and the moderate mean scores, even for CI professionals, suggest a need for further development, refinement, or exploration of alternative approaches to enhance their ability to navigate ambiguous situations effectively.

As reported earlier in this section, participants predominantly employ dimension-specific tools to address individual VUCA elements; a thorough analysis reveals a noteworthy trend. Many tools exhibit cross-dimensional effectiveness for VUCA. This observation emerged when participants assessed their tools' effectiveness across all VUCA dimensions. For instance, scenario planning, often perceived as a tool primarily geared towards addressing volatility, received consistently high ratings (e.g., 4 out of 5) for uncertainty, complexity, and ambiguity as well. This suggests that certain tools that are claimed to be beneficial for specific dimensions also possess inherent characteristics that lend themselves to broader applicability within the VUCA context. Accordingly, Table 5.3 measures distinct tool effectiveness for each VUCA dimension as well as the combined effectiveness of the same tools used across all VUCA dimensions.

Table 5.3 *Measurement of Distinct and Combined tools' effectiveness for each VUCA Dimension (CI professionals and CMs)*

Dimension	CI professionals		CMs	
	Mean score for specific/distinct tool effectiveness	**Mean score for combined effectiveness**	**Mean score for specific/distinct tool effectiveness**	**Mean score for combined effectiveness**
Volatility	14/20	10/20	13/20	8/20
Uncertainty	13/20	9/20	8/20	8/20
Complexity	10/20	11/20	8/20	9/20
Ambiguity	14/20	10/20	8/20	9/20
Total Mean	**13/20**	**10/20**	**9/20**	**9/20**

E.g. a score of 3 out of 5 is converted proportionally to a score out of 20 using the following calculation:

$$\frac{a}{b} = \frac{x}{c}$$

$$\frac{3}{5} = \frac{x}{20}$$

$$x = \frac{3 \times 20}{5} = 12$$

Therefore, a score of 3 out of 5 is equivalent to a score of 12 out of 20. Other scores follow the same calculation method.

Note. *Author's survey results (2024).*

The data suggests that when used separately, the effectiveness of a tool used by CI professionals to navigate VUCA show a total mean score of 13 out of 20, but if the same tool is to be used comprehensively, that is, for all VUCA dimensions combined, it will drop to 10 out of 20. On the other hand, the effectiveness of a tool used by CMs to navigate VUCA show a total mean score of 9 out of 20 when used separately, and if the same tool is to be used comprehensively for all VUCA dimensions, the score will remain unchanged. To contextualise this finding, the following table presents a performance rating scale that categorises levels of achievement based on specific score ranges out of 20. This scale provides a general guideline for assessing performance with ratings ranging from 'Excellent' to 'Very Poor.' Additionally, the table indicates the recommended separate and comprehensive application for CI professionals and CMs based on the performance score.

Table 5.4 *Ranking of Current Tools Based on CI Professionals and CMs Usage and Performance Ratings*

Score (out of 20)	Rating	CI professionals	CMs
17-20	**Excellent**	-	-
14-16	**Good**	-	-
11-13	**Fair**	☒ **Separate use of tools (13/20)**	--
7-10	**Poor**	☒ **Comprehensive use of tools (10/20)**	☒ **Separate use of tools (9/10)** ☒ **Comprehensive use of tools (9/20)**
0-6	**Very Poor**	-	-

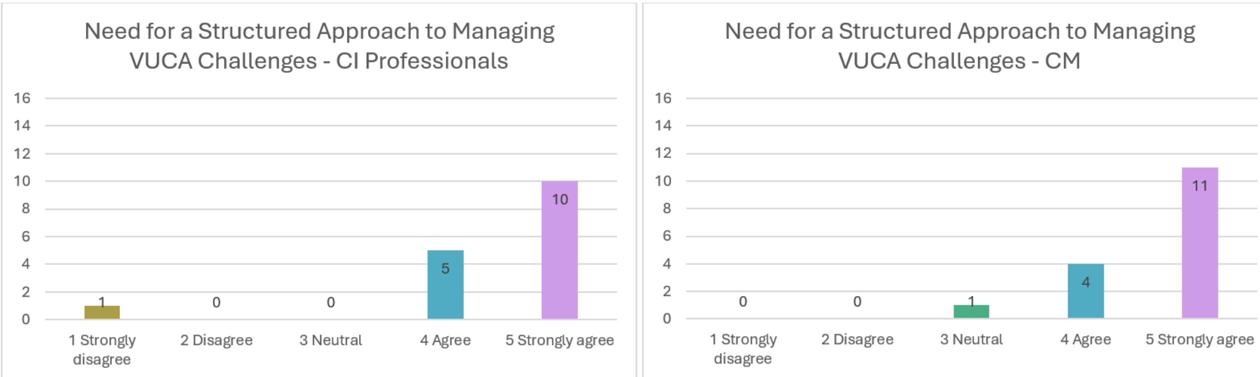
Note. *Author's survey results (2024).*

A micro-level examination of tool effectiveness in navigating VUCA reveals a critical vulnerability in the approaches employed by both CI professionals and CMs, albeit with divergent manifestations. CI professionals gravitate towards tools that demonstrate commendable effectiveness when addressing individual VUCA dimensions in isolation; their effectiveness suffers a precipitous decline when deployed to address the interconnected complexities of the phenomenon holistically. This suggests that a reliance on disjunct tools and techniques, even though they may be adept at deconstructing VUCA into constituent elements, falters when confronting its emergent properties, a critical shortcoming when navigating the dynamic interplay of VUCA in real-world contexts. Conversely, the tools employed by CMs demonstrate a consistent, albeit underwhelming, level of effectiveness irrespective of whether they are applied to individual VUCA dimensions or used in combination. This points to a fundamental misalignment between their chosen tools and the multifaceted nature of VUCA and suggests a lack of conceptual frameworks and operational approaches equipped to effectively address the phenomenon comprehensively.

5.4.1.8. Need for a Structured Approach to Managing VUCA Challenges

Statistical analysis reveals a strong consensus among both CMs and CI professionals regarding the need for structured approaches to navigate VUCA environments. This shared perspective is evidenced by high mean scores (4.63 and 4.44, respectively), both exceeding “agree” on a 5-point Likert scale and a mode of 5 (“strongly agree”) for both groups. However, slight differences emerge upon closer examination of the data. CMs exhibit a higher degree of agreement homogeneity, reflected in a lower standard deviation (0.60) compared to CI professionals (1.00). This suggests a more unified perspective among CMs regarding the imperative for structured VUCA management.

Figure 5.16 *Survey Responses on the Need for a Structured Approach to Managing VUCA by CI Professionals and CMs*



Statistic	CI Professionals	Chartered Managers
Mean	4.4375	4.625
Median	5	5
Mode	5	5
Standard Deviation	0.998045	0.599479

Note. *Author’s survey results (2024).*

The higher variability within the CI Professional cohort may reflect diverse experiences and perspectives on VUCA challenges inherent to their domain. Despite this variability, the overall high level of agreement across CI professionals and CMs, with 81.25% and 75%, respectively, agreeing on the need for structured approaches to navigate VUCA challenges, substantiates the recognised importance of a structured approach in today’s turbulent business setting. This consensus lays the groundwork for the importance and value of this research, which is concerned with fulfilling this demand through the development of the SCI framework underpinned by VUCA CRE.

5.4.2. Phase One: Qualitative Analysis

This phase employs a thematic analysis to explore and conduct a comparative examination of the organisational challenges attributed to VUCA by CI professionals and CMs, the tools deployed to navigate and manage VUCA environments, the experienced tools' shortcomings and key limitations, desired capabilities and features by both cohorts and finally, the main reasons underlying the need for a conceptual understanding of VUCA supported by the chain reaction effect principle.

This thematic analysis aims to clarify the underlying patterns in how these two distinct groups address the challenges posed by VUCA, whether through comprehensive tools or discrete instruments specifically targeting each VUCA dimension. Moreover, the analysis seeks to appraise and critically examine the effectiveness and limitations of these tools, as well as identify potential gaps that may require the development of more integrated solutions. Through this comparative lens, the researcher aspires to illuminate any significant divergences or convergences in the strategic paradigms adopted by CI professionals and CMs operating within VUCA contexts. The chosen qualitative thematic analysis allows for deep and enhanced comparison of the types of tools and techniques used by each group, going beyond superficial similarities and differences to unpack what these meanings lay within the data. The approach is in line with calls in the literature to use more rigorous comparative techniques to develop advanced understandings of organisational phenomena (Naeem et al., 2023). The initial phase of the thematic analysis entails a comprehensive immersion in the data corpus, which consists of survey responses elicited from both CI professionals and CMs. This preliminary stage is paramount as it enables the researcher to cultivate an intimate familiarity with the data to enable a profound understanding of the content and the identification of emergent patterns (Braun & Clarke, 2006).

To analyse the qualitative data, this study adopted Braun and Clarke's six-phase framework for thematic analysis to ensure a rigorous and systematic engagement with participants' responses. The process started with a period of deep familiarisation, during which all open-ended responses were transcribed, read, and re-read multiple times. This iterative engagement enabled the researcher to immerse fully in the dataset to gain an initial sense of recurring ideas, contextual distinctions, and potential patterns of meaning. Once immersed in the data, initial codes were generated through a systematic, segment-based review of the data, using inductive and semantic coding to capture key patterns of meaning in relation to the research questions. The specific coding logic and structure, including the development of compact thematic codes (e.g., V-MF for "Volatility – Market Fluctuations"), is detailed in section 5.4.2.1. This stage involved the careful identification of salient segments of text that spoke directly to the research questions. Coding was conducted manually using Excel, with each meaningful unit of data labelled and categorised to preserve its contextual integrity. Codes were not pre-determined but instead allowed to emerge from the data to capture participants' experiences and perspectives in their own terms.

Following the initial coding, similar codes were collated and grouped to form broader candidate themes, as represented in Figure 5.17. This stage sought to identify commonalities across responses, drawing out shared challenges, tools used in VUCA contexts, and perceptions of uncertainty and complexity. Emerging themes were then refined and reviewed through a comparative lens, with particular attention paid to differences and similarities between the two participant groups. During this phase, some themes were restructured and/or merged to ensure conceptual clarity and distinctiveness. Once the thematic structure had been solidified, each theme was defined and named to include its central organising idea. Efforts were made to ensure that the themes reflected not only the surface meaning of the data but also deeper and latent patterns. Names were carefully chosen to be both descriptive and analytically meaningful. Finally, the themes were written into the findings and analysis chapters as part of a coherent narrative. Illustrative quotes were selected to exemplify key points, and thematic insights were compared across the CI professionals and CMs cohorts. This final phase was not merely a reporting exercise but an interpretative one that sought to draw out analytical depth and delineate the practical and conceptual implications of the findings within the broader VUCA discourse. Through this meticulous engagement with the raw data, preliminary insights into the recent VUCA challenges, specific tools deployed by each cohort, and their lived experiences in navigating the complexities of VUCA environments can be gleaned.

Following familiarisation, a systematic coding procedure is undertaken to set out and extract key segments of information pertinent to the overarching research questions. This coding phase constitutes a pivotal juncture in the thematic analysis that enables the distillation of the data corpus into manageable and conceptually coherent units that capture the specific tools, techniques, and strategies employed by the participants (Miles et al., 2020). Codes are meticulously applied to textual segments that clarify the nature of the tools deployed, their perceived effectiveness in navigating VUCA environments, and whether these tools are deployed as part of a comprehensive strategic framework or as discrete instruments tailored to address individual VUCA dimensions. This coding process is executed independently for both the CI professional cohort and the CMs cohort to enable a granular comparison of their respective approaches to VUCA management.

5.4.2.1. Organisational Challenges Attributed to VUCA

The qualitative analysis begins with analysing the type of challenges both groups identify as VUCA. Following data extraction, codes were developed using a structured labelling system, combining the first letter of each overarching VUCA category (e.g., V = Volatility) with abbreviations representing specific sub-themes (e.g., MF = Market Fluctuations). Subsequently, participants' responses, though worded differently, were grouped under the thematic code “V-MF” (Market Fluctuations) within the Volatility category, as shown below.

Grouped Responses: Market Fluctuations (Volatility)

	Raw Data Extract	Code	Theme	VUCA Category
1	market fluctuation	V-MF	Market Fluctuations	Volatility
2	Market uncertainty	V-MF	Market Fluctuations	Volatility
3	Turbulence from changes in consumer preferences	V-MF	Market Fluctuations	Volatility
4	Rapid market shifts due to emerging technologies have required quick adaptation in	V-MF	Market Fluctuations	Volatility

Note: Example of the thematic coding logic

This approach exemplified a systematic coding across both cohorts and allowed for clear theme identification and comparison. Raw data extracts leading to thematic codes are presented in Appendix 1.

Table 5.5 presents a thematic summary detailing the frequencies and coding for both CI professionals and CMs regarding the VUCA components.

Table 5.5 *Thematic summary of the type of VUCA challenge identified by CI professionals and CMs*

VUCA Component	Theme	CI professionals – Frequency	CMs – Frequency	Overall Observations
Volatility	Market Fluctuations (V-MF)	4 occurrences	4 occurrences	Both groups focus on market dynamics and consumer behaviour as key sources of volatility.
	Supply Chain Disruptions (V-SCD)	4 occurrences	-	CI professionals emphasise supply chain disruptions as a major volatility challenge.
	Technological Changes (V-TC)	1 occurrence	4 occurrences	CMs focus more on the rapid pace of digital changes.
	Regulatory Changes	-	2 occurrences	CMs are concerned about

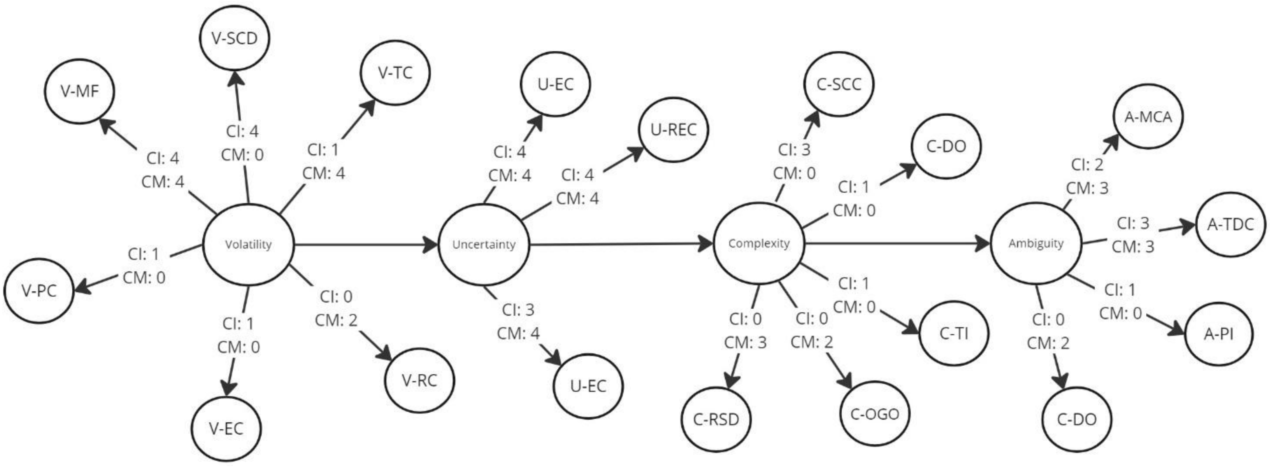
	(V-RC)			the impact of new government policies.
	External Conflicts (V-EC)	1 occurrence	-	CI professionals note external geopolitical events as a volatility factor.
	Pandemic-Related Changes (V-PC)	1 occurrence	-	CI professionals mention the pandemic as a significant source of volatility.
Uncertainty	Emerging Competitors (U-EC)	4 occurrences	4 occurrences	Both groups frequently mention emerging competitors as a source of uncertainty.
	Regulatory/Economic Changes (U-REC)	3 occurrences	3 occurrences	Both groups face uncertainty due to changing regulations and economic conditions.
	Talent and Technology Uncertainty (U-TTU)	3 occurrences	4 occurrences	Technological advancements are a shared source of uncertainty, with CMs also noting talent acquisition.
Complexity	Supply Chain Complexity (C-SCC)	3 occurrences	-	CI professionals emphasise the complexity of managing supply chains.
	Data Overload (C-DO)	1 occurrence	-	CI professionals note challenges with managing large volumes of data.
	Technological Integration (C-TI)	3 occurrences	2 occurrences	Both groups face complexity due to integrating new technologies, though CI

				professionals also note this in supply chains.
	Organisational Growth and Operations (C-OGO)	-	2 occurrences	CMs highlight the complexity arising from rapid organisational growth and operational challenges.
	Regulatory and System Development (C-RSD)	-	3 occurrences	CMs focus on the complexity introduced by regulatory shifts and system development.
Ambiguity	Market and Consumer Ambiguity (A-MCA)	2 occurrences	3 occurrences	Both groups face ambiguity in understanding market and consumer behaviour, though CMs focus more on workforce challenges.
	Technological and Data Challenges (A-TDC)	3 occurrences	3 occurrences	Both groups mention ambiguity related to technological shifts and data interpretation.
	Pandemic Impact (A-PI)	1 occurrence	-	CI professionals specifically mention ambiguity related to the impact of COVID-19.
	Workforce and Service Delivery (A-WSD)	-	2 occurrences	CMs face ambiguity in workforce challenges and service delivery.

Note. *Author's survey results (2024). The same thematic coding logic is followed, e.g.* A-TDC – 3 occurrences, means 'Technology and Data Challenges' has been mentioned 3 times in relation to 'Ambiguity'

This example demonstrates the semantic and inductive logic applied during the coding process, as well as the structured labelling approach used throughout the analysis. The following visualisation offers a consolidation of codified VUCA challenges faced by CI professionals and CMs cohorts:

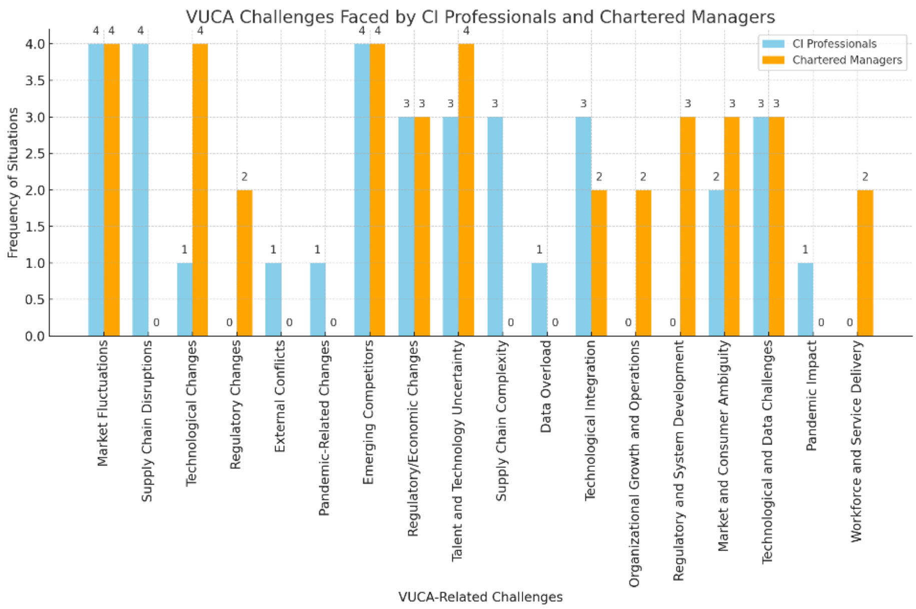
Figure 5.17 *Thematic Visualisation of Challenges Identified by CI and CMs Cohorts*



Note. *Author's survey results (2024). The same thematic coding logic is followed as mentioned earlier.*

The ensuing bar chart compares how each group experiences challenges related to Volatility, Uncertainty, Complexity, and Ambiguity.

Figure 5.18 *Survey Responses on Identified VUCA Challenges by CI and CMs Cohorts*



Note. *Author's survey results (2024).*

The comparative analysis reveals that CI professionals and CMs may share some common concerns regarding market fluctuations, emerging competitors, and regulatory/economic changes as key VUCA challenges, and significant divergences emerge across other areas. Notably, technological changes preoccupy CMs considerably more than CI professionals and signal a potential gap in focus or impact perception. Additionally, CI professionals grapple more distinctly with supply chain complexity, data overload and technological integration issues, whereas CMs face pressing, role-specific challenges related to organisational growth, workforce, and service delivery. Both cohorts view market and consumer ambiguity as pivotal shared challenges. Interestingly, CMs appear more attuned to external conflicts in contrast to CI professionals. Taken together, these findings suggest that despite certain universal VUCA issues, the two groups often encounter substantively different types of volatility, uncertainty, complexity and ambiguity, likely aligned to their discrete professional responsibilities. The data also implies that CMs contend with a wider range of high-intensity VUCA situations compared to their CI peers. This informs about the distinct priorities and concerns of CI professionals and CMs in navigating complex business settings against the backdrop of their specialised organisational roles.

5.4.2.2. Management of VUCA by CI Professionals and Chartered Managers

To understand how both groups included in this study navigate VUCA, the survey questionnaire incorporated questions designed to achieve this objective. An overview of these tools is detailed and shown in the following Table 5.6.

Table 5.6 *Summary of VUCA Management Approaches by both Cohorts based on Survey Responses*

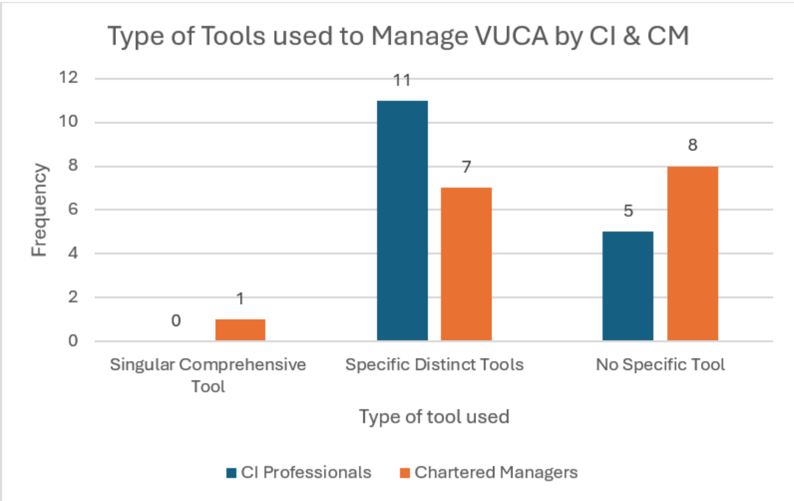
Theme	CI professionals	CMs	Key Observations
Tools Usage (TU)	- Singular Comprehensive Tool (SCT): 0 responses	- Singular Comprehensive Tool (SCT): 1 response	CI professionals generally do not use a singular comprehensive tool, while a small number of CMs do.
	- Specific Distinct Tools (SDT): 11 responses	- Specific Distinct Tools (SDT): 7 responses	Both groups primarily rely on distinct tools for managing each VUCA element, though CI professionals use them more frequently.
	- No Specific Tool (NST) (5 responses)	- No Specific Tool (NST) (8 responses)	A significant portion of CMs report that they do not use any specific tools for VUCA management.
Comprehensive Tool (CT)	No respondent uses a singular comprehensive tool.	- Advanced analytics tools for real-time market trend analysis -Agile framework and emerging technology monitoring tools	CMs who use comprehensive tools tend to focus on advanced analytics and agile frameworks.

Specific Tools for Volatility (STV)	-Real-Time Monitoring and Market Analysis (V-RTMMA) – 4 responses - Scenario and Strategic Planning (V-SSP) – 6 responses -Statistical and Environmental Analysis (V-SEA) - Non-Specific or Confidential – 4 responses (V-NSC)	-Risk Management and Analysis (V-RMA) – 4 responses -Advanced Analytics and Predictive Tools (V-AAPT) – 3 responses -Market and Trend Analysis (V-MTA) – 4 responses -Non-Specific or Negative Responses (V-NSN) – 5 responses	CI professionals favour scenario and strategic planning, while CMs lean towards risk management and market trend analysis for volatility management.
Specific Tools for Uncertainty (STU)	-Risk Management and Assessment (U-RMA) – 6 responses -Strategic Planning and Forecasting (U-SPF) – 4 responses -Environmental and Market Analysis (U-EMA) 2 responses -Non-specific/Confidential Response (U-NSC) – 4 responses	-Scenario Planning and Strategic Modelling (U-SPSM) – 6 responses -Simulation and Testing (U-ST) – 3 responses - Real-Time Tracking and Sensing (U-RTTS) – 2 responses -Non-Specific or Negative Responses (U-NSN) – responses	Both groups emphasise scenario planning and risk management, but CI professionals focus more on risk assessment, while CMs prioritise strategic modelling.
Specific Tools for Complexity (STC)	-Systems Thinking and Analytical Models (C-STAM – 4 responses - Strategic and Scenario Planning (C-SSP) – 3 responses -Advanced Analytics and Design (C-AAD) – 3 responses Non-specific/Confidential (C-NSC) – responses	-Modelling and Analytical Approaches (C-MAP) – 3 responses -Simulations and Scenario Techniques (C-SST) – 2 responses -Agile and Iterative Methods (C-AIM) – 2 responses -Customer Experience and Journey Mapping (C-CEJM) – 2 responses -Non-Specific or Negative Responses (C-NSN) – 7 responses	CI professionals prefer systems thinking and analytical models, whereas CMs employ a more diverse set of approaches, including modelling, simulations, and agile methods.
Specific Tools for Ambiguity (STA)	-Decision-Making and Risk Management (A-DMRM) – 5 responses -Simulation and Wargaming (A-SWG)	-Customer Sentiment and Stakeholder Analysis (A-CSSA) – 3 responses -Simulations (A-S) – 2 responses -Non-Specific or Negative Responses (A-NSN) – 10 responses	Ambiguity appears to be the most challenging VUCA element for both groups. CI professionals focus on decision-making tools, while CMs emphasise stakeholder analysis.

Note. *Author's survey results (2024). The same thematic coding logic is followed, e.g.* C-STAM – 4 responses, means 'Systems Thinking & Analytical Models' has been mentioned 4 times in relation to 'Complexity'

The analysis reveals divergences in tool usage patterns between the groups. CI professionals exhibit a greater tendency to rely on distinct tools targeting specific VUCA elements, whereas CMs show more varied adoption. One response seems to leverage a comprehensive tool, and others do not use any designated instruments. When employed, CMs favour advanced analytics and agile frameworks as integrated solutions, while CI professionals do not report deploying singular comprehensive tools. Figure 5.19 visualises the type of tool each group uses.

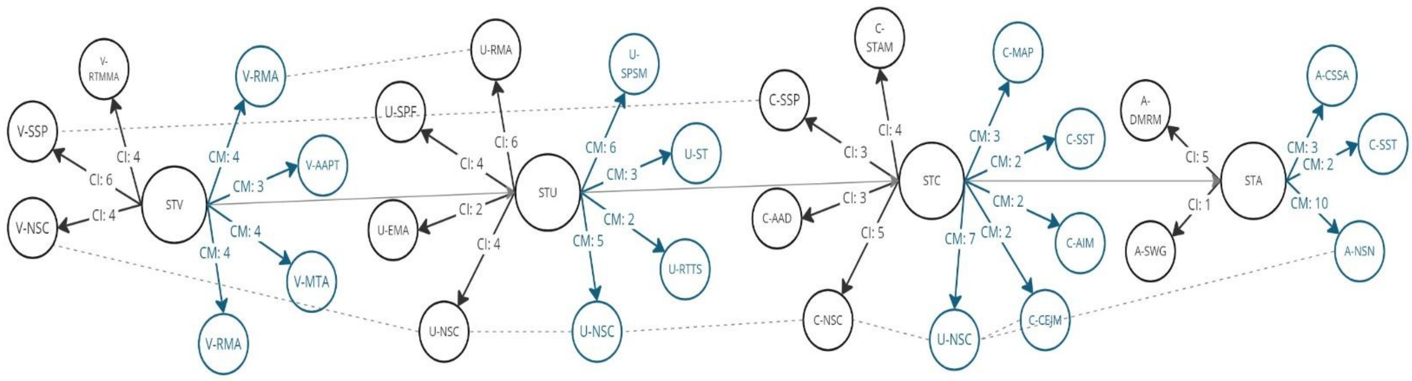
Figure 5.19 *Survey Responses on Types of Tools Used to Manage VUCA by CI Professionals and CMs*



Note. *Author's survey results (2024).*

However, both cohorts display preferences for tailored tools when managing discrete VUCA aspects, with certain tools like scenario planning and risk analysis being common across groups. Nonetheless, the specific tool selections differ substantially, echoing the contrasting strategic priorities of each group. In essence, while some common tools exist showing an overlap in tool usage across different VUCA dimensions, such as strategic and scenario planning (SSP), used by CI professionals for both volatility and complexity and risk management assessment (RMA), used by CMs for volatility and by CI professionals for uncertainty, the groups diverge in their overall tool usage preferences and choices, indicating that tool effectiveness is aligned to their specialised focus areas and responsibilities.

Figure 5.20 Coded Thematic Visualisation of VUCA Tools Used by Both Cohorts (CI Professionals and CMs)



Note. *Author's survey results (2024). As mentioned earlier, the same thematic coding logic is followed.*

Moreover, CI professionals demonstrate a more structured and analytical approach across VUCA elements, while CMs show more variability and flexibility in their methods. CI professionals tend to use more data-driven tools, whereas CMs show a greater emphasis on stakeholder-oriented approaches, especially for complexity and ambiguity. CI professionals consistently provide more specific responses across all categories, while CMs have higher rates of non-specific or negative responses, particularly for complexity and ambiguity.

Table 5.7 *Thematic Categorisation of Successful VUCA Navigation by Both Cohorts (CI Professionals and CMs)*

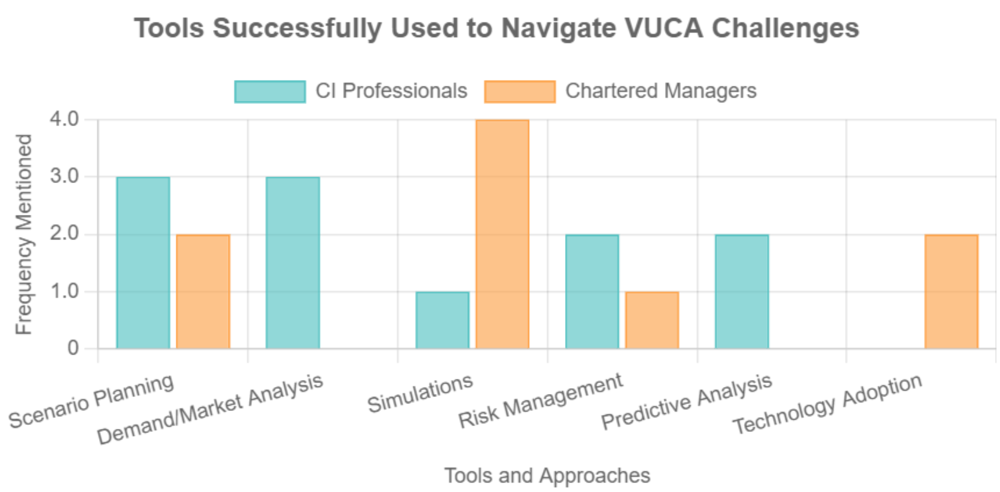
CI professionals		CMs	
Theme	**Success example**	**Theme**	**Success example**
Scenario Planning and "What-If" Analysis:	Navigate uncertainty and prepare for multiple potential outcomes, especially in supply chain and political contexts.	**Advanced Technology and Innovation**	Anticipate and capitalise on emerging technological trends, such as blockchain and the metaverse.
Market and Demand Analysis	Adapt to consumer behaviour changes and market dynamics.	**Risk Management and Stress Testing**	Prepare for financial and supply chain disruptions through stress testing and risk assessments.
Regulatory and Risk Management	Avoid crises by anticipating regulatory changes and managing risks.	**Scenario Planning**	Anticipate various outcomes and prepare contingency plans, particularly in research and supply chains.
Strategic Product Development	Plan thoroughly and debate to ensure successful product launches in volatile markets.	**Simulations and Modelling**	Pivot strategies and adapt their business models through simulations and structural modelling.

Environmental Scanning and Competitor Analysis	Stay ahead of competitors and identify strategic partnerships.	-	-
Supply Chain Impact Assessment	Foresee and mitigate potential supply chain disruptions based on market data.	-	-

Note. *Author's survey results (2024).*

The analysis reveals divergent strategic orientations despite some common recognition of risk management and supply chain significance. CI professionals concentrate more on analytical and predictive approaches like scenario planning, market analysis and environmental scanning. CMs prioritise technological solutions and adaptive strategies instead and also emphasise advanced technology adoption and simulation. While both groups highlight risk management, CI professionals focus on regulatory and broader market risks, whereas CMs specifically highlight financial risk and stress testing. Regarding supply chains, CI professionals emphasise impact assessment and disruption mitigation, contrasted with CMs' scenario planning emphasis.

Figure 5.21 *Survey Responses on Tools Successfully Used to Navigate VUCA Challenges.*



Note. *Author's survey results (2024).*

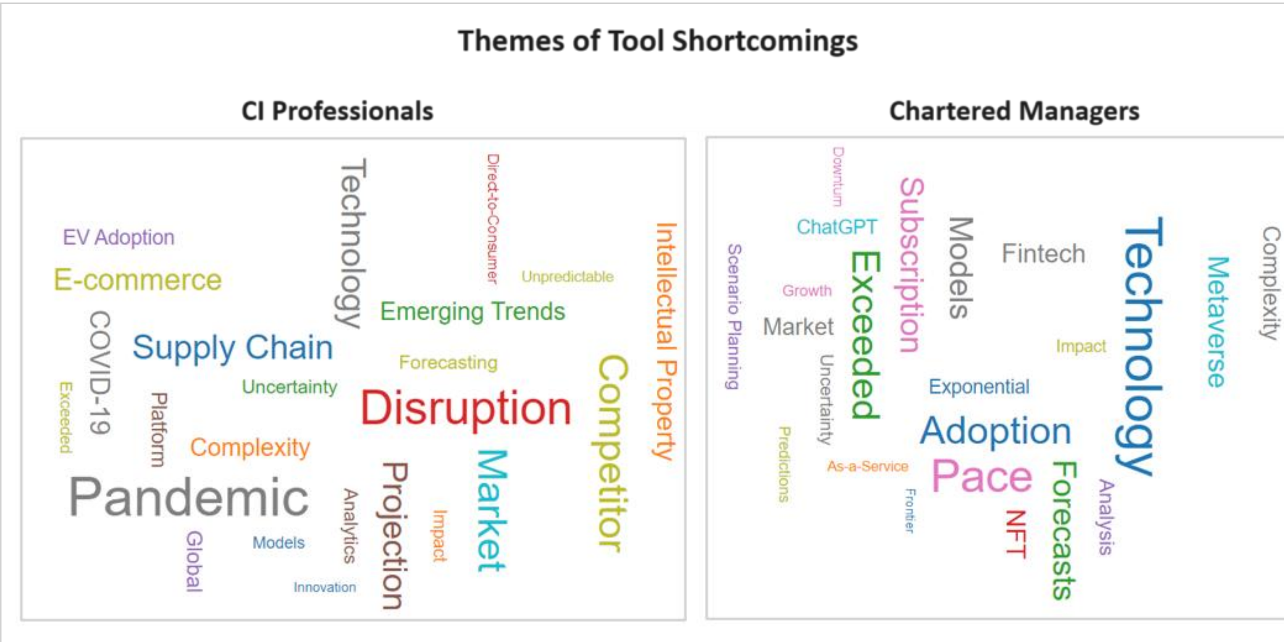
Additionally, distinct focuses emerge, and CI professionals spotlight competitor analysis and strategic product development versus CMs' focus on structural modelling and strategy pivoting. The groups also diverge regarding adaptability, scope of analysis and success metrics. CMs explicitly discuss pivoting flexible business models and internal process adaptations, with examples centred on capitalising on market trends. CI professionals demonstrate more thorough planning and external-focused analysis, including competitors, with success geared towards crisis avoidance.

Finally, CMs exhibit a greater technological innovation orientation, directly citing emerging technologies and innovation themes more frequently. CI professionals reflect longer strategic timeframes, more diverse analytical methods, and a heavier focus on market analysis. So, despite common considerations around risk and supply chains, the groups demonstrate differentiated priorities and approaches regarding VUCA navigation strategies.

5.4.2.3. Tools Shortcomings in Managing VUCA

When it comes to the shortcomings in dealing with VUCA, findings reveal divergences in the scope and focus of the challenges faced. CI professionals emphasise broad and macro-level issues like pandemic disruptions, supply chain volatility, competitor activities, and external factors affecting industry-wide stability. Contrastingly, CMs focus more on specific technological disruptions and the resultant internal adaptations required. Figure 5.22 shows two separate word clouds, one for CI professionals and another for CMs, based on the tool shortcomings they reported. The size of each word corresponds to its frequency and importance in the responses.

Figure 5.22 *Thematic Word Cloud of Key Themes of Tool Shortcomings for both CI professionals and CMs*



Note. *Author's survey results (2024).*

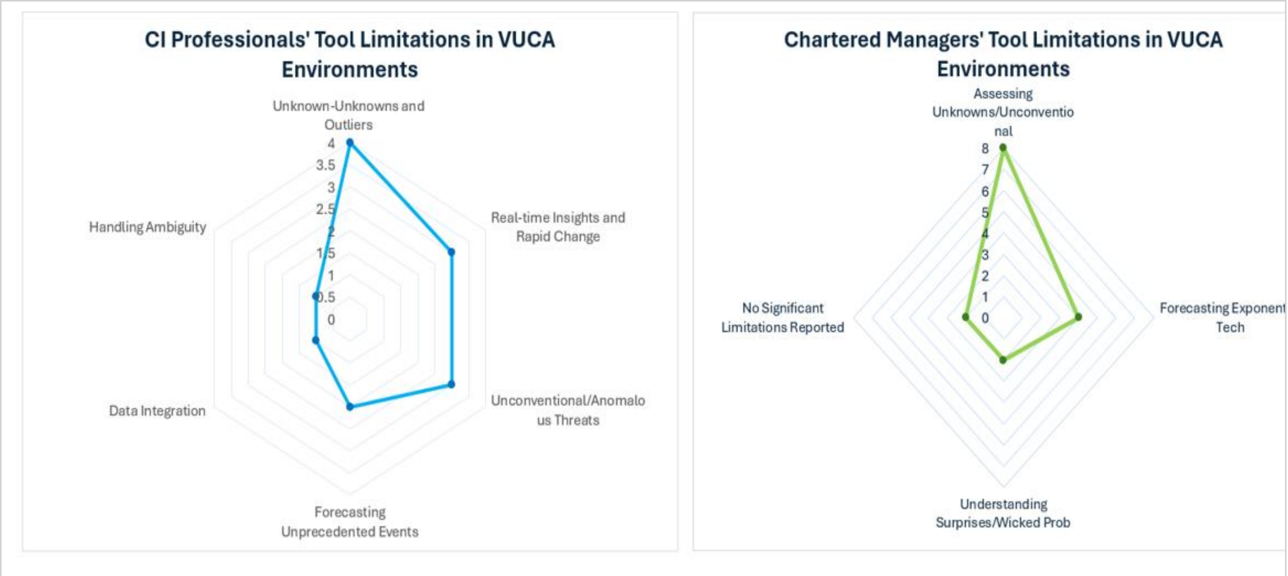
With concerns to technology, CI professionals cite general emerging trends and innovations like e-commerce and EV adoption, while CMs provide more targeted examples like metaverse, digital assets such as NFTs (Non-Fungible Tokens) and generative AI and stress their rapid impact pace. The pandemic represents a pronounced pain point featured across CI professionals' responses yet finds no mention among CMs, potentially signalling different strategic timeframes. More CMs highlight rapid transformations towards subscription business models exceeding initial projections. Both groups appear to recognise analytical limitations, yet CI professionals centre predictive accuracy and early signal detection constraints alongside global supply chain complexities. Conversely, CMs emphasise dynamic analysis challenges and scenario planning limitations in volatile contexts. Finally, CI professionals uniquely cover intellectual property and competitor monitoring blind spots, reaffirming their specialised remit. A higher CMs ratio reports sufficient tools, implying variant expectations across groups.

