



BOURNEMOUTH UNIVERSITY

**Analysing the Influence of Organizational Culture and
Innovation on Firm Performance Across Various
Industries in the UK, France, Germany, Spain, Italy, and
Poland: A Comparative Study**

**A dissertation submitted by
CHRISTABEL CHIAMAKA NWOKO
in partial completion of the award of
MSc Management with Business Analytics**

**‘I hereby declare that the dissertation submitted is wholly the work of
Christabel Chiamaka Nwoko. Any other contributors or sources have
either been referenced in the prescribed manner or are listed in the
acknowledgements together with the nature and scope of their
contribution.’**

Bournemouth University Business School (2024)

Under the supervision of: Yasin Rofcanin

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ABSTRACT

Organizational culture and innovation are crucial for industrial success and competitive advantage in today's dynamic market. As industries adapt to market changes and technological advancements, critical analyses of the relationship between these factors become increasingly vital. This study investigates and compares the influence of organizational culture and innovation on firm performance across different industries in the UK, France, Germany, Spain, Italy, and Poland. The research pattern follows a positivist philosophy and employs a quantitative approach. The study utilized secondary data observation of 5593 from the European Company Survey 2019. Multivariate regression analysis and prediction regression model were used to investigate the influence of several variables on firm performance metric. The findings of this study indicate that collaboration, leadership style, technology adoption, and upskilling significantly influence production volume. Conversely, teamwork and employee involvement were not found to have a significant impact within the model. Furthermore, innovations in processes, products, and marketing were found to positively affect production volume. The study ultimately concludes that organizational culture and innovation significantly influence firm performance across various industries.

Furthermore, the study highlighted the importance of considering industry-specific differences in the relationship between organizational culture, innovation, and firm performance in strategic management and organizational development initiatives. The comparative analysis showed significant differences in the influence of organizational culture and innovation on firm performance across industries and across countries. The study emphasizes the significance of strategic alignment between organizational culture, innovation strategies, and business objectives, ensuring clear communication of its vision, mission, and values in all decision-making and organizational culture. In addition, the study emphasizes the need for organizational leaders and policy makers to foster a culture of innovation. Finally, the implications, limitations, recommendations, and suggestions for further research are all mentioned in the conclusion chapter of the study.

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TABLE OF CONTENTS

DISSERTATION DECLARATION.....	ii
ABSTRACT.....	iii
ACKNOWLEDEgements.....	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES	vii
LIST OF FIGURES.....	viii
CHAPTER 1: INTRODUCTION	9
1.1 Opening Section.....	9
1.2 Background Of The Study	9
1.3 Research Problem.....	12
1.4 Research Aims	14
1.5 Research Objectives	14
1.6 Research Questions	14
1.7 Research Significance	15
1.8 Rationale For The Study.....	15
1.9 Structural Outline	17
CHAPTER 2: LITERATURE REVIEW	18
2.1 Introduction.....	18
2.2 Organizational Culture; Definitions And Dimensions	18
2.2.1 The Role Of Organizational Culture In Firm Performance.	19
2.3 Innovation: Definitions, Types, And Processes.....	20
2.3.1 Types of Innovation.....	21
2.4 The Link Between Innovation and Organizational Culture Across Industries.	22
2.5 Cultural Factors Facilitating Innovation In Organizations	24
2.6 Navigating Organizational Cultures To Foster Innovation And Enhance Firm Performance: Empirical Studies.....	25
2.7 Theoretical Underpinning.....	26
2.7.1 Competitive Values Framework (CVF)	27
2.7.2 Open Innovation.....	29
2.8 Hypothetical Statement	30
2.9 Research Gap.....	31
CHAPTER 3: RESEARCH METHODOLOGY	32
3.1 Introduction.....	32

3.2	Research Method	32
3.2.1	Research Philosophy.	32
3.3	Data Collection.	33
3.3.1	Survey And Database	33
3.3.2	Justification Of Methods	33
3.3.3	Data Restriction.....	33
3.3.4	Key Data Transformation	33
3.4	Variables Definition	35
3.5	Analytical Methods.....	36
3.5.1	Data Analysis Process	36
3.5.2	Data Analysis Tool	37
3.6	Conceptual Framework	37
3.7	Validity And Reliability.....	37
CHAPTER 4:	DATA ANALYSIS AND DISCUSSION	39
4.1	Introduction.....	39
4.2	Demographic Profile And Descriptive Statistics	39
4.2.1	Descriptive Statistics	43
4.3	Data Visualisation	45
4.4	Testing For Correlation And Multicollinearity	49
4.5	Multiple Regression Model	51
4.6	Prediction Regression Model.....	56
4.6.1	Cross Validation With K-Fold And Lasso Regression Analysis	63
4.7	Discussion And Finding	63
CHAPTER 5:	CONCLUSION	68
5.1	Introduction.....	68
5.2	Summary.....	68
5.3	Implications.	69
5.3.1	Theoretical Implications.....	69
5.3.2	Managerial Implementations And Recommendations.	69
5.4	Limitations.	70
5.5	Recommendations For Further Study	71
REFERENCES	72

LIST OF TABLES

TABLE 1. SECTORIAL GROUPING USED IN THE ANALYSIS.	34
TABLE 2. VARIABLE DEFINITION TABLE	35
TABLE 3. DEMOGRAPHIC PROFILE.....	39
TABLE 4. DESCRIPTIVE STATISTICS.....	44
TABLE 5. VARIANCE INFLATION FACTOR.	50
TABLE 6. MULTIPLE REGRESSION ANALYSIS	51
TABLE 7. PREDICTION REGRESSION MODEL	56
TABLE 8. RMSE PREDICTION REGRESSION MODEL.	61
TABLE 9. CROSS VALIDATION RESULTS FOR K –FOLDS AND LASSO REGRESSION	63
TABLE 10. HYPOTHESIS SUMMARY TABLE.	64

LIST OF FIGURES

FIGURE 1. UK ECONOMIC OUTPUT BY INDUSTRY, 1990-2022(PANJWANI 2024)	13
FIGURE 2 THE COMPETING VALUES FRAMEWORK (CVF), (CAMERON AND QUINN 2011).....	27
FIGURE 3. A CONCEPTUAL MODEL OF THE RELATIONSHIP BETWEEN ORGANIZATIONAL CULTURE, INNOVATION, CONTROL VARIABLES AND FIRM PERFORMANCE.	37
FIGURE 4. FREQUENCY DISTRIBUTION BY COUNTRY.....	40
FIGURE 5. DISTRIBUTION OF FIRM BY INDUSTRY AND COUNTRY.	41
FIGURE 6 DISTRIBUTION OF INDUSTRY BY ESTABLISHMENT SIZE.	42
FIGURE 7 DISTRIBUTION OF INDUSTRY BY ESTABLISHMENT SIZE.	42
FIGURE 8 DISTRIBUTION OF INDUSTRY BY ESTABLISHMENT SIZE.	43
FIGURE 9. LEVELS OF PRODUCT INNOVATION BY COUNTRY.	45
FIGURE 10. PRODUCT AND PROCESS INNOVATION LEVELS ACROSS DIFFERENT INDUSTRIES.	46
FIGURE 11. LEVELS OF COLLABORATION ACCORDING TO FIRM ACTIVITY BY INDUSTRY.....	47
FIGURE 12. VARIATIONS IN PRODUCTION VOLUME BETWEEN COUNTRIES.....	48
FIGURE 13. PRODUCTIVITY OUTPUT BETWEEN COUNTRIES BY INDUSTRY.	49
FIGURE 14. PREDICTED PRODUCTION VOLUME BY PRODUCT INNOVATION.	61
FIGURE 15. PREDICTED PRODUCTION VOLUME BY MONETARY REWARD.	62
FIGURE 16. PREDICTED PRODUCTION VOLUME BY EMPLOYEE TURNOVER.....	63

CHAPTER 1: INTRODUCTION

1.1 Opening Section

In the modern competitive business landscape, organizational performance and sustainability rely heavily on innovation. The role of organizational culture in fostering innovation, as well as its impact on firm performance has received considerable attention. Many studies, including organizational culture and innovation have clearly established their positive effect on firm performance (Buschgens 2013; Uzokurt et al. 2013; Naranjo-Valencia et al. 2016).

This study examines and compares the effect of organizational culture and innovation on firm performance across various industries in the UK, France, Germany, Spain, Italy and Poland using the European Company Survey 2019. The Comparative study offers a framework for analyzing organizational culture, innovation, and firm performance in an international context, providing valuable insights across different geographical locations. Through this in-depth comparative study, we seek to contribute to the existing body of knowledge on innovation, organizational culture, and firm performance, offering actionable insights that can guide organizations in their pursuit of fostering a culture of innovation that aligns with the demands and opportunities of their respective industries.

This chapter will provide a comprehensive introduction to the research by discussing the study's background, followed by the research problem. The research aims, objectives and questions are also outlined, indicating the goals and outcomes that the study seeks to achieve. The study's significance and rationale are discussed to emphasize its potential impact and relevance. Finally, this chapter discusses the research structure and provides an overview of the subsequent chapters.

1.2 Background Of The Study

Organizational culture and innovation are critical to industry success and competitive advantage, especially in this dynamic and ever-changing commercial market. As industries attempt to adapt to market changes, technological improvements, and societal shifts, critical analysis of the link between organizational culture and innovation becomes increasingly important. Prior research underscores the pivotal role of a positive organizational culture in fostering innovation, empowering employees to take risks and contribute innovative ideas (Martins and Terblanche 2003; Yilmaz and Ergun 2008; Yang and Konrad 2011).

Organizational culture has a significant impact on whether a company's innovation thrives, a culture that encourages risk-taking, experimentation, cooperation, and open communication helps to generate innovation (Schein 2010; Cameron & Quinn 2011). Conversely, cultures characterised by inflexibility, resistant to change, and hierarchical structures may hinder innovation and prevent the acceptance of innovative ideas (O'Reilly & Chatman 1996).

The emphasis on innovation in academia has grown significantly during the last 28 years (Walker et al. 2015). Innovation broadly defined as the process of generating current ideas and transforming them into value-added products, services, or procedures is a critical driver of organizational development, competitiveness, and long-term viability (Gunday et al. 2011; Amabile and Pratt 2016). However, innovation is not exclusively driven by technology breakthroughs or financial resources (Damanpour et al. 2009; Walker et al. 2015) rather, it is integrally linked to organizational culture - the shared values, beliefs, conventions, and behaviours that influence how individuals inside an organization think and behave (Schein, 2010). Consequently, organizations must recognize and comprehend these cultural elements to promote an atmosphere that fosters innovation (Dombrowski et al. 2007). Innovation when supported by a supportive and empowered organizational leader can lead to the development of innovative products, procedures, and services, providing firms a competitive edge in the market (Musneh et al. 2021). Thus, Organizational innovation is strongly affected by cultural characteristics that determine how individuals and teams interact, communicate, and approach problem solving (Byukusenge and Munene 2017).