Evidently, CI professionals demonstrate external and long-term orientation concentrated on industry-level stability, whereas CMs reflect targeted technological and internal adaptability interests that prioritise business model resilience. Collectively, the findings illuminate distinct analytical maturity, competitive focus and response timeframes between the cohorts.

5.4.2.4. Key Limitations of Current Tools

When asked about the limitations encountered with current tools in addressing either the overall VUCA challenges or each of its specific elements, salient commonalities and divergences in the instrumental approach deployed by both groups were revealed. Assessing unknown and unconventional factors emerges as the foremost shared challenge, with a prevailing emphasis on the universal difficulty of navigating unpredictability across VUCA contexts. However, CMs exhibit higher frequency citing this issue, implying potentially greater exposure to such abstruseness in their roles. Additionally, exponential technology forecasting ranks uniquely high among CMs' concerns, which signifies technology-centric environments. Conversely, CI professionals privilege meticulous risk assessment, predictive modelling and cultivation of holistic market insight to inform judicious decision-making and minimise exposure to emergent threats or adversities.

Figure 5.23 *Summary of Tool Limitations in VUCA Environments for Both Cohorts*



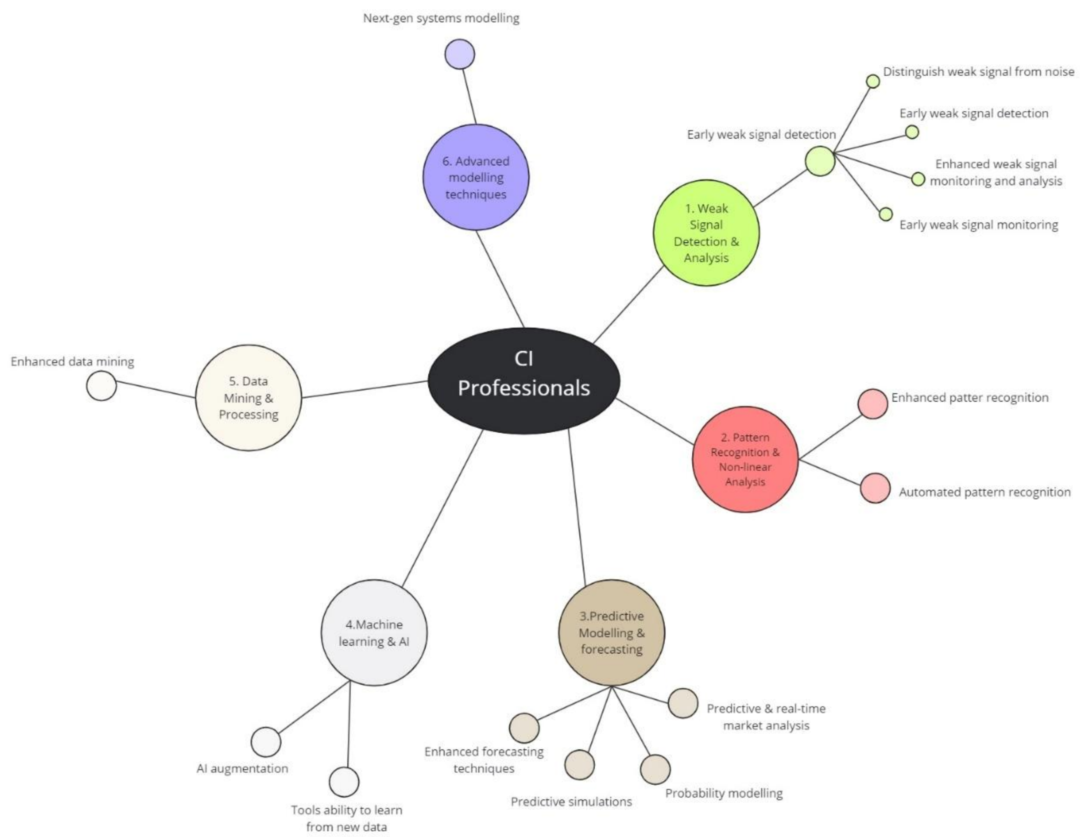
Note. *Author's survey results (2024).*

The following radar charts illustrate tool limitations for CI professionals and CMs in VUCA environments. Such a comparison exhibits the main differences in the performance of respective tools within highly unpredictable contexts. In the case of CI professionals, their respective tools show significant limitations in handling unknown-unknowns and outliers, reflecting challenges that are related to unexpected or highly unpredictable situations. They also struggle with gaining real-time insights and with the ability to adapt to rapid change; this leads to a belief that their tools are less effective when they need to make rapid adjustments to dynamic and fast-moving conditions. On the other hand, CI professionals' tools are more effective in areas like forecasting unprecedented events and data integration, where limitations are minimal. This indicates that they are relatively well-equipped to deal with unique events and to incorporate various data sources efficiently. Their tools also demonstrate moderate proficiency in handling ambiguity. By contrast, the most significant tool limitations for CMs involve assessing unknown or unconventional threats; the management of non-traditional risks within a VUCA environment is difficult to identify and handle. Another bottleneck they report is related to forecasting exponential technologies, which indicates their difficulties in predicting rapid technological advances.

5.4.2.5. Desired Capabilities and Features for VUCA Tools Enhancement

In response to the question "In your opinion, what capabilities and or features should be integrated into these tools to make them more effective against VUCA challenges and in detecting early signals?", salient areas of convergence as well as divergence emerge between CI professionals and CMs regarding requisite capabilities for navigating complexity and volatility. Prevailing priorities coalesce around early signal detection, predictive modelling and pattern recognition, stressing a shared imperative for discerning nascent trends and mapping prospective scenarios within turbulent environments. Interestingly, a marginally more pronounced emphasis on signal detection among CMs is evident, potentially intimating greater exposure to such uncertainty within their supporting business leadership roles. Meanwhile, CI professionals exhibit more specialised nomenclature like “weak signal”, befitting their domain-specific expertise.

Figure 5.24 *Mapping CI Professionals' Desired Tools Capabilities and Features for Effective VUCA Management by CI Professionals*



***Note**. Author’s survey results (2024).*

Additionally, stark contrasts in analytical orientation emerge; CI professionals favour advanced technical modelling techniques that enable granular nonlinear system analysis and intimate close engagement with extensive data volumes. On the other hand, CMs exhibit a preference for more aggregated simulation and scenario planning methodologies, which insinuates a broader strategic perspective. Both cohorts express interest in risk assessment and artificial intelligence, albeit marginally stronger among CI professionals, again potentially reflecting intensive information processing demands.

Figure 5.25 *Mapping CMs' Desired Tools Capabilities and Features for Effective VUCA Management by CMs*

***Note**. Author's survey results (2024).*

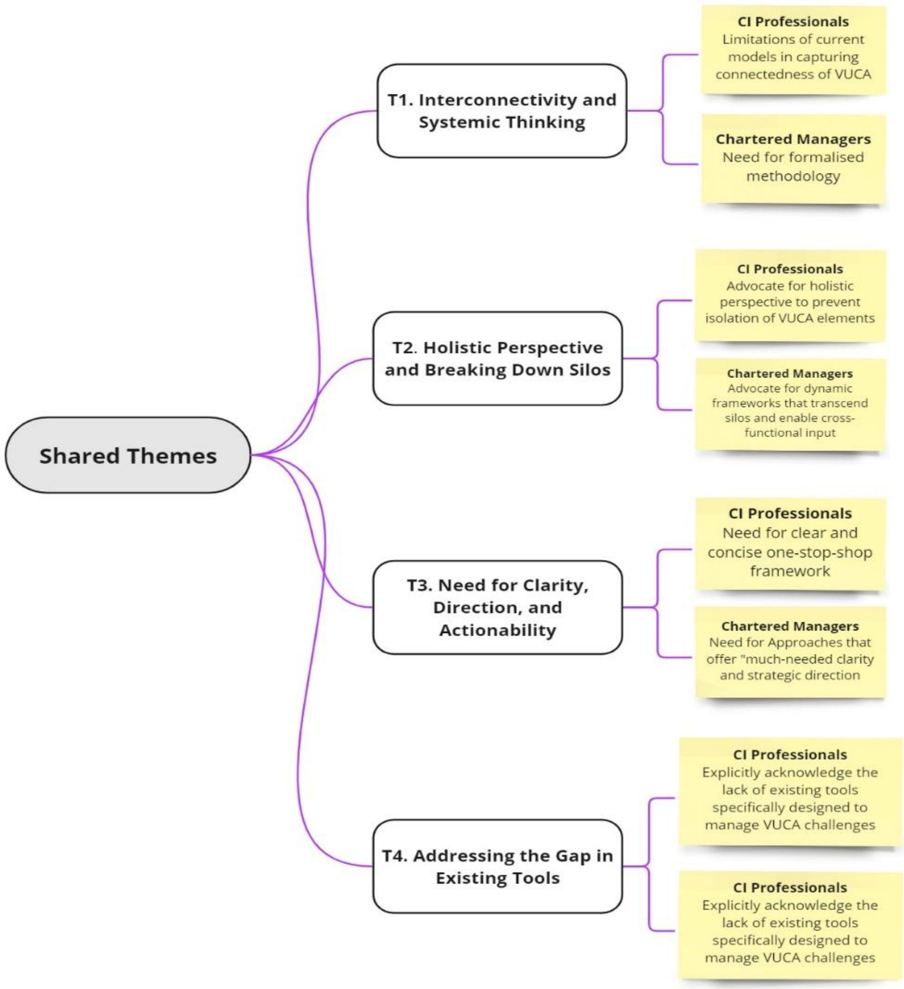
Uniquely, CMs cite holistic ecosystem analysis and customer journey mapping as priorities, featuring connectivity to stakeholder experiences defining their leadership mandate. Meanwhile, CI professionals exclusively highlight adaptability, automated systems, and extensive data processing as desired capabilities, which are consonant with frequent data shifts. Though early signal detection and predictive prowess represent shared aspirations, divergences in analytical scope and strategic priorities split along specialisation boundaries, with CI professionals delving into technical complexities and CMs maintaining multilayered business leadership oversight. Both CI professionals and CMs, when asked about any supplementary tools, techniques and methods they would like to add to their existing ones, continually seek innovative ways to navigate the complexities of VUCA environments. Their quest for effective tools and techniques reveals a fascinating interplay of analytical prowess and strategic foresight. Both cohorts acknowledge the utility of collective intelligence systems, evolutionary forecasting, and simulations/wargaming, which suggest a shared interest in harnessing collective knowledge for complex scenario modelling.

CI professionals gravitate towards analytically rigorous, data-intensive approaches such as weak signal analysis, game theory, and prediction markets, reflecting their core competency in information acquisition and interpretation. Conversely, CMs demonstrate a proclivity for holistic, strategically oriented methodologies like red teaming, AI augmentation, and ethnographic research, which are consonant with their broader organisational leadership mandates. This dichotomy manifests as a technical versus strategic divide, with CI professionals emphasising data-driven prediction derived from complex quantitative models while CMs prioritise understanding macro-level evolutionary trends and their implications for strategic decision-making. Notably, CMs exhibit greater sensitivity to human factors, evidenced by their interest in ethnographic research and expert inference engines, which underline the importance of detailed socio-cultural insights for effective leadership within complex adaptive systems. Both groups recognise the value of external perspectives, albeit through different mechanisms: CI professionals leveraging external relationship networks for information gathering and CMs employing red teaming for strategic challenge and external pressure testing.

5.4.2.6. Reasons for the Need for the VUCA Chain Reaction Effect

The descriptive statistics in section 5.4.1.8 paint a similarly congruent picture; the CI professionals and the CMs are strongly in favour of structured approaches to deal with VUCA challenges. Their joint perspective can be understood to arise from the inherent demands of their roles, which require systematic processing of information, strategic foresight, and stakeholder alignment, each of these benefits from structured scaffolds. Qualitative responses from both CI professionals and CMs when asked to identify reasons for their consensus around the need for a systematic approach to navigate VUCA provided considerable insight into the rationale behind their preference for a structured approach to VUCA challenges. Figure 5.26 shows converging themes that lead to a common understanding of the complexities involved and the potential benefits of such a systematic approach.

Figure 5.26 *Converging themes reveal shared benefits of a systematic approach to VUCA across CI professionals and CMs.*



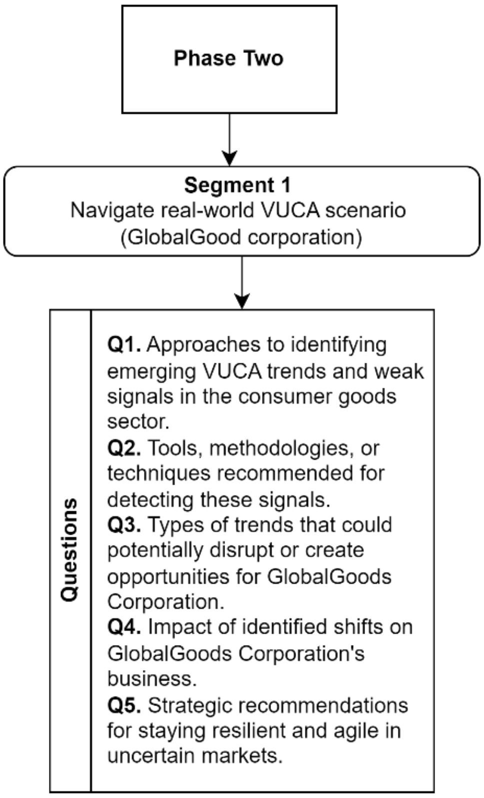
Note. *Author's survey results (2024).*

The qualitative data strongly reinforces the quantitative findings, which demonstrate a shared understanding among CI professionals and CMs that to effectively navigate VUCA environments, they need to move beyond traditional approaches. They seek structured methodologies that embrace systemic thinking, promote holistic perspectives, provide actionable guidance, and address the limitations of existing tools. This substantiates the importance of continued research and development efforts focused on creating practical and adaptable frameworks that empower professionals to navigate VUCA confidently.

5.4.3. Phase Two: Segment One – Navigating Real-World VUCA Scenario

This section outlines the analytical approach for the first segment of Phase Two, where participants navigate the real-world VUCA scenario of GlobalGoods Corporation (Appendix 13). The focus is on the five open-ended questions asked after the scenario presentation. The primary analytical method employed is qualitative content analysis, which aims to uncover themes, patterns, and insights from the participant responses.

Figure 5.27 *Phase 2, segment 1: Navigating a Real-World VUCA Scenario*



Note. *Based on this research, survey questions were formulated by the author.*

The analysis involves inductive coding using an emergent data-driven technique to identify codes organically from the responses. Theme development follows through refinement and definition of relationship-based categories reflecting shared meanings to enable overarching themes to emerge across codes. The analysis examines theme frequency and relationships between themes, as well as a comparative analysis of groups and granular focus on insights related to each specific question.

Reporting is supported through a narrative with quotes and visualisations that underpin the variation of themes and findings of critical importance. Together, this structured analytical approach positioned on qualitative content analysis allows the distilling of participant perceptions, practices, challenges, and opportunities regarding navigating strategic intelligence in VUCA contexts. The findings will be triangulated with the findings from the literature, Phase One, and will directly inform the refinement and validation of the SCI framework.

Table 5.8 *Comparative Analysis of How CIP and CMs Approached the Presented Real-World VUCA Scenario and the Tools Used*

	CI professionals		CMs	
Segment 1 questions	**Codes**	**Themes**	**Codes**	**Themes**
Q1. How to approach the GlobalGoods VUCA scenario	1. Environmental scanning (ES) 2. Horizon scanning (HS) 3. Intelligence systems (IS) 4. Market research (MR) 5. Trend analysis (TA) 6. Data analytics (DA) 7. Consumer behaviour monitoring (CBM) 8. Competitive intelligence (CI) 9. Social media monitoring (SMM) 10. Early Warning Systems (EWS)	1. Comprehensive Information Gathering 2. Proactive Monitoring and Analysis 3. Multi-Source Intelligence	1. Environmental scanning (ES) 2. Market research (MR) 3. Consumer feedback analysis (CFA) 4. Competitive analysis (CA) 5. Trend reports examination (TRE) 6. Systems thinking approach (STA) 7. Ecosystem mapping (ESM) 8. Trendspotting techniques (TST) 9. Multi-channel data gathering (MCDG) 10. Frontline employee insights (FEI)	1. Comprehensive Data Collection 2. Holistic Systems Approach 3. Diverse Perspective Integration 4. Consumer-Centric Intelligence
Q2. Tools, Methods, and Techniques suggested for VUCA scenario	1. SWOT Analysis (SWOT) 2. PESTLE Analysis (PESTLE) 3. Scenario Planning (SP) 4. Porter's Five Forces (P5F) 5. Sentiment analysis (SA) 6. Environmental scanning (ES) 7. Trend analysis (TA) 8. AI-powered tools (AI) 9. Data analytics platforms (DAP) 10. Social media monitoring tools (SMT)	1. Traditional Strategic Analysis Tools 2. Advanced Technological Solutions 3. Scenario-based Planning 4. Data-driven Insights	1. SWOT analysis (SWOT) 2. PESTLE analysis (PESTLE) 3. Scenario planning (SP) 4. Predictive analytics (PA) 5. SAS Analytics (SAS) 6. Systems Dynamics Modelling (SDM) 7. Trendspotting tools (TST) 8. Innovation Radar (IR) 9. Reverse innovation (RI) 10. AI-powered sentiment analysis (AISA)	1. Traditional Strategic Tools 2. Advanced Analytics and Modelling 3. Future-Oriented Techniques 4. Technology-Enabled Insights

Q3. Trends to consider (disruption/opportunities)	1. Technological innovations (TI) 2. Economic shifts (ES) 3. Regulatory changes (RC) 4. Consumer behaviour changes (CBC) 5. Health and wellness trends (HWT) 6. Digital transformation (DT) 7. AI and automation advancements (AIA) 8. Demographic shifts (DS) 9. Sustainability focus (SF) 10. Geopolitical factors (GF)	1. Technological Disruption 2. Socioeconomic Changes 3. Consumer Preference Evolution 4. Regulatory and Political Landscape	1. Sustainability trends (ST) 2. Ethical consumption patterns (ECP) 3. Digital channel growth (DCG) 4. AI and automation advancements (AIA) 5. Personalisation demands (PD) 6. Experiential consumption shifts (ECS) 7. New distribution models (NDM) 8. Hybrid work patterns (HWP) 9. Technology convergence (TC) 10. Blockchain adoption (BLC)	1. Ethical and Sustainable Consumerism 2. Digital Transformation Impacts 3. Evolving Consumer Expectations 4. Workplace and Lifestyle Changes
Q4. Shifts impact	1. Digital strategy adoption (DSA) 2. Consumer spending changes (CSC) 3. Operational cost increases (OCI) 4. New technology integration (NTI) 5. Product line diversification (PLD) 6. Supply chain disruption (SCD) 7. Market reach expansion (MRE) 8. Business model transformation (BMT) 9. Customer engagement enhancement (CEE) 10. Workforce reskilling (WR)	1. Digital Transformation Imperatives 2. Market Dynamics Shifts 3. Operational Adaptations 4. Customer-Centric Innovations	1. Market reach expansion (MRE) 2. Business model rethinking (BMR) 3. Product innovation necessities (PIN) 4. Supply chain reconfiguration (SCR) 5. Operational cost implications (OCI) 6. Customer engagement transformation (CET) 7. Workforce disruption (WD) 8. Reskilling initiatives (RI) 9. Brand loyalty redefinition (BLR) 10. Sales channel adaptation (SCA)	1. Business Model Evolution 2. Operational Restructuring 3. Workforce Transformation 4. Customer Relationship Redefinition
Q5. Strategic Recommendations	1. Continuous learning culture (CLC) 2. Innovation focus (IF)	1. Innovation and Adaptability 2. Technology-Driven Transformation	1. Scenario-based strategy development (SBS) 2. Sustainability integration (SI)	1. Futureproofing Through Scenario Planning 2. Digital and Technological Advancement

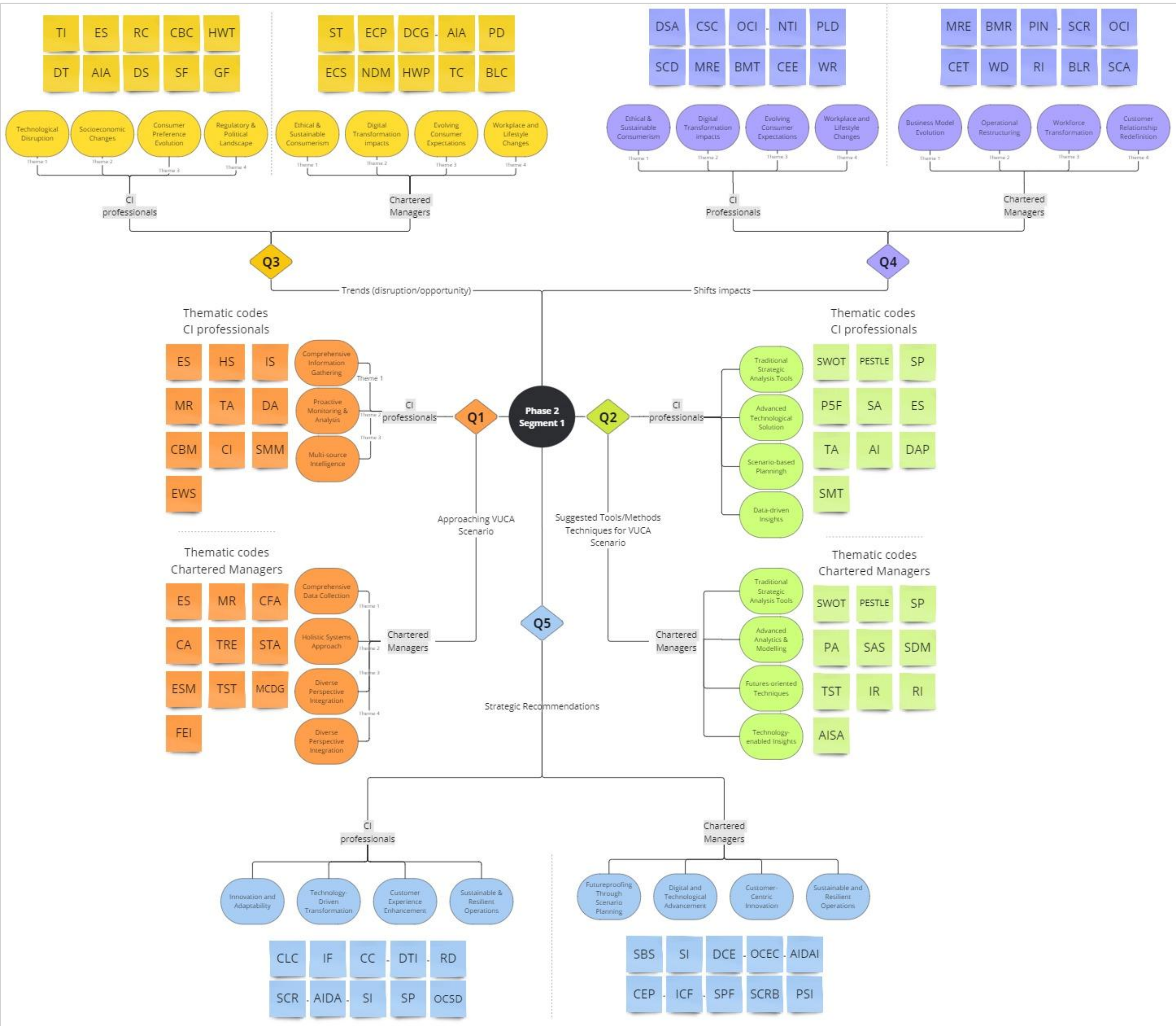
	3. Customer centricity (CC) 4. Digital transformation investment (DTI) 5. R&D investment (RD) 6. Supply chain resilience (SCR) 7. AI and data analytics adoption (AIDA) 8. Sustainability integration (SI) 9. Strategic partnerships (SP) 10. Omnichannel strategy development (OCSD)	3. Customer Experience Enhancement 4. Sustainable and Resilient Operations	3. Digital capabilities enhancement (DCE) 4. Omnichannel experience creation (OCEC) 5. AI and data analytics investment (AIDAI) 6. Customer experience prioritisation (CEP) 7. Innovation culture fostering (ICF) 8. Strategic partnerships formation (SPF) 9. Supply chain resilience building (SCRB) 10. Personalisation strategy implementation (PSI)	3. Customer-Centric Innovation 4. Sustainable and Resilient Operations

Note*. Author's survey results (2024). The same thematic coding logic is followed as mentioned earlier.*

The above comparative analysis table of responses from CI professionals and CMs reveals contrasting differences in the use of tools to navigate the VUCA despite shared objectives. Although both groups leverage a combination of traditional strategic tools (e.g., SWOT, PESTLE) and advanced methodologies such as scenario planning and analytics, CI professionals exhibit a greater affinity for real-time and market-focused techniques like sentiment analysis and social media monitoring. In contrast, CMs lean towards comprehensive, future-oriented modelling approaches, such as systems dynamics modelling, predictive analytics, and innovation radars. This disparity reflects the different time horizons inherent to their respective roles.

Even though both groups acknowledge the significance of technological disruption, consumer behaviour changes, and regulatory shifts, CI professionals exhibit heightened sensitivity to competitive landscape shifts and geopolitical factors. Conversely, CMs prioritise ethical consumption, sustainability, and workplace/lifestyle changes, which depicts their broader consideration of societal trends and internal organisational dynamics. This distinction aligns with the strategic levels at which each group operates, with CI professionals focusing on market positioning and CMs on overall organisational adaptation.

Figure 5.28 Coded Thematic Diagram of Key Themes Used by Both Cohorts to Navigate Real-World VUCA Scenario



***Note**: These are the author's survey results (2024). As mentioned earlier, the same thematic coding logic is followed.*

Both groups also recognise the transformative impact of VUCA factors and acknowledge the need for digital transformation, business model evolution, and operational adaptations. However, CI professionals prioritise market dynamics shifts and customer engagement enhancements, whereas CMs emphasise workforce transformation and brand loyalty redefinition. This disparity reflects the primary concerns of each role as well as market competitiveness versus organisational effectiveness. Indeed, both groups acknowledge the imperative for comprehensive data acquisition, with CI professionals demonstrating a more pronounced inclination towards adaptive intelligence tools and techniques (AITTs). These specialised tools represent a subset of intelligence systems, such as early warning mechanisms and horizon scanning, designed to evolve and respond dynamically to changing environmental conditions. Conversely, CMs drift towards a holistic, systems-based perspective that emphasises what can be termed systemic intelligence integration tools (SIITs). These tools include systems thinking, ecosystem mapping, and the integration of frontline insights. This divergence likely stems from the distinct scopes of their roles, with CI professionals concentrating on competitive environments and CMs adopting a broader organisational lens.

There is an important distinction between AITT and SIIT that reflects differing approaches employed by CI professionals and CMs when dealing with VUCA. Both AITTs and SIITs seek to improve organisational intelligence and decision-making, but they have different areas of emphasis. AITTs take a more targeted and adaptable approach to meeting specific intelligence requirements, while SIITs aim to provide a more holistic and integrated understanding of organisational ecosystems and dynamics. The divergence demonstrates how CI professionals tend to favour nimble and customised AITTs to address immediate intelligence needs (IIN), whereas CMs prefer the big-picture perspective offered by SIIT to navigate VUCA environments. In addition, the shared strategic recommendations reported by both cohorts include investments in digital capabilities, customer-centric innovations and resilient operations. However, CI professionals advocate for continuous learning, adaptability, and the leverage of AI and data analytics for market insights, whereas CMs emphasise scenario-based strategy development and sustainability integration, which stresses the varying time horizons within which each group operates.

Overall, the analysis reveals several key patterns and trends:

1. Both groups demonstrate convergence of traditional and advanced approaches, implying a synergistic integration of established frameworks with data-driven, AI-enhanced methodologies. This reflects a broader management trend.

2. The pervasiveness of digital transformation resonates across all responses, suggesting its importance and profound impact on contemporary business strategy.

3. The notable shift towards considering AITT by CI professionals and SIIT by CMs signals a departure from siloed approaches to strategy and demonstrates the ascendancy of holistic and systems-based thinking.

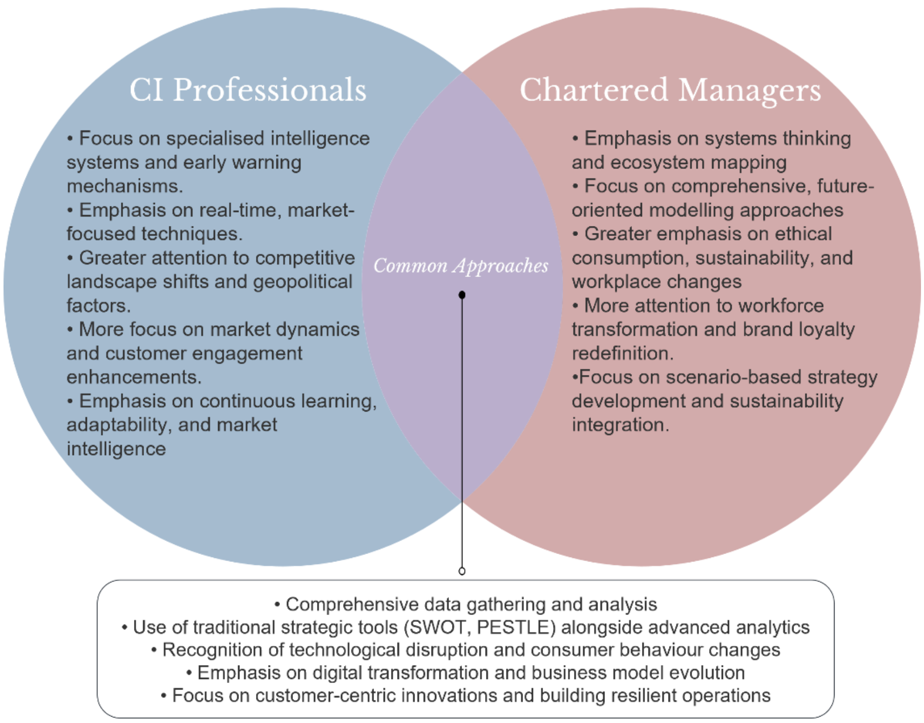
4. The heightened emphasis on sustainability and ethics themes, particularly prominent among CMs, reflects a broader societal shift towards responsible business practices. However, this trend has not been reported by CI professionals, which may indicate a potential blind spot in their strategic outlook when addressing organisational challenges. This absence of ethical consideration within CI professional responses is particularly concerning when considering the pivotal role of ethics in distinguishing CI practice from competitive espionage, as mentioned previously in section 2.4.1 related to the context of intelligence in CI.

5. The need for agile adaptability and long-term planning highlights the dual nature of VUCA challenges, which require immediate responses and strategic foresight.

6. The emphasis on AI and advanced analytics demonstrates a growing reliance on data-driven, predictive approaches to strategy.

It was also observed that neither cohort demonstrated a structured or systematic approach to addressing VUCA, either holistically or with respect to its individual components. Specifically, when confronted with a VUCA scenario, none of the participants from either cohort proposed a targeted strategy tailored to each distinct element of VUCA. This finding reaffirms the notion that VUCA is often perceived as a conceptual buzzword rather than a well-defined operational construct, leading to a reliance on broad and generalised strategies rather than detailed and element-specific interventions. This justifies the significant gap in the practical application and understanding of VUCA. This suggests that, though the concept is recognised, its strategic implementation remains superficial and lacks the necessary depth to effectively navigate the complexities it represents.

Figure 5.29 *Differences and Commonalities between CI professionals and CMs in Approaching Real-World VUCA Scenario*



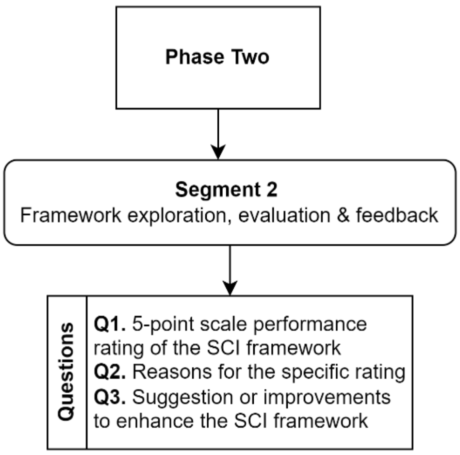
Note. *Author's survey results (2024).*

This comparative analysis in Figure 5.29 reveals that, though CI professionals and CMs share common goals of strategic adaptation amidst VUCA complexity, variances exist in their approaches, reflective of their differentiated organisational roles and scopes. CI professionals prioritise monitoring fluid market conditions and external competitive dynamics by leveraging specialised intelligence to enable agile sense-making and rapid response. CMs, in contrast, address a broader imperative of long-term organisational sustainability, integrating holistic systems thinking to reimagine internal capabilities, workflows and values in alignment with emerging societal needs. Yet, despite these strategic distinctions, the study reveals a convergent capacity in both groups to synergise traditional and advanced methods to navigate uncertainty. The fusion of established and new approaches, with short-term strategies operating in harmony with proactive foresight, demonstrates an adaptive and progressive evolution of strategic management philosophy in the face of increasing VUCA turbulence. The integration across disciplines, from market intelligence to organisational development to systems thinking, has become increasingly important for resiliently coping with the intensifying challenges posed by VUCA.

5.4.4. Phase Two: Segment Two – Framework Exploration, Evaluation and Feedback

This section outlines the analytical procedure combining descriptive statistics and qualitative content analysis to evaluate participant feedback on the SCI framework. For the Likert-scale rating question, the analysis will involve means testing, dispersion metrics, frequency distributions, and comparative testing between the two groups.

Figure 5.30 Phase 2, segment 2: Framework Exploration, Evaluation and Feedback



Note. *By the author.*

A structured qualitative approach of iterative coding, categorisation, theme refinement, a comparative lens, and prioritisation of critical issues was used to distil the reasons underlying the ratings and suggestions for improvement in open-ended questions. Findings across question types were integrated to support understanding of perception; visualisation and description strengthened the validity and contextualisation of findings. This data-driven, mixed-methods technique provides an evaluation of the SCI framework's effectiveness, applicability and areas for refinement to directly inform iterations required to maximise its utility in navigating VUCA environments. The evaluation of the proposed SCI framework by both CI professionals and CMs reveals consistently favourable perceptions. More specifically, the level of approval from both groups is high, as every statement on the 5-point Likert scale means scores above 4. CI professionals demonstrate a marginally higher mean rating (4.38) compared to CI professionals (4.25).

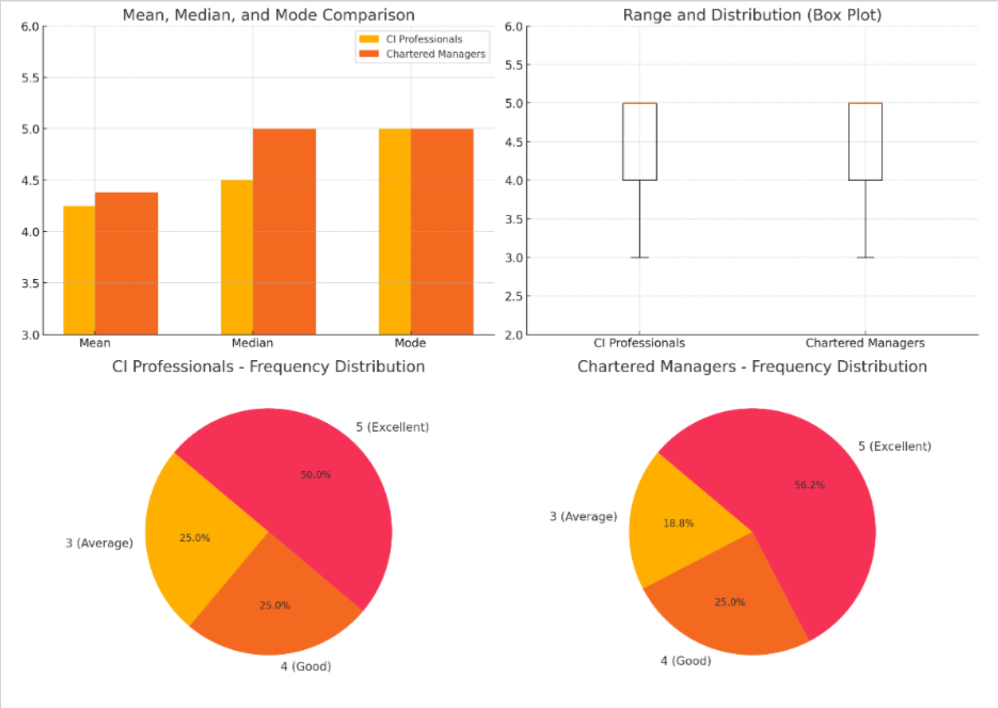
Table 5.9 *SCI Framework Rating by CI professionals and CMs*

Statistic	CI Professionals	Chartered Managers
Mean	4.25	4.38
Median	4.5	5
Mode	5	5
Standard Deviation	0.856	0.806
Range	2 (3 to 5)	2 (3 to 5)
Frequency: 3 (Average)	25% (4 responses)	18.75% (3 responses)
Frequency: 4 (Good)	25% (4 responses)	25% (4 responses)
Frequency: 5 (Excellent)	50% (8 responses)	56.25% (9 responses)

Note. *Author's survey results (2024).*

Analysis of the standard deviation reveals a slightly greater variability in ratings among CI professionals (sd = 0.856) compared to CMs (sd = 0.806). This suggests a greater homogeneity of opinion within the CMs group, indicating a more unified perception of the framework's value. Conversely, the wider dispersion of views among CI professionals might be attributed to factors such as diverse organisational contexts, varying levels of familiarity with the framework, or differing applications within their professional roles.

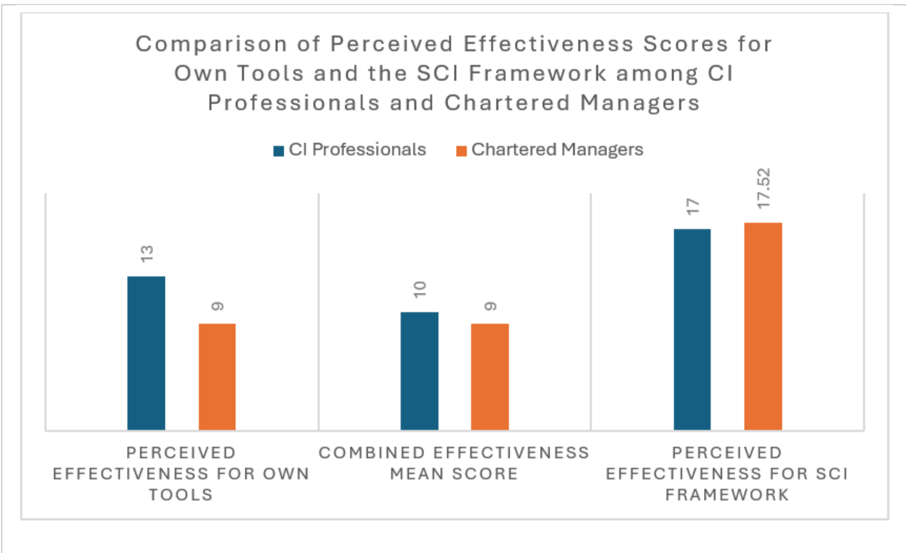
Figure 5.31 Multi-Panel Plot Combining Frequency Distribution for Both Cohorts



Note. *Author's survey results (2024).*

This visualisation provides a comparison between the two groups and highlights central tendencies, response distributions, and the frequency of different response levels. To ascertain the value of the SCI framework as a superior alternative to existing tools employed by CI professionals and CMs in navigating VUCA environments, a comparative analysis of perceived effectiveness scores was conducted. This analysis involved juxtaposing the perceived effectiveness scores of respondents' own tools as detailed in section 5.1.1.7 with their standardised scores for the SCI framework. Initially, the 5-point Likert scale data pertaining to the SCI framework underwent a linear transformation to a 20-point scale (using the same formula used previously) to ensure standardisation and enable direct comparison.

Figure 5.32 Survey Responses on Perceived Effectiveness of Own Tools and SCI Framework by CI Professionals and CMs



	Perceived Effectiveness of Own Tools	Combined Effectiveness Mean Score	Perceived Effectiveness for SCI Framework
CIP	13	10	17
CM	9	9	17.52

Note. *Author's survey results (2024)*.

The results make it evident that there is overwhelming support for the SCI framework in both samples. Probably most telling, both CI experts and CMs rated the SCI framework significantly better than their present tools. When using their tools to tackle VUCA dimensions individually, CI professionals rated the perceived effectiveness of their own score as 13/20, compared to CM professionals, who rated theirs at 9/20. When evaluating the SCI framework, both groups collectively rated its perceived effectiveness at 17/20. When evaluating the use of participants' tools to address the combined VUCA elements, CI professionals' perceived effectiveness of their own score decreased slightly to 10/20, while CM professionals maintained their rating at 9/20. The perceived effectiveness of the SCI framework in this combined context was rated slightly higher at 17.52/20. This, therefore, suggests that, for participants, the holistic and integrated approach the SCI framework takes towards VUCA challenges conceptually resonates more than their current approaches, which may be fragmented in addressing VUCA. The finding has serious implications from both theoretical and practical perspectives. On one hand, theoretically, it supports the need for comprehensive and adaptive frameworks as a means of dealing with VUCA. The pragmatic implication of the findings is that they make an appealing case for adopting the SCI framework, which presented a superior alternative that would, by default, improve strategic decision-making and enhance organisational agility in the face of VUCA.

The following and last question related to this segment relates to the feedback from both cohorts regarding the SCI framework. User comments on the SCI framework point to a spectrum of recommended improvements meant to increase its effectiveness in navigating VUCA. Both CI professionals and CMs stressed customisability, flexibility and ease of use to address heterogeneous needs and constraints across adopting organisations. However, pathways diverged regarding mechanisms for improvement, that is, suggestions to enhance or expand the SCI framework with additional capabilities or optimisation, with CI professionals prioritising technological integration, such as AI and real-time analytics, while CMs focused more on simplification, modularisation, and responsive governance. This dichotomy stresses tensions in balancing analytical sophistication with usability. For their part, both groups advocated increased training, real-case demonstrations, and continuous improvement loops to enhance the value of the framework.

Table 5.10 *Specific and Common Thematic Feedback on SCI Improvements*

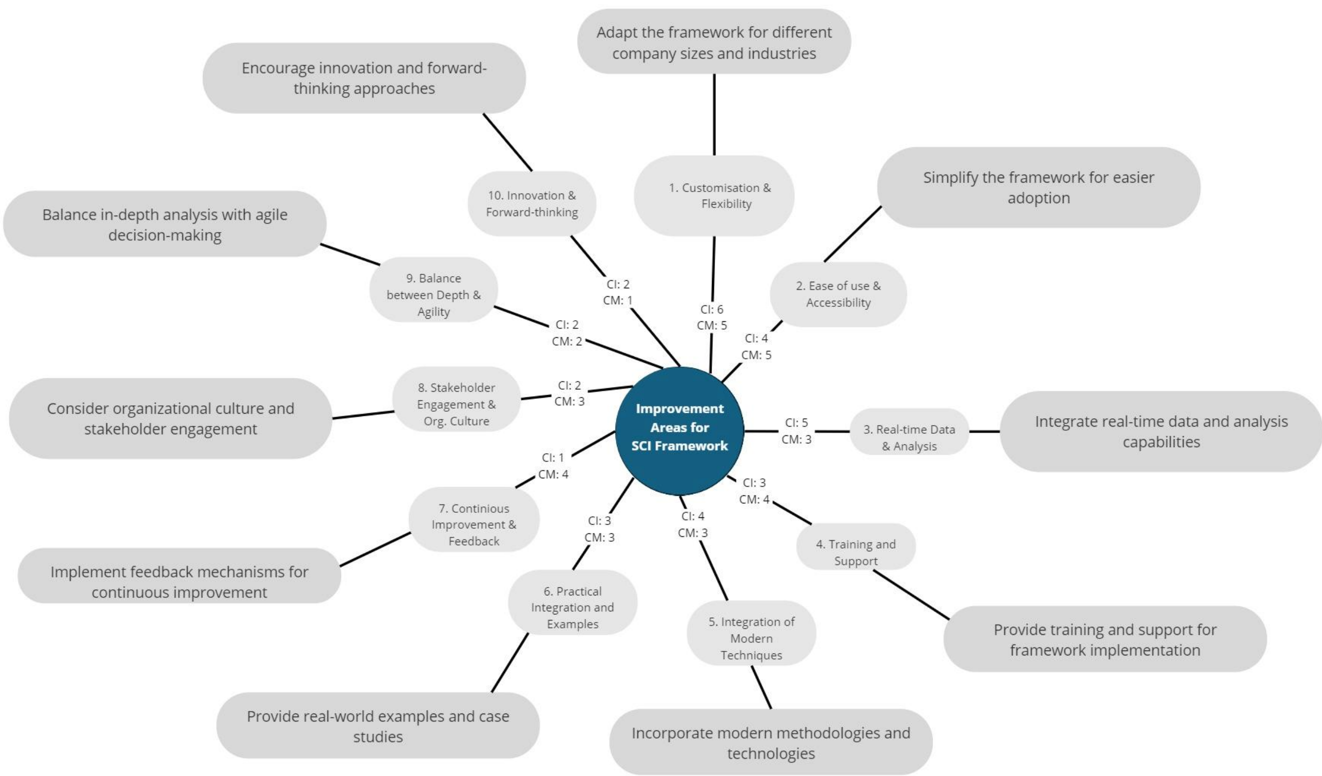
Theme	CI professionals	CMs	Common Feedback
1. Customisation and Flexibility	- Customisation for specific industries - Integration with AI	- Simplify for companies with limited time and resources - Make it more flexible for quick strategies	- Adapt the framework for different company sizes and industries
2. Ease of Use and Accessibility	- Provide templates for easier use - Develop a simplified version for smaller companies	Make tools easier to use for companies of all sizes and skill levels Further guidance on using the complexity map	- Simplify the framework for easier adoption
3. Real-time Data and Analysis	- Include real-time data collection and analysis - Implement early warning systems for weak signals	- Include real-time environment tracking and data analysis - Continuous feedback loops for strategy updates	- Integrate real-time data and analysis capabilities
4. Training and Support	- Offer hands-on training and support - Training for implementation	- Requires training for use in different fields	- Provide training and support for framework implementation
5. Integration of Modern Techniques	- Consider design thinking at the ambiguity level Include elements of behavioural economics	- Include elements considering the impact of emerging technologies	- Incorporate modern methodologies and technologies
6. Practical Application and Examples	- Test the framework in various business settings - Need for personal testing to provide accurate judgment	- Show framework application in other industries - Include more real-world case studies from different industries	- Provide real-world examples and case studies
7. Continuous Improvement and Feedback	- Greater integration of consumer insights	- Implement feedback loops for learning from successes and failures - Include continuous feedback loops for strategy updates	- Implement feedback mechanisms for continuous improvement
8. Practical Application and Examples	- Test the framework in various business settings - Need for personal testing to provide accurate judgment	- Show framework application in other industries - Include more real-world case studies from different industries	- Provide real-world examples and case studies
9. Continuous Improvement and Feedback	- Greater integration of consumer insights	- Implement feedback loops for learning from successes and failures - Include continuous feedback loops for strategy updates	- Implement feedback mechanisms for continuous improvement

10. Innovation and Forward-thinking	- Include crowdsourced intelligence in the model - Incorporate dynamic methods like design thinking and ethnographic research	- Add guidelines for iterative strategy development	- Encourage innovation and forward-thinking approaches

Note. *Author's survey results (2024).*

These tensions between desires for comprehensive rigour versus rapid insights identified cognitive balancing acts, which organisations face in dynamic environments. While the focus of CI professionals is more on deepening the analytical toolkits and anticipating future shifts, CMs prioritise how to streamline current operations and accelerate practical implementation. Such divergent priorities manifest the multi-dimensionality of enhancing systems for adaptation in VUCA settings.

Figure 5.33 *Survey Responses on Improvement areas for the SCI framework as suggested by both cohorts*



Note. *Author's survey results (2024).*

This underlines the requirement for adaptation in the structure of the analytical framework and in the cognitive models used by SCI framework users. While considering contextual details and matching situational analysis with the desire for practical and easily available outputs, the study suggests opportunities to improve design, deepen evidence quality, and increase decision support. The results illustrate the interactions among the sociotechnical elements essential for increasing system resilience.

5.5. Interpretation of Results

5.5.1. Phase One: VUCA Knowledge

The empirical evidence garnered from quantitative and qualitative scrutiny of survey responses supplied by CI professionals and CMs yields informative perspectives on three integrally linked domains that are part of the problem space. The nature of knowledge pertaining to VUCA, its reverberations upon the business environment and the array of instruments deployed to harness it. Through triangulating insights emergent from the statistical dissection of ratings, rankings data and thematic examination of text-based responses, this investigation reveals a compelling narrative about the pervasiveness of VUCA awareness, with both CI professionals and CMs demonstrating a firm grasp of the concept. However, the quantitative data also reveals a worthy distinction. CI professionals largely self-identify as possessing an "expert level" understanding of VUCA principles, while CMs show a greater distribution across expertise levels, with a significant portion placing themselves at an intermediate level. This difference in self-reported expertise is a key point where the quantitative data intersects with the qualitative findings to provide a richer understanding of how this knowledge disparity manifests in practice.

The qualitative analysis, particularly the thematic analysis of perceived challenges and successful navigation strategies, illuminates the 'why' behind this quantitative trend. CI professionals, by the very nature of their roles, constantly engage with VUCA's elements. Their narratives are steeped in data-driven interpretations of market volatility, meticulous assessments of potential threats and vulnerabilities, and a focus on forecasting and mitigating risks. This constant immersion in the practical realities of VUCA is reflected in their confident self-assessments as experts. Conversely, CMs, though acutely aware of VUCA, discuss it through a more strategic lens. Their narratives focus on organisational agility, adaptation to rapid changes, and ensuring long-term sustainability amidst disruption. Their qualitative responses demonstrate a clear understanding of VUCA's implications but often lack the same level of granular, data-driven analysis that characterises the CI professionals' discourse. This difference in perspective, as evidenced in the qualitative data, explains the broader distribution of self-reported VUCA expertise observed in the quantitative findings.

This triangulation of quantitative and qualitative findings surfaces a salient insight. Expertise in navigating the VUCA environment is largely role-dependent rather than monolithic. It manifests differently depending on one's role, responsibilities, and daily engagement with its elements. Although both groups possess valuable knowledge, their areas of expertise and comfort levels with specific VUCA dimensions differ. The comprehension of their differentiated competencies is imperative for organisations aiming to mount a holistic organisational response to VUCA. Recognising this reality is vital for seeking to build a comprehensive and effective response to VUCA-driven challenges. Such a revelation of a shared awareness but divergent depths in VUCA knowledge between CI professionals and CMs unveils a critical detail often overlooked in traditional leadership discourse. The discrepancy between the groups' understanding of VUCA transcends superficial familiarity with the acronym itself and potentially signals a more profound epistemological divergence with notable implications. The contrast suggests fundamental differences in how CI professionals, CMs, and potentially other professionals exposed to or navigating VUCA environments conceptualise, interpret, and operationalise the construct of VUCA in practice. Their lack of shared meaning belies possible variances in deeply held assumptions, knowledge structures and ways of sensemaking when navigating VUCA.

Such epistemic incongruence risks impeding effective communication, collaboration, and strategic alignment across functional silos. Resolving this division requires bridging theoretical gaps through cross-disciplinary learning, dialogue, and co-creation of integrative mental models attuned to organisational complexities. A shared cognition of VUCA's multidimensional nature and systemic drivers may illuminate interdependencies, foster agile decision-making and unlock novel solutions tailored to turbulent environments. With consonant understanding, VUCA shifts from an intimidating buzzword to an actionable framework for sustaining resilience.

5.5.2. Phase One: VUCA Impact on Business Environment

The study unequivocally confirms that VUCA is not merely a theoretical construct but a potent force shaping the contours of the modern business environment. The quantitative data paints a clear picture; both CI professionals and CMs acknowledge VUCA as a significant force impacting their organisations, stressing its disruptive influence on operational dynamics and organisational performance. This shared recognition is evident in the high scores both groups attribute to VUCA's influence on their companies and industries. However, a granular analysis reveals that this shared recognition of VUCA as a common threat masks a critical sensitivity. The manifestations of its impact diverge significantly between the two groups which reflects the complex and multifaceted nature of VUCA itself and its differential impact across organisational strata and functional silos.

Moreover, both groups identify volatility and uncertainty as the most potent VUCA elements impacting both operational dynamics and overall performance. However, the quantitative data alone only tells half the story. It is the qualitative findings that breathe life into these numbers and reveal different ways in which this shared threat manifests differently for each group. The qualitative data unveils a compelling divergence in how VUCA's impact is experienced and articulated. When CI professionals describe VUCA's impact, they gravitate towards concrete examples related to their domain. They speak of fluctuating data streams complicating threat detection, the emergence of novel attack directions and the difficulty of forecasting rapidly evolving cyber threats. Their narratives are rich with technical details, reflecting their daily strain to maintain stability and security amidst a constantly shifting threat environment. This aligns with the quantitative findings where CI professionals perceive a higher level of VUCA impact on their operations, which confirms their frontline experience with volatility.

Furthermore, the interconnected nature of modern threats often transcending geographical boundaries and spanning multiple domains (cyber, physical, informational) amplifies the complexity faced by CI professionals. The traditional linear models of threat assessment that are reliant on historical patterns and predictable actor behaviour prove inadequate in a VUCA environment where threats emerge rapidly, evolve unpredictably, and leverage unforeseen vulnerabilities. CMs, on the other hand, acknowledge VUCA's disruptive potential and discuss its impact in broader and more strategic terms. Their narratives revolve around adapting business models to technological disruptions, navigating regulatory uncertainty, and fostering organisational agility to respond to unpredictable market shifts. Their qualitative responses often lack the granular, technical specificity of CI professionals, focusing instead on the overarching challenges of maintaining competitiveness and sustainability in a VUCA world. This aligns with the quantitative data where CMs, while scoring VUCA's impact on organisational performance as significant, place slightly less emphasis than CI professionals who indicate a different focal point for their concerns. Moreover, CMs are acutely aware of the human element within VUCA. The uncertainty surrounding talent acquisition and retention, combined with the need to cultivate a culture of adaptability and innovation within their organisations, adds another layer of complexity to their decision-making processes. They recognise that successfully navigating VUCA requires not only adapting to external changes but also cultivating an internal environment that embraces agility, experimentation and continuous learning.

The bifurcated manifestations of the disruptions wrought by VUCA create an imperative need for organisations to build consonant comprehension in bridging tactics and strategy orientations. The CI professionals do seem to show acumen in decoding and defusing proximate threats; however, their insights need to permeate into actionable strategic guidance. Conversely, the CMs-missioned long-term resilience must tune into the granular and unpredictable tumult ignited at the operational levels by VUCA. Building this collective mindset requires the creation of integrative mental models of the multi-dimensional effects of VUCA. This can be achieved through opening lines of communication, improving cooperative learning and dismantling inflexible barriers to common knowledge. The integration of observational acumen and contextual knowledge offers depth, comprehensiveness, and ultimately more effective answers to the challenges and opportunities created by VUCA.

5.5.3. Phase One: Tools and Techniques for Managing VUCA

The study reveals that one thing that is common between CI professionals and CMs is the realisation that the existing tools and techniques are inadequate to sail through the turbulent waters of VUCA. This shared feeling aligns with the findings of the literature and demonstrates an increasing consciousness in professional circles that traditional and linear strategies and risk management cannot cope with the complexity brought about by a world that is rapidly changing and interconnected.

This comparative effectiveness of the tools navigating VUCA thus uncovers an epistemological tension between a reductionist and systemic approach to complexity, underlining a critical blind spot both in the arsenals of the CI professionals and the CMs. Clearly, CI professionals, while adept at parsing VUCA into its discrete and hence manageable components, do seem trapped in what may be termed a 'fallacy of decomposition.' The dependence on disjunct tools, even while localised effectiveness is thereby achieved, betrays a critical misapprehension on the part of CI professionals regarding VUCA specifically, a misapprehension that it is no more than the sum of its parts. This fragmented lens obscures the emergent, synergistic nature of the phenomenon and leads to a failure of translatability from analytical dissection to holistic mastery. On the other hand, CMs seem to be caught in some sort of 'fallacy of aggregation' insofar as they deploy tools which, while conceptually sound in and of themselves, lack the level of granularity and flexibility required for effectively engaging with the composite VUCA's dynamism. Approaches indicative of a top-down, one-size-fits-all mentality could not engage in the detailed interaction of elements of VUCA as those manifest in specific and localised contexts. This disagreement reveals a significant gap in how businesses approach VUCA. To bridge this gap, a simple increase in tool number is insufficient; a paradigm shift towards a more dynamic and contextually aware comprehension of VUCA is required. It demands an embrace of methodologies that acknowledge both the distinct properties of VUCA's elements and their synergistic interrelationships to foster the organisational capacity for both focused analysis and agile, holistic response. In consequence, both cohorts recognise the imperative for more efficacious tools and techniques; however, their preferred approaches and the underlying rationales for their choices exhibit marked divergence. This disparity stems from the very nature of VUCA per se and highlights the necessity for context-specific solutions that accommodate the unique challenges and perspectives inherent in each professional domain.

Faced with the relentless onslaught of data and the ever-evolving, threatening business environment, CI professionals lean towards tools and techniques that offer a semblance of structure and predictability. Their preferred approaches, deeply rooted in data analysis and risk assessment, reflect a desire to quantify, categorise, and predict the unpredictable. Scenario planning emerges as a favoured tool, allowing CI professionals to explore multiple potential futures and develop contingency plans for a range of potential threats. Similarly, risk assessment frameworks, with their emphasis on identifying, analysing, and prioritising potential risks, provide a structured approach to navigating uncertainty. These tools provide a valuable framework for decision-making, yet they often struggle to keep pace with the interconnected and dynamic nature of VUCA. The inherent limitations of relying on historical data and pre-defined scenarios become apparent when confronted with unprecedented events or the emergence of entirely new threat categories. Furthermore, the qualitative data reveals a strong emphasis on data-driven technologies and techniques. CI professionals express a desire for advanced analytics platforms, predictive modelling tools, and artificial intelligence systems that can sift through vast amounts of data, identify patterns, and provide early warning signals of emerging threats. This reliance on technology, while promising, also raises concerns about data overreliance, algorithmic bias, and the potential for false positives and underlines the need for human oversight and critical thinking even in the most sophisticated technological solutions.

Different from the CI professionals' quest for structure and prediction, CMs are inclined towards tools and techniques that emphasise agility, adaptability, and a willingness to embrace uncertainty. Their focus lies in building organisational cultures and structures that can weather the storms of disruption and emerge stronger on the other side. Agile methodologies, born from the world of software development but increasingly adopted across industries, resonate strongly with CMs. The iterative, experimental nature of agile, with its emphasis on rapid prototyping, continuous feedback, and a willingness to pivot based on changing circumstances, aligns well with the need for organisational flexibility in a VUCA environment. Moreover, the qualitative data reveals a strong emphasis on collaboration, communication, and knowledge sharing. CMs recognise that navigating VUCA successfully requires breaking down traditional organisational silos and adopting a culture of shared awareness and collective problem-solving. Tools and techniques that promote cross-functional collaboration such as design thinking workshops, hackathons, and cross-functional teams are seen as pivotal for enabling rapid adaptation and innovation.

Evidently, CI professionals and CMs are actively seeking new tools and techniques to manage VUCA. However, the study reveals a critical limitation: most existing approaches still reflect a tendency towards reactive modes of engagement. They focus on responding to VUCA's manifestations rather than proactively shaping the organisation's relationship with it. The qualitative data highlights a recurring theme, the desire for tools and techniques that enable not just prediction but also anticipation. Both groups express a need for methodologies that help them make sense of weak signals, identify emerging trends before they become disruptive forces, and develop a proactive and anticipatory approach to risk and opportunity management. This suggests a need for a paradigm shift in how organisations approach VUCA. Moving beyond a reactive stance requires embracing frameworks and methodologies that foster strategic foresight, encourage experimentation and learning and promote a culture of continuous adaptation. Systems thinking, with its emphasis on reciprocal interconnections, emergent phenotypes, and iterant feedback circuits, proffers an illuminating perspective for decoding the fluid dynamics of VUCA and sculpting more dexterous strategies to harness its peculiarities.

The Interpretations derived from three poles of analysis, VUCA knowledge, impact, and management, coalesce into a compelling argument for a paradigm shift in how organisations approach VUCA. The findings indicate that a successful framework cannot merely aggregate existing tools and techniques but must actively bridge the chasm between disparate understandings of VUCA and its implications for decision-making. The disparity in VUCA expertise between CI professionals and CMs requires a framework that functions as a pedagogical tool that capitalises on a shared vocabulary and a common understanding of VUCA. This can be achieved through an accompanying tailored training module addressing the specific knowledge needs of each group and a knowledge management system that democratises access to VUCA-related insights and best practices. Furthermore, the framework must bridge the gap between the granular and operational perspective of CI professionals and the broader, strategic outlook of CMs. This requires moving beyond siloed assessments of VUCA's impact towards a unified understanding that informs strategic decision-making. A full spectrum view of VUCA based on systems thinking becomes pronounced to enable organisations to not just weather the storm of VUCA but to navigate it strategically to harness its inherent dynamism as a source of opportunity and innovation.

Finally, the framework needs to go beyond the constraints often associated with reactive and prediction-focused approaches that many existing tools and techniques rely on. It should help organisations anticipate rather than just react to the unpredictable dynamics of a VUCA environment. The study's findings point to the need for a strategic CI framework that is not just a set of tools but rather a generative, evolving problem-solving ecosystem. This ecosystem should not look at VUCA as just a collection of separate challenges needing isolated solutions. Instead, it should build a consolidated organisational capacity to engage with VUCA as a single, complex system and a dynamic interaction of four unique yet closely connected elements. This will require a shift from linear and reductionist approaches to embracing a holistic, adaptive framework. This means that organisations can no longer deploy different tools, each addressing a separate component of VUCA, and they need to consider an integrated approach. Such an approach will include understanding how an action in one dimension ripples across the entire system, thereby shaping and influencing the others. Along these lines, supportive tools will include continuous learning, adaptive practices, and periodic reassessment of strategy in concert with the dynamic interaction between VUCA interdependent elements.

5.5.4. Phase Two: Segment One – Navigating Real-World VUCA Scenario

Phase two marks a shift toward practical and real-world navigation of VUCA scenarios. Using the GlobalGood corporation case study allowed for a tangible exploration of VUCA challenges to move from theory to hands-on application. In this first segment of Phase Two, in which participants were introduced to a real-world VUCA scenario, analysis shows a strong tendency among participants to break down VUCA dimensions into separate areas of analysis rather than viewing them as an interconnected system. This approach, which dissects VUCA into its parts, reflects a categorical approach that separates the VUCA construct into a quartet of segregated concepts detached from their complex interrelations and emergent effects. This observation underscores a gap between holistic theoretical conceptualisations of VUCA, which involves the covariation and integration between domains, versus compartmentalisation in applied practice that fragments these elements. The diagnostics demonstrate that while the umbrella terminology of VUCA has permeated strategic vocabularies, its treatment as a catch-all disruption descriptor overlooks the detailed architecture linking volatility, uncertainty, complexity and ambiguity into a coherent schema. The mechanisms binding these forces risk being obscured when addressed through an excessively segmented lens. For strategic decision-making to navigate unpredictable nonlinearity, an integrated systems perspective, including both differentiation and integration of core VUCA dynamics, remains imperative. As findings indicate, practical applications must better emulate theoretical systemic models to mirror the true interconnectivity that amplifies turbulence across volatile, uncertain, complex and ambiguous environments.

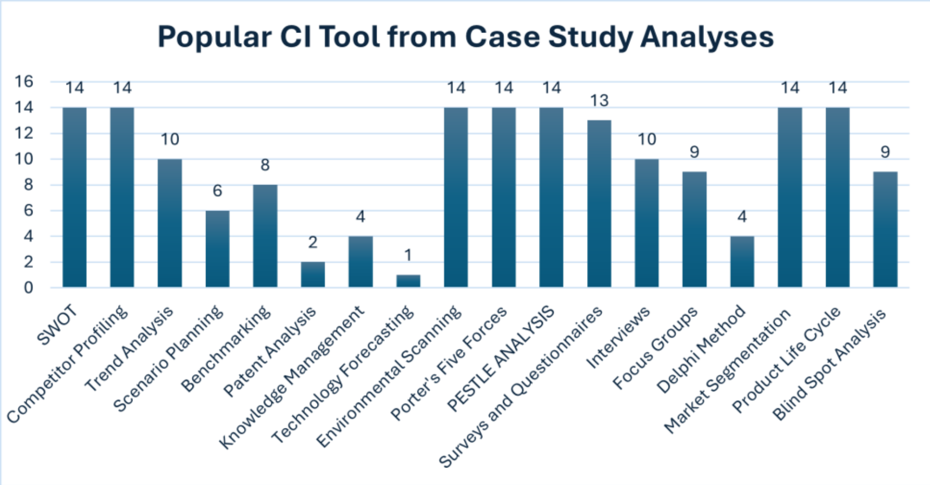
Another salient observation developed from the comparative analysis is that both CI professionals and CMs exhibit a propensity to apply generalised strategic tools and frameworks lacking any contextual specificity to address discrete dimensions of VUCA. This reliance on conventional tools refracts each wicked element through the same lens rather than developing targeted protocols attuned to the unique contours of each. For volatility, the shortage of emphasis on mechanisms for rapid sense-making and agile decision architectures calibrated to turbulence leaves organisations vulnerable to disruptive change. According to the respondents, probabilistic forecasting, simulation-based risk quantification, and contingency protocols warrant greater prioritisation to temper uncertainty. For complexity, systems thinking provides intuitive traction but neglects analytical techniques to map emergent relationships within interconnected environments. Lastly, while extensive data-gathering mechanisms exist, ambiguity remains less served by sense-making processes to interpret contradictory signals. Correspondingly, the analysis of trends and disruptions reveals a subtle yet significant difference in priorities. With both groups acknowledging the transformative impact of technological advancements, consumer behaviour changes, and regulatory shifts, CI professionals exhibit heightened sensitivity to competitive environment shifts and geopolitical factors. This external focus aligns with their role in safeguarding organisational competitiveness within a dynamic market. CMs, however, prioritise ethical consumption, sustainability, and workplace/lifestyle changes. This broader societal perspective reflects their concern for aligning organisational strategy with evolving social values and ensuring long-term organisational legitimacy and sustainability.

The strategic Implications and recommendations offered by both groups further disclose their distinct focuses. CI professionals prioritise digital transformation, market dynamics shifts, and customer engagement enhancements. This reflects their primary concern for maintaining market competitiveness and capitalising on emerging opportunities. CMs, on the other hand, emphasise business model evolution, operational restructuring, workforce transformation, and brand loyalty redefinition. This suggests a greater focus on adapting internal organisational structures and processes to ensure long-term effectiveness and alignment with changing market conditions and societal expectations. A key observation emerging from this analysis is, again, the tendency of both cohorts to employ broader, more general tools and approaches, potentially overlooking the specific characteristics needed to address individual VUCA elements effectively. This suggests a gap between the theoretical understanding of VUCA and its practical application in organisational contexts. For example, while there is a general awareness of the need for agility and adaptability in volatile conditions, the GlobalGoods corporation case study reveals a gap in implementing concrete rapid-response mechanisms or agile decision-making processes. None of the participants in either group suggested a targeted strategy that addressed each unique element of VUCA. Beyond broad endorsement, few participants identified specific tactical steps for quick sensing, analysis, or mobilisation in response to sudden market changes or disruptions. This disconnect between conceptual agility and operational practice leaves room for turbulence to outpace and potentially overwhelm an organisation's response.

Similarly, scenario planning earns due acknowledgement for tempering uncertainty, yet processes to translate scenographic foresight into quantified projections or probabilistic mappings are lacking. Uncertainty thus remains nebulous rather than converted into actionable risk metrics to inform decisions. The lack of clear methods to define and measure uncertainty prevents strategic management and leads to greater ambiguity. To extract strategic value from scenario outputs, greater precision is required in translating envisioned possibilities into probabilistic templates that guide decision-making under quantified uncertainty. The rhetoric-reality gaps illuminated in both cases stress the need to associate aspirational ideals of agility and foresight with tactical tools and protocols that hardwire these principles into organisational operating systems. Closing this integrity gap can reinforce commitments to continuous anticipation and preparedness even amidst market fluidity. This trend extends to complexity and ambiguity as well. Although systems thinking is referenced, particularly by CMs, there is a lack of specific tools for managing complex adaptive systems or conducting network analysis. Similarly, despite emphasising data gathering and analysis, neither group explicitly mentions techniques for dealing with complex or contradictory information, such as sense-making frameworks or paradox navigation tools. Excessive reliance on broader tools suggests that while professionals are aware of the VUCA concept, they may not be fully equipped to address each element systematically and strategically. This gap highlights a potential area for improvement in both strategic intelligence practices and professional development programmes. Besides, Phase One, through its quantitative survey, revealed a general awareness of VUCA among both CI professionals and CMs, along with a recognition of its impact on their respective industries. However, the qualitative exploration in phase two, segment one, reveals a potential disconnect between this awareness and the practical application of tools and techniques specifically designed to address the challenges of each VUCA element. This disconnect presumes the need to have more focused and specialised VUCA-centric tools that can be seamlessly integrated within existing strategic frameworks. The findings underpin the development of professional competencies to handle growing VUCA complexity with the view of enabling organisational agility, resilience, and success in the long term. Moreover, various approaches adopted by CI professionals and CMs hint at opportunities for cross-functional collaboration to add value to emergent VUCA challenges. Understanding the dynamics of an organisation in its totality and sustainable commitment by CMs, together with wide, environmental-scanning-based CI competencies by CI professionals, may enable an organisation to pursue a more comprehensive and effective way of strategising, a development that will enable them to cope with the VUCA environment with greater success.

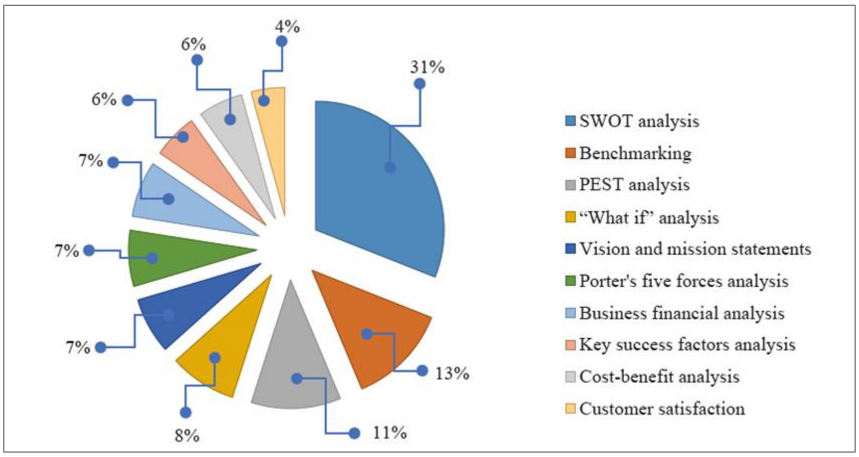
The narrative gaining a foothold en route to insight is the evolution of strategy tools and techniques in this research. The initial analysis of the literature and case studies related to strategic management tools reveals a dominant reliance on traditional strategic management tools and techniques (SMTTs), particularly SWOT analysis, PESTLE analysis, and benchmarking, with no tool specifically designed to tackle VUCA. Similarly, the analysis of CI tools used in the literature case studies reveals a dominant reliance on SWOT analysis, competitive profiling, environmental scanning, Porter's five force analysis and PESTLE analysis. These tools, often lauded for their simplicity and ease of use, have long been staples in strategic management and CI practice. This dominance is evident in both the bar chart depicting popular CI tools (Figure 5.34) and the pie chart (Figure 5.35) illustrating the ten most used SMTTs in strategic management. This suggests a persistent belief in the adaptability of these tools to VUCA contexts despite their inherent limitations in addressing the dynamic and interconnected nature of VUCA elements.

Figure 5.34 *Comparative Analysis of Popular Tools Used by CI Professionals Across Fourteen Global Case Studies*



Note. *Author's literature within-case analysis results (2024). Appendix 2 provides more information.*

Figure 5.35 *The Ten Most Used Strategic Management Tools and Techniques (SMTTs)*

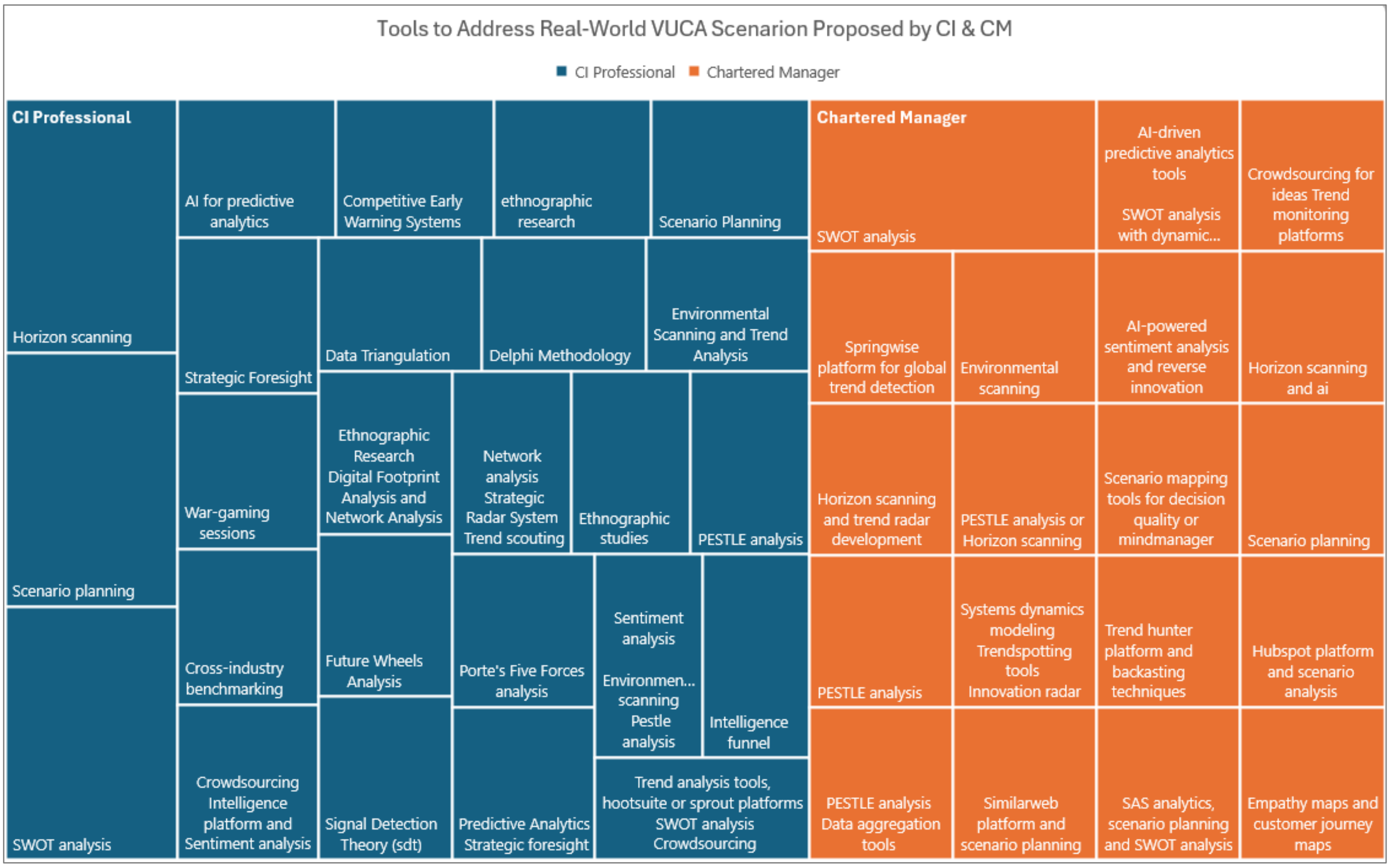


Note. *By Qehaja et al. (2017).*

When surveyed about the tools used to address VUCA in phase one (as summarised in Table 5.10), respondents from both cohorts reported a significant diversification in tool usage compared to the literature findings. In addressing volatility, respondents have suggested the use of real-time monitoring systems and advanced scenario-planning techniques. The uncertainty dimension has witnessed the integration of risk management tools and strategic modelling approaches, which indicates an interest towards dynamic and predictive methodologies. Complexity management has incorporated systems thinking and advanced analytical models, while ambiguity resolution has seen the use of specialised decision-making tools and stakeholder analysis frameworks. Both CI professionals and CMs acknowledged the impact of VUCA and the need for dedicated tools, yet they rely on traditional tools or, at best, suggest general, non-VUCA-specific tools to manage each VUCA dimension. This shows that no specific tool or technique is readily available for VUCA itself. Survey responses confirm that nearly all CI professionals and CMs lack a single, comprehensive tool for this purpose, underlining their consensus on the need for a structured approach to navigating VUCA challenges, with 81.25% of CI professionals and 75% of CMs expressing agreement.

As seen in the thematic summary in Table 5.10, when participants responded about how to improve the SCI framework, both cohorts favoured tools like scenario planning, risk management, and market trend analysis, which, while valuable, lack a specific focus on the unique challenges posed by each VUCA dimension. This suggests a gap between theoretical awareness of VUCA and the practical application of tools specifically designed to address its dimensions. In contrast, the second phase of the study, which involved participants navigating a real-world VUCA scenario, revealed a significant shift in preferred tool usage compared to the first phase. Whereas SMTTs still featured to some degree, a prominent emphasis emerged on advanced intelligent technological tools (AITTs) during the qualitative comparative analysis of proposed approaches. This notable prioritisation of AITTs, when participants engaged with a real-world VUCA scenario, specifies that practitioners intuitively discern the constraints of conventional frameworks in these contexts and are drawn to solutions that purportedly enhance agility, foresight, and data-driven insights.

Figure 5.36 *Treemap of CI and CMs tools to tackle VUCA real-world scenario*



Note. *Author's literature analysis results (2024).*

These findings suggest that respondents from both cohorts recognise their tool's limitations when tested in real-world engagement. When immersed in an actual VUCA scenario, participants' preferences shifted noticeably from traditional tools to advanced intelligent technological tools (AITTs). This demonstrates an intuitive understanding that conventional frameworks fall short in highly dynamic environments. This shift suggests that the experience of navigating real-world complexity alters perceptions of effective responses. Future research could examine how the interaction between theoretical knowledge and practical experience influences strategic thinking in complex and unpredictable contexts.