Furthermore, organizational culture is crucial in forming the atmosphere that fosters innovation (Damanpour and Gopalakrishnan 1998; Zennouche et al. 2014), by instilling commitment among employees and elevating innovation as a core organizational value, culture plays a crucial role in encouraging innovative behaviour (Hartmann 2006). According to Cameron and Quinn (2011), organizational culture influences workers' attitudes, actions, and decision-making processes while acting as the unifying factor that holds the firm together. In addition, Organizational culture involves common values, beliefs, conventions, and behaviours that govern individual and collective activities within an organization (Schein 2017). While ensuring satisfactory performance requires a robust organizational structure, changes to organizational structure necessitate time for implementation. Organizational culture emerges as a key driver of employee engagement, essential for organizational success (Heskett 2022).

CHAPTER ONE

To achieve long-term competitive advantages, organizations must navigate a complicated and uncertain commercial world (Gunday et al. 2011). To do this, they must focus on designing strategies that not only improve performance but also stimulate innovation to satisfy the evolving market needs and desires of their respective industries. Vveinhardt (2018) posits that organizational culture plays a pivotal role in fostering innovation by influencing employee behaviour, thereby fostering commitment to innovation as a core organizational value. Mingaleva et al. (2022) conclude that organizational culture, as a component of organizational innovation, constitutes an active resource for managing sustainable growth, emphasizing its significance in driving innovation outcomes. Furthermore, Alharbi et al. (2022) in their study discover a positive relationship between organizational culture and organizational innovation, among universities in Saudi Arabia. However, findings on the comparative analysis of organizational culture, innovation and firm performance across diverse industries is still unclear. Thus, to customize strategies to organizational contexts, it is imperative to acknowledge that what works well for one organization may not necessarily yield similar results for another (Yazici et al. 2007).

Various theoretical frameworks including the Competing Values Framework (CVF) have been proposed by scholars to explain the connection between organizational culture, innovation, and firm performance. The CVF categorizes organizational culture into four types- hierarchy, adhocracy, market, and clan, each with distinct implications for innovation. For instance, a clan culture prioritizing staff development and collaboration may generate a conducive atmosphere for innovation through open communication and cooperation (Cameron and Quinn 2011). This paper delves into the CVF model and Open innovation theory, providing a comprehensive perspective on how organizations can align their culture and innovation strategies to improve performance in various industry contexts, underscoring their relevance in research on organizational culture, innovation, and firm performance.

Market dynamics across industries have a significant impact on innovation pursuit and operationalization. Rapidly technologically advanced industries such as telecommunication and automotive, require agility, while more stable industries, such as utilities and construction, value incremental innovation and long-term sustainability. Depending on the sector and organizational setting, innovation and organizational culture have different and complicated linkages that impact firm performance across diverse industries (Büschgens et al. 2013). Gupta (2011) suggests that to improve performance and effectiveness, firms operating

in diverse competitive situations should foster cultures that are in line with their needs and strategic direction. Innovation can also be utilized to enhance procedures, maximize resources, and adapt to client demand which is recognized as organizational innovation. Thus, understanding how these dynamics interact with organizational culture can provide valuable insights for firms across industries (Khazanchi et al. 2007).

In summary, despite the growing recognition on the impact of organizational culture and innovation on firm performance, research on the comparative examination of these variables across diverse industries remains scarce. While several studies have explored their link within specific industries, few have examined them across a range of industries (Uzkurt et al. 2013). This presents an opportunity to investigate how organizational culture and innovation affect the performance of firms across various industries. By addressing the identified research gap and accounting for contextual variations, this study endeavors to provide insightful information that can inform academic discourse and practical decision-making in the ever-evolving field of modern business.

1.3 Research Problem

The global business landscape is characterized by intense competition, rapid technological advancements, and evolving customer preferences. Hence, the imperative for firms to enhance performance is paramount. However, many organizational leaders struggle to effectively combine organizational culture and innovation, leading to unsatisfactory outcomes. Organizational performance and business profitability are negatively impacted by inadequate cultural integration and ineffective organizational culture. Eaton and Kilby (2015) found that 72% of business executives believe organizational culture impacts performance, yet merely 25% can pinpoint a successful organizational culture for their company. For instance, empirical evidence demonstrates a significant shift in the UK's economic landscape, with the services sector's share increasing from 70% to 81% since 1990, while manufacturing's share has declined from 17% to 9% (Rhodes 2024).

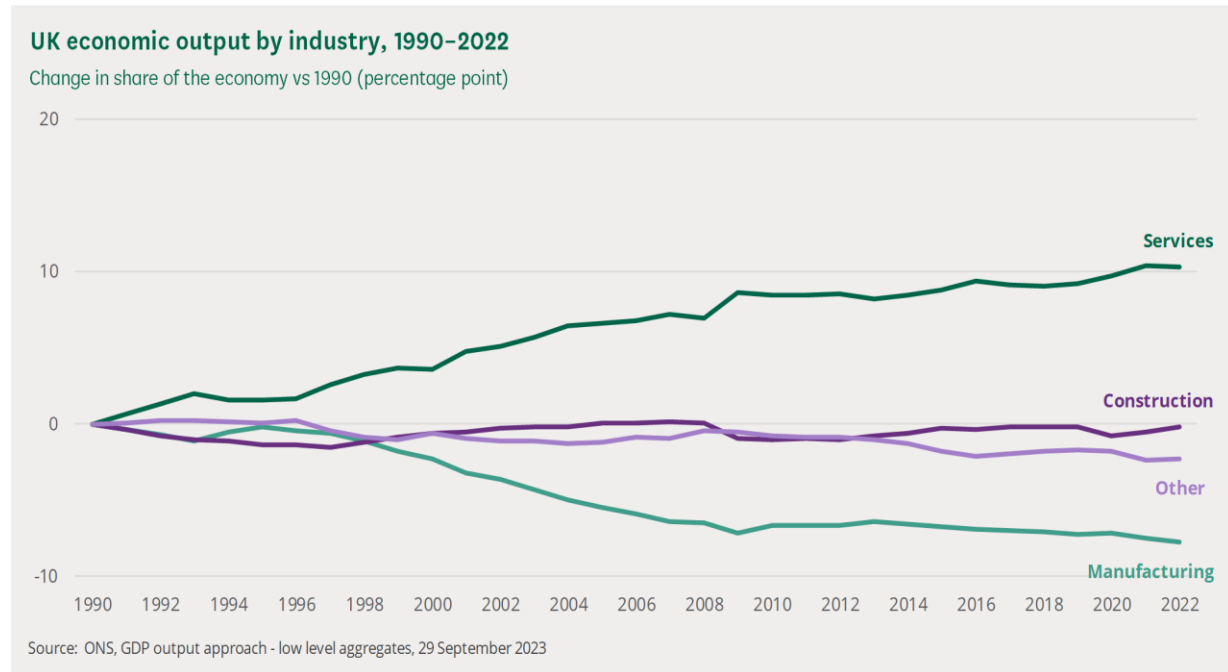


Figure 1. UK economic output by industry, 1990-2022(Panjwani 2024)

Figure 1 illustrates disparities in firm performance across different industries within the UK. This prompts the question: what factors contribute to these variations in industry performance? Through a comparative analysis encompassing diverse industries in the UK and the largest economies in the Eurozone, this research endeavours to shed light on these inquiries. Scholars have recognized that firms across all sectors vary in the extent to which they pursue innovation (Tidd and Pavitt 2011). Existing literatures indicates a positive relationship between organizational culture, innovation, and firm performance. However, its extent across industries remains unclear. Different sectors emphasize distinct aspects of organizational culture, such as cooperation, adaptability, or stability (Groysberg et al. 2018). Thus, understanding these industry-specific cultural variables is crucial for effective management and strategy. Innovation is widely recognized as a significant factor in firm performance (Hartmann 2006). Nevertheless, its impact may vary depending on the current organizational culture (Smit 2015). In addition, previous studies have found that organizations with a robust innovation-focused culture are more capable of harnessing innovative ideas and translating them into observable performance outcomes; nonetheless, the extent of this relationship and the influence of diverse organizational cultures on this relationship remain to be explored. Furthermore, the peculiarities, obstacles, and prospects of every industry impact the dynamics of innovation and organizational culture (Tidd and Pavitt 2011). To evaluate factors influencing the role of organizational culture and innovation in

firm performance across different industrial sectors, a comparative analysis is employed to measure differences between industries and selected countries.

1.4 Research Aims

The purpose of this research is to analyze the influence of organizational culture and innovation on firm performance across various industries in the UK, Germany, France, Spain, Italy, and Poland using the European Company Survey 2019. The study investigates and compares industries and countries with varying levels of innovation and organizational culture to identify key elements for success and insights into effective strategies for improving firm performance.

1.5 Research Objectives

- To comprehend and analyze the conceptualization of organizational culture and innovation and their interplay with firm performance as depicted in academic literature.
- To assess the influence of organizational culture and innovation on firm performance across diverse industries.
- To examine the differences in the effects of organizational culture and innovation on firm performance across various industries within the UK, France, Germany, Italy, Spain and Poland.
- To explore the differences in firm performance across different industries within the UK, France, Germany, Italy, Spain and Poland.
- To devise actionable recommendations for organizational leaders and policy makers aimed at optimizing the synergies between organizational culture and innovation to enhance firm performance.

1.6 Research Questions

- How does organizational culture influence innovation within various industries, and which specific cultural components contribute to fostering or hindering innovation?
- What are the effects of organizational culture and innovation on firm performance across various industries?
- What differences exist in the impact of organizational culture and innovation on firm performance across various industries in the UK, Germany, Spain, Italy, France and Poland?

- What are the differences in firm performance among industries in the UK, Germany, Spain, France and Poland?

1.7 Research Significance

The study will provide valuable insights into the role of organizational culture and innovation in firm performance, making it relevant across various industries. By comparing industries with diverse levels of innovation and performance, the research sheds light on critical successful factors and gives workable recommendations for encouraging innovation and increasing competitiveness. Furthermore, by exploring the contextual variations and industry-specific factors that shape these relationships, the research contributes to the development of more robust theoretical foundations.