5.5.5. Phase Two: Segment Two – Framework Exploration, Evaluation and Feedback

Phase two, segment two of this research delves into the critical evaluation of the proposed strategic SCI framework, gauging its perceived effectiveness and gathering feedback for refinement. The analysis, employing a mixed-methods approach, reveals overwhelmingly positive perceptions of the framework among both CI professionals and CMs. This strong endorsement, evidenced by high mean scores on a 5-point Likert scale (exceeding 4 for both cohorts), suggests that the SCI framework resonates with practitioners seeking to navigate the difficulties of VUCA environments. A key finding, underpinned by both qualitative and quantitative data, is the perceived superior value of the SCI framework compared to existing tools used by participants. The comparative analysis of perceived effectiveness scores reveals a significant gap, with the SCI framework consistently outperforming participants' own tools, whether used in isolation or in combination. This disparity draws attention to a critical insight: Existing approaches, often fragmented and lacking a cohesive theoretical foundation, fall short in systemically addressing the interconnected challenges posed by VUCA. This gap, which further transpires through the qualitative feedback, points towards an important absence in the current application of VUCA management tools: a lack of targeted frameworks underpinned by a deep conceptual understanding of the dynamic interplay between Volatility, Uncertainty, Complexity, and Ambiguity. The SCI framework, grounded in the novel concept of the 'VUCA Chain Reaction Effect,' addresses this gap by providing a structured approach that systematically and systemically navigates each VUCA element and recognises its interconnected nature and cascading impact.

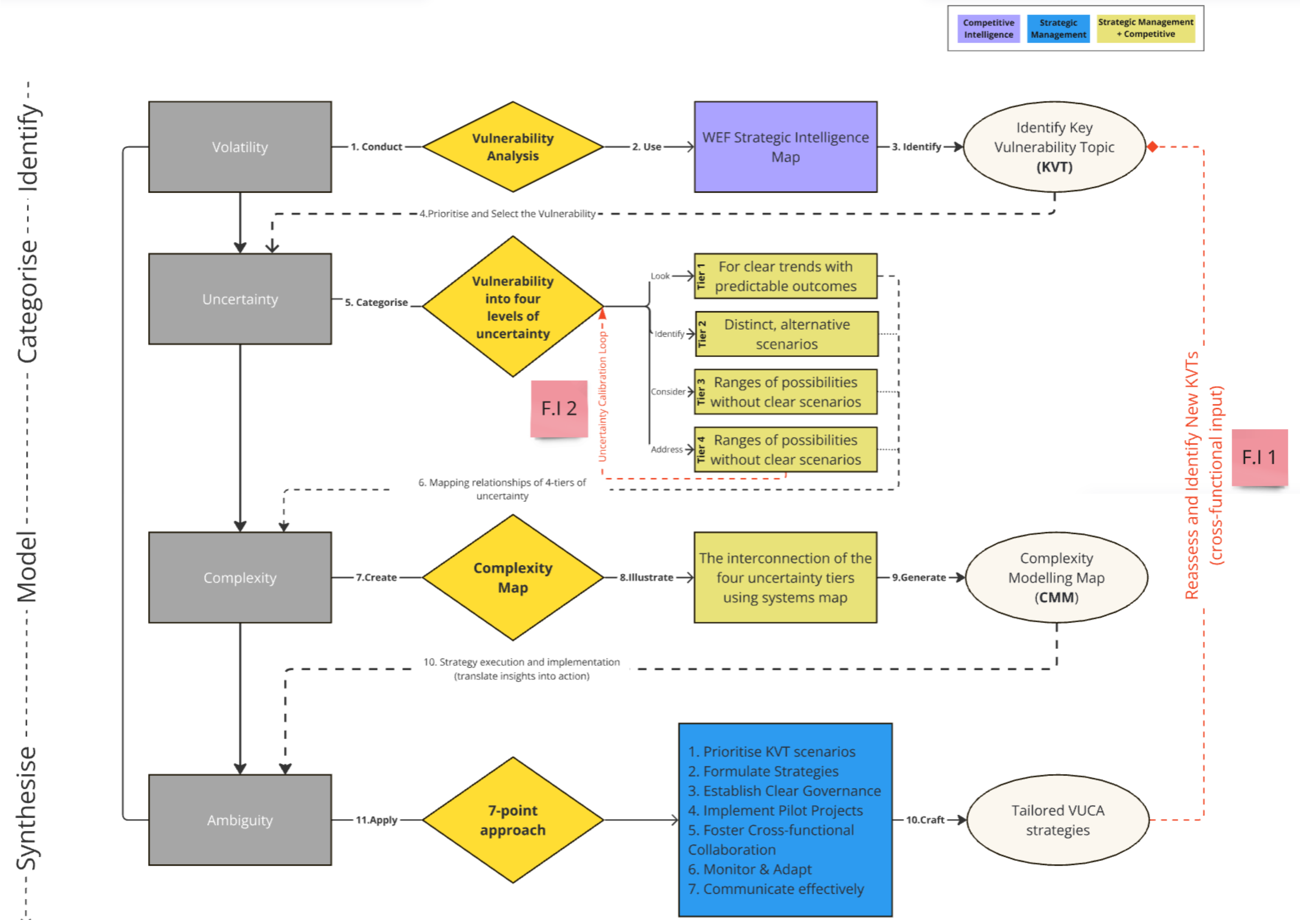
Also, the qualitative data, rich with detailed explanations and examples, furnishes compelling evidence for this assertion. Participants consistently highlighted the SCI framework's holistic and integrated approach as a key strength, contrasting it with their current practices, which often involved using disparate tools without a unifying framework. For instance, multiple CI professionals noted that the SCI framework "provides a comprehensive and practical step-by-step approach to tackle VUCA, explaining interdependencies well." Other CMs participants praised the framework's "organised way to understand and respond to VUCA factors," with emphasis on its ability to "include real-time data and apply it to practical scenarios." These qualitative insights are further corroborated by the quantitative findings. The significantly higher mean score for the SCI framework compared to existing tools across both cohorts provides compelling statistical evidence for its perceived effectiveness. This suggests that the framework's approach, guided by the 'VUCA Chain Reaction Effect,' resonates with practitioners seeking a more targeted and comprehensive solution for navigating VUCA challenges.

5.6. Refinement of the SCI Framework

To maximise the SCI framework's success potential and eschew linear information processing, an infrastructure for recursive refinement and improvement based on stakeholder insights and desired capabilities is essential to scaffold adjustment efforts to enhance the accuracy of the SCI output. The evaluation space within the design science research (DSR) approach enables the co-creation of a framework between the researcher and stakeholders to empower more targeted, penetrative and actionable strategic practice. The embedding of a dialogical exchange through the asynchronous interactive workshop in Phase Two, Segment Two, therefore provides a vital yet often neglected epistemic ballast, thus transforming strategic management and CI disciplines and any resulting practical tool from a linear process to an adaptive, socially constructed competence.

The evaluation phase is concerned with question three in the second segment of phase two, which includes valuable inputs given by both cohorts as to what they consider valuable aspects to include within the framework to enhance its effectiveness and adaptation to VUCA and evoke a spirit of adopting a stakeholder-centric approach in developing the artefact. Hence, the researcher elected to prioritise the incorporation of critical user feedback in recognition of its potential to enhance the framework's effectiveness. Any excluded user feedback, although acknowledged as significant, was discarded due to practical constraints that would exacerbate the framework's complexity, such as the integration of AI, or because they were misaligned with the framework's complex nature, such as making the framework easy to use. Initially, three pieces of feedback will be integrated. First, 'continuous vulnerability assessment' will be integrated to span three main themes mentioned by participants: 1) real-time data and analysis (in theme 3), 2) 'continuous improvement and feedback' (in theme 7), and 3) 'balance between depth and agility in VUCA environments' (in theme 9). This results in the integration of Feedback (F.I1- reassess and identify new KVTs) to continuously reassess and identify KVTs, thus linking 'tailored VUCA strategies' to 'identify key vulnerability topic' as illustrated in Figure 5.37.

Figure 5.37 *Refined SCI Framework with User-Integrated Feedback (F.I1 and F.I 2)*



Note. *By the Author.*

Additionally, to transcend static analytics and integrate modern techniques as per participants' recommendations, an uncertainty calibration loop is embedded to fit within the SCI framework (F.I2 – uncertainty calibration loop), specifically, the loop would be added as a feedback mechanism connecting the output of the 'vulnerability into four level of uncertainty' to create a cyclical process within the uncertainty section of the framework. In practice, this loop would involve collecting data on actual outcomes related to each uncertainty tier, comparing these outcomes to the initial categorisations, and lastly analysing discrepancies between predicted and actual uncertainty levels. Such an incorporation enables a dynamic and self-correcting assessment of uncertainties, leading to more accurate and reliable planning over time. Additionally, a user-friendly template is provided in Appendix 14 to simplify the framework implementation in response to the feedback received in theme three, corresponding to the need for a more accessible and easier-to-use framework.

5.6.1 Justification for Excluded Improvements

The pilot study and practitioner engagements yielded an array of thoughtful and innovative suggestions. However, a critical filtering process was required to ensure that the SCI framework remained conceptually coherent, methodologically rigorous, and pragmatically applicable. The DSR paradigm encourages stakeholder involvement and iterative refinement, yet it simultaneously requires selective integration to preserve the scientific robustness of the artefact. Accordingly, several proposed enhancements, although valuable, were excluded from the final framework for reasons of feasibility, theoretical alignment, and scope boundaries. Table 5.11 below outlines key participant and pilot feedback suggestions that were acknowledged but not adopted, accompanied by a rationale grounded in methodological and strategic considerations.

Table 5.11: Summary of Unadopted Participant and Pilot Recommendations

No	Recommendation	Source	Rationale for Exclusion
1	Integration of artificial intelligence (AI) to automate or enhance strategic responses	Practitioner Feedback (Theme 11)	AI integration holds promise for automation and prediction; incorporating it would substantially increase the complexity and technical resource demands of the framework, potentially making it inaccessible to smaller organisations—the very contexts the SCI framework aims to support.
2	Incorporation of crowdsourced intelligence for collective insight generation	Practitioner Feedback (Theme 13)	Crowdsourced data introduces challenges related to reliability, standardisation, and bias. Embedding such mechanisms without robust filtering systems could compromise the framework's analytical integrity.
3	Development of simplified versions tailored for SMEs or low-capacity users	Pilot Study and Practitioner Feedback (Theme 2 & Theme 3)	The feedback was partially addressed by introducing a user-friendly implementation template (Appendix 14). However, creating a full simplified version was beyond the scope of this study and risked diluting the framework's depth and utility in navigating complex VUCA dynamics.
4	Integration of behavioural economics to better anticipate consumer decision-making under uncertainty	Practitioner Feedback (Theme 14)	While conceptually rich, behavioural economics represents an entirely separate theoretical lens that would require substantial reconfiguration of the SCI framework's foundational structure. Therefore, this integration is suggested as a direction for future research.
5	Inclusion of sector-specific customisations or modular adaptations	Practitioner and Pilot Feedback	The request for industry-specific modules was acknowledged; however, such adaptations require a breadth of contextual tailoring better suited to institutional implementation projects or sectoral studies. The SCI framework was deliberately designed as a meta-framework to enable contextual application without constraining it to specific sectors.
6	Development of training modules or instructional	Pilot Feedback	Although desirable, producing training materials was beyond the study's research design. However, suggestions are provided for future work

	materials to facilitate framework adoption		on educational or organisational implementation pathways.
7	Incorporation of real-time threat detection and weak signal monitoring systems	Practitioner Feedback (Theme 9)	This recommendation was fully integrated into the SCI framework via the use of the WEF Strategic Intelligence Map, which is embedded within the *Volatility* phase to support real-time environmental scanning, trend analysis, and early identification of key vulnerability topics (KVTs). The Uncertainty Calibration Loop (F.I2) further reinforces this by enabling adaptive refinement based on evolving signals. Therefore, this was not excluded but operationalised through an existing, globally credible platform.

This structured selection process guarantees that the core purpose of the SCI framework designed to enhance strategic readiness and complexity intelligence within VUCA environments is preserved without overwhelming users or compromising methodological clarity. Importantly, several of the excluded suggestions remain promising and could be explored in subsequent iterations, institutional applications, or future postdoctoral research.

5.6.2. Challenges in Analysis

The design and realisation of the data analysis process entailed myriad challenges, which are intrinsic to conducting research with specialised participant groups and using a mixed-methods approach across two interconnected phases. However, overcoming these methodological and practical constraints needs to be critically weighed against the results and conclusions derived. The dual-cohort research design with both CI professionals and CMs presented varied challenges in participant recruitment and sustained engagement. It took intensive recruitment to secure contributors with the expertise and experience needed to provide meaningful insights while ensuring their longitudinal participation throughout the extended research phases.

This binary cohort structure, while valuable for capturing differences in perspective and practice, inherently magnified analytical complexity. The need for conducting parallel yet distinct analyses for each group before synthesising the results added strain and increased the potential for asymmetric response rates or uneven engagement levels across cohorts. Coherent findings from disjointed datasets require methodological vigilance to ensure continuity in participant depth. In the end, although procedural demands were higher, the richer analytical texture gained from using two different cohorts outweighed the complications. Even so, the challenges of tracking professional activity over time have raised cautionary notes about multiphase, dual-cohort designs. Another concern, of course, is the length of the questionnaires, particularly in phase one, which includes 34 questions, where participant fatigue may affect response quality and completion rates. The design aimed to limit questions in each section and provide clear breaks so users could save and return later, though it is possible that too many questions were asked overall. This reflects a constant tension in survey design: achieving comprehensiveness without placing a high burden on respondents is challenging.

Besides, the chosen mixed-methods approach was important in capturing the multidimensionality of the research problem and, in the meantime, introduced analytical complexities. Meanwhile, the blend of qualitative exploration and quantitative measurement surfaced tensions between divergent epistemic traditions, demanding diligent integration. For instance, thematic analysis in the second phase required delicate processes such as coding, categorisation, and theme development, whereas quantitative data gathered through the Likert-scale questions required descriptive statistics and comparative analyses. These diverging analytic logics made methodological coherence difficult to maintain, compelling continuous comparative balancing to synthesise insightful interpretations without corrupting intrinsic meanings. Furthermore, increased complexity heightened the likelihood of interpretive biases, which called for an elevated sense of self-reflexivity by the researcher. Eventually, the enriched insight into multidimensional phenomena justified the analytical exertion and provided rigour that contained reductionist proclivities along with amplifying procedural friction. All the same, the strains illustrate the growing expertise necessary for navigating mixed architectures without compromising sensitivity.

5.6.3. Mitigation Strategies

Acknowledging the innate limitations associated with the research design and data analysis process, several strategies to mitigate potential biases and enhance the reliability and robustness of the findings were undertaken to draw conclusions. First, the adopted design science research methodological choice represents a safe and sound approach for the development and refinement of mitigation strategies within the context of this research. The systematic integration of creating and evaluating the innovative artefact, precisely, the SCI framework, explicitly addresses complexities germane to real-world problems, assuring both theoretical and practical contribution. This methodological endeavour begins with the precise identification and articulation of the problem space, which, in the context of a mitigation strategy, involves a deep understanding of the specific risks and challenges that need to be mitigated. This foundational step is sine qua non, as it ensures that the subsequent design efforts are directed towards addressing the most salient and impactful issues, thereby increasing the relevance and effectiveness of the research.

Second, the purposive sampling method, though limiting the aspect of generalisability, was strategically adopted to ensure the recruitment of participants with specialised expertise and experience directly relevant to the research questions. The focus on CI professionals and CMs, maximised the likelihood of gathering rich and insightful data from individuals actively engaged in navigating VUCA environments at a strategic level, therefore nurturing the scope for evidence-based analysis that expounds the fine points of strategic decision-making processes and adaptive strategies employed in response to VUCA, as well as providing a fertile ground for theoretical advancements and practical applications in strategic management disciplines. Third, the mixed-methods approach employed for both phases in this study sought to enhance the strength of the findings through rigorous data analysis techniques. Triangulation, which stands as a core principle of mixed methods, was achieved across quantitative data from surveys in phase one and qualitative insights in phase two. This cross-fertilisation of data sources enabled an in-depth understanding of the phenomenon under investigation and strengthened the validity of the conclusions. Additionally, the researcher maintained a reflexive stance throughout the data analysis process by being aware of the potential influence of personal biases and documenting all analytical decisions. This transparent approach enhances the trustworthiness of the findings and allows for critical scrutiny of the interpretive process.

Finally, the research findings were systematically compared and contrasted with existing literature on VUCA, strategic management, and CI, grounding the study's conclusions within the established body of knowledge and strengthening the validity of its contributions.

5.7. Discussion

5.7.1. Introduction to the Discussion

This section articulates the theoretical contributions of the study and draws together the conceptual threads that emerged from the empirical findings, the literature review, and the design process of the SCI framework. Whereas the preceding chapters have demonstrated how VUCA challenges manifest in professional practice and exposed the inadequacies of dominant strategic tools, this discussion shifts the focus toward what the research adds to academic knowledge. The following subsections present a layered contribution to theory and begin with the identification of an unresolved gap in the literature and then move through the conceptual innovations introduced, the theoretical foundations of the SCI framework, and the integration of multiple disciplinary perspectives. Jointly, these contributions do not simply add to what is known; they reconfigure how VUCA is understood, how it can be theorised as a dynamic and relational construct, and how strategy itself might evolve in response. This discussion, therefore, positions the study not only as a critique of outdated paradigms but rather as a generative contribution to the ongoing renewal of strategic management thought in an age of relentless uncertainty.

5.7.2. Contribution to Theoretical Knowledge

This research contributes to advancing theoretical knowledge in strategic management and CI by critically engaging with the limitations of prevailing frameworks to address the realities of VUCA environments. While the VUCA construct has become a common rhetorical device in both academic and practitioner discourse, it has largely remained under-theorised and frequently referenced yet seldom interrogated as a complex and dynamic phenomenon with systemic interdependencies. This study challenges superficial engagement by proposing a reconceptualisation of VUCA, not as a collection of separate attributes but as an integrated system of forces capable of triggering cascading and chain-reaction effects. Consequently, it introduces a novel theoretical lens, the VUCA CRE, which reimagines volatility, uncertainty, complexity, and ambiguity as interdependent elements that must be addressed collectively rather than in isolation.

Instead of accepting the fragmented and static approach found in many strategic management tools and models, this research calls for and delivers a shift towards a more integrated, systemic, and dynamic understanding of VUCA. It contributes theoretically by reinterpreting the interface between strategy and CI through the introduction of the SCI framework, which fuses foresight, intelligence, agility, and scenario planning into a cohesive decision-making model. Theoretically, this positions the SCI framework not merely as an applied tool but as a structural response to conceptual shortcomings in the literature: it operationalises complexity theory, systems thinking, and adaptive expertise into an architecture that bridges epistemological abstraction with actionable cognition.

Essentially, this study moves beyond mapping problems to constructing solutions that are theoretically grounded yet practically viable, an often-neglected balance in contemporary literature. By this means, it provides a mid-range theory that sits between grand conceptualisation and technical application to offer researchers a platform upon which further empirical and theoretical work may be scaffolded. Integrating this contribution into the DSR methodology strengthens the credibility of theory-building by reinforcing iterative and problem-solving engagement. This approach underlines the novelty of the SCI framework and also affirms the value of co-creative and context-sensitive theorising in response to organisational VUCAlity.

5.7.3. Theoretical Gap Addressed

Despite the increasing prominence of the VUCA construct in management discourse, there remains a conspicuous absence of robust theoretical models that meaningfully engage with its complexity. Much of the existing literature treats VUCA as a heuristic label rather than a theoretically elaborated system. This results in a conceptual context marked by fragmentation, oversimplification, and vague prescriptions. Scholars have often conflated the four VUCA dimensions into a single undifferentiated threat, which obscures their distinct ontologies and undermines attempts to generate coherent strategic responses. This research directly addresses that gap by deconstructing the VUCA acronym and examining the interplay between its components, thus framing VUCA as a composite system rather than a rhetorical shorthand.

Further, while strategic management and CI have been extensively studied as separate domains, there is limited theoretical work that unites them into a cohesive and interdependent architecture capable of responding to rapid and recursive environmental change. Traditional strategic models such as SWOT, PESTLE, and Porter's Five Forces remain prevalent in both theory and practice, yet they were conceived for relatively stable contexts and assume linear causality and predictable feedback loops. These assumptions do not hold in today's volatile landscapes, where uncertainty is often irreducible, and complexity arises not from the number of variables but from the non-linearity of their interactions.

What remains under-theorised, then, is not only the nature of VUCA itself but also the strategic mechanisms through which organisations interpret and act upon it. There is a paucity of conceptual frameworks that integrate real-time intelligence gathering, anticipatory foresight, and agile strategic planning into a single, systemic model. This research fills that theoretical void by introducing a framework (SCI) that is explicitly designed to accommodate dynamism, interconnectedness, and organisational learning. This way, it responds to calls in the literature for more context-sensitive, systems-aware, and forward-looking theoretical constructs that can move beyond the limitations of legacy strategy tools and engage with the emerging realities of twenty-first-century organisational life.

5.7.4. Conceptual Contribution

At the heart of this research lies a conceptual contribution that reimagines how VUCA is understood, framed, and addressed within strategic thinking. Integral to this is the articulation of the VUCA CRE, a new theoretical lens that shifts the discourse away from a static typology of four disconnected forces toward a systems-oriented view of VUCA as a dynamic network of interdependencies. Rather than treating volatility, uncertainty, complexity, and ambiguity as discrete challenges, VUCA CRE proposes that these elements often emerge in sequence or simultaneously, compounding their impact and generating ripple effects across strategic, operational, and cognitive domains. This model recognises VUCA not simply as environmental noise but as a structural condition capable of producing systemic disruption that requires equally systemic understanding.

By theorising this chain reaction effect, the study offers a new way to conceptualise environmental turbulence, one that accounts for temporal sequencing, feedback loops, and causal layering within complex decision environments. This perspective draws from and builds upon concepts in complexity theory and systems thinking but uniquely situates them within the lived realities of strategy and intelligence practice. It introduces a conceptual shift from static diagnosis to dynamic anticipation, framing strategic resilience not as a reactive capacity but as a proactive orientation rooted in situational awareness, foresight, and adaptive cognition.

In contrast to abstracted or overly prescriptive models that populate much of the VUCA-related literature (e.g. VUCA Prime, TUNA, BANI), the VUCA CRE conceptualisation anchors itself in empirical observation and practitioner insight, making it simultaneously **t**heoretically rich and grounded in real-world logic. It serves as the intellectual foundation upon which the SCI framework is built and justifies the need for an integrated and modular approach to strategic decision-making. As such, the conceptual innovation offered here is not simply the naming of a new model but the reframing of how environmental volatility is theorised in relation to organisational strategy, a move that extends the boundaries of both strategic management and CI literature.

5.7.5. Framework Contribution

The cornerstone of this study's theoretical contribution is the development of the SCI framework. It stands as a structured, modular, and empirically informed model designed to support strategic decision-making in VUCA environments. Although numerous strategy tools populate both academic and practitioner toolkits, very few have been intentionally crafted to address the multifaceted and interrelated nature of VUCA. The SCI framework is not an incremental refinement of existing tools; rather, it constitutes a paradigmatic departure from linear, siloed, and static strategy models that continue to dominate the strategic landscape despite their diminishing relevance in conditions of heightened turbulence.

The framework makes a substantive theoretical contribution by operationalising the VUCA CRE into a decision-making architecture that is both coherent and adaptive. It weaves together core principles from strategic foresight, CI, agile planning, and systems thinking into an integrated model that enables decision-makers to map, interpret, and respond to VUCA forces in a phased and responsive manner. In doing so, it advances theory by translating abstract complexity into structured action without oversimplification, something few models have successfully achieved. The SCI framework's layered design, comprising volatility triggers, uncertainty categorisation, complexity mapping, and ambiguity synthesis, is an embodiment of a systems logic that mirrors the recursive and unpredictable nature of real-world conditions.

In theoretical terms, the SCI framework fills a long-standing void in the literature by providing a model that is neither reductionist nor overly abstract. It achieves what many strategy models fail to do: it bridges conceptual sophistication with practical utility, thus contributing to the emerging school of thought that favours design-oriented theorising in the face of complexity. Its anchoring in DSR further strengthens its legitimacy as a knowledge artefact developed through iterative engagement with real-world challenges, an approach still underutilised in mainstream strategic management research. By grounding the framework in both empirical data and systems theory, this research affirms that strategic agility is not an abstract ideal but a designable capability, one that can be modelled, scaffolded, and refined over time.

5.7.6. Theoretical Integration

One of the most salient theoretical advances of this study rests in its integrative nature, represented by deliberately weaving together disparate theoretical strands into a unified lens for understanding and navigating VUCA environments. Where much of the literature on strategic management, CI, and complexity theory has remained siloed, this research harmonises these traditions to develop a composite and cross-disciplinary foundation for resilient decision-making. The SCI framework is not only a standalone construct but also a site of theoretical convergence, where ideas from systems thinking, adaptive expertise, foresight studies, and organisational learning intersect and cohere.

This integration challenges the traditional compartmentalisation of strategic knowledge. It reframes intelligence not as a passive input to strategy but as an active, interpretive process embedded within decision-making itself. Similarly, it situates strategic planning not as a forecasting exercise bound by certainty but as a continuously adaptive capability informed by real-time sensemaking. The positioning of foresight, agility, and intelligence as co-equal components in a recursive system qualifies this study to transcend linear paradigms and embrace a more ecological understanding of strategic behaviour, one that aligns with the logic of complex adaptive systems.

In this way, the theoretical contribution of the SCI framework lies not only in its novel elements but also in its ability to synthesise fragmented concepts into a coherent whole. The framework becomes a living model of theoretical integration that fuses the predictive orientation of strategy, the scanning and interpretive functions of intelligence, and the systemic awareness of complexity theory into a mutually reinforcing structure. This synthesis does not dilute disciplinary rigour; instead, it generates a more robust conceptual toolkit for scholars seeking to explain and model organisational action under conditions of environmental turbulence. As a result, it lays the groundwork for a more integrated theoretical paradigm that reflects the real-world complexity with which organisations must contend, which is not only descriptive but also deeply diagnostic and generative.

5.7.7. Broader Contribution to Society, Policy, and Education

Beyond its theoretical and practical significance, this research carries important implications for broader societal, policy, and educational domains. As organisations across public and private sectors wrestle with increasingly turbulent environments, the capacity to anticipate, interpret, and respond to VUCA dynamics has become a matter of societal resilience. The SCI framework, through its emphasis on strategic foresight, adaptive intelligence, and systemic thinking, furnishes organisations with a tool for operational survival and a platform to enhance institutional agility, stakeholder responsiveness, and long-term sustainability. In this sense, the research contributes to a societal imperative that enables organisations to navigate disruption in ways that protect livelihoods, maintain critical services, and promote social stability.

From a policy perspective, the findings offer insights relevant to institutional and governmental bodies concerned with resilience, crisis preparedness, and strategic governance. The SCI framework may inform policy design in sectors vulnerable to complex disruptions, such as health, energy, defence, and education, by offering a structured model for scenario planning, risk anticipation, and adaptive resource allocation. Policymakers seeking to embed systems-level thinking into strategic processes could benefit from the framework's modular architecture, which supports the development of resilience policies grounded in intelligence-led decision-making rather than reactive crisis management. Moreover, the study's findings regarding the limitations of traditional tools echo challenges encountered in many public sector settings, where legacy planning models often fall short under pressure. Addressing this gap denotes a critical contribution to public value generation.

In the educational domain, this research challenges the dominance of outdated strategic management curricula that continue to teach tools ill-suited to contemporary complexity. The SCI framework, grounded in empirical insights and underpinned by design science principles, offers a more relevant, pedagogically rich model for equipping future leaders, strategists, and analysts. By introducing students to the VUCA CRE and a systems-based approach to strategy, educators can develop a deeper understanding of how to think critically, act adaptively, and lead responsibly in environments defined by VUCA. The framework may also serve as a valuable case study in postgraduate programmes across business, public policy, intelligence studies, and organisational leadership to encourage learners to engage with VUCA as a condition to be embraced and not avoided.

Taken together, these broader contributions affirm that the impact of this research extends well beyond the boundaries of academic debate or organisational application. It offers an actionable, theoretically grounded, and socially relevant response to the hyper-complex challenges of our time, one that holds value for institutions, educators, and society at large.

Conclusion

6.1. Reflecting on the Research Focus and Rationale

This research embarked on a scholarly investigation to explore the uncharted waters of strategic decision-making in VUCA environments and sought to bridge the gap between existing theoretical frameworks and the practical realities faced by organisations navigating an increasingly turbulent world.

Initially, this research has not only explored the evolution of strategic tools in a VUCA world but also delved into the specific practices and perceptions of two key cohorts: CI professionals and CMs. The choice of these groups was not arbitrary; it stemmed from a recognition of their primal roles in navigating strategic complexities and driving organisational adaptation and change. CI professionals, with their specialised expertise in gathering and analysing CI, represent the "eyes and ears" of the organisation, therefore providing critical insights into the external environment. CMs, on the other hand, embody the leadership and strategic decision-making capabilities of the organisation with responsibilities for translating intelligence into actionable strategies. The findings related to their VUCA awareness, the impact of VUCA on their business environments, and the perceived effectiveness of their existing tools offer helpful insights into the current state of practice highlight critical areas for improvement and, most importantly, directly address the research question by positioning the proposed framework as a strategic solution to both conceptual and practical gaps. The conceptual gap pertains to the absence of a reliable theoretical foundation to explain the principle of VUCA beyond its broad abstraction, whereas the practical gap involves the lack of tools that address the dimensions of VUCA in full detail and in a meaningful and actionable manner.

The convergence of strategic management and CI represents an important approach to addressing the challenges of a VUCA world. To this end, strategic management offers a forward-looking, visionary lens for conceptualising organisational direction and proactively allocating resources, while CI provides mechanisms for anticipating trends, deciphering complexities, and generating actionable insights into the competitive environment. This synergy goes beyond mere reactive responses to empowering organisations to be proactive in shaping and influencing their context. This dynamic interplay enables organisations to transition from mere adaptation to change into actively shaping the future in a competitive and foresight-driven manner and setting new dimensions for addressing VUCA realities.

6.2. Key Insight from Research Findings

The research findings drawn from the multi-phased mixed-methods approach paint a complex and dynamic picture, revealing both the limitations of existing tools and the emergent need for more adaptive and intelligent strategies. The revealed gap between the theoretical understanding of this synergy and its practical application was noticeable. Participants indeed acknowledged the importance of both strategic management and CI in addressing VUCA, but their actual practices often fell short of a truly integrated approach. The dominance of traditional strategic management tools and techniques (SMTTs), with their limitations in capturing the dynamic and interconnected nature of VUCA elements, connote a struggle by participants from both cohorts to translate theoretical knowledge into effective VUCA strategies. As a result, the SCI framework developed through this research aims to narrow this chasm by delivering a unified and structured approach that integrates key elements of both strategic management and CI to mobilise organisations to navigate the complexities of VUCA more effectively. The dominant theme, emerging from the literature and reinforced by both survey phases of this research, was the persistence of reliance on traditional SMTTs despite their acknowledged limitations in addressing VUCA. Among the possible reasons for their enduring attractiveness are simplicity, ease of use and comfort derived from familiarity. Nevertheless, static by nature, linear in their assumptions, and predisposed to shallow analysis, they are misaligned with the dynamic, interconnected, and unpredictable challenges of a VUCA environment. Since organisations still face more wicked problems than any one organisation can resolve, these limitations of traditional tools are magnified.

From the literature review to the empirical data collected in phase one, the ubiquitous SWOT analysis, PESTLE analysis, and benchmarking consistently featured as the primary instruments for practitioners. However, the triangulation of findings from the literature and both empirical phases unveiled significant discrepancies in the use of these tools. When participants were asked how they would address VUCA or presented with a real-time VUCA scenario, a need for adaptive intelligence tools and techniques (AITT) became evident, such as automated weak signal detection, advanced modelling techniques, data mining and processing, predictive forecasting, AI and machine learning, pattern recognition and data interpretation were among the aspired tools and techniques mentioned by participants to address VUCA successfully. Such a need reveals a desire for tools that can, inter alia:

- Proactively sense and anticipate change as a critical capability that allows participants and their organisations to transcend mere reactive adaptation and strategically position themselves in an increasingly complex and volatile environment. The deployment of rigorous tools and techniques with a focus on specialised intelligence, early warning mechanisms, machine learning, AI and predictive modelling mark a strong desire of participants to adopt contemporary VUCA-effective tools and sublate existing ones, namely SWOT, PESTLE, benchmarking and the like.
- Explore a range of plausible future scenarios and simulation techniques to develop strategies that are robust to different potential outcomes. Thus calling to embrace VUCA instead of discarding or ignoring it.
- Adapt rapidly and iteratively using agile methodologies and flexible decision-making processes that empower organisations to respond promptly to new information and evolving circumstances and enable them to cultivate a culture of continuous learning and adaptation.

- Leverage data and technologies for enhanced insight using AI-powered analytics, real-time monitoring systems, and data visualisation tools that facilitate the provision of valuable data-driven insights to enhance strategic foresight and strategic decision-making.

A pivotal shift occurred in phase two of this research, where participants were confronted with a real-world VUCA scenario and instinctively gravitated towards the same set of tools mentioned in phase one. Although traditional tools still played a role, there was a notable emphasis on adaptive intelligence tools and techniques (AITTs) as desirable capabilities across both cohorts of respondents. However, participants did not demonstrate a need to address VUCA elements, either individually or comprehensively. Specifically, when asked to manage a VUCA scenario, participants from both cohorts broadly referenced the tools but did not assign specific tools to particular VUCA dimensions. This behaviour confirms two key assumptions: both cohorts perceive VUCA as an abstract concept rather than a concrete series of events requiring a coherent, targeted intervention. In addition, there is a lack of a unified understanding of VUCA supported by a viable theoretical underpinning, such as the VUCA chain reaction effect (VUCA CRE) suggested by this research. The recognition of this inadequacy fuelled attempts to develop VUCA-specific tools and strategies. Nonetheless, early efforts often succumbed to abstract conceptualisations, reducing each component of the acronym to lofty terms like vision, as seen in Johansen's VUCA prime framework and similar approaches. The intuitive appeal of these abstract pronouncements has been conceded, but they fundamentally lack the practical grounding and actionable steps that practitioners crave. This disconnect between theory and practice has presumably led to a proliferation of competing acronyms such as TUNA, BANI, and RUPT, each vying to capture the complexity continuum of the contemporary business environment, yet eventually contributing to conceptual crowding and diffusion of focus.

The permeation of AITTs across organisational strategy and CI domains reflects the burgeoning primacy of data-enriched decision science. This diffusion also indicates a critical juncture. As these emergent socio-technical instruments infiltrate institutionalised analytical practices, their transformative implications require detailed examination. The rise of AITTs has been fuelled by the exponential growth of structured and unstructured data alongside advancements in extraction, integration, and analytical technologies. As computational capabilities increasingly automate tasks once considered beyond automation, human judgment remains indispensable for interpreting tool outputs and driving purposeful intelligence innovation. Therefore, the introduction of AITTs into organisational routines warrants cautious integration that aligns automated potential with well-defined strategic priorities and cultural readiness.

The SCI framework, developed through this research, represents a deliberate attempt to bridge the gap between traditional SMTFs and the emerging need for AITTs in VUCA environments. Grounded in the concept of the VUCA Chain Reaction Effect (VUCA CRE), the framework grants a structured approach that systematically and systemically addresses each VUCA element, founded upon the recognition of their interconnected nature and cascading impact. The integration of key elements of proactive intelligence gathering, strategic foresight, scenario planning, and agile decision-making afforded the SCI framework to offer an unmatched VUCA navigation framework, a comprehensively configured toolkit that activates a key resilience mechanism for effectively managing turbulence in VUCA environments. The iterative refinement of the SCI framework in response to end-user feedback demonstrates the merits of co-creative methods that bridge theory with practice. Rather than a static analytical model divorced from applied VUCA contexts, the framework is deeply ingrained in the practical realities of management, designed not as an abstract theoretical construct but as a tool that represents a unified and modular architecture welcoming ongoing enhancement. Attributable to the positioning of design science research (DSR) as the orienting methodology undergirding the SCI framework to strengthen its practical relevance and empirical grounding, the DSR's essence permitted traversing the problem-solution continuum, facilitating an immersive engagement with real-world complexities to catalyse innovation. Paramount to the DSR is the movement from the problem space to the solution space, driven by the identification and articulation of a real-world problem that requires resolution. The problem space involves not only defining the issue but also understanding the relevant contextual factors, constraints, and stakeholder needs, which provide the foundation for the creation of a solution. The in-situ comparative evaluation phase, informed by perceived usefulness and practical feedback, functions as a relay between the problem and solution spaces. This process ensures that the proposed solution is not only contextually appropriate but also delivers measurable value.

6.3. Theoretical and Practical Implications

This research provides a rich set of implications for the theoretical development and actionable practice of strategic management in contemporary VUCA conditions. Theoretically, findings on the limited applicability of extant SMTTs within turbulent contexts represent one point of departure. Where linear, deterministic framing approaches fall short, dynamic complexity demands more integrative forms of analysis that capture interrelatedness and recurrence. The permeation of advanced intelligence tools and technologies (AITTs) likewise underlines the emerging understanding of how organisations can extract actionable intelligence from growing data abundance to orient strategic responses. The proposed SCI framework, in mapping relationships between VUCA elements and emphasising quick-cycle sense-making, furnishes impactful empirical and conceptual expansion to the field, which has relied on static templates. This contribution proffers scholars more intelligible procedural guidance on resilience-based strategic management fitted to turbulent environments.

For practice, the research flags a widening chasm between institutionalised strategy routines and the demands of navigating modern ambiguity at velocity among CI professionals and CMs. Adopting modular, customisable tools like the SCI framework to support rapid sense synthesis and decision-making helps bridge this divide. More broadly, cultivating organisational capacities in systems thinking, enhanced cognition, and data literacy appears essential to realising human-AITT symbiosis. Thus, in shaping future strategy, this work stands as an urgent call to action for researchers and practitioners who wish to lead rather than be led across the turbulent waters ahead. With frameworks, mindsets, and skills unsuited to prevailing reality, one must collectively embrace the adventure of open-ended discovery.

6.4. Limitations and Future Research

While this research strived to contribute valuable insights, it has limitations that suggest future research directions. The research scope, with its focus on CI professionals and CMs within specific industries and geographical contexts, limits the generalisability of the findings. Future research should broaden this scope to include diverse practitioners and organisational settings. The reliance on self-reported data provided by respondents introduces potential response bias that indicates a need for future studies to incorporate objective measures such as behavioural observations or performance data. Though the SCI framework was evaluated in a simulated VUCA scenario, its real-world application and long-term impact require further validation through longitudinal studies. For instance, validation could involve tracking multiple organisations implementing the SCI framework over 3–5 years to measure concrete outcomes, including financial performance during real crises, decision speed and quality, accuracy of threat prediction, organisational adaptability metrics, and staff confidence in handling VUCA situations. This real-world, long-term data would provide stronger evidence of the framework's actual effectiveness and reveal any unforeseen limitations or unintended consequences that a simulation might not capture. Further research into the human dimensions of VUCA could provide additional perspectives on the cognitive, emotional, and behavioural factors shaping strategic decisions under conditions of volatility, uncertainty, complexity and ambiguity. There may be opportunities to develop blended qualitative and quantitative methodologies that also integrate insights from diverse academic disciplines. Finally, investigating the ethical implications of artificial intelligence for strategic decision-making is critical, including considerations of bias, transparency, accountability, and responsible application. Pursuing these research avenues can refine existing frameworks, uncover new findings, and empower organisations to navigate the complex 21st-century business challenges with greater foresight, agility, and resilience.

Further research could explore the application of the SCI framework within Business War Gaming environments. As a structured simulation technique designed to anticipate strategic challenges, war gaming offers fertile ground for testing the SCI framework's capacity to map and manage VUCA dynamics in real time. Specifically, the framework's layered design and emphasis on cascading interdependencies align well with cross-impact analysis, enabling users to model how volatility in one area may trigger complex reactions across strategic domains. This extension of the SCI framework into scenario-based training and simulation could inform both academic exploration and executive education, providing decision-makers with immersive, low-risk environments to rehearse strategic responses to dynamic uncertainty.