Moreover, the study's cross-country comparisons will reveal similarities and differences in organizational culture, innovation dynamics, and firm performance across nations, revealing distinct cultural factors influencing organizational behaviors and outcomes, providing valuable insights for international business and management research.

Through this comparative research endeavor, our aspiration is to offer actionable insights and best practices that firms can leverage to enhance their innovation capabilities and promote sustained performance across diverse industry environments. Furthermore, the research findings may offer insights and valuable information for policy makers on national-level issues affecting innovation and firm performance, aiding governments in creating policies and industrial strategies to promote innovation and enhance economic competitiveness across different countries. For managers and organizational leaders, the findings of this research will provide actionable insights into creating a conducive environment for innovation and optimizing firm performance. Understanding the specific cultural attributes that enhance innovation and identifying key drivers and inhibitors can guide organizational strategies for cultural development and innovation management.

1.8 Rationale For The Study

In today's rapidly changing economic environment, organizations face significant challenges due to technological advancements, globalization, and evolving customer preferences.

Innovation, fostering a positive organizational culture, and achieving excellent performance are crucial for survival and competitiveness. Despite a wealth of study on the individual linkages between innovation, organizational culture, and firms' performance, there is still a significant gap in understanding how these elements interact, particularly across different

industries. In addition, Context is crucial for assessing a culture's strategic efficacy. Leaders should consider cultural types, organizational and market factors, region, and industry, to ensure their culture contributes to performance, including the organizational design of industries (Institute of Leadership and Management 2003).

Furthermore, by examining the differences in the relationship between organizational culture, innovation, and firm performance across different industries in the UK and the Eurozone big economies this comparative study seeks to identify the key drivers of successful cultures and innovation within different industries and economies. Hollinger (2017) identifies four primary challenges associated with the UK's new industrial strategy. First, UK productivity is 20% lower than it was before the monetary crisis and lags behind France and the United States, despite the UK's status as a developed economy. Second, there is a persistent shortage of applicable skills across all industries. Third, the expansion of data and artificial intelligence is recognized as a significant economic issue. Lastly, industrialists stress the need for a clear industrial policy to attract investment, particularly given the uncertainties surrounding Britain's withdrawal from the EU. This study aims to help policymakers understand how organizational culture and innovation can enhance firm performance across various industries.

The basis for focusing on the UK and the selected European countries stems from their diverse culture, economic, and institutional background. These countries are home to a varied range of companies, ranging from conventional manufacturing to innovative technological enterprises, each with its own set of challenges and possibilities. As a result, understanding how diverse organizational cultures impact innovation processes and subsequent firm performance across industries in the international context is critical for policymakers, business leaders, and academics looking to promote innovation-led growth and economic development.

Conclusively, the justification for undertaking a comparative examination of innovation, organizational culture, and firm performance across different industries and a cross-country comparison stems from the need to uncover cross-national variations in organizational dynamics and performance outcomes which will provide valuable insights for both academic research and practical applications. Also, understanding the mechanisms behind this complex link and its consequences for organizational management allows firms to adopt personalized strategies and interventions to improve their innovation capabilities, optimize their

organizational culture, and achieve long-term competitive advantage in an increasingly dynamic and unpredictable world.

1.9 Structural Outline

This paper comprises five chapters. Chapter one introduces the study's background, problem statement, aims and objectives, significance, and rationale of the study. In chapter two, existing literature on innovation, organizational culture, and firm performance were carefully reviewed together with theoretical underpinnings leading to the formulation of the hypothetical statement. The third chapter discussed the methodology used in the research which includes research philosophy, data collection, variables definition, conceptual framework and the research reliability and validity. Chapter four presented results from the data analysis with discussions from the findings of the study. Finally, chapter five includes the study summary, recommendations, limitations, and conclusions.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This section provides a brief literature review of organizational culture, innovation, and firm performance, focusing on its contextualization and specific areas of study. Details about the effects of organizational culture and innovation on performance across different industries will be described in this section. Furthermore, theoretical framework for a comparative study of organizational culture and innovation theories will also be developed examining their impact on firm performance. Also, this section will include the hypothetical statements formulated to determine the key aspects to be analysed in the study.

2.2 Organizational Culture; Definitions And Dimensions

The concept of organizational culture has been extensively researched and applied in corporate settings to enhance performance, understand its impact on workplace behaviour, and identify the cultural elements that influence organizational structure. (Allaire and Firsirotu 1984; Denison 1990; Shein and Shein 2017; Alharbi et al. 2022). Organizational culture is a complex and diverse concept that cannot be easily defined or understood in a single context (Warrick et al. 2016). However, different conceptualizations have been put forth by academia to grasp its meaning. Edgar Schein, a pioneer in organizational culture research, defines organizational culture as *"a pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems"*. (Shein 2010, p.18). This concept highlights different significant aspects of organizational culture. Firstly, it highlights the concept of shared assumptions, which implies a common awareness and acceptance of specific values and views among organizational members. Secondly, it emphasizes on absorption and influence. However, it is possible for a certain organization to lack the learning resources necessary for it to develop a culture in this way (Gregory et al. 2009).

Reynolds (1986) posits how important it is to understand organizational culture in terms of performance and effectiveness, considering work setting, values, and beliefs. In addition, Reynolds argues that claims on organizational culture are unlikely to be true except they

consider variations in organizations, technologies, or job requirements as well as variances between industries.

Shein (2011) model divides organization culture into three levels, Artifacts, Espoused values, and shared basic assumptions. Artifacts are the organizations outwardly visible output, such as its language, technology, and goods, as well as the architecture of its physical surroundings, Espoused values are the company's stated set of standards and principles which influences how workers relate with one another in the workplace, and Shared basic assumptions are the foundation of an organization's culture which are core beliefs and deeply ingrained attitudes and actions that occasionally go unnoticed. Shein's model is a tool that can enable managers understand their organizations culture. However, Shein's model would have been more useful if they had included how these organizations give room for innovation.

New concepts have provided a more nuanced understanding of organizational culture for example, Denison and Mishra (1995) proposed a paradigm of four cultures which includes adaptability, mission, involvement, and consistency, adaptability and mission are outwardly focused, whereas involvement and consistency are inwardly focused. Building on this theory, Cameron and Quinn's (2005) Competing Values Framework (CVF) identifies four types of organizational culture: clan, adhocracy, market, and hierarchy, each with unique implications for innovation. For example, a clan culture centred on employee development can create a conducive environment for innovation through open communication and collaboration (Cameron and Quinn 2011). Firms often choose to promote aspects of their culture based on their attributes, such as high-tech companies like Apple promoting an innovative culture and customer-focused businesses while Walmart promotes an honest culture. Hence, these companies do so in a way that serves their own interests (Zhao et al. 2018).

2.2.1 The Role Of Organizational Culture In Firm Performance.

Organizational culture has a significant impact on firm performance, affecting everything from team morale to innovation capacity (Zeb et al. 2021). While Strong and good culture may enhance firm, a toxic or dysfunctional culture can be harmful. The glue that keeps an organization together is its organizational culture, which shapes the attitudes, actions, and decision-making processes of its members (Cameron & Quinn, 2011). However, while creating a strong and positive organizational culture is useful, it should not come at the price of overlooking other important parts of business operations (Chandler et al. 2000). The importance of organizational culture cannot be underscored because it impacts different

elements of organizational operation and performance (Shahzad et al. 2017), culture gives members of an organization a sense of identity and belonging, which promotes commitment and collaboration. Also, when people absorb cultural norms and values that influence their conduct, it acts as a potent mechanism for directing behaviour and decision-making (Martins and Terblanche 2003).

Furthermore, organizational culture may provide a competitive advantage and distinctiveness. However, Zhao et al. (2018) argue that not all organizational cultures have a favourable influence on firm performance, indicating that established organizational cultures may resist change and innovation, creating barriers to the implementation of innovative ideas. Understanding organizational culture and its subcultures is crucial for identifying factors that promote or hinder innovation across industries (McLean 2005; Naranjo-Valencia et al. 2016). In addition, a strong and unified culture that is linked with company aims and values may foster innovation, adaptability, and agility, allowing firms to survive in challenging settings (Aboramadan et al. 2020).

Conclusively, the study of organizational culture is critical because of the changing nature of work and the complexity of organizational contexts. Organizations may build cultures that promote long-term performance, and employee well-being by recognizing their complexities, dynamics, and implications (Tan 2019). Organizational culture is a complex phenomenon that affects all facets of life inside an organization. Its power may be used to drive firm performance and strategic results in addition to influencing individual behaviour (Xiao-yan 2006). However, few studies have investigated the role of organizational culture in firm performance across different industries. With the findings from this study, firms may effectively utilize culture to establish dynamic, resilient, and adaptable work environments that survive in a constantly evolving global landscape.

2.3 Innovation: Definitions, Types, And Processes.

Innovation is a crucial factor in societal growth, corporate competitiveness, and economic prosperity. It drives transformation in all human endeavours, from groundbreaking inventions to innovative business structures (Walker et al. 2015; Battisti and Stoneman 2010).

Innovation is not a single concept but encompasses diverse types, methods, and outcomes (Drucker 2014; Musneh et al. 2021). Innovation is a complicated notion with several conceptualizations suggested by researchers and practitioners, each highlighting a particular aspect of the innovation concept (Musneh et al. 2021). The Organization for Economic Co-

operation and Development (OECD 2005, p.46) defines innovation as "*the implementation of a new or significantly improved product (good or service), process, marketing method, or organizational method in business practices, workplace organization, or external relations*".

Innovation impacts a firm's sales, market share, productivity, and efficiency through enhanced information transfer, knowledge spillovers, total factor productivity, and international competitiveness, primarily through national and industrial networks (OECD 2005; Byukusenge and Munene 2017). Innovation is a vital component of a company's competitiveness, influencing its operations, products, services, and organizational structures (Gunday et al. 2011).