Finally, the application of the SCI framework within Business War Gaming environments presents a promising avenue for exploration. As a structured simulation technique designed to anticipate strategic challenges, war gaming offers fertile ground for testing the SCI framework's capacity to map and manage VUCA dynamics in real time. Specifically, the framework's layered design and emphasis on cascading interdependencies align well with cross-impact analysis to enable users to model, for example, how volatility in one area may trigger complex reactions across strategic domains. This extension of the SCI framework into scenario-based training and simulation could enrich both academic inquiry and executive education to equip decision-makers with immersive, low-risk environments in which to rehearse agile responses to strategic uncertainty.

6.5. Planned Next Step in Research

Building upon the promising avenues for future research illuminated by this exploration of strategic decision-making in VUCA environments, the development of a web-based platform for the SCI framework emerges as a critical next step. This undertaking addresses a key limitation of the current research highlighted by participants' feedback, which resides in the difficulty of applying the framework in its current form, particularly the strain of the complexity modelling map (CMM) and the lack of simplified templates. Materialising the SCI framework into a user-friendly web application may offer a powerful means of bridging the theory-practice gap and empowering organisations to effectively navigate VUCA challenges across diverse contexts and industries. The proposed SCI framework web-based platform envisions a dynamic and interactive environment that guides practitioners through a structured process of analysing and addressing VUCA challenges. Its primary aim is to streamline the navigation of volatility, viewed as the trigger event by seamlessly integrating it with the World Economic Forum's (WEF) strategic intelligence map using an application programming interface (API) to automate the identification of key vulnerability topics (KVT) upon a user's specification of industry, thereby enabling an efficient data-driven analysis of sector-specific risks. The application/software will then incorporate the remaining core principles of the SCI framework to autonomously categorise the identified KVT into four levels of uncertainty and map their complex relationships. Finally, a systematic proposition of actionable strategies following the seven-step approach will be presented. The SCI application will be endowed with the ability to automatically reassess and identify new KVTs as soon as new entries are updated by the WEF strategic intelligence map. The application will supply structured guidance throughout all stages, supporting users in moving from insight to action. Additionally, by implementing a continuous user feedback channel, the system's embedded learning loop will consistently integrate user experiences to improve the user experience design and better align functionality with practical needs. This ongoing refinement upholds the potential to significantly enhance strategic management practices in VUCA environments to empower organisations to make more informed, agile, and, most importantly, effective foresighted strategic decisions. Future research could explore the application's impact on organisational performance, comparing outcomes for organisations using the application with those relying on traditional approaches. Additionally, further development of the application capabilities may consider the incorporation of machine learning and predictive analytics, which could enhance its ability to anticipate and respond to emerging trends and disruptions.

To conclude, this research presents a window and a beacon into the shifting and dynamic world of strategic decision-making in VUCA environments. Most importantly, it brings to the front the inherent deficiencies of available tools and frameworks and points to the voids that have been overlooked for so long. Even more promising is that newer, adaptive, and smarter strategic tools are beginning to emerge, as first pointed out by participants in this study. Certainly, such strategies are only fresh and offer new views and directions that the existing literature has neither covered nor analysed. This change indicates a shifting context of strategy-making, a defying conventional line of thinking, which provides a doorway to possibilities never seriously considered. Hence, the SCI framework born of this research is theoretically sound while still practical for any organisation wanting to chart its course in the stormy waters of a VUCA world. Even though the findings are intimately linked to one specific industry context, the utility of the framework is not confined to one particular context. It comes complete with a user guide and can theoretically be adapted to suit different industries as well as various companies, clusters, and value chains. This opens an exciting opportunity with a bespoke SCI application that might enable organisations to thrive, not merely navigate, in a VUCA world.

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Appendices

h) Can you cite a recent situation or challenge faced by your organisation that you would attribute to:

Volatility?

16 responses

n/a

Client disruption events linked to supply chains

market fluctuation

Market uncertainty,

Turbulence from changes in consumer preferences

During pandemic, digital marketing trends change fast. We had to adjust strategy quickly

Rapid market shifts due to emerging technologies have required quick adaptation in product development strategies

ecosystem shift

ecosystem shifts

The rapid and unexpected changes in consumer preferences have significantly impacted our sales and marketing strategies

Disruptions in supply chains

Integrating AI into our systems and solutions, and how much to invest in doing so.

Disruptions across supply chains

RU-UA War

Uncertainty?

16 responses

shifting customer preferences

Major new product development

demand fluctuations

energy prices and unpredictable technological shift

Global events like pandemics made economic climate hard to predict

The unpredictability of global economic conditions amid the pandemic has led to challenging strategic decisions

Unpredictable market changes, emerging competitors

regulations

technological disruptions

demand changes

The emergence of new competitors and the changing regulatory setting have created uncertainty in our industry, making it difficult to plan for the future

demand fluctuations

competition

How new talent hires should be prioritized in terms of their grasp of skills in emerging technologies.

production

Isreal Hamas War

Complexity?

16 responses

regulations

emerging competitors

Major new product development

emerging competitor

n/a

We take marketing data from many digital platforms, put together, and analyze

Managing the complexities of a global supply chain with multiple stakeholders and regulations.

Information overload

competition

interconnectedness of emergence

emerging technologies

The increasing complexity of our supply chain and the growing volume of data we collect have made it challenging to manage our operations effectively

talent acquisition

How much to "trust" LLM-based machine learning outputs, which are hard to source or are developed in black boxes that we cannot open up.

ChatGPT as a black box

Ambiguity?

16 responses

n/a

When product launch is controversial and feedback is mixed, we try to understand how customers feel and behave

Interpreting conflicting market data to decide on the launch of a new product line.

digital shifts

Absence of clear singular meaning

supply shifts

The ambiguity of the future and the lack of clear information about emerging trends have made it difficult to make informed decisions

emerging competitors

technologies

Global changes in privacy, data security, transparency, and geopolitics and where they are heading.

customer behaviors

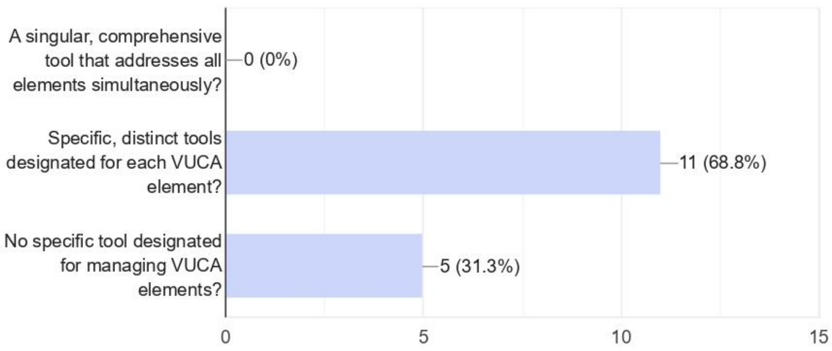
Impact of COVID-19

III. Tools, Techniques for Managing VUCA

a) For managing and addressing the elements of VUCA (Volatility, Uncertainty, Complexity, Ambiguity), does your organisation primarily rely on:

Copy

16 responses



b) Based on your previous response:

b.1) If you use a comprehensive tool, please specify the tool you use.

16 responses

no

NO

No

Visualping

b.2) If you use specific tools for each VUCA element, please specify the tool (s) used:

Tool (s) used for Volatility

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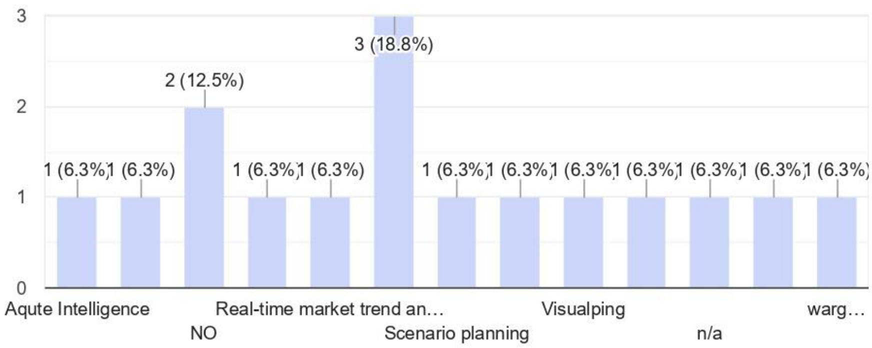
16 responses



Tool (s) used for Uncertainty

16 responses

Traffic Analytics by Semrush

Strategic and financial analyses for major new-product development

risk monitoring

forecasting

Predictive analytics and scenario planning software

Scenario planning software

Risk assessment

risk analyses

risk analysis

n/a

Environmental scanning, horizon scanning, and trend analysis

Risk monitoring dashboards

no

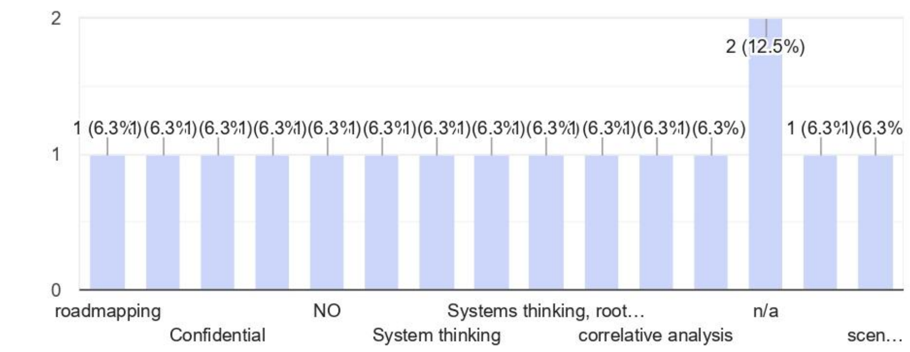
NO

risk simulations

Confidential

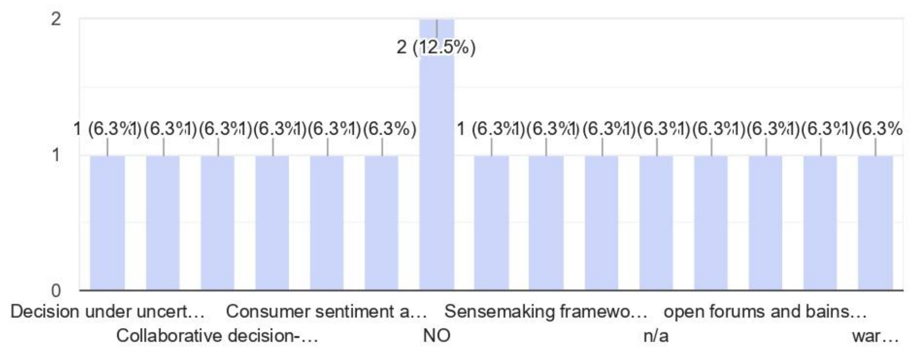
Tool (s) used for Complexity

16 responses



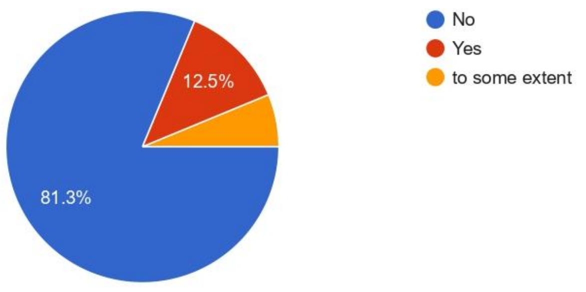
Tool (s) used for Ambiguity

16 responses



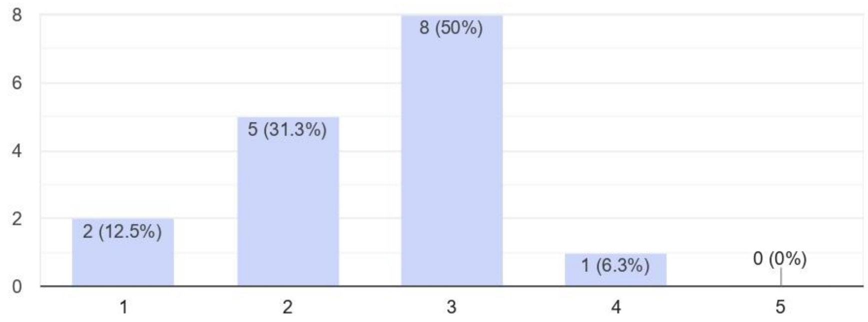
c) Does your employed tool(s) reveal any order or sequence among the different VUCA elements?

16 responses



g) How often do your tools accurately identify and predict VUCA (Volatility, Uncertainty, Complexity, Ambiguity) challenges, considering their potential to create ripple and domino effects?

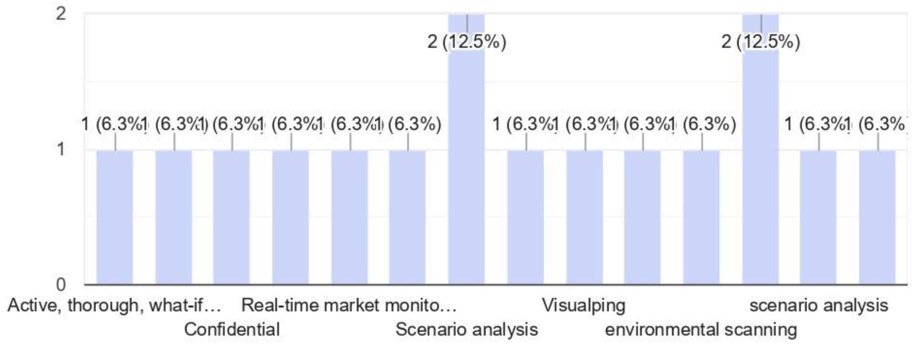
16 responses



h) How would you rate the effectiveness of the tool(s) you mentioned in addressing each VUCA challenge? If you mentioned multiple tools, please rate each one.

Name of tool 1

16 responses



*Rate the effectiveness of **tool 1** in addressing:*

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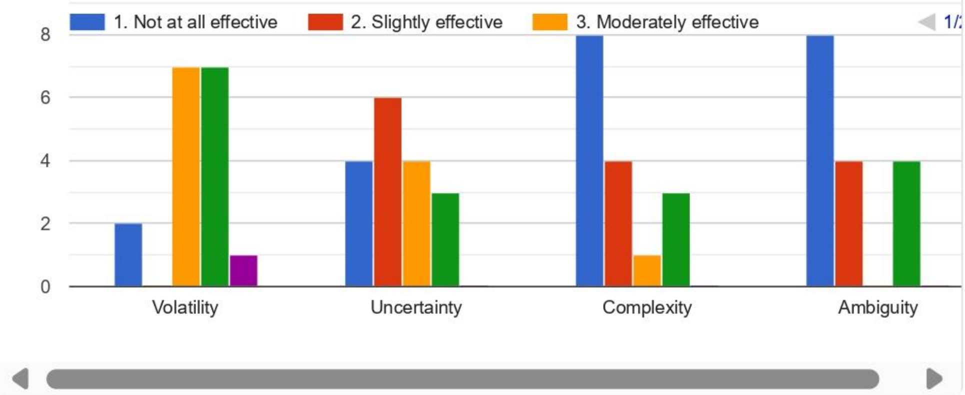

Name of tool 2

12 responses

n/a

risk monitoring

forecasting

Predictive analytics and scenario planning software

Scenario planning

Risk assessment

risk analyses

risk analysis

Environmental scanning, horizon scanning, and trend analysis

risk monitoring dashboards

Superiority analysis

risk simulations

*Rate the effectiveness of **tool 2** in addressing:*

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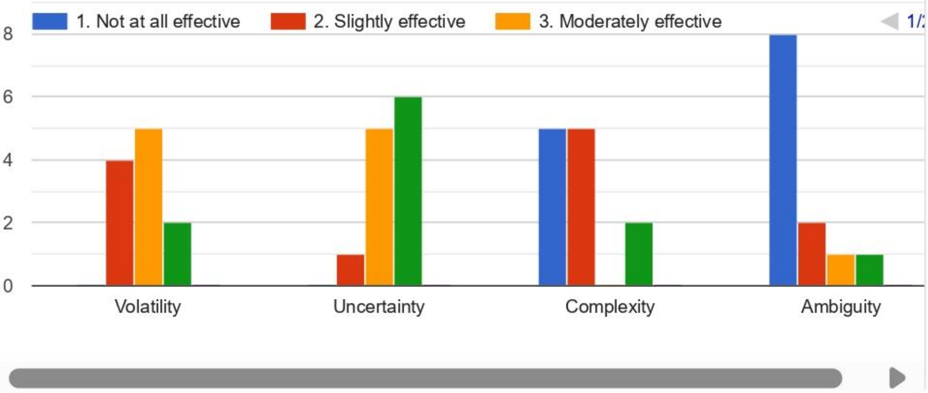

Name of tool 3

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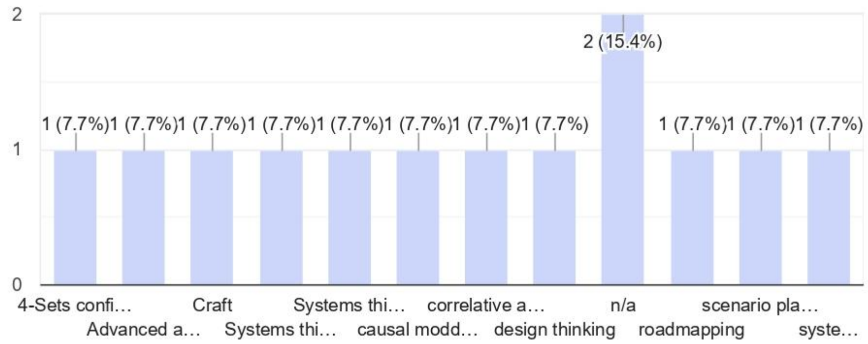
13 responses



*Rate the effectiveness of **tool 3** in addressing:*

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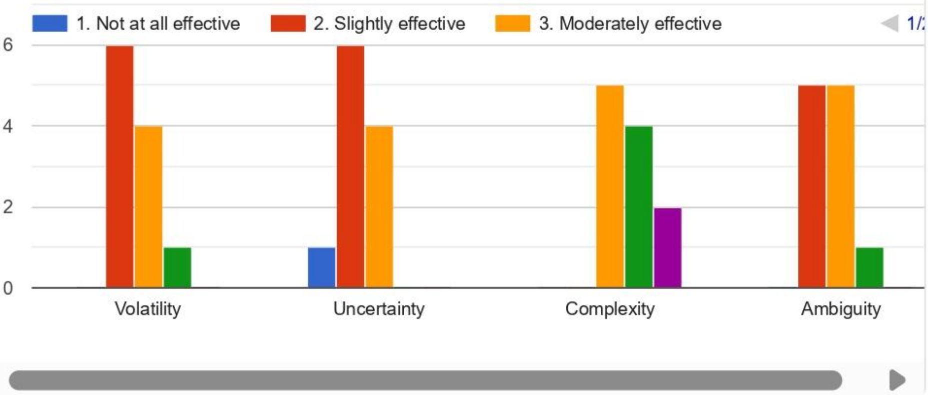

Name of tool 4

12 responses

Social searcher

n/a

war gaming

correlative analysis

Consumer sentiment analysis tools

Collaborative decision-making framework

Sensemaking

design thinking

open forums and bainsorming

Decision under uncertainty techniques, risk assessment, and contingency planning

sensemaking

wargaming

*Rate the effectiveness of **tool 4** in addressing:*

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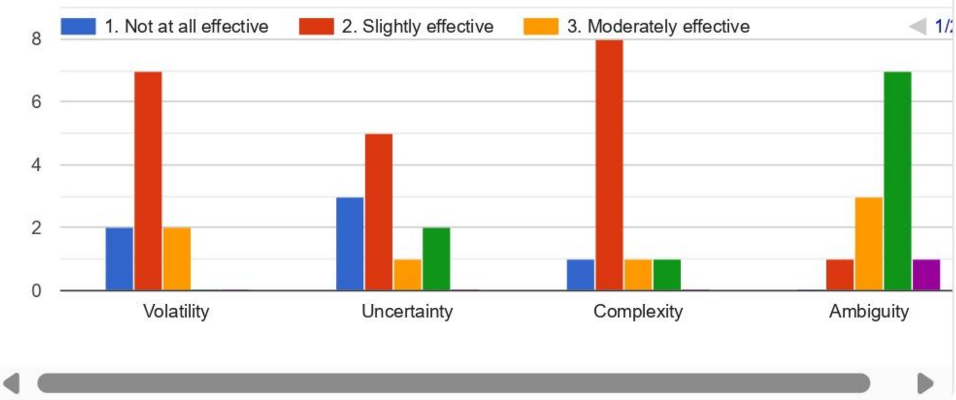

i) Describe a recent scenario where your tools successfully helped you navigate a VUCA challenge.

16 responses

n/a

Developed scenarios to assess potential demand change impacts

Narrowing key product-development decisions after thorough debate... and always being open to continuing the debate

Anticipated supply chain impacts from market indicators

Demand analysis guided supply chain expansion initiatives...

when customers suddenly like sustainable products more, we use market trend analysis and customer sentiment tools to understand and respond

used scenario planning to anticipate different pandemic scenarios and impacts

Aqute Intelligence identified demand volatility triggers tied to demographic shifts...

Environmental scanning enabled us to identify pending competitor partnership.

We recently played out a bunch of "what if" scenarios to guess any hiccups in our worldwide supply chain due to political drama. We imagined different outcomes, we spotted possible issues and came up with backup plans. This way, we managed to dodge the bullet and keep our business running smoothly

predicted supply disruptions based on pandemic warning signals.

Pre-launch of a disruptive health product. We used all the tools I identified above. We achieved high clarity for the new venturer.

avoided major regulatory crisis by preemptively assessing chain reactions...

j) Can you recall specific instances where your tool(s) have addressed overall VUCA challenges or individual elements of Volatility, Uncertainty, Complexity, or Ambiguity?

Example 1

16 responses

n/a

Risk dashboards tracked market volatility indicators

War gaming helped prepare for potential competitive disruption scenarios...

Econometric models helped quantify potential growth scenarios...

when market trend is new, we use predictive analytics to change marketing campaigns

The organization employed an advanced data analytics platform that integrated consumer data from multiple sources, including social media trends, purchase histories, and demographic information. This tool utilized machine learning algorithms to analyze patterns and correlations in the data that were not immediately apparent.

Risk assessment helped assess supply chain uncertainties during trade war

risk analyses enabled client to get ahead of emerging competitor

identified market volatility triggers

We used environmental scanning and horizon scanning to identify a number of emerging trends that could have a significant impact on our industry

scenario analysis assessed potential demand fluctuation impacts

N/A - out of time

Causal models helped identify VUCA interconnections exacerbating supply volatility...

Example 2

16 responses

n/a

when advertising campaign is controversial, we use sentiment analysis to understand and respond to how customers react

Causal loop diagram revealed feedback loops increasing market volatility

We used decision under uncertainty techniques to make a critical decision about whether to enter a new market. When we analysed the risks and uncertainties involved, we were able to make an informed decision that has been beneficial to our company.

N/A - out of time

k) Were there instances where your tool(s) were insufficient in predicting or managing either overall VUCA challenges or specific elements of Volatility, Uncertainty, Complexity, or Ambiguity? Please provide brief details

16 responses

n/a

Pandemic impacts exceeded tool projection

We don't know what competitors are doing in their major product development. Our market involves a lot of intellectual property.

Pandemic impacts exceeded initial projections.

Emergence of recent direct-to-consumer models outpaced projections.

inaccurate market predictions during an unexpected global event led to to a mismatch in marketing strategies.

The data analytics platform fell short in managing uncertainty when forecasting the impact of emerging technologies. Despite employing scenario planning and market analysis tools, they could not accurately predict the rapid advancement and market adoption of a disruptive technology, leading to unanticipated industry changes, delayed strategic response, and temporary market share loss.

Trend analysis missed some early signals of emerging e-commerce disruptions

Unprecedented scale of recent platfrom disruption exceeded CI projections.

unable to predict scale of recent platform disruption

Yes, we were not able to predict the COVID-19 pandemic, which had a significant impact on our business.
Our tools have not always been effective in helping us to manage the complexity of our global supply chain.

pandemic impacts more severe than projected in models

N/A - ou of time

pace of EV adoption surpassing initial projections.

l) Please rate the effectiveness of your current tools in detecting early signals of:

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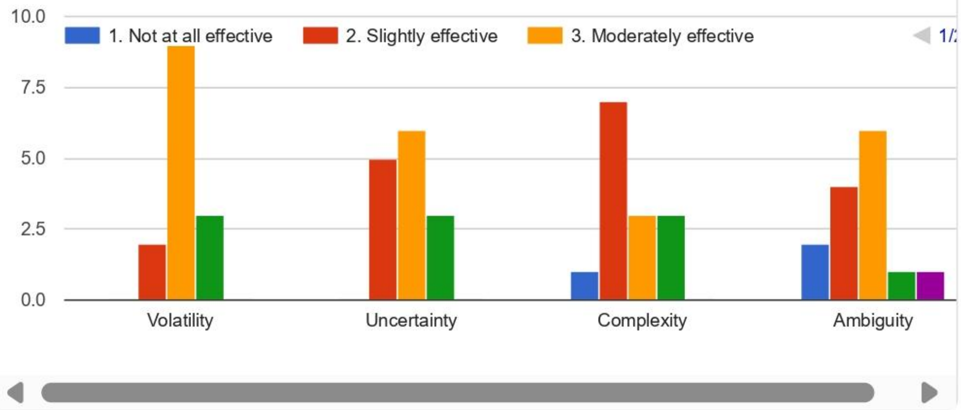


m) What are the most significant limitations you've encountered with your current tools in addressing either overall VUCA challenges or specific elements of Volatility, Uncertainty, Complexity, or Ambiguity?

16 responses

n/a

identifications of unknown-unknown entities remains outside the scope of the tools used

Unknown unknowns and outlier data still prove challenging

Unknown unknowns and unconventional threats remain challenging.

putting together different data sources for one market view is still hard

Handling rapid change
Predict unceratinty
Interpreting ambiguous information

Difficulty detecting unknown unknowns and peripheral signals

Residual gaps in tracking anomalous threats

Limitations still exist assessing unconventional threats

VUCA challenges often tend to emerge quickly and unexpectedly.
Inability to provide real-time insights
Inability to handle new or emerging challenges swiftly and in a comprehensive way.

detection of unknown unknowns remains a gap

N/A - out of time

forecasting unprecedented disruptions and black swans

n) In your opinion, what capabilities and or features should be integrated into these tools to make them more effective against VUCA challenges and in detecting early signals?

⚠ *Mark '**n/a**' if you're unable to provide an answer.*

16 responses

n/a

Enhanced weak signal monitoring and analysis

It's hard to distinguish weak signals from noise

Earlier weak signal monitoring, automated pattern recognition

Enhanced data mining, machine learning, and forecasting techniques.

Make better tools for more correct predictive and real-time market analysis.

Robust Risk Assessment Models
Improved scenario planning tools
Developing systems that can automatically detect early signals

Early weak signal detection, pattern recognition and non-linear analysis

Amplified pattern recognition, nonlinear modeling, predictive simulations.

Amplified pattern recognition, non-linear analysis.

allow our tools to learn from new data and experience, and improve their ability to predict and manage VUCA challenges over time.

enhanced pattern recognition and non-linear analysis

Adaptability. Options. Probability modeling.

Extreme scenario analysis, next-gen systems modeling, AI augmentation.

o) Are there any other tools, techniques, or methods you believe would be beneficial in addressing VUCA challenges and early signal detection? If so, please specify.

16 responses

n/a

War gaming andlead user analysis

The tools I build

Lead user analysis, simulations

collective intelligence and simulations

Weak signal analysis, lead user analysis, game theory

CI complemented by prediction markets

prediction markets, simulation, evolutionary forecasting

I believe that adding a way to build a network of external relationships allowing us to access new sources of information and insights, and help us to identify early signals of change would be very helpful

cliodynamics, lead user analysis, wargaming

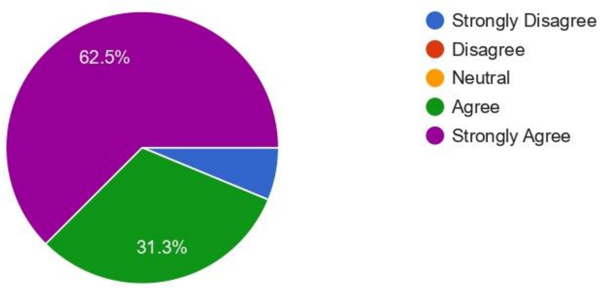
Tripartite signal enhancement. Analytical fitness.

collective intelligence systems

p) The rapidly changing business landscape characterised by VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) has challenged traditional methods of strategic planning, competitive intelligence and decision-making. While various tools and frameworks exist to address some aspects of VUCA, a holistic understanding remains elusive. Within this research, the concept of a 'VUCA causal chain theory' has been proposed as a way to offer a foundational approach to dissecting and managing these challenges systematically. Given this perspective, do you recognise a potential need for this kind of structured approach to better grasp and manage VUCA challenges?"

Copy

16 responses



q) Based on your previous answer, please provide any additional thoughts or reasons for your choice.

16 responses

n/a

Complex interdependencies between elements call for a systemic methodology

I create strategy models and, at least for now, don't see a good way to have a causal chain. It's like "you started it!", "no, you started it!"

Interdependencies demand holistic assessment insulating from fragmentation

seeing across different areas is crucial to understanding market effects

A causal chain framework could provide a more systematic way to analyse interconnected VUCA elements.

holistic perspective prevent things from isolation

interconnection between diferent elements is important to stop information getting stuck in separate groups/departments and prevent things from failling apart

Currently no existing tools destined to manage VUCA, hence, I strongly agree to the development of a tool to address VUCA.

The VUCA causal chain theory may provides a clear and concise one-stop-shop framework for understanding VUCA challenges especially if the theory is evidence-based, actionable and scalable

interconnectivity of elements requires integrated causal analysis

N/A

Appendix 2: Case Study Analysis of CI Tool Usage Across Countries and Industries (2016–2024)

Competitive Intelligence - within-case Analysis

1. Purpose

The 'Within-Case Analysis' section is designed to provide a comprehensive and detailed examination of individual case studies, focusing on the application and effectiveness of competitive intelligence (CI) processes, practices, and techniques within distinct organisational and national contexts. The primary aim of this section is to reveal the most frequently used CI tools as reported by these case studies, thereby offering a clear picture of the current CI setting and its practical applications across various industries and countries.

Through meticulous within-case analyses, this section aims to achieve the following objectives:

1. Detailing CI Implementation: To provide an in-depth description of how CI is implemented within the organisations studied, including the specific processes, practices, and techniques employed.

2. Assessing CI Effectiveness: To evaluate the effectiveness of CI practices in achieving strategic objectives, identifying strengths, weaknesses, opportunities, and threats specific to each case.

3. Identifying Contextual Factors: To explore the contextual factors that influence the adoption and success of CI practices, such as industry characteristics, national economic conditions, regulatory environments, and organisational culture.

4. Generating Insights for Best Practices: To derive insights and potential best practices that can be generalised or adapted to other organisations or contexts, enhancing the overall understanding of CI's strategic value.

2. Scope

The scope of the 'within-case analysis' section encompasses a detailed examination of each case study, with a focus on several key elements to ensure a thorough and comprehensive understanding.

Firstly, the analysis includes fourteen CI cases spanning a diverse set of countries and cases, selected based on specific criteria to ensure relevance and timeliness. The cases included in this analysis are from Australia, Brazil, Canada, Japan, Jordan, Mexico, Morocco, Nigeria, Pakistan, Qatar, Spain, South Africa, Sweden, and Turkey. Each case study examines the application of CI in various industries such as military, manufacturing, government, banking, energy, telecommunications, pharmaceuticals, and education, thereby providing a wide-ranging perspective on CI practices across different sectors.

The selection criteria for these cases aimed at ensuring the relevance and applicability of the findings. All selected cases are no more than ten years old (2016-2024), ensuring that the analysis reflects current practices and trends in CI. This temporal limitation is essential for capturing the dynamic nature of CI, especially in rapidly changing environments. Furthermore, the cases were chosen based on the availability of detailed documentation and empirical data on CI processes, practices, and outcomes. This criterion ensures that the analysis is grounded in robust and comprehensive data, allowing for a more accurate and insightful examination.

Each within-case analysis begins with a contextual background, providing essential information about the organisational and national setting. This includes an overview of the industry, market conditions, regulatory environment, and any relevant historical or economic factors that may influence CI practices. Through setting the stage with this background information, the analysis can more effectively highlight the specific CI processes employed.

The examination of CI processes includes a detailed description of how intelligence needs are identified and prioritised (Planning and Direction), the methods and sources used for gathering data (Collection), the techniques and tools used for data analysis (Analysis), the means of communicating intelligence to stakeholders (Dissemination), and the mechanisms for assessing the effectiveness of CI activities (Feedback and Evaluation).

In addition to the processes, the analysis also delves into the specific CI practices and techniques employed in each case. This includes practices such as SWOT analysis, competitor profiling, trend analysis, scenario planning, benchmarking, and others. The aim is to assess how these practices are integrated into the organisation's strategic planning and decision-making processes, and to evaluate their effectiveness in achieving strategic objectives.

Furthermore, the within-case analysis identifies the key challenges faced in implementing CI practices, as well as the successes and benefits realised. This may include issues such as resource constraints, technological limitations, cultural barriers, and the impact of CI on organisational performance and competitive advantage.

Table 1: List of selected CI case studies by country and industry in the past seven years.

Case study #	Country	Year	Title	Industry
1	Australia	2024	The Role of Competitive Intelligence in Shaping Australia's Defence Strategy to Mitigate China's Influence in the Indo-Pacific Region	Military
2	Brazil	2016	Competitive Intelligence Practices in Brazilian Exploratory Study	Manufacturing
3	Canada	2017	Canadian Competitive Intelligence Practices – A Study of Practicing Strategic and Competitive Intelligence Professionals	CI Professionals from various industries
4	Japan	2022	Competitive Intelligence Practices in Japanese Companies: Multicase Studies	n/a
5	Jordan	2022	Competitive Intelligence Practices in Japanese Companies: Multicase Studies	Manufacturing
6	Mexico	2018	Exploratory Study of Competitive Intelligence in Mexico	Various industries
7	Morocco	2022	Exploratory Study of Competitive Intelligence in Mexico	Banking
8	Nigeria	2024	Towards Adoption of Competitive Intelligence in Marketing of Library Services in Public University Libraries in Southwestern Nigeria	Library/Education
9	Pakistan	2022	Towards Adoption of Competitive Intelligence in Marketing of Library Services in Public University Libraries in Southwestern Nigeria	Banking
10	Qatar	2023	The Energy Industry's Response to Competitive Intelligence in Green Marketing (Case Study Qatar)	Qatar
11	Spain	2017	Relevance of the Competitive Intelligence Process on the Spanish Pharmaceutical Companies	Pharmaceutical
12	South Africa	2016	Pharmaceutical	Various industries
13	Sweden	2017	Why Care About Competitive Intelligence and Market Intelligence? The Case of Ericsson and the Swedish Cellulose Company	Telecom/Cellulose
14	Turkey	2018	A Competitive Intelligence Practices Typology in an Airline Company in Turkey	Pharmaceutical

3. Methodology

3.1 Case Selection Criteria

The selection of case studies for this research was conducted with careful consideration to ensure a comprehensive and diverse representation of competitive intelligence (CI) practices across different countries and industries. The primary aim was to include both single-country and multi-country comparisons to provide a holistic understanding of CI processes, practices, and techniques. The selection criteria employed were as follows:

1. *Temporal Relevance*: All selected case studies are no more than ten years old. This criterion ensures that the findings reflect current practices and trends in CI, which is particularly essential in the dynamic and rapidly evolving VUCA environments.

2. *Diverse Geographic Representation: The case studies encompass a broad geographical scope, including countries from different continents such as* Australia, Brazil, Canada, Japan, Jordan, Mexico, Morocco, Nigeria, Pakistan, Qatar, Spain, South Africa, Sweden, and Turkey. This diversity allows for a comparative analysis of CI practices across various cultural, economic, and regulatory settings.

3. *Industry Variety*: To capture the breadth of CI applications, the selected cases span a range of industries, including military, manufacturing, government, banking, energy, telecommunications, pharmaceuticals, and education. This variety facilitates an understanding of how CI practices are adapted to specific industry needs and challenges.

4. *Availability of Detailed Documentation*: The inclusion of case studies was contingent upon the availability of comprehensive and detailed documentation. This includes academic papers, industry reports, and other relevant documents that provide an in-depth view of CI processes, practices, and outcomes.

5. *Empirical and Practical Relevanc*e: Cases were chosen based on their empirical richness and practical relevance, ensuring that the insights derived are grounded in real-world applications and can inform both academic research and practical implementations of CI.

3.2 Data Sources

The data source for the case studies was carefully selected to ensure a robust and comprehensive collection of information. The sources included academic papers, specifically peer-reviewed journal articles and conference papers, which provided rigorous and scientifically validated primary data on CI practices in various contexts. This approach ensured the reliability and validity of the information gathered for the case studies.

3.3 Analytical Framework

The analytical framework for this research was designed to systematically examine and compare CI practices across the selected case studies. The methodology comprised within-case analyses, employing a combination of thematic analysis and pattern matching to derive meaningful insights.

1. Within-Case Analysis: Each case study was analysed individually to explore the specific CI processes, practices, and techniques employed. Thematic analysis was used to identify key themes and patterns within each case. This involved coding the data into relevant themes such as planning and direction, data collection methods, analytical techniques, dissemination practices, and feedback mechanisms. The analysis also focused on identifying challenges faced and successes achieved in the implementation of CI.

2. Comparative Analysis: While primarily focused on within-case details, the analysis also identified commonalities and differences in CI processes, practices, and outcomes across the cases. This involved examining recurring themes and patterns to understand the factors influencing the effectiveness of CI in different contexts.

3. Synthesis and Interpretation: The findings from the within-case analyses were synthesised to provide a comprehensive understanding of the CI landscape. This synthesis involved interpreting the results in light of existing literature and theoretical frameworks, thereby contributing to the academic discourse on CI and its strategic value in VUCA environments.

Employing this rigorous and systematic analytical framework, the research aims to reveal the most frequently used CI tools and practices, providing valuable insights for academics, practitioners, and policymakers seeking to enhance strategic decision-making through effective competitive intelligence.