This paper explores innovation in organizations, which is the process of generating, developing, and implementing innovative ideas or solutions (Wei et al. 2019). Schumpeter (1934) highlights several forms of innovation, including new firm goods, manufacturing techniques, supply sources, market expansion, and new firm organizational structures. While, Chesbrough's (2003) innovation value chain model highlights the interconnectedness of innovation activities, identifying key stages like idea generation, technology development, market validation, and commercialization. Chesbrough posits cross-functional collaboration, open innovation, and ecosystem partnerships for driving innovation outcomes, emphasizing the importance of resources and collaborations. Furthermore, design thinking model by Brown posits that creative thinking, and prototyping, will help firms identify unmet needs, explore alternative approaches, and quickly iterate towards workable solutions (Brown 2011). The common conclusion drawn from these models is that innovation involves the development or implementation of anything new or improved, whether it be a product, process, approach, or practice. These models also emphasize the necessity of execution, asserting that mere innovation is insufficient and must result in tangible outcomes that deliver value. (Kolluru and Mukhopadhyaya 2017). However, there is inconsistency in the theory of innovation when applied to diverse organizations (Wolfe 1994; Lukes and Stephan 2017). Innovation may take place in a variety of settings, including technology advancement and organizational changes (Damanpour and Aravind 2012).

2.3.1 Types of Innovation.

Scholars have developed several types of innovation based on their unique characteristics, motivations, and effects, categorizing them based on their extent and influence. Previous studies have maintained that differentiating between different forms of innovation is essential

to comprehending the adoption behaviour of businesses and identifying the factors that influence innovation within them (Damanpour 1991). Incremental innovation is the practice of introducing slight changes to current products, procedures, or services often through revisions, optimizations, or adjustments. It aims to enhance efficiency, quality, or functionality, and is crucial for maintaining competitiveness and promoting continuous development within firms, despite not delivering game-changing discoveries. While incremental innovation would not provide game-changing discoveries, it is critical for maintaining competitive edge and promoting continual development inside firms. In contrast, Radical innovation involves introducing new products, methods, or business models that challenge old paradigms and bring about dramatic change. Examples include the smartphone and internet streaming platforms (Veena 2023). These innovations can disrupt businesses, create new markets, and drive exponential development however, they require greater uncertainty, risk, and investment. (McLaughlin et al. 2008)

Previous studies have identified several types of innovation which include product, process, service, and marketing innovation beyond the traditional dichotomy of incremental and radical innovation (Tidd et al. 2005). Product innovation is the process of developing new or enhanced products or services to satisfy changing consumer demands or tastes. Process innovation is the process of streamlining internal processes, workflows, or procedures to increase productivity, lower expenses, or improve quality. While, marketing innovation is creation of unique service products, delivery strategies, or customer experiences that set businesses apart in the marketplace. Firms embrace innovations to adapt to internal and external changes, however, organizational environment and different industries influence innovativeness differently. Therefore, Organizational characteristics may not equally influence innovation in diverse types of organization (Damanpour 1991; Tidd and Pavitt 2011).

2.4 The Link Between Innovation and Organizational Culture Across Industries.

Over the last few decades, substantial studies have shown the link between organizational culture and innovation (Büschgens et al. 2013; Uzokurt et al. 2013; McLean 2005; Naranjo-Valencia et al. 2016). Zheng et al. (2010) posit that organizational culture and innovation are key factors in determining how well businesses thrive in a variety of industries. These elements have complex linkages that can change significantly based on the industry (Khazanchi et al. 2007; Büschgens et al. 2013). Innovation encompasses not only the creation of new goods or services but also the continuous enhancement of an organization's

procedures, frameworks, and methods of operation (Walker et al. 2015) this calls for a culture that values innovation, taking calculated risks, and teamwork (Machmud 2020). Also, Rangus and Slavec (2017) conclude that employee involvement and capacity for absorption are critical in establishing the connection between firm's performance and innovation.

Previous studies have demonstrated that a robust and affirmative organizational culture may cultivate an atmosphere that is favourable to innovation (Schein and Schein 2016; Naranjo-Valencia et al. 2018; Bendak et al. 2020; Alharbi et al. 2022). Also, Organizational culture has a significant impact on innovation because it shapes how teams and individuals work together, communicate, and solve problems (Nguyen et al. 2019). Moreover, employees are more willing to take risk, exercise their creativity, and contribute to the creation of new ideas when they feel empowered, respected, and supported by their organization (Hartmann 2006), this can therefore result in the creation of innovative products, procedures, and services that offer industries a competitive advantage in the marketplace (Damanpour and Schneider 2006).

There is, however, limited research in the relationship between innovation and organizational culture across different industries despite individual studies exploring their link within specific sectors (Szczepańska-Woszczyna 2014). For example, Uzokurt et al. (2013) surveyed 154 branches of ten notable banks in Turkey to assess the link between innovation, organizational culture, and firm performance. The result indicates that innovation and organizational culture have a positive and direct effect on firm performance. However, Uzokurt et al. noted that organizational culture does not significantly impact firm performance dimensions when organizational innovations are present. Tian et al. (2020) in their systematic review of 100 articles on innovation and organizational culture reveals that cultural variables influence every component of the innovation ecosystem in an international business context. However, the extent to which these variables influence firms across diverse industries has not been carefully reviewed.

It is essential to carefully consider the opportunity and challenges that each industry offers when examining the relationship between innovation and organizational culture across industries. For example, in technology-driven industries such as information technology and software industry, Innovation is frequently tied to research and development initiatives, while in service-based sectors such as transport and finance, innovation may centre on enhancing client experiences and operational efficiency (Khazanchi et al. 2007; Walker et al. 2015).

Prajogo (2006) in their comparative analysis between service and manufacturing industries in Canada found no significant difference in product and process innovation performance between manufacturing and service firms. However, their second finding revealed a stronger relationship between innovation and firm performance in manufacturing firms compared to service firms, especially when it came to process innovation. This research however focused only on two industries.

Conclusively, the link between innovation and organizational culture is complicated and multidimensional, with implications for management across industries. Previous studies have not clearly established this link across various industries.

2.5 Cultural Factors Facilitating Innovation In Organizations

Extensive study has been conducted on the cultural factors that influence innovation and how to generate and foster it. (Loewe and Dominiquini 2006; Dombrowski et al. 2007; Smith et al. 2008; Zennouche et al. 2014) Innovation is crucial for organizational success in the global marketplace, but it's not solely determined by technological advancements or financial investments (McLaughlin et al. 2008). Innovation is also significantly influenced by cultural factors within the organization's context (McLean 2005). A culture that promotes variety, inclusion, and openness can foster intelligent thought and innovation, while a rigid or strict one may hinder such thinking and hinder the creation of innovative ideas (Jassawalla and Sashittal 2002). However, Chouki et al. (2020) in their comprehensive analysis of organizational culture revealed that organizational culture poses a substantial barrier to the adoption of information technology in small and medium-sized businesses in Morocco, the primary obstacle identified were organizational informalization, centralized decision-making process and opposition from technology stakeholders to change. An organization's attitude towards risk-taking is a key factor in influencing innovation. A culture that encourages risk-taking and encourages employees to explore new concepts and technologies fosters an environment with increased potential for innovative solutions (Zennouche et al. 2014).

The study of organizational culture's impact on innovation involves a thorough analysis of factors like risk-taking, adaptability, communication methods, and hierarchical organization. This understanding can provide insights into how cultural changes can enhance innovation potential and overall business performance. According to Smith et al. (2008, p.6) "management style and leadership, resources, organisational structure, corporate strategy, technology, knowledge management, employees and innovation process" were noted as

significant factors that affect organizational innovation after a review of 100 literatures on innovation. while Rao and Weintraub (2012) believed that innovative culture is comprised of six fundamental elements: success, behaviour, procedures, values, and resources. Also, Zennouche et al. (2014) in their detailed analysis argued that structure, culture, strategy, and resources are the only factors that affect innovation at the organizational level. Although, these 3 studies have similar conclusions, Zennouche et al. indicated that cultural factors have various levels of impact on innovation.

Diversity and inclusion within an organization play a significant role in shaping its culture. When individuals from varied backgrounds, perspectives, and experiences collaborate, they contribute a broad spectrum of ideas and perspectives that can drive innovation (Yang and Konrad 2011). An organizational culture that prioritizes diversity and nurtures inclusivity is more inclined to produce pioneering solutions for intricate problems (Dombrowski et al. 2007).

Furthermore, Organizational leadership significantly influences its culture and innovation (Yildirim and Birinci 2013). According to previous studies, leaders that focus and actively encourage a culture of innovation, cooperation, and continuous improvement are more likely to foster an innovative atmosphere (Kim and Yoon 2015). An organization's leadership style and conduct have a substantial impact on its culture and, by extension, its innovative potential (Tsai 2011; Acar 2012; H. Soken and Kim Barnes 2014). Organizational innovations are significantly predicted by leadership, leaders are noted for their capacity to inspire and encourage staff to be innovative (Hughes et al. 2018).

Conclusively, relevant literatures have concluded that organizational culture is a major determinant of how organizations adopt innovation (Ahmed 1998; Damanpour and Wischnevsky 2006; Murswieck et al. 2020). However, the interplay between these factors on performance across different industries is still unclear.

2.6 Navigating Organizational Cultures To Foster Innovation And Enhance Firm Performance: Empirical Studies.

Understanding the deep link between organizational culture, innovation, and firm performance is crucial for firms that want to develop an innovative culture and improve their overall performance. By studying the dynamics of organizational cultures and their influence on innovation, valuable insights can be gained to help firms navigate their unique cultural landscapes and promote successful innovation (Bendak et al. 2020). Burdon et al. (2016)

argues that various essential innovation qualities must be implemented and customized for any organization, considering their industry and long-term goals. This agrees with the findings of Damanpour et al. (2009) who assert that service, technical, and administrative process innovation significantly affects the performance of public service organizations.

A quantitative analysis by (Nguyen et al. 2019) establishes a significant relationship between organizational culture, organizational commitment, and employee innovation. However, Nguyen et al. do not ascertain whether this finding will be useful to other industries. Despite the wealth of empirical studies shedding light on the role of organizational culture and innovation in firm performance, significant gaps persist, particularly in international contexts. For instance, an empirical study by Naranjo-Valencia et al. (2016) examined the link between innovation, organizational culture and firm performance in Spanish companies and found that firm performance can be enhanced by organizational culture and innovation, reinforcing earlier research finding which emphasized the significance of both factors in firm success. However, empirical evidence linking these factors in diverse global settings remains scarce.

Awadh and Saad (2013) and Abodunde et al. (2021) in their study indicated a significant relationship between organizational culture, innovation and firm performance. Their findings highlight the potential for organizations to harness the collective creativity and intellect of their workforce to drive innovation and enhance performance. However, these analyses did not take account of the association between organizational culture, innovation and firm performance across different industries.