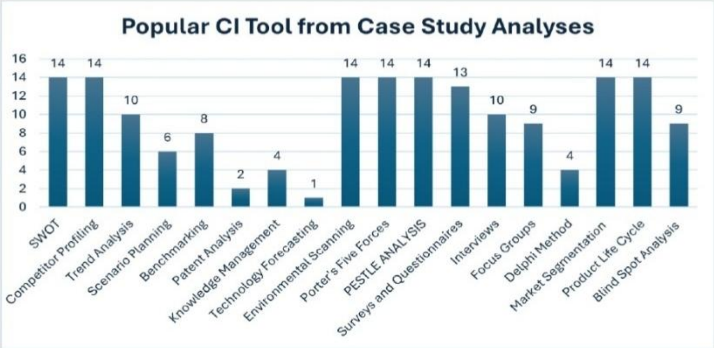
Table 2: Synthesis of Key Findings

Country	Planning and Direction	Collection	Analysis	Dissemination	Feedback and Evaluation
Australia	Define intelligence needs, set objectives and priorities, Identify Key Intelligence Topics (KITs)	Gather data from government reports, intelligence briefings, OSINT, and surveillance	Perform SWOT analysis, conduct trend analysis, Develop scenario planning	Prepare intelligence reports, share findings through dashboards and meetings, Ensure usability	Evaluate effectiveness of CI activities, collect feedback from decision-makers, Refine CI processes
Brazil	Identify intelligence needs, Plan CI activities	Collect data from industry reports, market analysis, competitor data	SWOT analysis, Competitor analysis, Market trend analysis	Reports, Presentations	Evaluate CI impact on strategic decisions, Feedback loop with management
Canada	Set CI objectives, Define scope of activities	Gather data from market reports, internal databases, commercial databases, company employees	SWOT analysis, Competitor analysis, Benchmarking	Email, Presentations, Central databases	Evaluate CI effectiveness through metrics, Feedback from CI users
Japan	Define intelligence objectives, Identify key areas for intelligence	Collect data from multiple sources, both internal and external	SWOT analysis, Competitor analysis, Knowledge management	Reports, Digital platforms	Regular evaluation of CI activities, Feedback from strategic decision-makers
Jordan	Define strategic goals, Set intelligence objectives	Collect data from market reports, competitor analysis, customer feedback	SWOT analysis, Knowledge audits, Collaborative platforms	Reports, Meetings, Digital platforms	Assess impact on product development, Feedback from employees and management
Mexico	Define intelligence scope, Set objectives	Gather data from industry reports, competitor analysis, market trends	SWOT analysis, Patent analysis, Trend analysis	Reports, Presentations	Continuous evaluation of CI impact, Feedback loop for improvements
Morocco	Establish CI objectives, Align with strategic goals	Collect data from market reports, competitor analysis, customer feedback	SWOT analysis, Competitor profiling, Trend analysis	Reports, Meetings, Digital platforms	Continuous assessment of CI activities, Feedback from stakeholders
Nigeria	Identify intelligence needs, Plan CI activities	Gather data from market reports, customer feedback, competitor analysis	SWOT analysis, Benchmarking, Market trend analysis	Reports, Digital platforms, Meetings	Assess CI effectiveness, Feedback from library services stakeholders
Pakistan	Establish CI objectives, Define scope of activities	Gather data from market reports, competitor analysis, regulatory information	SWOT analysis, Competitor profiling, Scenario planning	Reports, Meetings, Digital platforms	Evaluate CI impact on strategic performance, Feedback from decision-makers
Qatar	Define strategic CI objectives, Identify key intelligence needs	Collect data from industry reports, market trends, environmental regulations	SWOT analysis, Trend analysis, Scenario planning	Reports, Digital platforms, Stakeholder meetings	Continuous evaluation of CI effectiveness, Feedback from management
Spain	Establish CI objectives, Align with strategic goals	Gather data from market reports, competitor data, research collaborations	SWOT analysis, Patent analysis, Competitor profiling	Reports, Meetings, Digital platforms	Regular assessment of CI activities, Feedback loop with strategic planners
South Africa	Define intelligence needs, Set objectives	Collect data from regulatory bodies, industry reports, competitor activities	Industry analysis, SWOT analysis, Competitor analysis	Reports, Presentations, Briefings	Evaluate CI impact on competitiveness, Feedback from stakeholders
Sweden	Define CI objectives, Align with strategic planning	Gather data from market reports, competitor analysis, technological trends	SWOT analysis, Competitor profiling, Scenario planning	Reports, Meetings, Digital platforms	Continuous assessment of CI activities, Feedback from management

Turkey	Identify intelligence needs, Plan CI activities	Collect data from industry reports, competitor analysis, market trends	SWOT analysis, Competitor profiling, Scenario planning	Reports, Digital platforms, Meetings	Evaluate CI effectiveness, Feedback loop for improvements
Nigeria (Pharmaceuticals)	Establish CI objectives, Align with strategic goals	Gather data from market reports, competitor analysis, regulatory information	SWOT analysis, Competitor profiling, Trend analysis	Reports, Meetings, Digital platforms	Continuous evaluation of CI impact, Feedback from strategic decision-makers

Visualisation of findings of the most popular CI tools reported by fourteen CI case studies across different countries and industries.

Figure 1: CI tools usage from fourteen case study analysis



Appendix 3: *Uncertainty Tier Categorisation Template and Guidelines*

Tier	Level of Uncertainty	Description	Key Questions	Actions/Strategies
1	Clear Enough Future (Known Knowns)	Describe the certain trends and established facts.	List key questions related to established trends and data.	Outline actions and strategies based on known information.
2	Alternate Futures (Known Unknowns)	Describe the range of possible outcomes, acknowledging uncertainty.	List key questions to explore plausible alternative scenarios.	Outline strategies to prepare for different contingencies.
3	Range of Futures (Unknown Knowns)	Describe the complex, interconnected factors and potential systemic shifts.	List key questions to understand interconnected systems and anticipate shifts.	Outline strategies to build agility and navigate systemic complexities.
4	True Uncertainty (Unknown Unknowns)	Describe the truly unknowable and unpredictable events (Black Swan events).	List key questions to explore potential Black Swan events and their impact.	Outline strategies to build resilience and antifragility for unexpected disruptions.

Uncertainty Tiers and Guidelines for Categorisation

Uncertainty level	Key Characteristics	Rules/Recommendations for categorisation	Additional Guidelines
Level 1: A Clear-Enough Future	-Single, clear future state -Highly predictable outcomes -Well-established trends	- Identify if there is a consensus among experts on future trends - Check if historical data shows a clear, consistent pattern - Verify if current regulations or technological limitations create a predictable path - Ensure that alternative futures are highly improbable	- Start from this level and move up if criteria are not met - Short-term horizons often fall here - Mature industries and technologies typically fit this level - Stable regulatory environments contribute to this level
Level 2: Alternate Futures	- Few (typically 2-4) distinct, alternative outcomes - Discrete scenarios can be defined - Probabilities can be assigned to each scenario	- Identify if there are clear, mutually exclusive future states - Verify if these states are driven by a few key factors or decisions - Check if probabilities can be reasonably assigned to each state - Ensure that the identified states cover most plausible outcomes	- Medium-term horizons often fall here - Industries facing clear but different possible regulatory outcomes fit here - Technologies with a few clear development paths belong in this level
Level 3: A Range of Futures	- Continuous range of potential outcomes - Key variables identified, but exact outcome uncertain - Difficult to define discrete scenarios	- Identify if there is a range of possible outcomes without clear discontinuities - Check if multiple interacting variables influence the outcome - Verify if boundaries of possible outcomes can be estimated - Ensure that point predictions within the range are not reliable	- Longer-term horizons often fall here - Fast-changing industries often fit this level - Emerging technologies with multiple development possibilities belong here - Complex regulatory environments contribute to this level
Level 4: True Uncertainty	- Multiple dimensions of uncertainty - Unpredictable interactions between variables - Difficulty in identifying all relevant factors	- Identify if there are unknown variables that could significantly impact outcomes - Check if cause-and-effect relationships are unclear or unpredictable - Verify if the situation is without precedent or analogues - Ensure that even the range of potential outcomes is difficult to determine	- Very long-term horizons often fall here - Highly disruptive technologies or unprecedented situations fit this level - Completely unpredictable regulatory or geopolitical situations contribute to this level
General guidelines for all levels	- Consider time horizon: Longer time horizons generally increase uncertainty levels - Assess industry dynamics: Fast-changing industries tend to have higher uncertainty levels - Evaluate technological maturity: Emerging technologies often have higher uncertainty levels than mature ones - Consider regulatory environment: Unpredictable regulatory changes can increase uncertainty levels - Consult multiple sources: Use a variety of expert opinions, market reports, and academic studies to inform the categorisation (you may refer to the additional resources included in the WEF intelligence map) - Regularly reassess: Uncertainty levels can change over time as new information becomes available - Be consistent: Apply the same criteria across different KVTs for comparative analysis - Document reasoning: Record the rationale for categorisation to ensure transparency and allow for future review		

Appendix 4: Initial contact with CMI for recruitment and their reply

UNIVERSITY OF PORTSMOUTH

Amine Belmejdoub Quotb <up2038871@myport.ac.uk>

Looking for PhD survey participants from CMI

2 messages

Amine Belmejdoub Quotb <Amine.BelmejdoubQuotb@myport.ac.uk> 19 October 2022 at 13:26
Reply-To: Amine.BelmejdoubQuotb@myport.ac.uk
To: cmiregionalsupport@managers.org.uk

Dear CMI Regional Support Team,

As a CMgr and PhD candidate at the University of Portsmouth, and as part of my PhD research, I would need to survey a total of 16 CMgr members involved in strategic decision making from different sectors and backgrounds.

My PhD research title is 'Developing a Strategic Competitive Intelligence framework for MNEs' where I will be investigating and comparing strategic analysis tools used by 2 different groups, namely, the 'CMI group' and the 'SCIP group' - Strategic and Competitive Intelligence Professionals, to mitigate volatility, uncertainty, complexity and ambiguity (VUCA) risk.

Would it be possible to facilitate the contact of this number of fellow members to take part in this PhD survey or direct me towards a person in charge of this.

Looking forward to hearing from you.

Thank you,

Kind regards

--

Amine Belmejdoub Quotb

PhD Candidate

University of Portsmouth

Faculty of Business and Law

Department of Organisations, Systems and People

T: +44 (0) 7878381180

E: amine.BelmejdoubQuotb@myport.ac.uk

UNIVERSITY OF PORTSMOUTH

Amine Belmejdoub Quotb <up2038871@myport.ac.uk>

Looking for PhD survey participants from CMI

CMI Regional Support <cmiregionalsupport@managers.org.uk> 17 November 2022 at 14:49
To: Amine.BelmejdoubQuotb@myport.ac.uk

Dear Amine

Thank you for your email.

We would not be able to provide this for you, however, you could try putting a message onto LinkedIn to see if anyone would be willing for you to survey them.

Kind regards

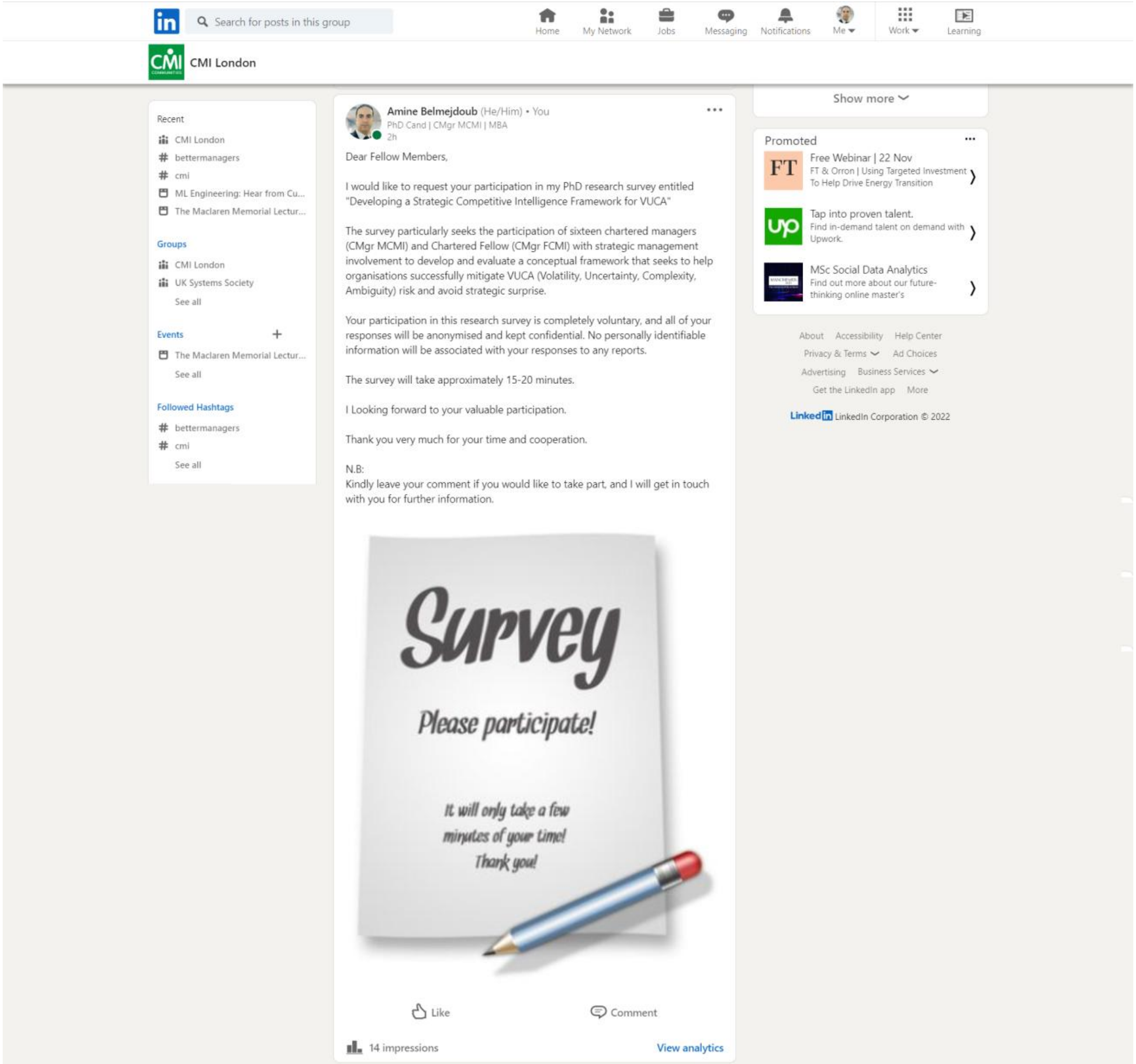
Karen

CMI REGIONAL SUPPORT TEAM
T 01536 207394 managers.org.uk
Registered Charity 1091035; Scotland SCO38105

[Quoted text hidden]
--

CMI Claudia Anderson (She/Her)
Chartered Journey Manager
T 01536 697818 managers.org.uk
Registered Charity 1091035; Scotland SCO38105

Appendix 5: *Chartered Managers invitation to participate using LinkedIn platform*



Appendix 6: Initial contact with SCIP for recruitment and their reply

scip

Custom form Contact Us was submitted on 10/10/2021 at 8:28:02 AM.

Review the Custom Form

First Name

Amine

Last Name

Belmejdoub Quotb

Job Title

Student

Company

University of Portsmouth

Email Address

beamine@yahoo.co.uk

Phone Number

+447305986096

Which team can we connect you with?

Other

How can we help you?

Hi. I recently joined SCIP as a student member. As I'm doing a Ph.D. related to competitive intelligence, and as part of my research I would need some information regarding the number of active members in the society and from how many countries. Also, as you may know, my research would require conducting surveys with SCIP members given that they are experts from different backgrounds, could you please inform me of the best possible way to get in touch with them as part of my research. Looking forward to hearing from you. Best Regards.

Lisa Badolato

From: lbadolato@scip.org

To: beamine@yahoo.co.uk

Cc: memberservices

Sat, 23 Oct 2021 at 01:48

Hello Amine,

Thank you for joining SCIP & hope you'll enjoy the resources.

We be happy to support you with your research. We have 1200 members in over 52 countries 70/30 split with most members in the USA. This is exactly what our members like to help each other with through our new online community Workplace. It's a way for you to connect with your fellow SCIP members, and to trade tips, tricks, and best practices in a fast, flexible, and secure way. I recommend that you post your survey and/or questions to the group link here, to get the most responses as well as our LinkedIn group as a consideration to address our community.

Please feel free to contact me at any time if you have questions or if we can help further.

Best Regards,
Lisa

Appendix 7: *Competitive Intelligence professionals invitation to participate using Workplace platform*

Everyone @ SCIP

Official · Open group · 398 members · This group is for members to share ideas, b

Posts Rooms Files More

Live video Image/video

Amine B. Quotb

7 mins ·

CI Professionals!

Your insights are needed to shape a trailblazing Strategic Competitive Intelligence framework meticulously designed to conquer the **VUCA terrain (Volatility, Uncertainty, Complexity, Ambiguity)**.

Your input is vital to my doctoral research survey with the University of Portsmouth (UK), aimed at developing a cutting-edge framework within the field of Competitive Intelligence (CI). Your contributions will help construct an advanced tool designed to endow CI experts with unmatched strategic foresight. This, in turn, will enable them to anticipate future trends, proactively interpret the complexities of the business landscape, and secure a superior strategic advantage in the marketplace.

Please add your perspective : https://forms.gle/efZvNgEfBLXsoSm99

Thank you!

#UniversityOfPortsmouth #StrategicForesight #DoctoralResearchSurvey #CIProfessionals #VUCA

#SuperiorStrategicAdvantage

Like Comment Share

Write a comment...

Appendix 8: *Invitation to participate letter*

UNIVERSITY OF PORTSMOUTH

School of Business and Law
Richmond Building, Portland St, Portsmouth, PO1 3DE

United Kingdom

Invitation Letter

Study Title: Developing a Strategic Competitive Intelligence framework for MNEs

Name of the research and supervisor: Amine Belmejdoub Quotb under the supervision of Professor Mark Xu.

Contact details: up2038871@myport.ac.uk

SCIP Workplace ID: @Amine B. Quotb

Dear Potential Participant,

I would like to invite you to take part in an experimental study (date, time, and online location to be determined) to evaluate a conceptual framework to address VUCA risk (Volatility, Uncertainty, Complexity, Ambiguity), which will be supported by the implementation of weak signal detection to enhance the predictive capabilities and learn from the future to better inform strategic decision-making.

The research will be concerned with investigating how business organisations are addressing VUCA as a risk factor of organisational ignorance, induced by 1) the unreliability of information to find answers – Volatility, 2) not having answers – Uncertainty, 3) difficulty in finding answers – Complexity, and 4) not able to formulate the right question – Ambiguity.

To fulfil the purpose of this study, an experimental research method will be adopted where two distinct groups (CI specialised and non-CI specialised groups) will be investigated to examine their behaviour towards VUCA risk to make strategic decisions. The aim is to extrapolate whether applying the novel conceptual framework to VUCA events will yield better results than the conventional strategic tools employed in terms of environmental scanning, sensemaking, and weak signal detection along with enhancing the predictive capabilities of firms and the quality of their strategic decision.

The research findings will contribute to the development of a strategic CI framework that can be used at a strategic management level to tackle VUCA risk in a methodical approach that goes beyond the classical versions of strategic tools largely created when the business world was a different place to what we are experiencing today.

Your valuable contribution to this experiment will be the focus of a PhD study. Any participant's identifying information will be completely secret and anonymized. Any participants' identifying details will be anonymised and will be strictly confidential. All data gathered will be stored in the University of Portsmouth's highly secured device and the data will be kept safe. If you wish to learn more about the results of the research or any other details, please contact the researcher at the mentioned email.

The decision to participate in this experiment is entirely voluntary. The participant can withdraw from the experiment at any time, without providing any reason if the participant does not wish to. If the participant wishes to withdraw from the group after some data have been collected, the participant will be asked if this data collected thus far can be retained and included in the study. If the participant prefers, the data collected can be destroyed and not included in the study. However, once the research has been completed, and the data analysed, it will not be possible for the participant to withdraw data from the study.

Looking forward to your valuable participation in this research.

Yours faithfully.

Appendix 9: Participant Consent Form

School of Business and Law
Richmond Building, Portland St, Portsmouth, PO1 3DE

United Kingdom

CONSENT FORM

Title of Project: Developing a Strategic Competitive Intelligence Framework for MNEs

Name and Contact Details of Researcher(s): Amine Belmejdoub Quotb – up2038871@myport.ac.uk

Name and Contact Details of Supervisor (if relevant): Professor Mark Xu - mark.xu@port.ac.uk

University Data Protection Officer: Samantha Hill, 023 9284 3642 or information-matters@port.ac.uk

1. I confirm that I have read and understood the information sheet dated (November 2020, version 2.8) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time before 31/07/2022 without giving any reason. After this date, the data will be published, and the opportunity of withdrawing will not b☐ available.

3. I understand that data collected during this study will be processed in accordance with data protection law as explained in the Participant Information Sheet (November 2020, version 2.8). ☐

4. I agree to take part in the above study. ☐

Name of Participant: **Date:** **Signature:**

Name of Researcher: Amine Belmejdoub Quotb **Date:** **Signature:**

***Note**: When completed, one copy is to be given to the participant, and one copy is to be retained in the study file.*

Appendix 10: *Participant Information Sheet*

UNIVERSITY OF PORTSMOUTH
School of Business and Law
Richmond Building, Portland St, Portsmouth, PO1 3DE

United Kingdom

PARTICIPANT INFORMATION SHEET

Title of Project: Developing a Strategic Competitive Intelligence Framework for MNEs

Name and Contact Details of Researcher(s): Amine Belmejdoub Quotb / +44 73 05986096 / up2038871@myport.ac.uk

Name and Contact Details of Supervisor (if relevant): Professor Mark Xu / +44 23 92844123 / mark.xu@port.ac.uk

1. **Invitation**

I would like to invite you to take part in my research study. Joining the study is entirely up to you. Before you decide I would like you to understand why the research is being done and what it would involve. I will go through this information sheet with you, to help you decide whether you would like to take part and answer any questions you may have. I would suggest this should take about 45min-60min. Please feel free to talk to others about the study if you wish. Do ask if anything is unclear.

*I am a PhD student from the University of Portsmouth, and I am conducting my research on "*Developing a Strategic Competitive Intelligence framework for MNEs.*"*

2. ***Study Summary***

In light of the current uncertainties many businesses, particularly those with cross-border operations, are facing, this study focuses on testing a strategic competitive intelligence framework, which is crucial because there is a lack of a well-charted systematic approach to handle VUCA (Volatility, Uncertainty, Complexity, Ambiguity) risk.

The researcher noticed a growing gap between conventional strategic decision-making and the messiness of the contemporary challenges confronting organisations. The researcher believes that the development of this strategic framework can shape how strategic decisions are made to close this gap.

This research will allow the development of a strategic competitive intelligent framework to address strategic decision-making under VUCA conditions. As a result, the researcher is seeking participants from a CI background preferably members of the society of competitive intelligence professionals (SCIP) and participants from non-CI backgrounds involved in strategic decision-making, preferably from the Chartered Management Institute (CMI).

Participation in this research would require you to participate in an experiment and will take approximately 45min to 60 minutes of your time.

3. **What is the purpose of the study?**

The objective of this research is to develop a strategic competitive intelligence framework for informed strategic decision-making. This framework will be primarily based on how organisations can use a combination of foresight methods, techniques, and tools such as weak signal detection, multicriteria decision-making and sensemaking to reduce strategic surprises at different degrees of uncertainties.

4. Why have I been invited?

You have been invited to take part in this study since you are a member of the society of competitive intelligence professionals and/or from a CI background, or you are a member of the Chartered Management Institute (CMI). Please note that I am inviting you in your personal capacity and I am seeking your personal view as a person with expertise in CI / strategic management. As a fellow member of SCIP myself, I have access to the SCIP group at the Workplace platform from where all SCIP members reach each other to share their views and opinions and ask questions.

I am also a Chartered Member of the Chartered Management Institute (CMgr) and would appreciate it if my fellow members at strategic level involvement can take part in this research study.

5. Do I have to take part?

No, taking part in this research is entirely voluntary. It is up to you to decide if you want to volunteer for the study. A description of the study is provided in this information sheet. If you agree to take part, we will then ask you to sign the attached consent form, dated (November 2020), version number, 2.8.

6. What will happen to me if I take part?

In this study, you will be presented with a series of questionnaires that will be published accordingly using the SCIP official group in the Workplace® platform or sent by email. The researcher will be following up with you should any issue arise. The researcher can be easily reached through the chat option available on the platform or by email.

During the experiment, participants will be asked, inter alia, to (1) nominate a conventional strategic tool (s) of choice and used in strategy formulation and strategic decision making; (2) Experiment with a series of VUCA scenarios and try to solve them using conventional tools chosen ; (3) Formulate a strategy as a result ; (4) Make a strategic decision in response to the VUCA scenarios presented; (5) Post-experiment user feedback.

7. Expenses and payments

There are no funds for any payments, and you will not be paid for participating in this study.

8. Anything else I will have to do?

There is no special instruction or restrictions for participating in this study.

9. What data will be collected and/or measurements taken?

The data that will be collected concern: 1) A list of current strategic tools used; (2) Approaches and tools used to solve strategic issues characterised by VUCA; (3) Importance of the current strategic tool (s) used to the organisation and level of influence on different types of decision-making – operational, tactical and strategic; (4) Any potential solutions to existing VUCA issues; (5) Views about the capability of conventional strategic tools and the novel framework to tackle VUCA constitutive elements; (6) Measuring the quality of strategic decisions under VUCA conditions; (7) Any other views, opinions and comments expressed by participants. Post-experiment feedback.

Strictly, no identifying data will be collected in this research. Participants' names will be analysed generally without referring to a specific individual.

10. What are the possible disadvantages, burdens, and risks of taking part?

45min-60min of your time will be required to respond to questionnaires, and while we appreciate that you are busy and your time is precious, your contribution is important.

11. What are the possible advantages or benefits of taking part?

Although participants will not receive any direct personal benefits from participating, this research will represent an opportunity to enrich the existing strategic management literature and develop the management capabilities to confidently tackle VUCA risk by employing the framework.

12. Will my data be kept confidential?

The raw data identifying you will be kept securely by the researcher and/or their supervisor. They will be stored in the researcher's university account and laptop to ensure that they cannot be reached by any person without getting permission. Moreover, the data will be only used for academic research purposes without mentioning any identities related to participants.

- The University support team can be reached for any inquiries about data at researchdata@port.ac.uk. the researcher will seek advice from The Research Data Officer, Dr Gary Pike, who is part of the Research Outputs Team based in the University Library. All information about keeping and archiving data will be arranged at the initial stage of data collection.

- The data, when made anonymous, may be presented to others at academic conferences, or published as a project report, academic dissertation or in academic journals or books. It could also be made available to any commissioner or funder of the research.

- Anonymous data, which does not identify you, will be publicly shared at the end of the project and made open access. A CC-BY licence will be applied to this publicly shared data. This will allow anyone else (including researchers, businesses, governments, charities, and the general public) to use the anonymised data for any purpose that they wish, providing they credit the University and research team as the original creators. No restrictions will be placed on this shared anonymised data limiting its reuse to only non-commercial ventures.

- The raw data, which would identify you, will not be passed to anyone outside the study team without your express written permission. The exception to this will be any regulatory authority which has the legal right to access the data to conduct an audit or enquiry, in exceptional cases. These agencies treat your personal data in confidence."

- The raw data will be retained for a minimum of 10 years. When it is no longer required, the data will be disposed of securely (e.g., electronic media and paper records/images) and destroyed.

- Although you have the right to request a copy of the personal data we hold about you, to restrict the use of your personal data, to be forgotten, to data portability, and to withdraw your consent for the use of your data, it is possible that we may not be able to fully comply with those rights where your data has been used for the research and/or has been anonymised. For more information on your rights in general, please see the information on the following links:

https://www.port.ac.uk/about-us/structure-and-governance/legal/data-protection-and-gdpr/requesting-your-data

- You also have the right to complain about the use of your personal data to the University (information-matters@port.ac.uk) and then, if you are unhappy with our response, to the Information Commissioner's Office (ICO) – for more information please see https://ico.org.uk/your-data-matters/raising-concerns/ .

13. What will happen if I don't want to carry on with the study?

As a volunteer, you can stop any participation in the focus group at any time or withdraw from the study at any time before (15/10/2022), without giving a reason if you do not wish to. If you do withdraw from the study after some data have been collected, you will be asked if you are content for the data collected thus far to be retained and included in the study. If you prefer, the data collected can be destroyed and not included in the study. Once the research has been completed, and the data analysed, it will not be possible for you to withdraw your data from the study.

14. What if there is a problem?

If you have a query, concern, or complaint about any aspect of this study, in the first instance you should contact the researcher(s) if appropriate. If the researcher is a student, there will also be an academic member of staff listed as the supervisor whom you can contact. If there is a complaint and there is a supervisor listed, please contact the Supervisor with details of the complaint. The contact details for both the researcher and any supervisor are detailed on page 1.

If your concern or complaint is not resolved by the researcher or their supervisor, you should contact the Head of Department:

Professor Mark Xu

Organisations, Systems and People / Faculty of Business and Law +44 23 9284 4123

University of Portsmouth mark.xu@port.ac.uk

Faculty of Business and Law

Richmond Building, Portland St

Portsmouth, Hampshire

PO1 3DE

UK

If the complaint remains unresolved, please contact: The University Complaints Officer

+44 23 9284 3642 complaintsadvice@port.ac.uk

15. Who is funding the research?

This research is self-funded. None of the researchers or study staff will receive any financial reward for conducting this study, other than their normal salary/bursary as an employee/student at the University.

16. Who has reviewed the study?

Research involving human participants is reviewed by an ethics committee to ensure that the dignity and well-being of participants are respected. This study has been reviewed by the Business and Law Faculty Ethics Committee and has been given a favourable ethical opinion.

Thank you for taking the time to read this information sheet and for your consideration volunteering for this research.

Appendix 11: *Phase One Survey Questionnaire*

Section 1 of 5

Phase 1 questionnaire

(The questionnaire may take around 20-30 minutes to complete fully)

This survey is part of a doctoral research study being conducted at the University of Portsmouth, focusing on the impact of **Volatility, Uncertainty, Complexity**, and **Ambiguity (VUCA)** in the field of Strategic Management and Competitive Intelligence. Your expertise and insights are invaluable to this research.

Please take a few minutes to complete this survey. All responses are confidential and will only be used for the purposes of this research.

Thank you for your time and contribution.

Email *

Valid email address

This form is collecting email addresses. Change settings

After section 1 Continue to next section

Section 2 of 5

Consent

To ensure you have all the information needed to make an informed decision about participating in this study, please find the link for the important document here --> Participant Information Sheet.

We encourage you to review the 'Participant Information Sheet' meticulously before deciding on participation.

Please select the boxes ☑ to give your consent *

	Yes
I confirm that I have read and understood the 'Parti...	☐
I understand that my participation is voluntary and t...	☐
I understand that data collected during this study w...	☐
By consenting to participate in the pre-test, you are ...	☐

After section 2 Continue to next section

Section 3 of 5

I. VUCA Knowledge

💡 *This section aims to assess perceptions, perspectives and familiarity with the* ***VUCA*** *concept and its applicability to organisations.*

a) Are you familiar with the term "VUCA" - referring to: *

-**Volatility**: Unpredictable rate of change leading to unstable, and potentially unreliable information.
-**Uncertainty**: The presence of unknown threats due to imperfect or lacking information, making it challenging to make predictions.
-**Complexity**: Overabundance of information that could make data unmanageable and paralyze decision making.
-**Ambiguity**: A certain level of fuzziness and confusion in the context that can complicate solution finding.

◯ Yes

◯ No. (if unfamiliar with the VUCA concept, you may refer to the below video 'What is VUCA')

What is VUCA?

b) How would you rate your understanding of **VUCA** principles and how they apply to business environments? *

	1	2	3	4	5	
No understanding	◯	◯	◯	◯	◯	Expert level understanding

c) To what extent do you believe that the VUCA elements (**Volatility, Uncertainty, Complexity, Ambiguity**) influence your company or industry in recent years? *

	1. No influence	2. Minor influe...	3. Moderate in...	4. Significant i...	5. Extreme infl...
Volatility	◯	◯	◯	◯	◯
Uncertainty	◯	◯	◯	◯	◯
Complexity	◯	◯	◯	◯	◯
Ambiguity	◯	◯	◯	◯	◯

d) In your experience, how significantly has VUCA (volatility, uncertainty, complexity, ambiguity) impacted your organisation's **operations** in recent years ? *

	1	2	3	4	5	
No impact	○	○	○	○	○	Severe impact

e) In your experience, how significantly has VUCA (volatility, uncertainty, complexity, ambiguity) impacted your organisation's **performance** in recent years ? *

	1	2	3	4	5	
No impact	○	○	○	○	○	Severe impact

f) What level of priority does your organisation place on navigating volatility, uncertainty, complexity, and ambiguity (VUCA) in strategic analysis and planning? *

	1. Not a priority	2. Low priority	3. Moderate pri...	4. High priority	5. Essential pri...
Volatility	☐	☐	☐	☐	☐
Uncertainty	☐	☐	☐	☐	☐
Complexity	☐	☐	☐	☐	☐
Ambiguity	☐	☐	☐	☐	☐

g) In your view, how important is it for businesses today to implement tools and strategies specifically aimed at navigating VUCA environments? *

	1	2	3	4	5	
Not important	○	○	○	○	○	Extremely important

h) How has the intensity of VUCA factors changed in your industry in recent years? *

	1. Greatly desc...	2. Slightly decr...	3. Remained th...	4. Slightly incre...	5. Greatly incre...
Volatility	☐	☐	☐	☐	☐
Uncertainty	☐	☐	☐	☐	☐
Complexity	☐	☐	☐	☐	☐
Ambiguity	☐	☐	☐	☐	☐

After section 3 Continue to next section

Section 4 of 5

II. VUCA impact on your Business Environment

💡 *This section aims to assess the extent to which elements of Volatility, Uncertainty, Complexity, and Ambiguity (VUCA) are experienced in your organisational environment and their degree of impact on operations, strategy, and decision-making.*

a) On a scale of 1-5, please rate the level of impact that VUCA elements have on your organisation's operations:

Description (optional)

Volatility: Unpredictable and rapid pace of change makes the information unstable, thus unreliable. Today's information may be obsolete tomorrow (the information lifecycle has shortened). *

	1	2	3	4	5	
No impact	○	○	○	○	○	Significant impact

Uncertainty: Unknown environmental threats caused by the lack or imperfect information, thus not possible to predict.

	1	2	3	4	5	
No impact	○	○	○	○	○	Significant impact

Complexity: Information overload makes information unmanageable and renders the information scope too large (as a result, difficult to find answers and causes analysis paralysis).

	1	2	3	4	5	
No impact	○	○	○	○	○	Significant impact

Ambiguity: Contextual fuzziness which makes it difficult to find a solution *

	1	2	3	4	5	
No impact	○	○	○	○	○	Significant impact

b) Please rank the following VUCA elements on a scale of 1-5 based on the degree of challenge they pose to your organisation, with 1 being the least challenge and 5 being the greatest challenge: *

	1. Least challe...	2. Minor challe...	3. Moderate ch...	4. Significant c...	5. Greatest cha...
Volatility	○	○	○	○	○
Uncertainty	○	○	○	○	○
Complexity	○	○	○	○	○
Ambiguity	○	○	○	○	○

c) In recent years, how frequently has your organisation faced challenges that you would classify as: *

	1. Never	2. Rarely	3. Occasionally	4. Frequently	5. Very Freque...
Volatile?	○	○	○	○	○
Uncertain?	○	○	○	○	○
Complex?	○	○	○	○	○
Ambiguous?	○	○	○	○	○

d) Which aspects of VUCA do you anticipate will pose increasing challenges in the next 3-5 years? Check all that apply *

- ☐ Volatility
- ☐ Uncertainty
- ☐ Complexity
- ☐ Ambiguity

e) How prepared do you feel your organisation is to effectively navigate rising VUCA pressures * in your sector?

	1	2	3	4	5	
Very Unprepared	○	○	○	○	○	Very Prepared

f) How would you rate the impact of each VUCA element on your organisation's strategic decision-making in recent years? *

💡 *Please consider the various challenges and changes your organisation has faced in recent years. Reflect on situations where these elements made decision-making particularly challenging or prompted significant shifts in strategy.*

Volatility	○	○	○	○	○
Uncertainty	○	○	○	○	○
Complexity	○	○	○	○	○
Ambiguity	○	○	○	○	○

g) To what extent have the following aspects of your operations and strategy been impacted by VUCA dynamics in recent years? Please rate each aspect on a scale from 1 (No Impact) to 5 (Significant Impact). *

	1. No impact	2. Slight impact	3. Moderate im...	4. Considerabl...	5. Significant i...
Competitiveness	○	○	○	○	○
Profitability	○	○	○	○	○
Customer needs	○	○	○	○	○
Business mode...	○	○	○	○	○
supply chain	○	○	○	○	○
Talent acquisiti...	○	○	○	○	○
Innovation and ...	○	○	○	○	○
Market share a...	○	○	○	○	○
Organisational ...	○	○	○	○	○
Brand reputation	○	○	○	○	○
Regulatory co...	○	○	○	○	○
Strategic partn...	○	○	○	○	○
Risk managem...	○	○	○	○	○
Sustainability a...	○	○	○	○	○
Operational effi...	○	○	○	○	○
Customer enga...	○	○	○	○	○
Financial stabil...	○	○	○	○	○

h) Can you cite a recent situation or challenge faced by your organisation that you would attribute to:

💡 *If you did not encounter one or all of the phenomena of volatility, uncertainty, complexity, or ambiguity, please answer '**n/a**' for that part of the question.*

Volatility? *

Long-answer text

Uncertainty? *

Long-answer text

Complexity? *

Long-answer text

Ambiguity? *

Long-answer text

After section 4 Continue to next section

Section 5 of 5

III. Tools, Techniques for Managing VUCA

💡 *This section aims to identify the key strategic analysis and/or competitive intelligence tools you currently use in your role. We will also gather your perspectives on how effective these existing tools are in helping you and your organisation navigate an increasingly volatile, uncertain, complex, and ambiguous (VUCA) environment, especially in detecting early or weak signals.*

a) For managing and addressing the elements of VUCA (Volatility, Uncertainty, Complexity, Ambiguity), does your organisation primarily rely on: *

- ☐ A singular, comprehensive tool that addresses all elements simultaneously?
- ☐ Specific, distinct tools designated for each VUCA element?
- ☐ No specific tool designated for managing VUCA elements?

b) Based on your previous response:

Description (optional)

b.1) If you use a comprehensive tool, please specify the tool you use. *

💡 *Please answer '**NO**' to this question If you use **specific tools for each VUCA element.***

b.2) If you use specific tools for each VUCA element, please specify the tool (s) used:

💡 *Please answer '**NO**' in each element if you use a **comprehensive tool** instead.*

Tool (s) used for Volatility *

Short-answer text

Tool (s) used for Uncertainty *

Short-answer text

Tool (s) used for Complexity *

Short-answer text

Tool (s) used for Ambiguity *

Short-answer text

c) Does your employed tool(s) reveal any order or sequence among the different VUCA elements? *

💡 *Consider if these tools offer clarity on whether there's a specific sequence or order in which the VUCA elements (Volatility, Uncertainty, Complexity, Ambiguity) typically emerge or affect decision-making. Your response should highlight the tool's ability to delineate any progression or hierarchy among the VUCA elements.*

- No
- Yes
- Other...

d) Does your employed tool(s) reveal any cause-and-effect relationships between the different VUCA elements? *

💡 *Consider whether these tools provide insights into how, for example, one VUCA element (like Uncertainty) might influence or be influenced by another (like Volatility).*

- No
- Yes
- Other...

e) How effective are your current tools and/or techniques at identifying embryonic trends, issues, or disruptions while they are still weak or early signals? *

	1	2	3	4	5	
Completely insufficient	○	○	○	○	○	Completely sufficient

f) To what extent do the tool(s) or technique(s) used help in identifying? *

[KK]: Knowledge **Known-knowns** Aspects, factors, or variables in your business environment that you are aware of and understand. For instance, if you are aware that a certain competitor has a particular product that competes directly with yours, that's a known-known.	[KU]: Awareness **Known-Unknowns** Areas or factors you know you don't have enough information about or fully understand. For example, you might know that cultural differences can impact a business expansion plan in a new country, but you don't know how significantly or in what specific ways the culture in a particular country you're considering might affect your business.
[UK]: Bias **Unknown-Knowns** Unconscious aspects, the "blind spots", that the organisation doesn't recognise or acknowledge. These might be ingrained biases, assumptions, or institutionalised perspectives that may hinder innovation or the ability to react to changes in the environment.	[UU]: Ignorance **Unknown-Unknowns** Factors, or circumstances that you're not even aware you don't know. They are typically unpredictable or unforeseen risks that no amount of research could have uncovered. For instance, an unexpected technological breakthrough that suddenly renders your product obsolete would be an unknown-unknown.

	1. Not at all lik...	2. Slightly likely	3. Moderately li...	4. Very likely	5. Extremely lik...
Known-Knowns	☐	☐	☐	☐	☐
Known-Unkno...	☐	☐	☐	☐	☐
Unknown-Kno...	☐	☐	☐	☐	☐
Unknown-Unkn...	☐	☐	☐	☐	☐

g) How often do your tools accurately identify and predict VUCA (Volatility, Uncertainty, Complexity, Ambiguity) challenges, considering their potential to create ripple and domino effects? *

💡 *Consider for instance, market crashes can trigger rapid technological changes; shifting consumer preferences might lead to geopolitical tensions; supply chain disturbances can exacerbate major pandemic-related market shifts; and climate change might catalyse all of these. Each of these challenges can start a chain reaction, where one event leads to another, much like dominos falling in succession, and create widening ripples that affect various aspects of the market and society.*

	1	2	3	4	5	
Never	○	○	○	○	○	Always

h) How would you rate the effectiveness of the tool(s) you mentioned in addressing each VUCA challenge? If you mentioned multiple tools, please rate each one.