Moreover, Prajogo's (2006) comparative study between manufacturing and service industries concluded that manufacturing firms have a stronger association with innovation and firm performance compared to service firms. This underscores the need to consider sector-specific dynamics in assessing the impact of innovation on performance. Although Prajogo's study offers insightful revelations about this relationship in distinct industrial sectors, its limited scope warrants further comparative analyses across diverse sectors to enrich our understanding.

2.7 Theoretical Underpinning

The link between organizational culture, innovation, and firm performance has received a lot of attention in management research. Understanding how these elements interact and impact each other across sectors is critical for gaining a sustainable competitive edge. This section

explores this relationship using the Competitive Value Framework Theory (CVF). And open innovation theory.

2.7.1 Competitive Values Framework (CVF)

The Competitive Value Framework (CVF) theory, initially proposed by Robert Quinn and Rohrbaugh in 1983, provides a methodology for analysing and maintaining organizational success. According to the concept, organizations may be divided into two basic categories: control and flexibility. While control relates to an organization's ability to maintain stability and effectiveness, flexibility refers to its capability to encourage innovation and adapt to change. (Quinn and Rohrbaugh 1983). The CVF theory distinguishes four organizational culture types based on the combination of these dimensions: Clan, Adhocracy, Market, and Hierarchy (Cameron and Quinn 2005). Cameron and Quinn (2011) concluded that organizational culture is what distinguishes successful organizations from others.

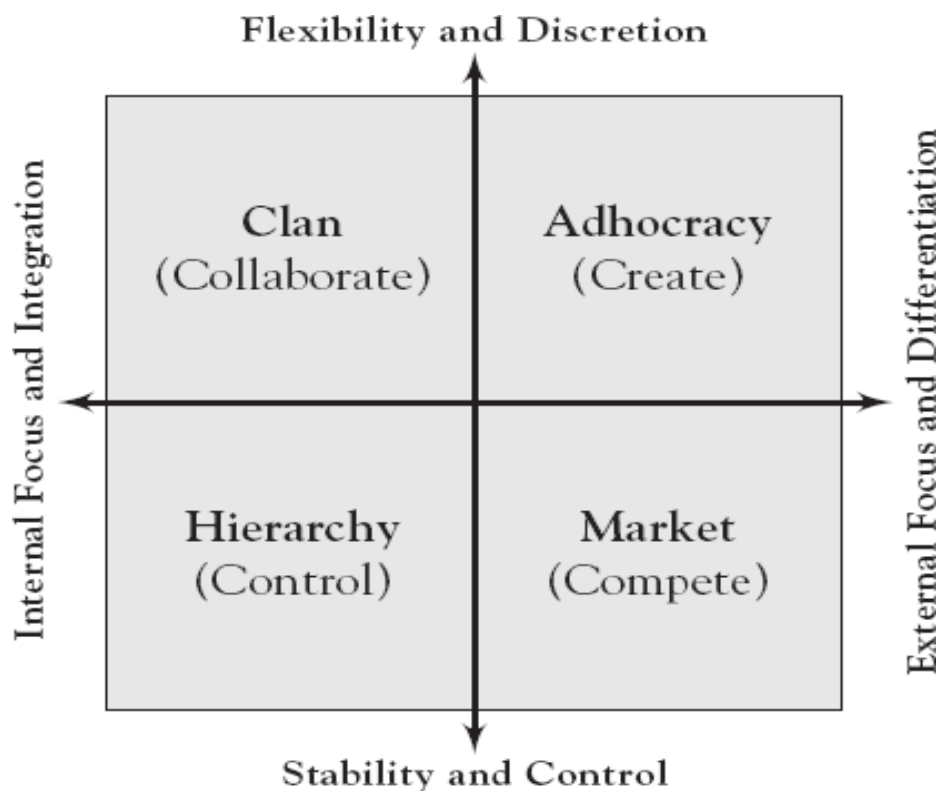


Figure 2 The Competing Values Framework (CVF), (Cameron and Quinn 2011)

The orientations and competitive values that make up an organizational culture are well-explained by the dimensions and quadrants in Figure 2. Clan culture places a strong emphasis on collaboration, teamwork, and employee growth. They mimic family settings where loyalty and togetherness are valued highly. Adhocracy culture fosters innovation and adaptation by

thriving on experimentation, risk-taking, and creativity, this culture places a strong emphasis on expanding quickly, generating new possibilities, and obtaining added resources, the major concern of this organization is to foster creativity, adaptability and flexibility. Market culture improve productivity and competitiveness by placing a heavy emphasis on external positioning and control, these organizations are primarily driven by attributes such as profit growth, competitiveness, economic output, and target achievement, Hierarchy culture emphasizes stability, efficiency, and control, like a bureaucracy with defined hierarchy and regulated processes (Cameron and Quinn 2005; Cameron and Quinn 2011).

The Competing Values Framework (CVF) offers a comprehensive lens through which to examine how various organizational culture types exert differential effects on innovation and organizational performance across industries. Clan culture, characterized by a focus on employee participation and cohesiveness, fosters an environment conducive to incremental innovation and continuous development (O'Reilly and Chatman 1996). Smith (2015) highlights that organizations that excel in adapting, learning, and creativity often generate innovative ideas, which adaptable firms can translate into products and disseminate both internally and externally (Indihar Štemberger et al. 2018). In contrast, innovation targeted at satisfying market needs and creating a competitive edge is driven by market culture, which prioritises outcomes and competition (Denison 1990). Despite criticisms of inhibiting innovation, hierarchy culture excels in enhancing operational efficiency and ensuring dependability in certain industries (Zeb et al. 2021).

Moreover, the CVF theory emphasizes how crucial it is to align innovation techniques with organizational culture to improve firm performance. Organisations that effectively match their innovation objectives with their culture will be in a better position to capitalize on their advantages and adjust to changing market conditions (Shein 2010). Büschgens et al. (2013) in their meta-analysis found that most Turkish construction companies had a combination of clan and hierarchical cultures which may not adequately meet their competitive needs. By employing the CVF, firms can enhance their effectiveness by comprehending and modifying their organizational culture (Cameron and Quinn 2011).

The applicability of the CVF extends across sectors and industries, emphasising the significance of flexibility and control irrespective of industry-specific influences on organizational culture and innovation strategies. Scholars recognize that organizations vary in their pursuit of innovation across sectors (Tidd and Pavitt 2011). Al-khalifa and Aspinwall

(2000) argue that organizations can benefit from using the CVF to examine the changes required to achieve a desired quality culture. Furthermore, Al-khalifa and Aspinwall (2001) applied the CVF model to examine organizational cultures in Qatar, they found that many organizations in Qatar are not solely characterized by one cultural type but a blend of two. Zeb et al. (2021) conclude from their analysis that adhocracy culture fosters innovation and predicts organizational performance. Ultimately, the Competitive Value Framework provides a strong theoretical basis for exploring the link between organizational culture, innovation, and firm performance across industries. Understanding the interaction between control and flexibility orientations within organizational cultures can provide valuable insights for scholars and practitioners in utilizing cultural strengths for innovation and performance improvement.

2.7.2 Open Innovation

Henry Chesbrough's Open Innovation Theory, introduced in 2003, challenges traditional ideas of creation by promoting a more collaborative approach to innovation. It encourages firms to actively incorporate external ideas, technology, and resources into their innovation efforts, unlike closed models that primarily rely on internal R&D operations (Chesbrough 2003). Chesbrough's method emphasizes on the idea of "openness," which includes using external networks, cooperative collaborations, and embracing both inward and outward open innovation. This strategy, ultimately aims to reduce costs, accelerate innovation cycles, and lower risk (Chesbrough 2003).

previous studies have highlighted the profound influence of Open Innovation Theory on organizational culture and firm performance (Aichouche and Bousalem 2016; Vargas-Halabi and Yagüe-Perales 2023). By fostering communication, calculated risk-taking, and teamwork. adopting open innovation strategies can improve innovation outputs, strategic partnerships, and market competitiveness (Chesbrough 2003). Chesbrough further advocates for a transformation in information commercialization practices, highlighting how open innovation can enhance the economic value of a company's ideas and technologies across diverse sectors (Chesbrough 2006). Moreover, empirical research indicates a strong and positive correlation between organizational innovation and open innovation (Chesbrough 2006). For instance, Lichtenthaler (2009) analysis of 136 industrial enterprises revealed that the benefits of outward open innovation on firm performance are enhanced by factors such as technological volatility, transaction rate, and competitive intensity in technology markets.

However, effective open innovation is not facilitated by the level of patent protection, Lichtenthaler study reveals that open innovation techniques significantly enhance performance in specific contextual factors, making them crucial for organizational leaders.

While firms can generate new innovations, products, and processes by expanding beyond their current key strengths (Tidd and Pavitt 2011), questions persist regarding the process of integrating external innovations into a company's business model and their subsequent impact on firm performance (West & Bogers, 2014). This study aims to delve into the collaborative practices of firms across industries and sectors and their implications for performance. Collaboration with external entities can foster an innovative mindset by exposing organizations to new perspectives and allowing them to draw from the experiences of others (Smith et al. 2008).

2.8 Hypothetical Statement

Based on the literatures and theories reviewed, the following hypothesis were formulated for the analysis.

Hypothesis 1

H0: There is no significant positive relationship between organizational culture and firm performance across various industries.

H1: There is a significant positive relationship between organizational culture and firm performance across various industries.

Hypothesis 2

H0: Innovation does not have significant positive effect on firm performance across various industries.

H2: Innovation has a significant positive effect on firm performance across various industries.

Hypothesis 3

H0: There are no significant differences in the impact of organizational culture and innovation on firm performance across various industries.

H3: There are significant differences in the impact of organizational culture and innovation on firm performance across various industries in Poland, Germany, Spain, Italy, France, and the UK.

Hypothesis 4

H4: There is no significant relationship between collaboration and firm performance across various industries.

H1: There is a significant relationship between collaboration and firm performance across various industries.

2.9 Research Gap

While several studies have looked at the specific linkages between innovation, organizational culture, and firm performance, there is a limited availability of broad comparative analysis across different industries. Existing research frequently focuses on certain sectors or organizational contexts, limiting our knowledge of how these dynamics differ across various industrial settings (Cameron and Quinn 2011). Additionally, the investigation of industry-specific factors is lacking. The impact of industry-specific factors on the relationship between organizational culture, innovation, and firm performance is often overlooked in research. According to Teece (2018), every industry possesses distinct attributes, obstacles, and prospects that can influence innovation procedures and organizational culture in disparate ways. However, these industry-specific complexities are frequently overlooked by the literature currently in publication hindering a comprehensive understanding of the topic. Furthermore, research examining organizational culture across several industries is lacking despite the accepted relevance of organizational culture in fostering innovation and firm performance (Shein 2017). Comprehending the ways in which diverse cultural norms and values impact organizational practices and results can yield significant insights for comparative studies. Examining the role of organizational culture and innovation in firm performance across different industries will bridge this gap in literature, which may provide important insights that will drive industrial practices, policy makers and contribute to the existing literature.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodological approach that was used to conduct a comparative study on the influence of organizational culture and innovation on firm performance across different industries, using data from the European Company Survey (ECS) 2019.

Furthermore, the chapter discusses the research method, research philosophy, data collection, variable definitions, conceptual framework, analytical methods, considerations for validity and reliability.

3.2 Research Method

The methodical process of obtaining, evaluating, and interpreting data to address a research topic or test a hypothesis is known as research methodology. It comprises several procedures and methods that enable researchers carry out their investigations in a planned and methodical way. Comprehending research method is essential to assuring the accuracy and consistency of research outcomes (Saunders et al. 2019). The research approach employed for this study is quantitative, this implies that the research used numerical data and statistical analysis to investigate the relationship between variables (innovation, organizational culture, and firm performance) across diverse industries. Quantitative research methods are ideal for this sort of investigation because they enable the systematic collecting and analysis of data from a large sample of organizations (Bryman and Bell 2007). The choice of suitable research methods is one of the most important components of research methodology. Furthermore, different approaches, such as mixed, qualitative, or quantitative methods, may be needed to answer different research questions. Every method has benefits and drawbacks, and so researchers need to examine carefully which approach will best address their research objectives and question (Ragab and Arisha 2017; Abutabenjeh and Jaradat 2018).

3.2.1 Research Philosophy.

Understanding the philosophical basis for research technique is critical. Researchers must evaluate if their method is consistent with positivism, interpretivism, or other philosophical viewpoints, as this influences the way data is acquired, processed, and interpreted. This study adopted a positivist research philosophy based on the belief in an objective world that can be understood via empirical observation and measurement. Positivism is consistent with the

quantitative method used in this study, facilitating the systematic evaluation of correlations between variables using statistical approaches. (Saunders et al. 2019).

3.3 Data Collection.

3.3.1 Survey And Database

The research design describes the entire strategy for carrying out the study and includes decisions concerning obtaining data, analysis, and interpretation. It is critical for researchers to carefully assess the sort of study design that best fits their research question and aims, as well as the nature of the data they want to gather. The European company survey (ECS) 2019 served as the key dataset for this study. The ECS collected data through structured questionnaires distributed to a representative sample of firms from various industries and organizational sizes. The survey collected quantitative data on innovative activities, organizational culture characteristics, and firm performance indicators, resulting in a comprehensive dataset for this study.

3.3.2 Justification Of Methods

The use of the European Company Survey (ECS) 2019 as the key data source is supported by its broad coverage of working practices, organizational culture, and innovation across European nations, including the United Kingdom. The ECS used rigorous techniques to assure data quality and dependability, making it appropriate for a comparative study (Eurofound and Cedefop 2020).

3.3.3 Data Restriction

The ECS (2019) dataset encompasses a substantial 21,869 observations, each characterized by 385 variables. To focus our research, we narrowed down our analysis to six countries, thereby reducing the observations to 6,585. From these, we selected 26 variables relevant to our research topic for in-depth analysis. To maintain data integrity, we deleted rows containing negative values, indicative of skipped responses, which further reduced the number of observations to 5,593. Additionally, our dataset exhibited no instances of missing or NA values, ensuring the completeness of our data analysis.

3.3.4 Key Data Transformation

All the variables in the dataset were originally encoded numerically to represent response values. To facilitate our analysis, we utilized the data code book and questionnaire to rename

these variables from their codes to more descriptive names. Notably, the outcome variable production volume was reordered to a new measurement on a scale of 1 to 3 to where the response indicates ‘decreased’, ‘the same’, and ‘increased’ respectively and then converted back to a numeric format for regression analysis. Similarly, key explanatory variables and control variables underwent a similar process of reordering and conversion to numeric variables except for collaboration, design collaboration, training and technology adoption which were treated as factors in the model. Additionally, industry and country variables were converted to dummy variables of 0 and 1 for the analysis which represented each category, this is to account for industry-specific and country specific influences on the role of organizational culture and innovation, in firm performance.

Various sectors in the survey were combined into 6 industrial groups for the analysis.

Table 1. Sectorial grouping used in the analysis.

Industry	Grouping
Production	Mining and quarrying Manufacturing Electricity, gas, steam, and air conditioning supply Water supply; sewerage, waste management and remediation activities
Construction	Construction
Commerce and Hospitality	Wholesale and retail trade; repair of motor vehicles and motorcycles Accommodation and food service activities
Transport	Transportation and storage
Financial services	Financial and insurance activities
Other services	Information and communication Real estate activities Professional, scientific, and technical activities Administrative and support service activities Arts, entertainment, and recreation Other service activities

3.4 Variables Definition

Outcome Variable: Firm performance is operationalized using metrics such as production volume. Production volume is the total quantity of goods or services a firm produces or provides in each amount of time. This key performance indicator is used to assess an organization's size and efficiency which made it an appropriate outcome variable for this study (Eurofound and Cedefop 2020).

Explanatory Variables: Innovation variable encompassed measures of product innovation, process innovation, marketing innovation and innovation strategies adopted by firms. Organizational culture is assessed through dimensions such as employee involvement, collaboration, leadership styles, teamwork and skill development.

Table 2. Variable Definition Table

Variable	Definition
Production volume	Growth or decline in the amount of goods produced or services provided (1-3). Discrete variable.
collaboration	level of collaboration (1-4) categorical variable.
Design collaboration	Firms level of new design collaboration (1-4) categorical variable.
Product innovation	Level of product innovation in firms 1= No innovation and 3 = Innovation to establishments. Discrete variable
Process innovation	Level of process innovation in firms (1-3) Discrete variable
Marketing innovation	Level of marketing innovation in firms (1-3) Discrete variable
Technology adoption	Regular purchase of software 1 if yes and 2 if No. Discrete variable
Manager approach	An indicator of managerial behaviour 1-2. Discrete variable
Training	An indicator of leadership style 1= Very often and 4= Never. Categorical variable
Monetary reward	An indicator of leadership style 1= Never and 4=Very often. Discrete variable
Vision and mission	An indicator of leadership style, communicating a strong vision and mission to motivate and retain employee. 1- 4. Discrete variable
Work stimulation	An indicator of leadership style 1-4. Discrete variable
Employee involvement	Level of employee engagement 1-3. Discrete variable
Suggestion scheme	An indicator of the use of suggestion scheme 1-2 discrete variable.
Employee retention	Level of retention 1-5. Discrete variable

upskilling	level of skill changes 1-4. Discrete variable
Static employee	If position does not upskill. Discrete variable 1-7
teamwork	If firm have teams 1 if yes and 2 if No. Discrete variable
Industry production	Dummy variable with 1 if firm is in production and 0 if otherwise.
Industry construction	Dummy variable with 1 if firm is in Construction and 0 if otherwise.
Industry commerce & hospitality	Dummy variable with 1 if firm is in commerce and hospitality and 0 if otherwise.
Industry Transport	Dummy variable with 1 if firm is in Transport and 0 otherwise.
Industry financial	Dummy variable with 1 if firm is in Financial and 0 otherwise.
Industry other services	Dummy variable with 1 if firm is in other service and 0 otherwise.
Country France	Dummy variable with 1 if firm is in France and 0 if otherwise.
Country Germany	Dummy variable with 1 if firm is in Germany and 0 if otherwise.
Country Italy	Dummy variable with 1 if firm is in Italy and 0 if otherwise.
Country Poland	Dummy variable with 1 if firm is in Poland and 0 if otherwise.
Country Spain	Dummy variable with 1 if firm is in Spain and 0 if otherwise.
Country UK	Dummy variable with 1 if firm is in UK and 0 if otherwise.
Size	Number of employees in the firm. 1 = “10-49”, 2 = “50-259”, 3 = “250 and above”. Discrete variable.
Market demand	Level of market demand 1-4. Discrete variable
Market competition	Level of market competition 1-4. Discrete variable
Employee turnover	Level of employee turnover 1-5. Discrete variable

3.5 Analytical Methods

3.5.1 Data Analysis Process

The study employed various statistical methods to meticulously analyse and evaluate the ECS data 2019. Quantitative analysis techniques, including descriptive statistics, multiple regression and prediction regression analysis are employed in the data analysis of this study. The study utilized descriptive statistics to analyse quantitative variables, focusing on the mean and median as central tendency measures and the standard deviation as measures of variability to assess the data point dispersion or spread. Multiple regression analysis is used to examine and compare the relationship and causality between outcome and explanatory

variables. Additionally, prediction regression analysis is used to forecast and evaluate the extent of the impact of organizational culture and innovation on firm performance, while controlling for size, country, industry type, market demand and market competition.

3.5.2 Data Analysis Tool

This study utilized the R programming language due to its open-source nature as an integrated development environment (IDE). R is a powerful tool for large-scale computations, data manipulation, and visualization which produces stunning outputs, tables, and graphs that effectively convey data stories.