💡 *For each tool you've mentioned, please provide a satisfaction rating on a scale from 1 (Not effective) to 5 (Extremely effective). If you listed more than one tool, rate each one separately.* ***Please ensure to mention at least one tool.***

Name of tool 1 *

Short-answer text

*Rate the effectiveness of **tool 1** in addressing:* *

	1. Not at all eff...	2. Slightly effe...	3. Moderately ...	4. Very effective	5. Extremely ef...
Volatility	☐	☐	☐	☐	☐
Uncertainty	☐	☐	☐	☐	☐
Complexity	☐	☐	☐	☐	☐
Ambiguity	☐	☐	☐	☐	☐

Name of tool 2

Short-answer text

*Rate the effectiveness of **tool 2** in addressing:*

	1. Not at all eff...	2. Slightly effe...	3. Moderately ...	4. Very effective	5. Extremely ef...
Volatility	☐	☐	☐	☐	☐
Complexity	☐	☐	☐	☐	☐
Ambiguity	☐	☐	☐	☐	☐

Name of tool 3

Short-answer text

*Rate the effectiveness of **tool 3** in addressing:*

	1. Not at all eff...	2. Slightly effe...	3. Moderately ...	4. Very effective	5. Extremely ef...
Volatility	☐	☐	☐	☐	☐
Uncertainty	☐	☐	☐	☐	☐
Complexity	☐	☐	☐	☐	☐
Ambiguity	☐	☐	☐	☐	☐

Name of tool 4

Short-answer text

*Rate the effectiveness of **tool 4** in addressing:*

	1. Not at all eff...	2. Slightly effe...	3. Moderately ...	4. Very effective	5. Extremely ef...
Volatility	☐	☐	☐	☐	☐
Uncertainty	☐	☐	☐	☐	☐
Complexity	☐	☐	☐	☐	☐
Ambiguity	☐	☐	☐	☐	☐

i) Describe a recent scenario where your tools successfully helped you navigate a VUCA challenge. *

⚠️ *Mark '**n/a**' if you're unable to provide an answer.*

Long-answer text

j) Can you recall specific instances where your tool(s) have addressed overall VUCA challenges or individual elements of Volatility, Uncertainty, Complexity, or Ambiguity?

Please provide brief details for up to 2 examples.

Example 1 *

💡 *Please begin by stating the name of your tool, followed by a description.*
⚠️ *Mark '**n/a**' if you're unable to provide an answer.*

Long-answer text

Example 2 *

💡 *Please begin by stating the name of your tool, followed by a description.*
⚠️ *Mark '**n/a**' if you're unable to provide an answer.*

Long-answer text

k) Were there instances where your tool(s) were insufficient in predicting or managing either overall VUCA challenges or specific elements of Volatility, Uncertainty, Complexity, or Ambiguity? Please provide brief details *

💡 *If the tools fell short in addressing VUCA comprehensively, please describe that scenario, mentioning how each element of VUCA was inadequately managed or predicted. If the tools fell short in addressing individual elements of VUCA, please specify which element was inadequately managed or predicted and describe the scenario.*
⚠️ *Mark '**n/a**' if you're unable to provide an answer.*

Long-answer text

l) Please rate the effectiveness of your current tools in detecting early signals of:

💡 *Please reflect on the efficiency of your tools in identifying initial signs of each VUCA element or VUCA as a whole, possibly, in varied contexts.*

	1. Not at all eff...	2. Slightly effe...	3. Moderately ...	4. Very effective	5. Extremely ef...
Volatility	○	○	○	○	○
Uncertainty	○	○	○	○	○
Ambiguity	○	○	○	○	○

m) What are the most significant limitations you've encountered with your current tools in addressing either overall VUCA challenges or specific elements of Volatility, Uncertainty, Complexity, or Ambiguity? *

💡 *If you've experienced limitations with tools addressing VUCA as whole, please specify and detail how they fell short in managing each element of VUCA. If you've experienced limitations with tools addressing specific elements of VUCA, please specify which element and detail how the tool fell short.*
⚠️ *Mark '**n/a**' if you're unable to provide an answer.*

Long-answer text

n) In your opinion, what capabilities and or features should be integrated into these tools to make them more effective against VUCA challenges and in detecting early signals? *
⚠️ *Mark '**n/a**' if you're unable to provide an answer.*

Long-answer text

o) Are there any other tools, techniques, or methods you believe would be beneficial in addressing VUCA challenges and early signal detection? If so, please specify. *

⚠ *Mark '**n/a**' if you're unable to provide an answer.*

Long-answer text

p) The rapidly changing business landscape characterised by VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) has challenged traditional methods of strategic planning, competitive intelligence and decision-making. While various tools and frameworks exist to address some aspects of VUCA, a holistic understanding remains elusive. Within this research, the concept of a 'VUCA causal chain theory' has been proposed as a way to offer a foundational approach to dissecting and managing these challenges systematically. Given this perspective, do you recognise a potential need for this kind of structured approach to better grasp and manage VUCA challenges?" *

- ◯ Strongly Disagree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly Agree

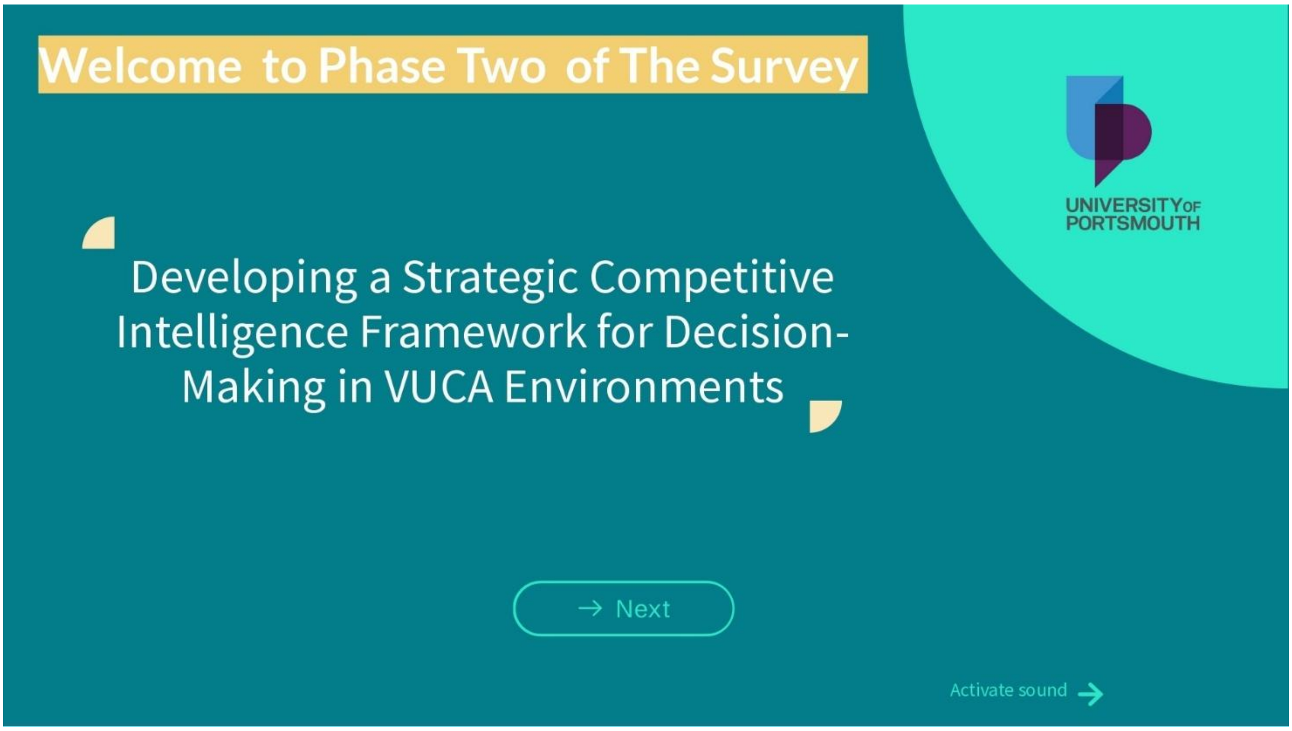
q) Based on your previous answer, please provide any additional thoughts or reasons for your choice. *

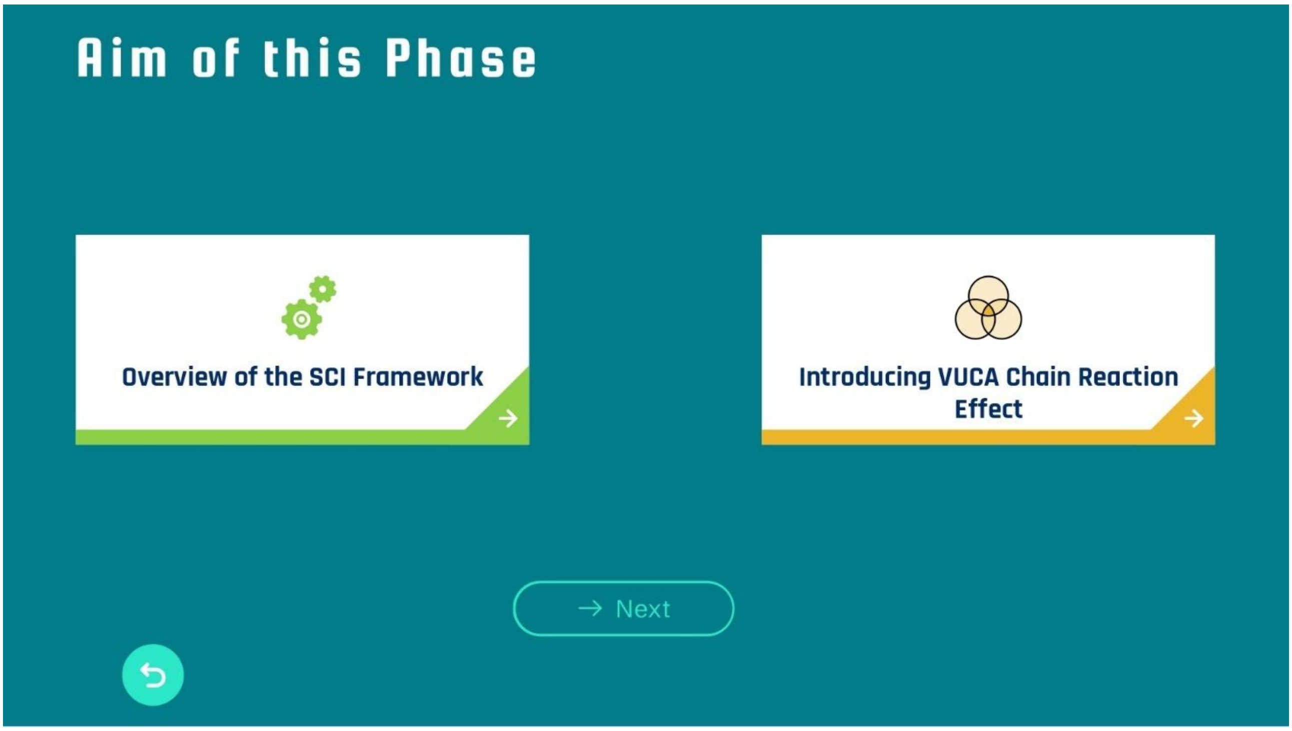
⚠ *Mark '**n/a**' if you're unable to provide an answer.*

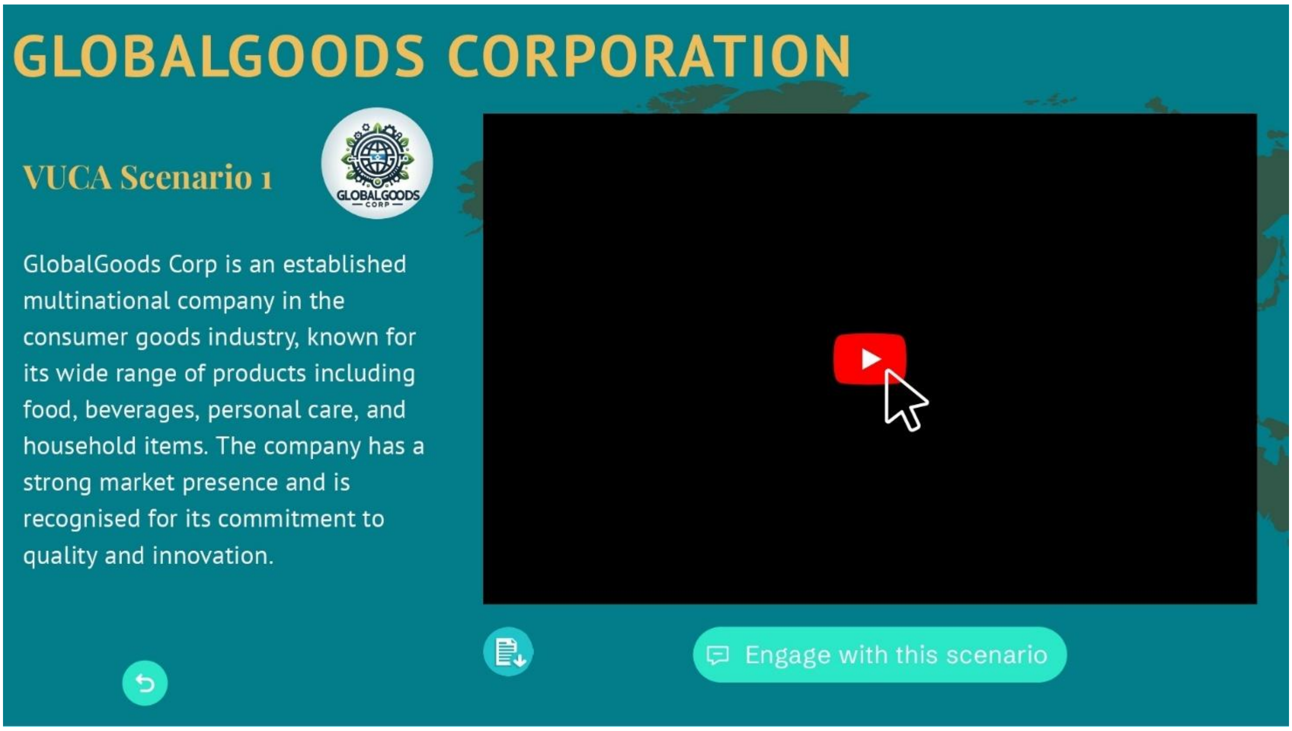
Appendix 12: *Phase Two Interactive VUCA Scenario and Questions*

Full interactive version is available via this link:

https://view.genially.com/65c2a94e32daaa0014f0c6bc






GLOBALGOODS CORPORATION
VUCA Scenario 1
GLOBALGOODS CORP
GlobalGoods Corp is an established multinational company in the consumer goods industry, known for its wide range of products including food, beverages, personal care, and household items. The company has a strong market presence and is recognised for its commitment to quality and innovation.
Engage with this scenario


Explore Global Goods Corporation
3. THE CHALLENGE
1. BUSINESS MODEL
GLOBALGOODS
CORP
2. STRATEGIC POSTURE
4. YOUR TASK

GlobalGoods Corp

Business Model

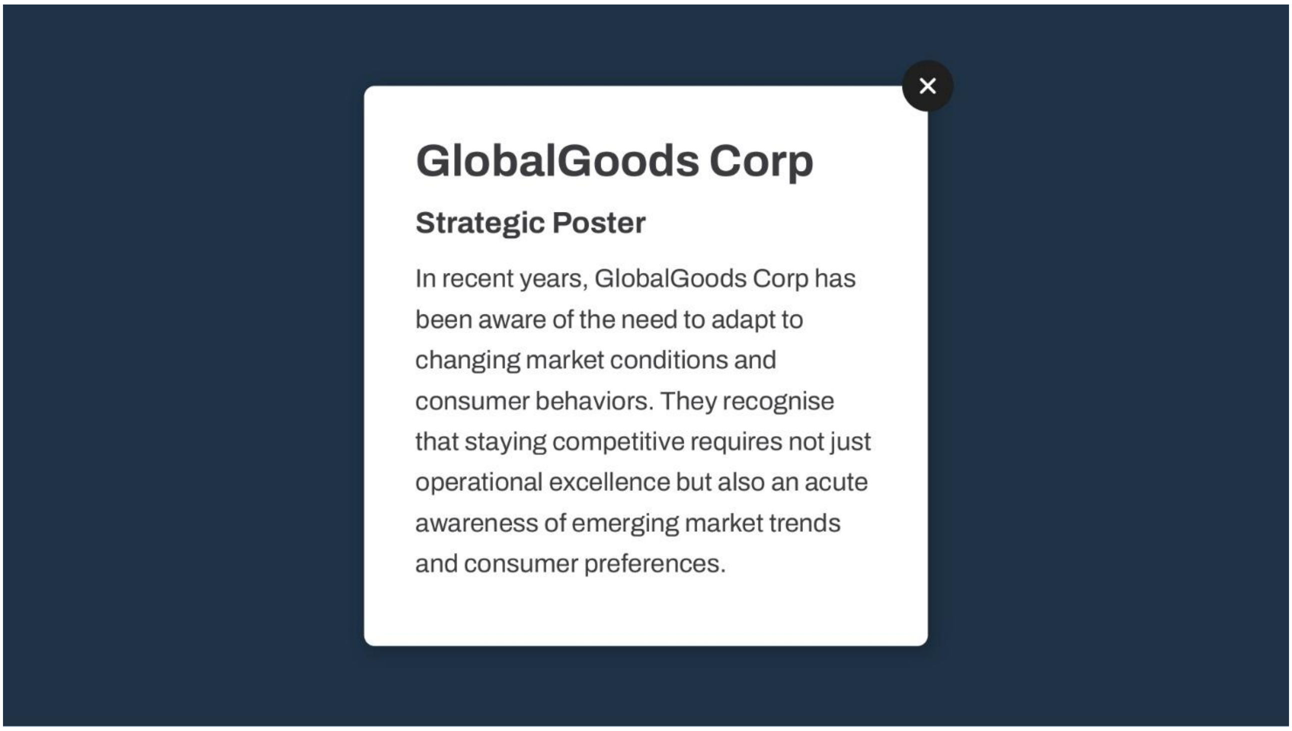
GlobalGoods Corp's business model has been centred around mass-market production and distribution, leveraging economies of scale to offer affordable products. Innovation has typically focused on product line extensions and incremental improvements.

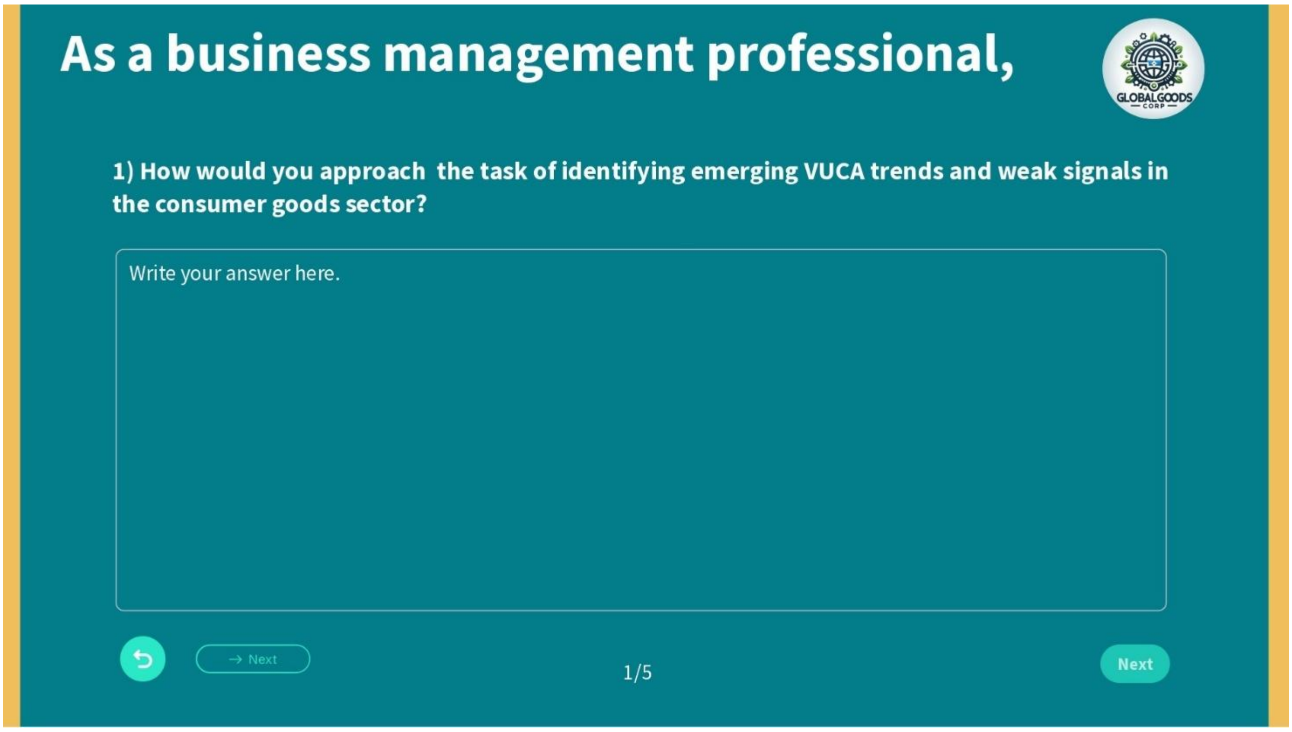
+ Info BM

GLOBALGOODS CORP

The Challenge

The consumer goods landscape is becoming increasingly complex and dynamic. Changes in technology, consumer preferences, and global market conditions are creating new opportunities and challenges. GlobalGoods Corp's leadership team knows they need to stay ahead of these changes but are uncertain about the specific nature of these shifts and how they might impact their business.


GlobalGoods Corp
Strategic Poster
In recent years, GlobalGoods Corp has been aware of the need to adapt to changing market conditions and consumer behaviors. They recognise that staying competitive requires not just operational excellence but also an acute awareness of emerging market trends and consumer preferences.


As a business management professional,
GLOBALGOODS
CORP
1) How would you approach the task of identifying emerging VUCA trends and weak signals in the consumer goods sector?
Write your answer here.
Next
1/5
Next

As a business management professional,

1) How would you approach the task of identifying emerging VUCA trends and weak signals in the consumer goods sector?

Write your answer here.

→ Next

1/5

Next

As a business management professional,

2) What tool (s), methodology or technique (s) would you recommend GlobalGoods Corp to use to detect these signals?

Write your answer here.

→ Next

2/5

Next

As a business management professional,

3) Without specific indicators, consider what types of trend (s) could potentially disrupt or create opportunities for GlobalGoods Corporation?

Write your answer here.

→ Next

3/5

Next

As a business management professional,

4) How might the shift (s) identified in your previous answer impact GlobalGoods corporation's business?

Write your answer here.

→ Next

4/5

Next

As a business management professional,

5) What strategic recommendations would you make for GlobalGoods Corp to stay resilient and agile in the face of uncertain and evolving market dynamics?

Write your answer here.

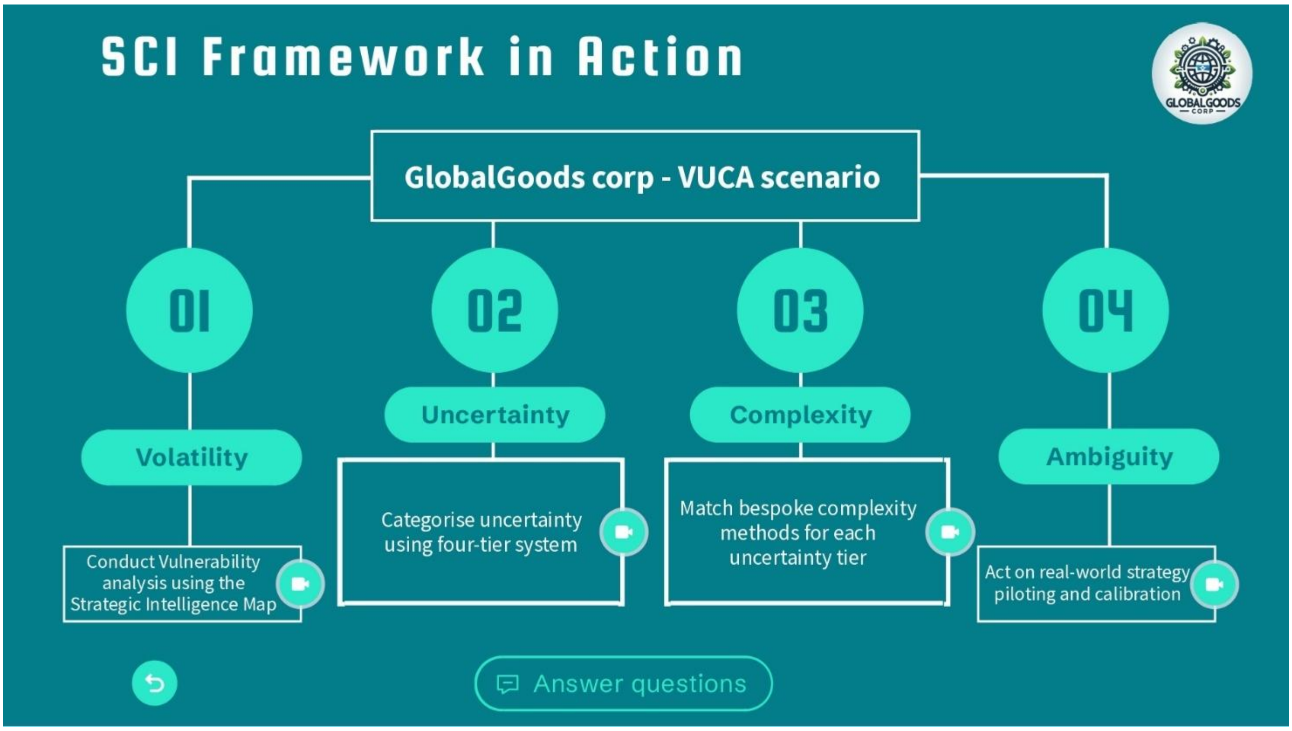
→ Next

5/5

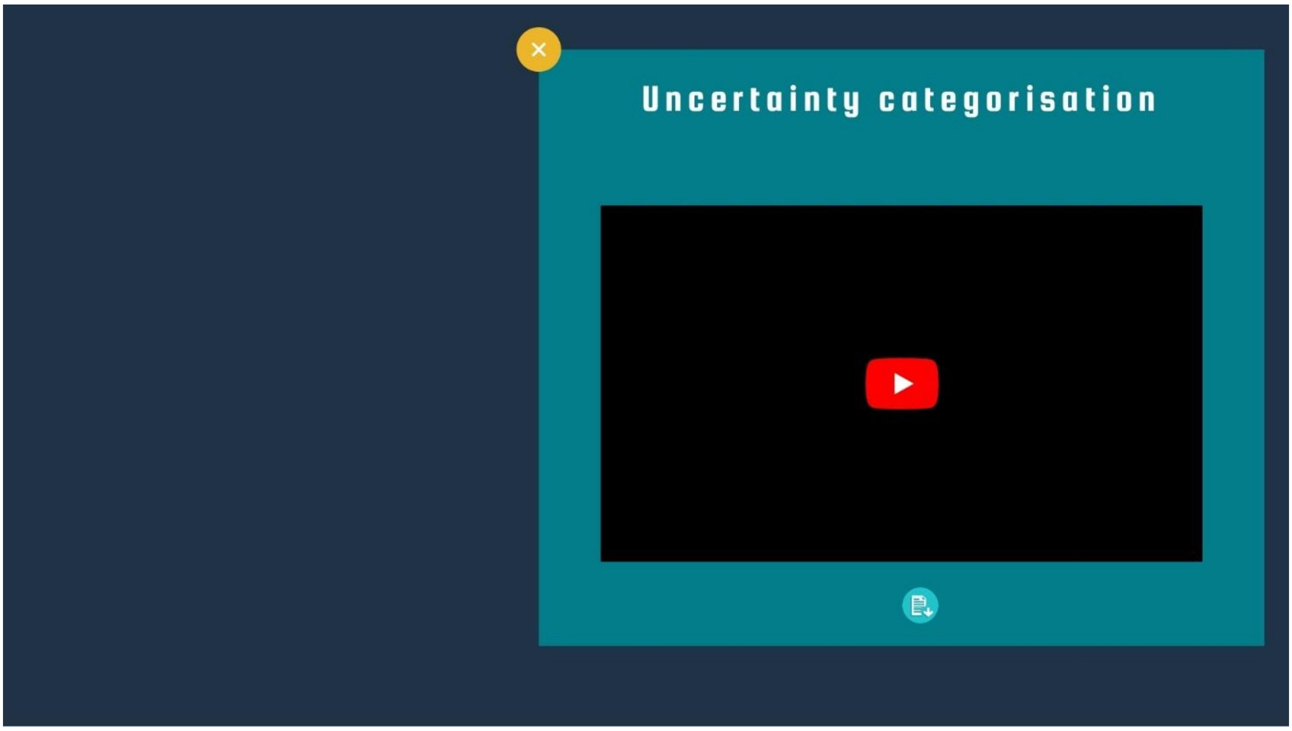
Send

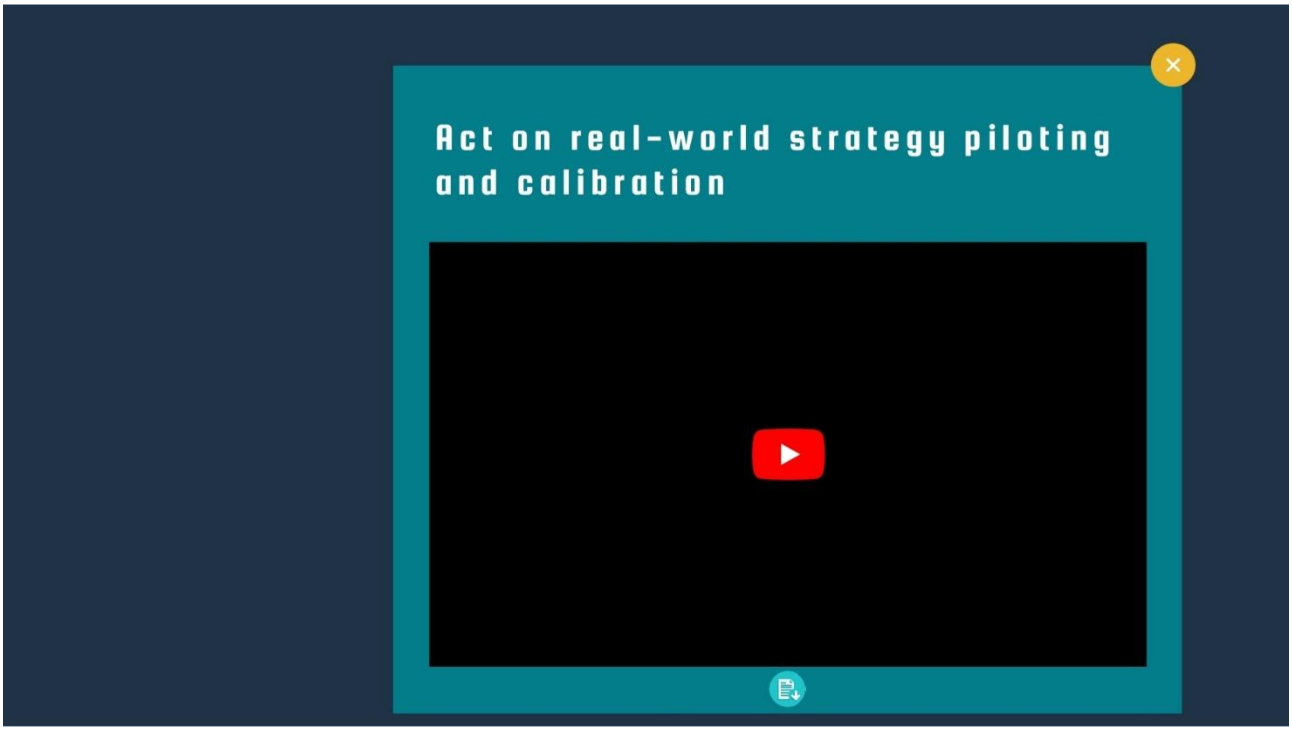
Now, let's explore how the SCI framework tackles the VUCA challenge faced by GlobalGoods Corp.

DISCOVER HERE →


SCI Framework in Action
GLOBALGOODS CORP
GlobalGoods corp - VUCA scenario
01
Volatility
Conduct Vulnerability analysis using the Strategic Intelligence Map
02
Uncertainty
Categorise uncertainty using four-tier system
03
Complexity
Match bespoke complexity methods for each uncertainty tier
04
Ambiguity
Act on real-world strategy piloting and calibration
Answer questions


Conduct Vulnerability Analysis using the Strategic Intelligence Map


Uncertainty categorisation


Act on real-world strategy piloting and calibration

Matching uncertainty level with complexity

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In essence, the four-tier system helps focus the complexity mapping where it will be most valuable, and the complexity mapping turns the theoretical uncertainties into actionable insights and strategies.

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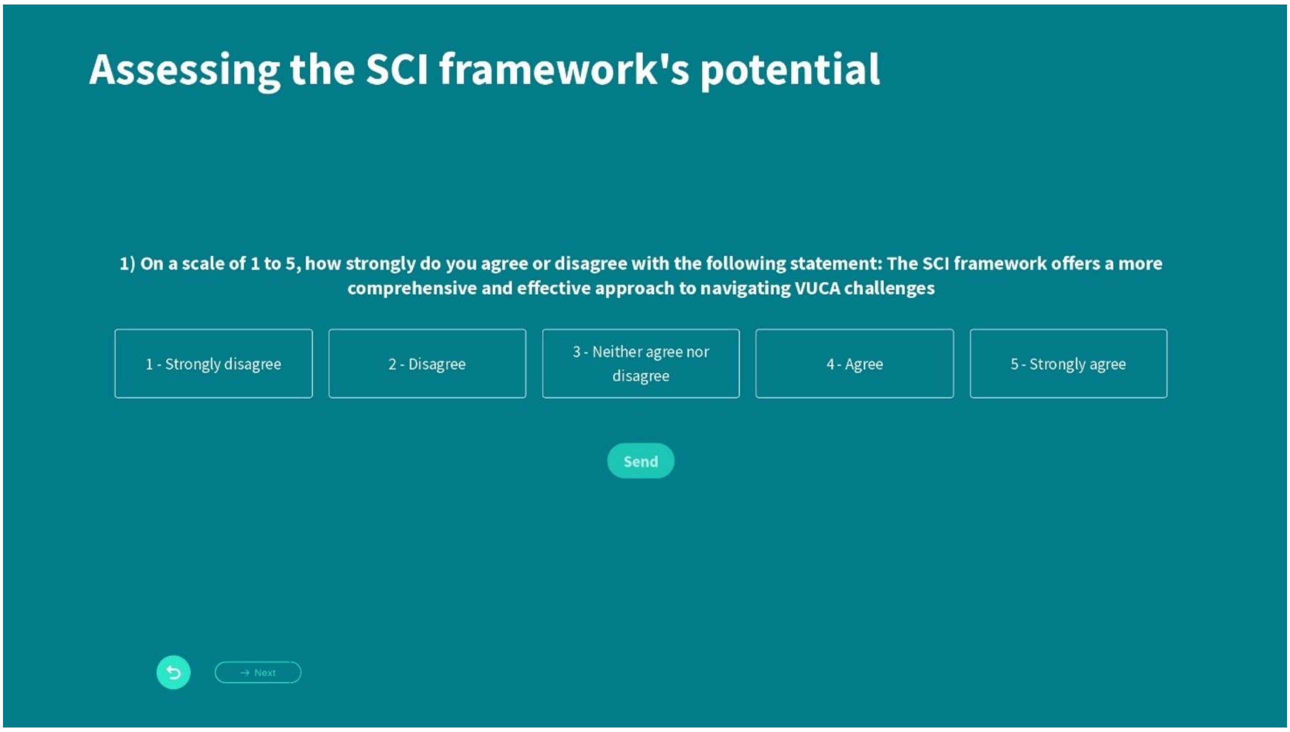
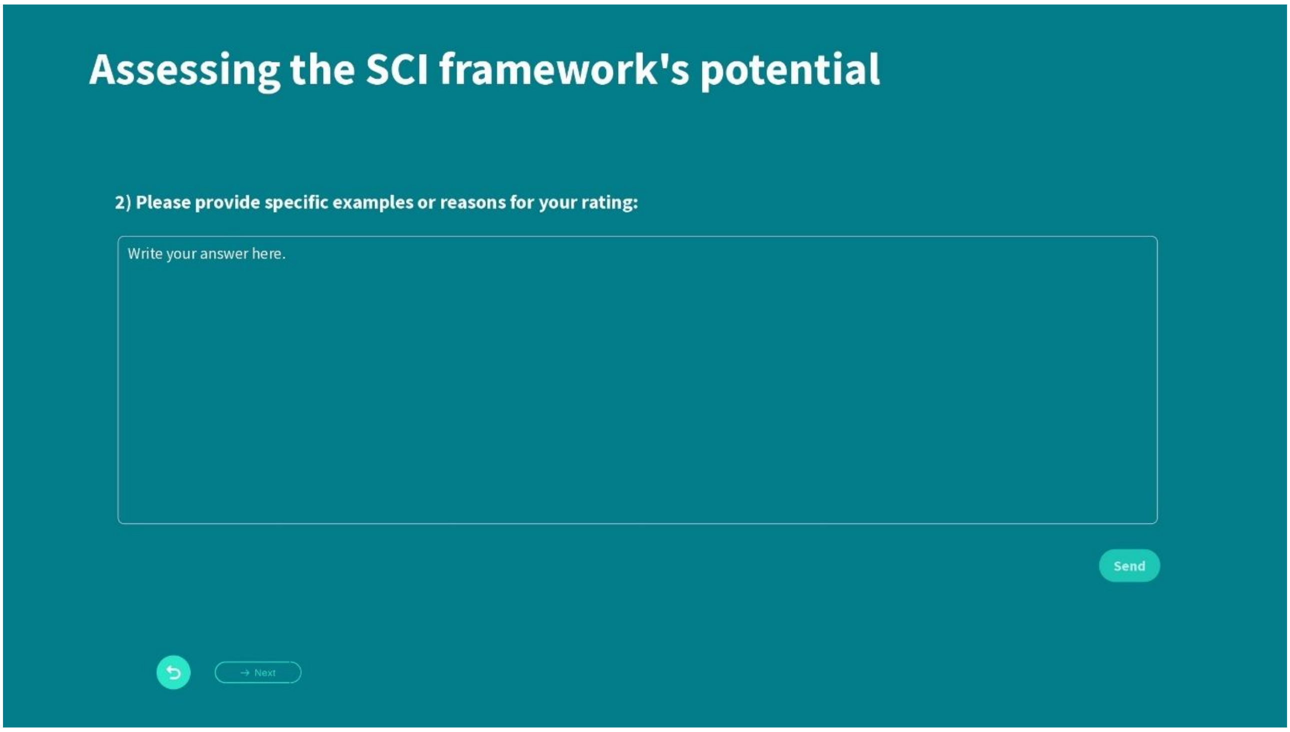
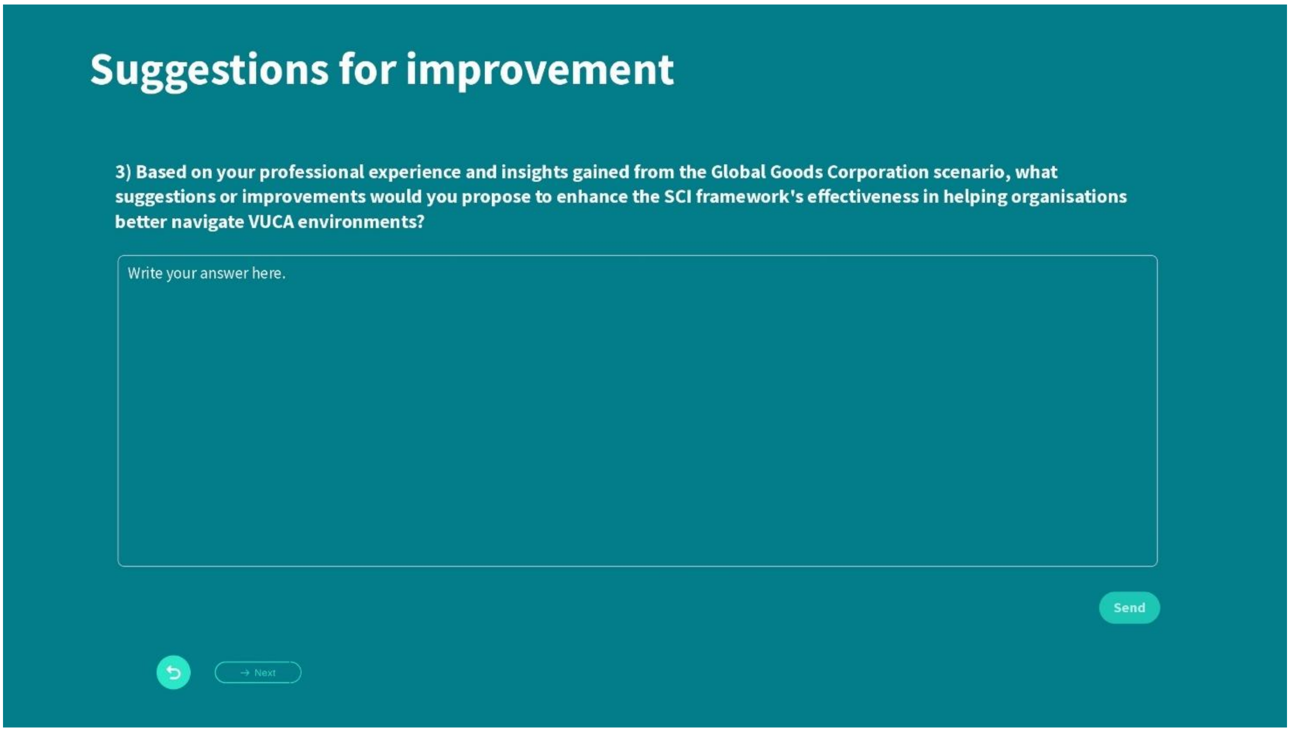
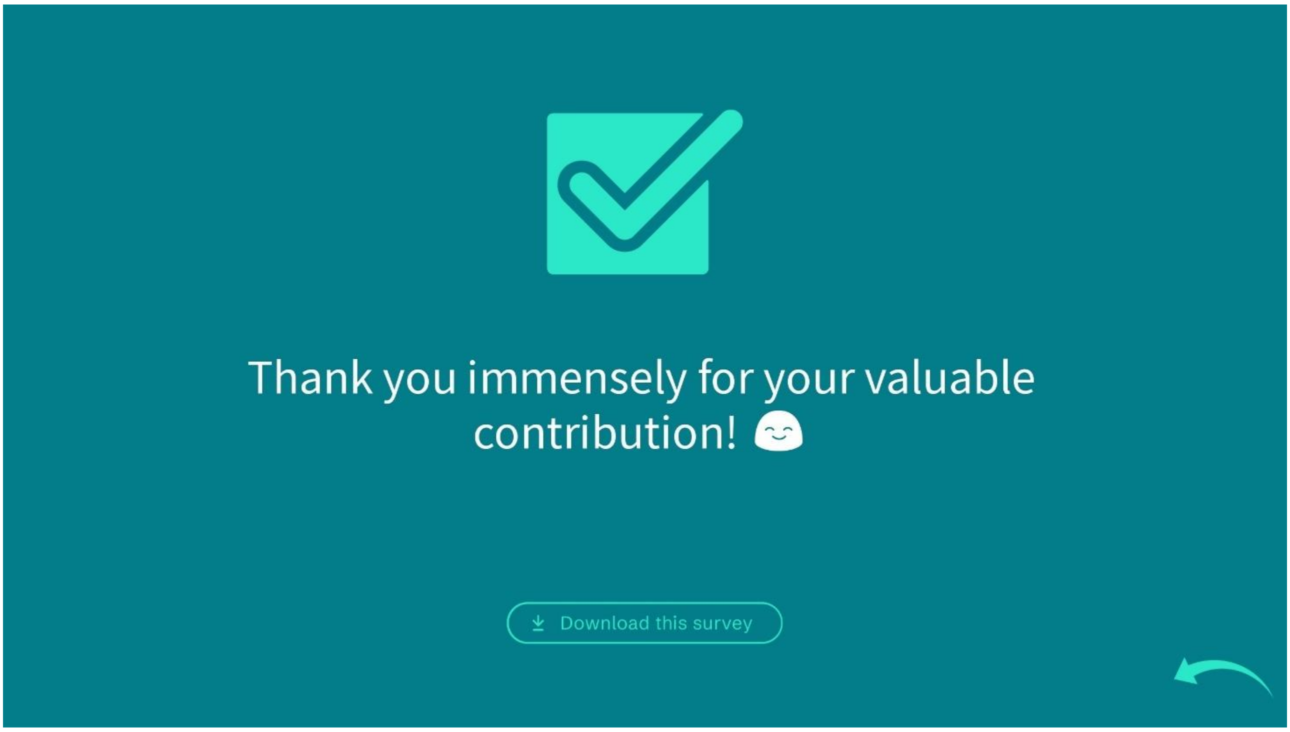
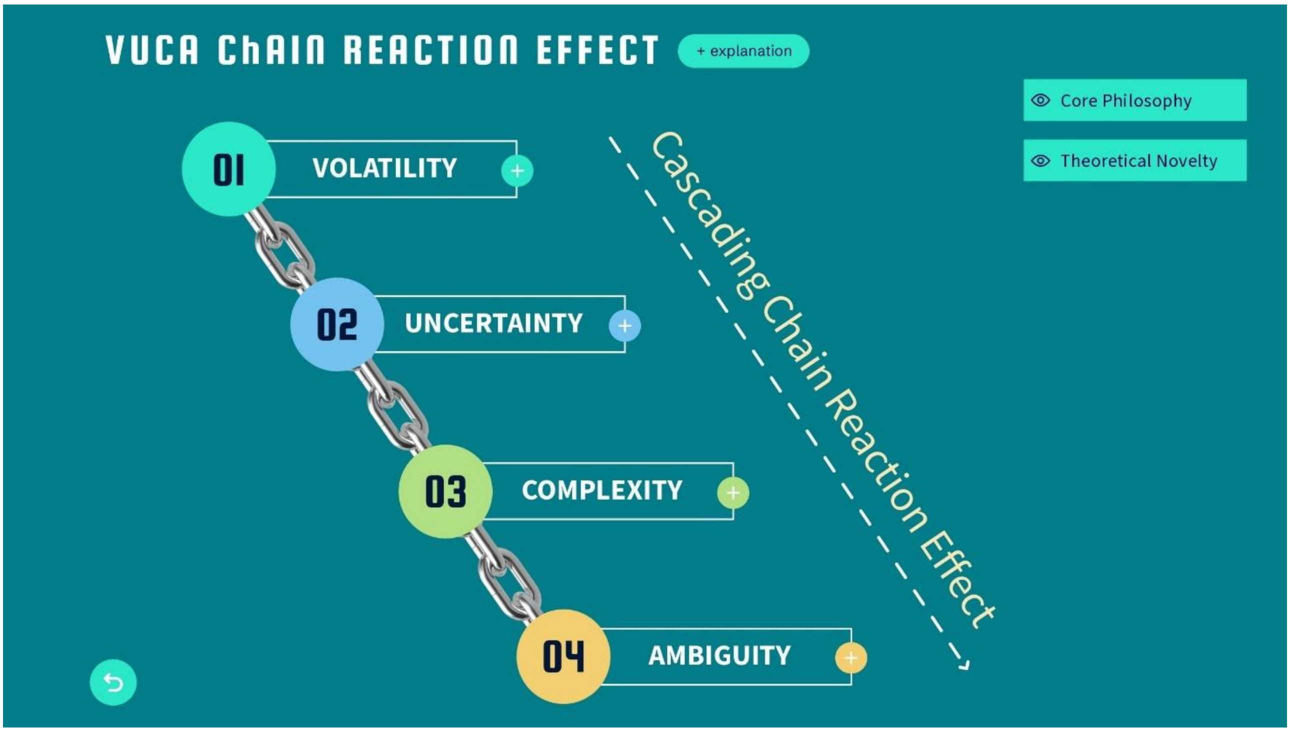

Assessing the SCI framework's potential
1) On a scale of 1 to 5, how strongly do you agree or disagree with the following statement: The SCI framework offers a more comprehensive and effective approach to navigating VUCA challenges
1 - Strongly disagree
2 - Disagree
3 - Neither agree nor disagree
4 - Agree
5 - Strongly agree
Send
Next


Assessing the SCI framework's potential
2) Please provide specific examples or reasons for your rating:
Write your answer here.
Send
Next


Suggestions for improvement
3) Based on your professional experience and insights gained from the Global Goods Corporation scenario, what suggestions or improvements would you propose to enhance the SCI framework's effectiveness in helping organisations better navigate VUCA environments?
Write your answer here.
Send
Next


Thank you immensely for your valuable contribution!
Download this survey


VUCA ChAIN REACTION EFFECT
+ explanation
Core Philosophy
Theoretical Novelty
01
VOLATILITY
02
UNCERTAINTY
03
COMPLEXITY
04
AMBIGUITY
Cascading Chain Reaction Effect


COMPLEXITY
Complexity
In the context of this research, complexity refer to the interconnectedness and interdependencies among the four levels of uncertainties identified in the framework;
(Level 1) - Clear-enough future
(Level 2) - Alternate futures
(Level 3) - Range of futures
(Level 4) - True ambiguity

VUCA CHAIN REACTION EFFECT (EXPLAINED)

The VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) chain reaction effect is an innovative concept that describes the interconnected and cascading relationships between the four elements of VUCA. This theory proposes that the elements of VUCA are not merely discrete challenges but rather form a chain reaction effect, with each element potentially triggering or amplifying the others.

At the core of the VUCA chain reaction effect is the idea that volatility, characterised by rapid and unpredictable changes in an organisation's environment, can set off a series of reactions. As volatility increases, it can contribute to heightened levels of uncertainty, which refers to the lack of predictability and the difficulty in determining potential outcomes. The combination of volatility and uncertainty can then compound the complexity of the situation, representing the intricate web of interconnected factors, relationships, and dependencies in the organisational environment.

As the chain reaction progresses, the interplay of volatility, uncertainty, and complexity can create ambiguity, a state in which there is a lack of clarity and the potential for multiple interpretations of a situation or problem

. The VUCA chain reaction effect highlights the interconnected nature of the VUCA elements and emphasises the importance of recognising their potential to influence and exacerbate one another.

This understanding of the VUCA chain reaction effect serves as a foundation for the development of the Strategic Competitive Intelligence (SCI) framework. The SCI framework aims to assist organisations in proactively identifying, assessing, and responding to the challenges posed by the VUCA environment. By acknowledging the interconnected nature of the VUCA elements and their potential for cascading effects, organisations can develop more comprehensive and adaptive strategies to navigate the complexities of the modern business landscape.

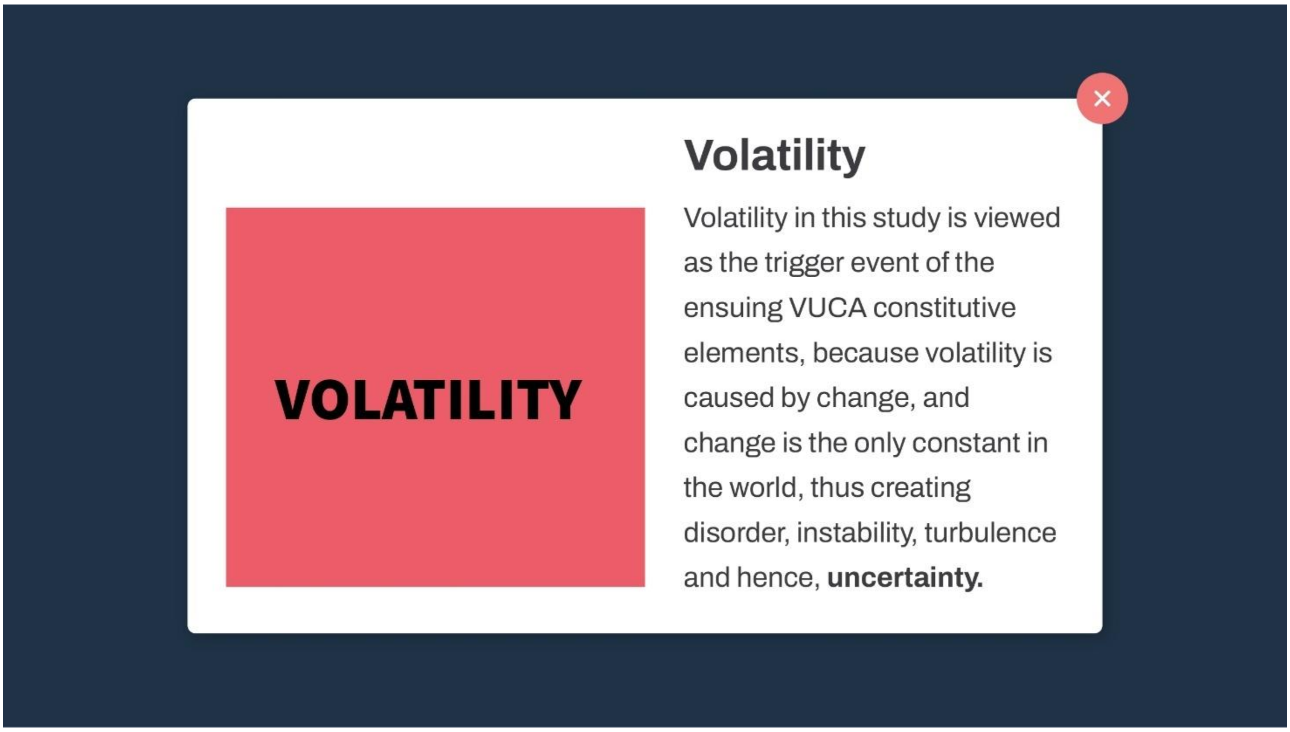
The VUCA chain reaction effect provides a valuable lens through which to understand the dynamic and interdependent nature of the challenges faced by organisations operating in a VUCA environment. By recognising the potential for volatility to trigger a chain reaction involving uncertainty, complexity, and ambiguity, organisations can adopt a more holistic and proactive approach to managing these challenges and building resilience in the face of rapid change.

See example

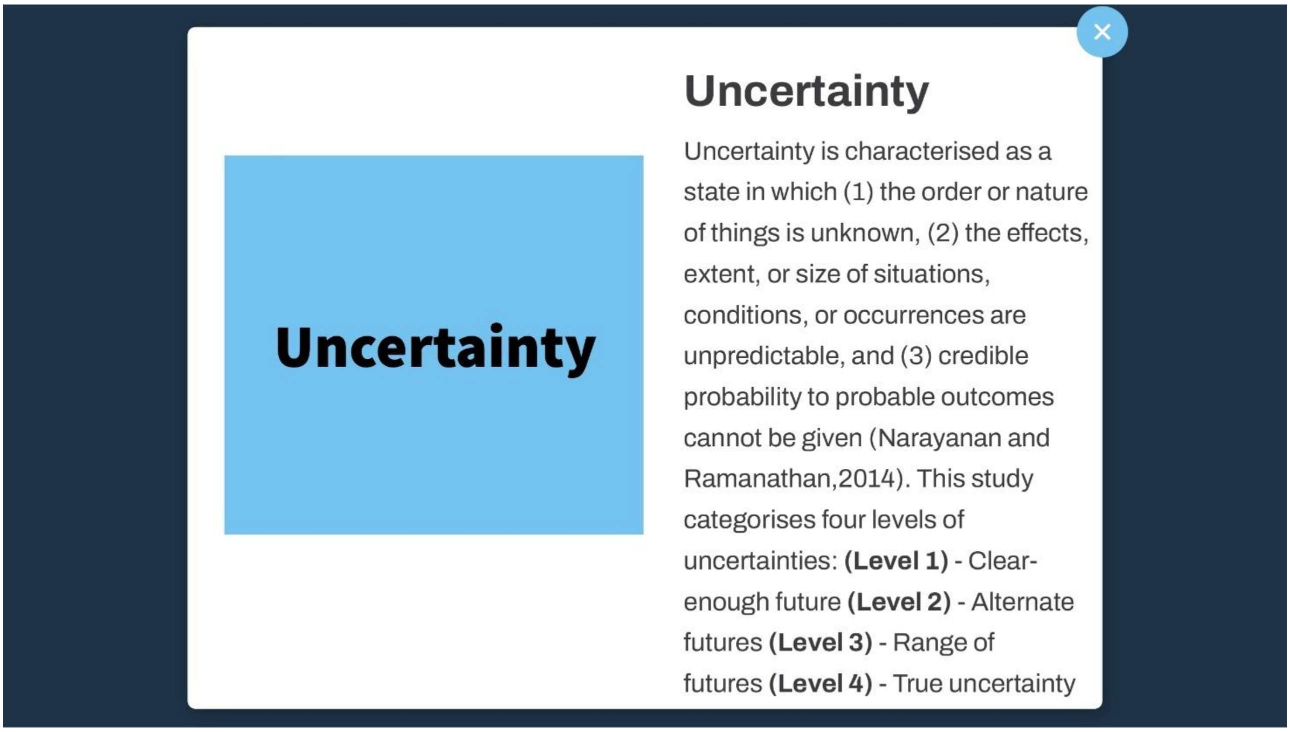
AMBIGUITY

Ambiguity

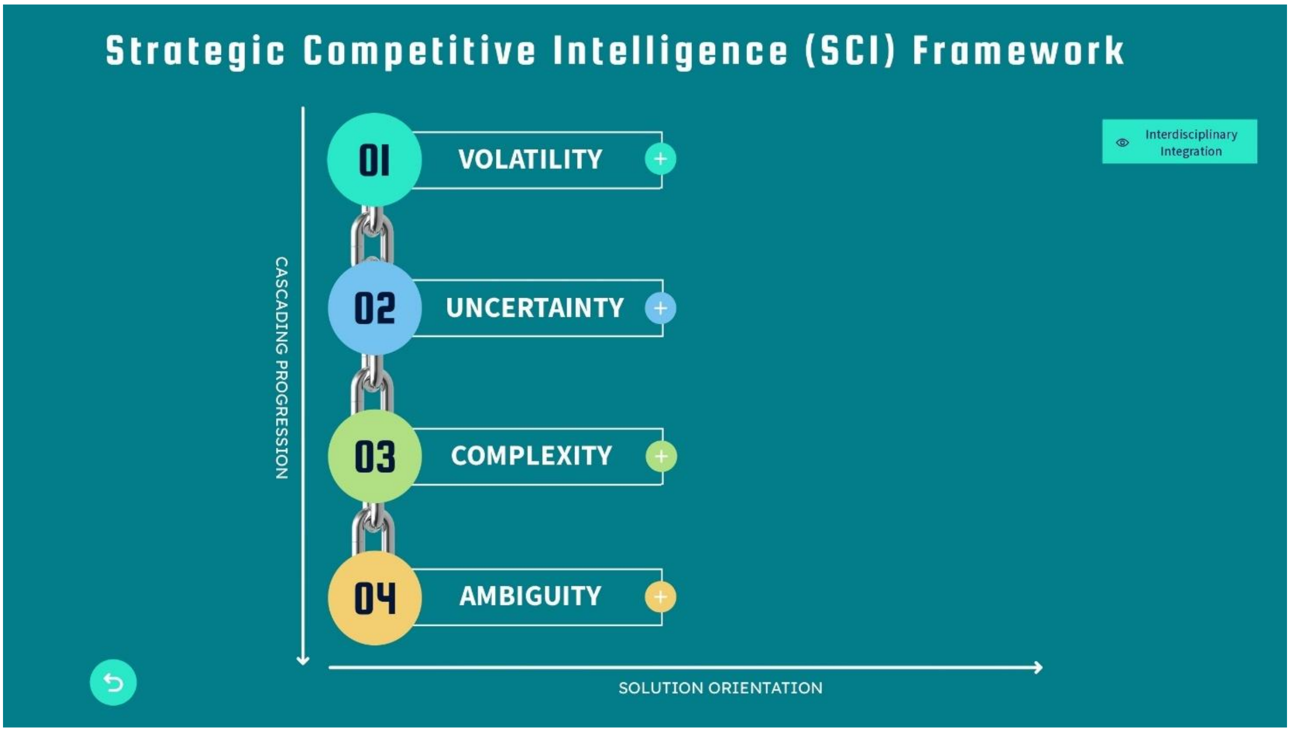
Within the SCI framework, ambiguity focus on clear strategy execution and implementation. This approach emphasises the need to translate insights into action and continuously refine strategies based on real-world feedback and changing circumstances.


VOLATILITY
Volatility
Volatility in this study is viewed as the trigger event of the ensuing VUCA constitutive elements, because volatility is caused by change, and change is the only constant in the world, thus creating disorder, instability, turbulence and hence, **uncertainty.**

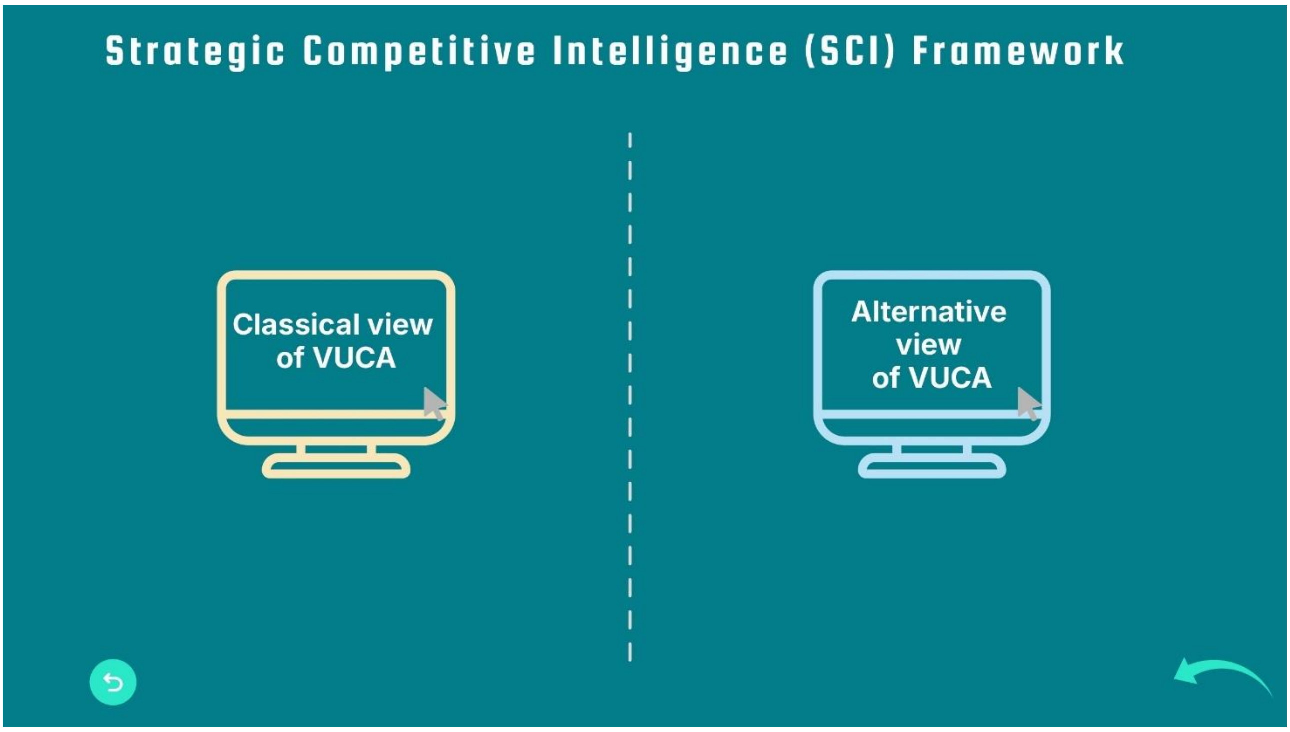

THEORETICAL NOVELTY
VUCA CHAIN REACTION EFFECT
As evidenced by a rigorous review of scholarly databases, the interconnection and sequencing of VUCA components remains conspicuously underexplored, presenting a compelling research gap that the proposed theory aims to address. By elucidating the chain reaction effect between VUCA elements, the theory enhances theoretical understanding of how these challenges unfold and intersect in organisational contexts.

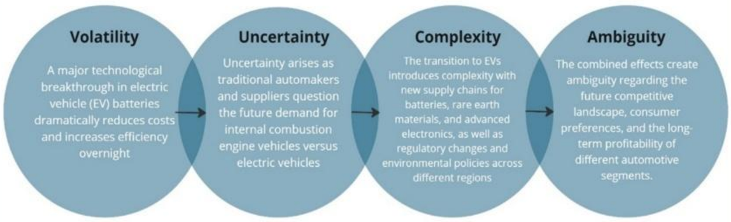

Uncertainty
Uncertainty
Uncertainty is characterised as a state in which (1) the order or nature of things is unknown, (2) the effects, extent, or size of situations, conditions, or occurrences are unpredictable, and (3) credible probability to probable outcomes cannot be given (Narayanan and Ramanathan,2014). This study categorises four levels of uncertainties: **(Level 1)** - Clear-enough future **(Level 2)** - Alternate futures **(Level 3)** - Range of futures **(Level 4)** - True uncertainty


Volatility
Navigating Volatility
Traditional theories may not adequately address the rapid and unpredictable changes in markets, technology, and geopolitics. A **VUCA Chain Reaction Effect** would help in understanding the root causes of volatility and developing strategies to mitigate its impact.
Uncertainty
Managing Uncertainty
The lack of predictability in economic, political, and social trends makes it difficult for businesses to plan for the future. A theory focused on Chain Reaction Effect in a VUCA context could pave the way for a framework to identifying potential uncertainties and developing contingency plans.
Complexity
Addressing Complexity
The interconnectedness of global markets, supply chains, and technological systems add layers of complexity to decision-making. A VUCA **Chain Reaction Effect** would aid in breaking down complex situations into manageable elements, allowing for more effective analysis and decision-making.
Ambiguity
Dealing with Ambiguity
Ambiguity arises from the lack of clarity about the meaning of events or the lack of a clear path forward. A theory that explicates how Volatility, Uncertainty and Complexity culminate in ambiguous situations, can guide leaders in making informed decisions amidst unclear circumstances.


Strategic Competitive Intelligence (SCI) Framework
Interdisciplinary Integration
CASCADING PROGRESSION
01
VOLATILITY
02
UNCERTAINTY
03
COMPLEXITY
04
AMBIGUITY
SOLUTION ORIENTATION


INTERDISCIPLINARY INTEGRATION
SCI FRAMEWORK
The SCI Framework represents a synthesis of diverse interdisciplinary perspectives encompassing strategic management, competitive intelligence, decision theory, complexity theory, chaos theory and organisational behaviour. This integration of insights across fields allows for a more comprehensive conceptualisation of the VUCA phenomenon compared to domain-specific approaches





Rather than four dissociated examples seen commonly used in the classical view of VUCA, this research proposes a paradigm shift in VUCA conceptualisation, positing that the VUCA phenomenon should be viewed as a **singular, integrated construct** with **four interconnected dimensions**. This example offers a **holistic perspective** that aligns with **systems thinking** approaches in organisational studies, which emphasise the importance of understanding phenomena as **interconnected wholes** rather than as collections of discrete parts.

In this common example, VUCA is **treated in isolation**, with each element depicted in four **distinct and unrelated** scenarios. This **compartmentalised approach** leads to the development of **siloed strategies** that fail to address the **holistic** nature of VUCA challenges. Furthermore, treating VUCA factors this way may result in **overlooking critical feedback loops** and **amplification effects**, which can exponentially increase the complexity of strategic decision-making. Developing four separate scenarios risks **obscuring strategic focus** and potentially undermines an organization's ability to build the **integrative and adaptive capacities** necessary for thriving in a VUCA environment.

Appendix 13: *Ethics Approval*

UNIVERSITY OF PORTSMOUTH

FAVOURABLE ETHICAL OPINION

Study Title: Developing a strategic competitive framework for MNEs

Reference Number: BAL/2022/06/QUOTB

Date Resubmitted: 13/04/2023

Thank you for resubmitting your application to the Faculty Ethics Committee and for making the requested changes/ clarifications.

I am pleased to inform you that the Faculty Ethics Committee was content to grant a favourable ethical opinion of the above research on the basis described in the submitted documents listed at Annex A, subject to standard general conditions (*See Annex B).*

Please note that the favourable opinion of the Faculty Ethics Committee does not grant permission or approval to undertake the research/ work. Management permission or approval must be obtained from any host organisation, including the University of Portsmouth or supervisor, prior to the start of the study.

Wishing you every success in your research

Judith Fletcher-Brown, Chair of the Faculty of

Business and Law Ethics Committee

Annexes

A - Documents reviewed

B - After ethical review

ANNEX A **Documents reviewed**

The documents ethically reviewed for this application

Document	*Version*	*Date*
Application form	1	13/04/2023

ANNEX B - After ethical review

1. This Annex sets out important guidance for those with a favourable opinion from a University of Portsmouth Ethics Committee. Please read the guidance carefully. A failure to follow the guidance could lead to the committee reviewing and possibly revoking its opinion on the research.

2. It is assumed that the work will commence within 1 year of the date of the favourable ethical opinion or the start date stated in the application, whichever is the latest.

3. The work must not commence until the researcher has obtained any necessary management permissions or approvals – this is particularly pertinent in cases of research hosted by external organisations. The appropriate head of department should be aware of a member of staff's plans.

4. If it is proposed to extend the duration of the study beyond that stated in the application, the Ethics Committee must be informed.

5. Any proposed substantial amendments must be submitted to the Ethics Committee for review. A substantial amendment is any amendment to the terms of the application for ethical review, or to the protocol or other supporting documentation approved by the Committee that is likely to affect to a significant degree:

(a) the safety or physical or mental integrity of participants
(b) the scientific value of the study
(c) the conduct or management of the study.

5.1 A substantial amendment should not be implemented until a favourable ethical opinion has been given by the Committee.

6. At the end of the work a final report should be submitted to the ethics committee. A template for this can be found on the University Ethics webpage.

7. Researchers are reminded of the University's commitments as stated in the Concordat to Support Research Integrity viz:

- maintaining the highest standards of rigour and integrity in all aspects of research
- ensuring that research is conducted according to appropriate ethical, legal and professional frameworks, obligations and standards
- supporting a research environment that is underpinned by a culture of integrity and based on good governance, best practice and support for the development of researchers
- using transparent, robust and fair processes to deal with allegations of research misconduct should they arise
- working together to strengthen the integrity of research and to reviewing progress regularly and openly.

8. In ensuring that it meets these commitments the University has adopted the UKRIO Code of Practice for Research. Any breach of this code may be considered as misconduct and may be investigated following the University Procedure for the Investigation of Allegations of Misconduct in Research. Researchers are advised to use the UKRIO checklist as a simple guide to integrity.

Appendix 14: *VUCA Scenario and Transcript*

Video link

Welcome to the second phase of our research journey. Today, we delve into the world of Global Goods Corp, a leader in the consumer goods industry. As we navigate their story, we invite you to explore, reflect, and engage with a scenario that is as challenging as it is intriguing.

Global Goods Corp stands at the forefront of innovation, with a diverse range of products reaching customers worldwide. They are a household name, but the market is changing, and so are consumer expectations. Think about this: what trends in consumer behaviour have you noticed recently? As technologies evolve and new markets emerge, Global Goods Corp faces a dilemma—how to stay ahead in a rapidly transforming landscape.

In this scenario, our protagonist company has noticed subtle shifts, signals of change in the consumer goods sector. But what are these signals, and how significant could they be? Consider this: if you were at Global Goods Corp, how would you detect these weak signals?

Now, let's dive deeper. Global Goods Corp's team is diverse and skilled, but unsure how these shifts will play out. They face a spectrum of possibilities, from groundbreaking opportunities to unseen challenges. In this complex environment, strategic decisions are not black and white; they require foresight, creativity, and a willingness to explore the unknown.

Here's a thought: what innovative strategies might Global Goods Corp consider in responding to these market changes? Your insights and strategies are crucial to this exploration.

After this video, you'll find a brief survey where you can share your thoughts and engage further with the scenario. Thank you for being a part of this journey. Your perspectives are invaluable in shaping the future of Global Goods Corp. Stay curious, stay innovative.

Appendix 15: *SCI Framework Simplified Template*

SCI Framework Template

1. Identify Key Vulnerability Topic (KVT) *

Describe the key topic or area of vulnerability

💡 Use the Strategic Intelligence Map® by the World Economic Forum (WEF) to explore key vulnerability topics relevant to your VUCA (Volatile, Uncertain, Complex, Ambiguous) context.The Strategic Intelligence Map can be found here: (https://intelligence.weforum.org/topics)

2. Volatility Analysis *

Describe the potential sources of Volatility related to the KVT, based on your analysis of the WEF Strategic Intelligence Map

💡 Analyse potential source of Volatility related to the KVT. Identify Related Nodes: On the WEF map, locate nodes directly related to your KVT. Explore their descriptions and connections. Explore Interconnections: Examine how these related nodes connect to other nodes on the map. Identify any cascading effects or feedback loops that could amplify volatility. Analyse Driving Forces: What trends, events, or factors are driving change within these interconnected nodes? How might these driving forces impact the KVT? Assess Potential Disruptions: Identify potential disruptions or Black Swan events that could emerge from these interconnected systems. How might these disruptions affect the KVT and its associated uncertainties?

Now that you have identified your KVT and analysed its potential volatility, categorise the associated uncertainties using the four tiers below.

Tier	Level of Uncertainty	Description	Key Questions	Actions/Strategies
1	Clear Enough Future (Known Knowns)	Describe certain trends and data related to your KVT.	What data or information do you already have about these trends? How confident are you in this data?	What actions can you take based on this certain information?
2	Alternate Futures (Known Unknowns)	Describe the range of possible outcomes related to your KVT, acknowledging uncertainty.	What are the plausible alternative scenarios? What are the key uncertainties that need to be addressed?	What strategies can you develop to prepare for these different scenarios?
3	Range of Futures (Unknown Knowns)	Describe the complex, interconnected factors related to your KVT and potential systemic shifts.	What are the interconnected systems that could impact your KVT? What are the potential cascading effects or feedback loops?	What strategies can you employ to build agility and navigate systemic complexities?
4	True Uncertainty (Unknown Unknowns)	Describe the truly unknowable and unpredictable events (Black Swan events) related to your KVT.	What are the potential Black Swan events that could significantly impact your KVT? How can you prepare for the unpredictable?	What strategies can you implement to build resilience and antifragility for unexpected disruptions?

4. Complexity Mapping *

Describe the interconnectedness netwrok of uncertainty, including relationship between tiers and sub-nodes. Use diagrams or visual representations

💡 Visualise the interconnections between the uncertainty tiers and their sub-nodes. Consider the following:

- **Interconnections between Tiers:** How do insights from one tier inform or influence other tiers? (e.g., Tier 1 informing Tier 2 scenarios)
- **Sub-Node Interconnections within Tiers:** How do factors within each tier relate to each other? (e.g., "Changing Retail Landscape" linked to "Shifting Demographics")
- **Types of Relationships:** What kind of relationships exist between elements? (e.g., causal, reinforcing, feedback)
- **Strength of Connections:** What is the relative importance of different relationships?

5. Ambiguity Mitigation (7-Point Approach)

1. Prioritise KVT Scenarios

Identify the most impactful scenarios related to your KVT. Consider their likelihood and potential consequences. Which scenarios pose the greatest threats or opportunities.

2. Formulate Strategies

Develop specific strategies to address each prioritised scenario. Outline clear objectives, key actions, resource allocations, and performance metrics.

3. Establish Clear Governance

Define roles, responsibilities, and decision-making processes for implementing your strategies. Who is responsible for what? How will decisions be made and communicated.

4. Implement Pilot Project

Test your strategies with small-scale pilot projects. This allows you to gather data, identify potential challenges, and refine your approach before full-scale implementation.

5. Foster Collaboration

Encourage collaboration and communication across different departments or teams. This ensures a coordinated and integrated approach to ambiguity mitigation.

6. Monitor & Adapt

Continuously monitor the implementation of your strategies and their impact. Be prepared to adapt your approach based on new information, changing circumstances, and feedback.

7. Communicate Effectively

Maintain clear and consistent communication with all stakeholders throughout the process. This helps build trust, manage expectations, and ensure alignment.

FORM UPR16

Research Ethics Review Checklist

Please include this completed form as an appendix to your thesis (see the Research Degrees Operational Handbook for more information

UNIVERSITY OF PORTSMOUTH

Postgraduate Research Student (PGRS) Information			**Student ID:**	2038871
PGRS Name:	Amine Belmejdoub Quotb			
Department:	Organisations, Systems and People	**First Supervisor:**	Professor Mark Xu	
Start Date: (or progression date for Prof Doc students)		**Oct 2020**		

Study Mode and Route:	Part-time ☐	MPhil ☐	MD ☐
	Full-time ☒	PhD ☒	Professional Doctorate ☐

Title of Thesis:	Developing a Strategic Competitive Intelligence Framework for Decision-Making in VUCA Environments
Thesis Word Count: (excluding ancillary data)	81859

If you are unsure about any of the following, please contact the local representative on your Faculty Ethics Committee for advice. Please note that it is your responsibility to follow the University's Ethics Policy and any relevant University, academic or professional guidelines in the conduct of your study

Although the Ethics Committee may have given your study a favourable opinion, the final responsibility for the ethical conduct of this work lies with the researcher(s).

UKRIO Finished Research Checklist: (If you would like to know more about the checklist, please see your Faculty or Departmental Ethics Committee rep or see the online ve the full checklist at: https://ukrio.org/publications/code-of-practice-for-research	
a) Have all of your research and findings been reported accurately, honestly and within a reasonable time frame?	YES ☒ NO ☐
b) Have all contributions to knowledge been acknowledged?	YES ☒ NO ☐
c) Have you complied with all agreements relating to intellectual property, publication and authorship?	YES ☒ NO ☐
d) Has your research data been retained in a secure and accessible form and will it remain so for the required duration?	YES ☒ NO ☐
e) Does your research comply with all legal, ethical, and contractual requirements?	YES ☒ NO ☐

Candidate Statement:			
I have considered the ethical dimensions of the above named research project, and have successfully obtained the necessary ethical approval(s)			
Ethical review number(s) from Faculty Ethics Committee (or from NRES/SCREC):		BAL/2022/06QUOTB	
If you have *not* submitted your work for ethical review, and/or you have answered 'No' to one or more of questions a) to e), please explain below why this is so:			
Signed *(PGRS)*:		**Date:** 29/11/2024	

UPR16 – April 2018

FORM UPR16

Research Ethics Review Checklist

Please include this completed form as an appendix to your thesis (see the Research Degrees Operational Handbook for more information

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a) Have all of your research and findings been reported accurately, honestly and within a reasonable time frame?	YES NO	☒ ☐
b) Have all contributions to knowledge been acknowledged?	YES NO	☒ ☐
c) Have you complied with all agreements relating to intellectual property, publication and authorship?	YES NO	☒ ☐
d) Has your research data been retained in a secure and accessible form and will it remain so for the required duration?	YES NO	☒ ☐
e) Does your research comply with all legal, ethical, and contractual requirements?	YES NO	☒ ☐

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Signed *(PGRS)*:		**Date:** 29/11/2024	