3.6 Conceptual Framework

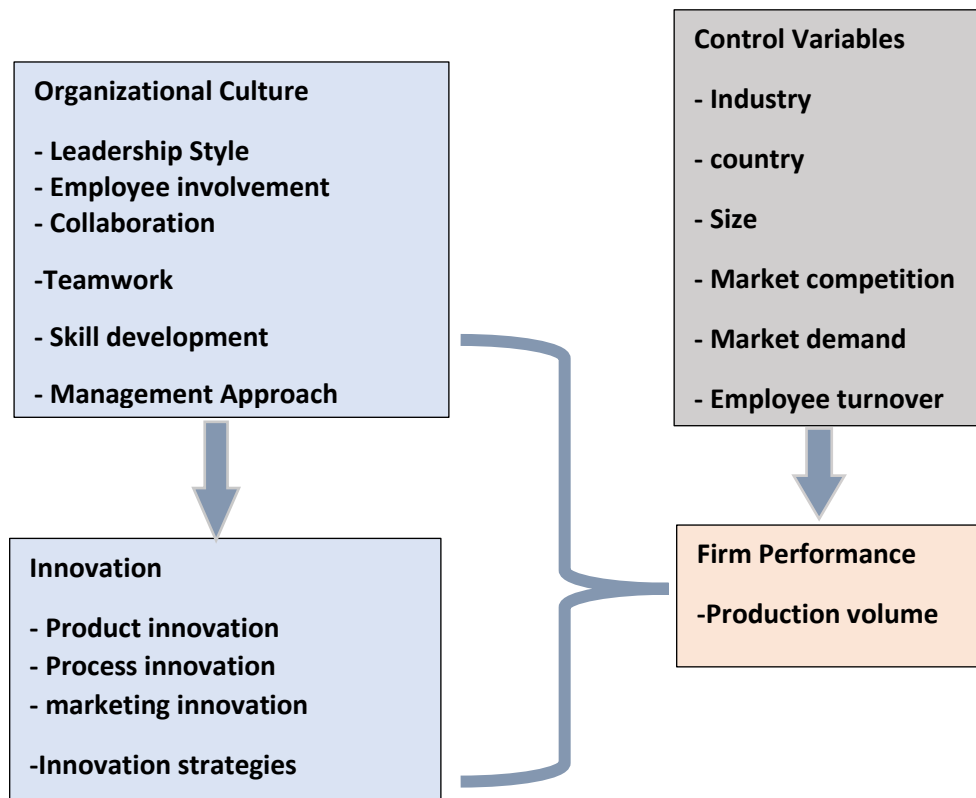


Figure 3. A conceptual model of the relationship between organizational culture, innovation, control variables and firm performance.

3.7 Validity And Reliability

It is crucial to make sure that study findings are reliable and genuine. Validity is the degree to which the study findings are true and accurate; reliability is the degree to which the results are stable and consistent. To improve the validity and reliability of a research, researchers use

a variety of techniques, including pilot studies, the use of statistical analyses to assure the accuracy of the findings, and the use of standardized instruments for gathering data. (Drost, 2011). To ensure the validity of the findings, strict methodological processes are followed throughout the study process. Validity is improved by collecting data from a well-known survey instrument (ECS 2019) with proven validity and reliability metrics. Furthermore, cross-validation statistical analysis is employed to test the model's validity and reliability.

CHAPTER 4: DATA ANALYSIS AND DISCUSSION

4.1 Introduction

In this chapter, data from the European Company Survey 2019 focusing on United Kingdom, Germany, France, Italy, Spain and Poland are examined to assess the influence of Organizational culture and innovation on firm performance across various industries. The analysis seeks to answer the research questions and hypotheses presented in Chapter 1 and 2 respectively by employing appropriate statistical techniques to examine the relationship and hypotheses proposed.

4.2 Demographic Profile And Descriptive Statistics

Descriptive statistics are crucial in research as they provide a concise summary of a dataset's features, including distribution, dispersion, and central tendencies. They aid researchers in understanding the dataset's structure and make it easier to analyse and communicate findings (McCarthy et al. 2019). Also, they offer a quick overview of the data, enabling further investigation and hypothesis testing (Field 2024). In table 3 below, descriptive statistics is used to examine the demographic characteristics of the survey participants.

Table 3. Demographic profile

Demographic	Variable	Frequency	Percentage (%)
Industry	Production	1763	32
	Construction	426	8
	Commerce and Hospitality	1365	24
	Transport	322	6
	Financial	107	2
	Other Services	1608	28
Country	United Kingdom	609	11
	France	1185	21
	Germany	608	11
	Spain	1264	23

	Italy	1296	23
	Poland	631	11
Firm Size	Large	591	11
	Medium	1551	28
	Small	3450	62
Firm type	headquarters	1010	18
	Single Firm	3861	69
	Subsidiary	722	13
Position	General manager	776	14
	Owner manager	725	13
	HRM	1720	31
	Training Manager	35	1
	Finance Manager	919	16
	Others	1418	25

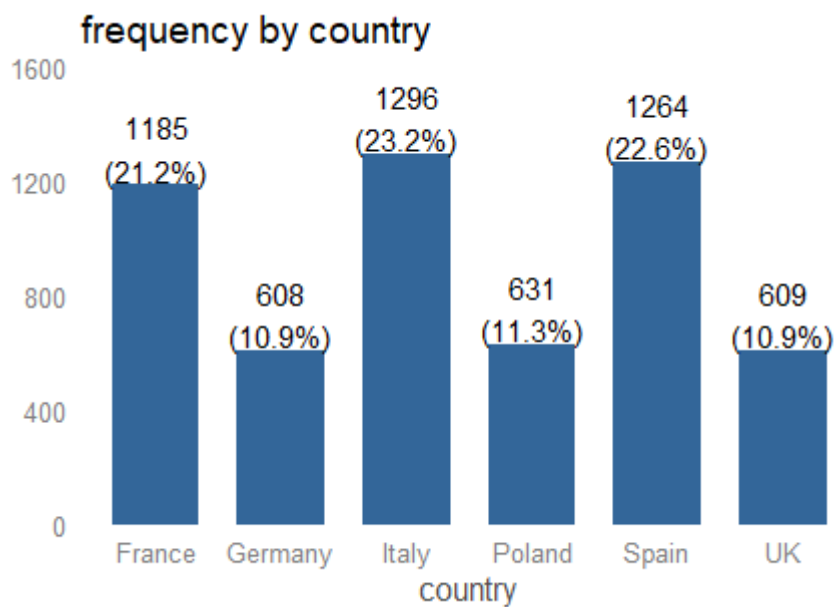


Figure 4. frequency distribution by country.

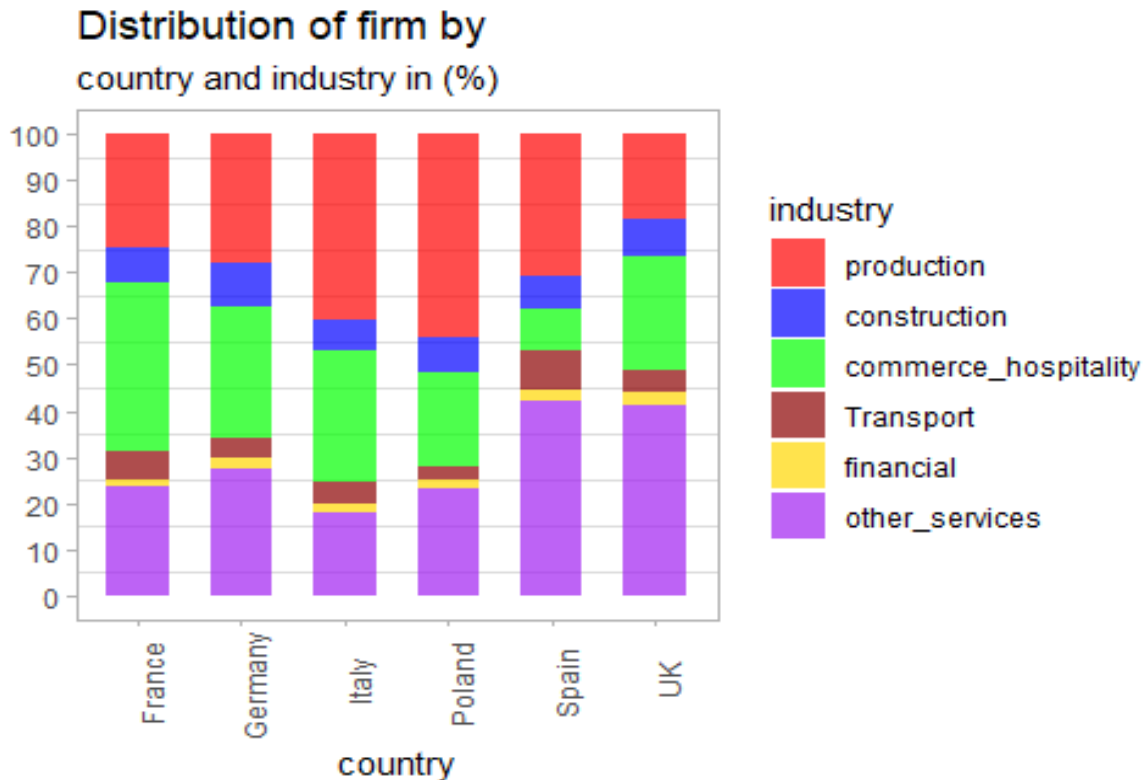


Figure 5. Distribution of firm by industry and country.

Figure 5 demonstrates significant variance in the frequency of different industries between nations. The economic activity sectors are categorized into six major industries: transportation (6%), financial services (4%), industrial (22%), construction (10%), commerce and hospitality (31%), and other services (28%). Production industry is largest in Poland (45%), followed by Italy (40%) and Spain (32%). While it is smallest in UK (20%) and France. Construction industry is most common in Germany and UK and least common in Italy. Commerce and Hospitality industry is highest in France and lowest in Spain. Transport industry is largest in Spain and smallest in Poland. The biggest financial industry is in UK (5%) and smallest in France (2%), other services comprise 43% of firms in Spain and 42% of establishments in the UK, and only 18% of establishments in Italy.

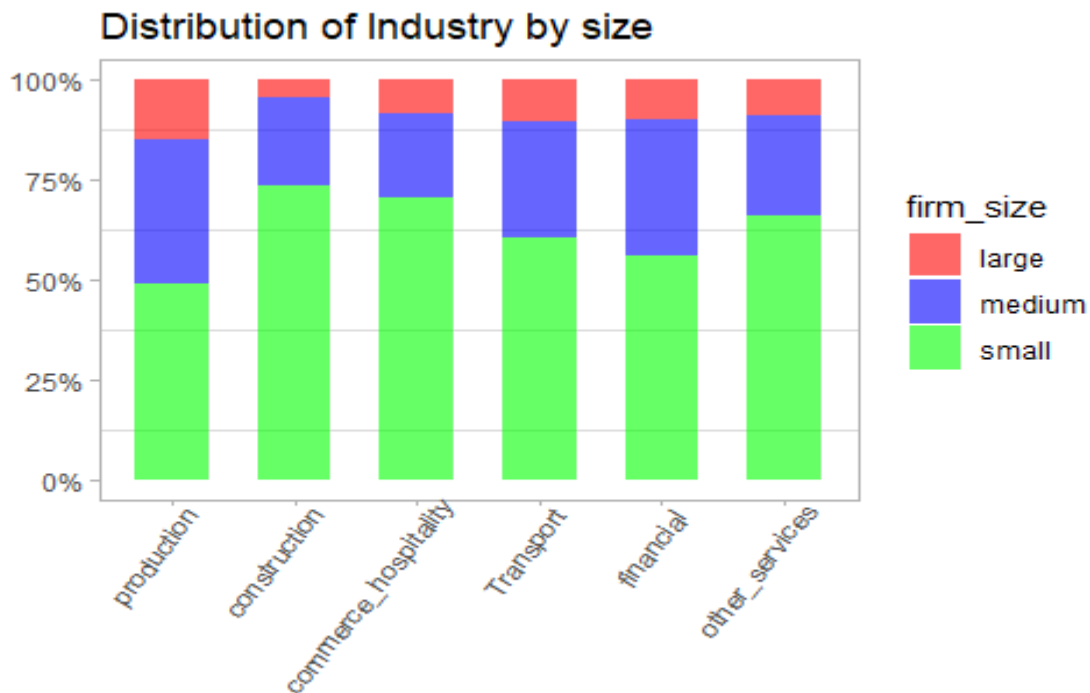


Figure 6 Distribution of industry by establishment size.

Figure 6 demonstrates that large-sized firms are predominantly found in the production, transport, and financial industries. Conversely, establishments within the construction and commerce and hospitality industries are more likely to be small, with 75% and 74% respectively falling into this category.

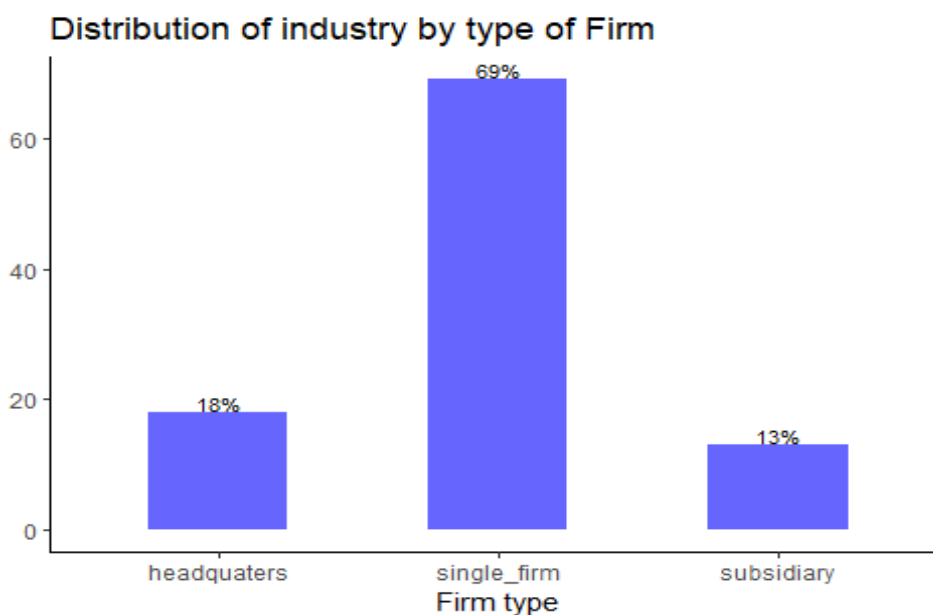


Figure 7 Distribution of industry by establishment size.

The ECS categorizes establishments into three groups: headquarters, single firms, and subsidiaries. Headquarters, and subsidiary are parent firms who have other firms in multiple locations. while single establishment are independent enterprises without branch offices or manufacturing units. Figure 7 shows that 69% of the firms used in this study are single-location establishments, 18% are headquarters, and the other 13% are subsidiary locations; this indicates that 31% are multi-location establishments.

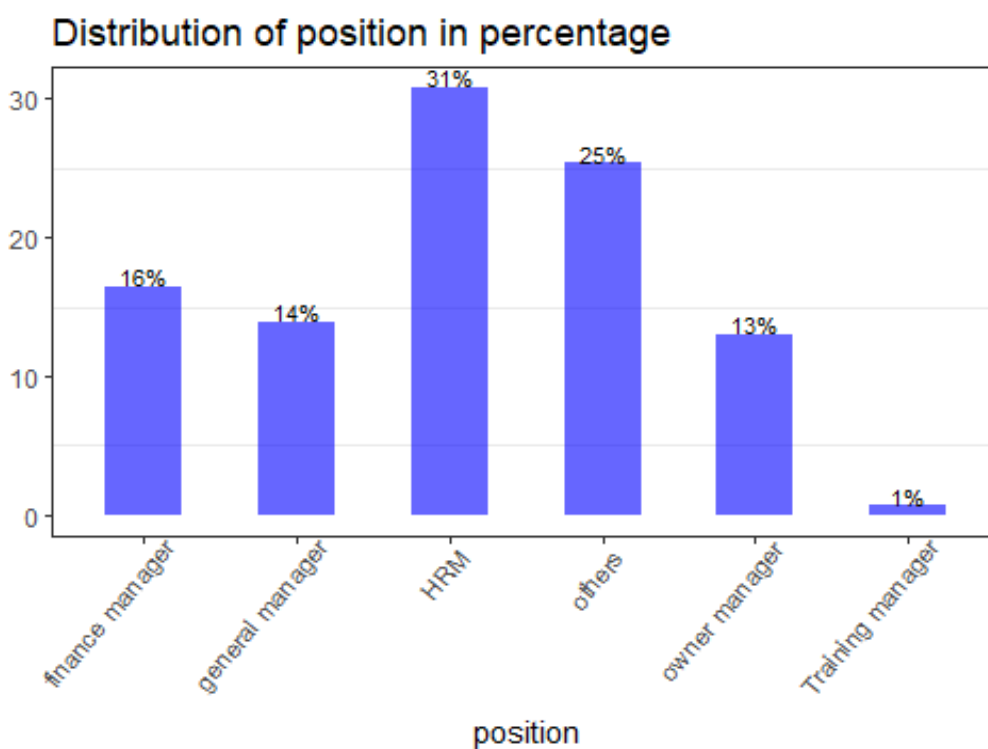


Figure 8 Distribution of industry by establishment size.

Human resource managers (31%) participated mostly in the survey, while training managers (1%) has the lowest participation.

4.2.1 Descriptive Statistics

Table 4 below shows the descriptive results of both the outcome variable, explanatory variables, and control variables.

Table 4. Descriptive Statistics

	Variable	N	Mean	SD	Min	Max
Outcome Variable	Production volume	5593	2.4	0.6	1	3
Explanatory Variables	collaboration	5593	2.5	1.7	1	5
	Design collaboration	5593	3.3	1.8	1	5
	Product innovation	5593	2.5	0.8	1	3
	Process innovation	5593	2.5	0.7	1	3
	Marketing innovation	5593	2.6	0.6	1	3
	Technology adoption	5593	1.4	0.5	1	2
	Manager approach	5593	1.7	0.4	1	2
	Monetary reward	5593	2.6	0.8	1	4
	Vision and mission	5593	2.2	0.8	1	4
	Work stimulation	5593	2.2	0.7	1	4
	Training	5593	2.1	0.8	1	4
	Employee involvement	5593	2.0	0.7	1	3
	Suggestion scheme	5593	1.6	0.5	1	2
	Employee retention	5593	2.9	0.7	1	4
	upskilling	5593	2.6	0.6	1	4
	Static employee	5593	2.8	1.6	1	7
	teamwork	5593	1.3	0.4	1	2
Control variables	Industry production	5593	0.3	0.5	0	1
	Industry construction	5593	0.1	0.3	0	1
	Industry commerce & hospitality	5593	0.2	0.4	0	1
	Industry Transport	5593	0.1	0.2	0	1
	Industry financial	5593	0.02	0.1	0	1
	Industry other services	5593	0.3	0.5	0	1
	Country France	5593	0.2	0.4	0	1
	Country Germany	5593	0.1	0.3	0	1

	Country Italy	5593	0.2	0.4	0	1
	Country Poland	5593	0.1	0.3	0	1
	Country Spain	5593	0.2	0.4	0	1
	Country UK	5593	0.1	0.3	0	1
	Size	5593	2.5	0.7	1	3
	Market demand	5593	2.3	0.7	1	4
	Market competition	5593	1.8	0.7	1	4
	Employee turnover	5593	2.6	1.1	1	5

4.3 Data Visualisation

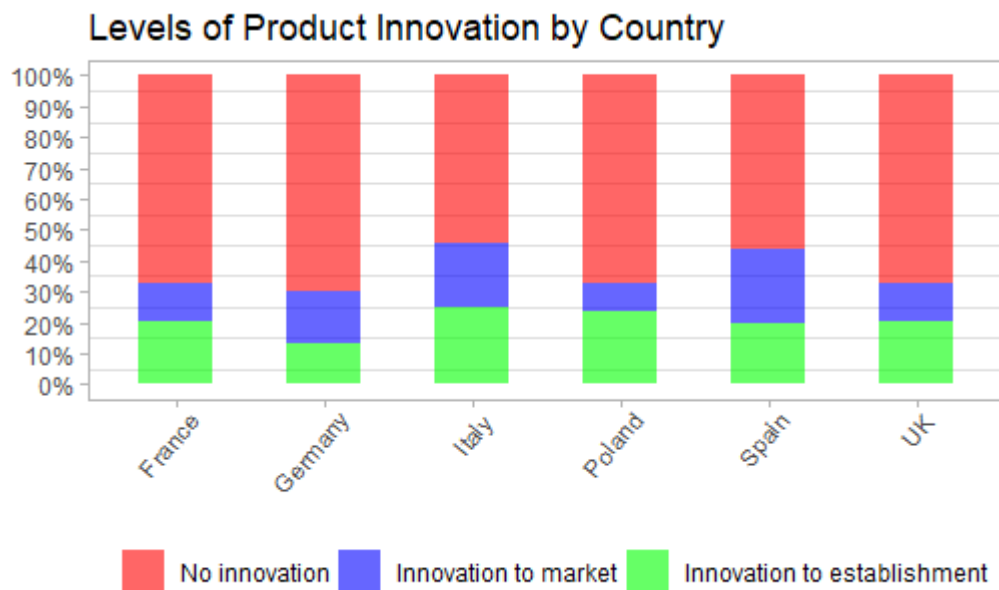


Figure 9. Levels of product innovation by country.

Figure 9 indicates that Italy (46%) and Spain (44%) have the highest level of product innovation both to the market and to the establishment, followed by France (34%) and UK (33%). The country with the lowest level of product innovation is Germany (30%).

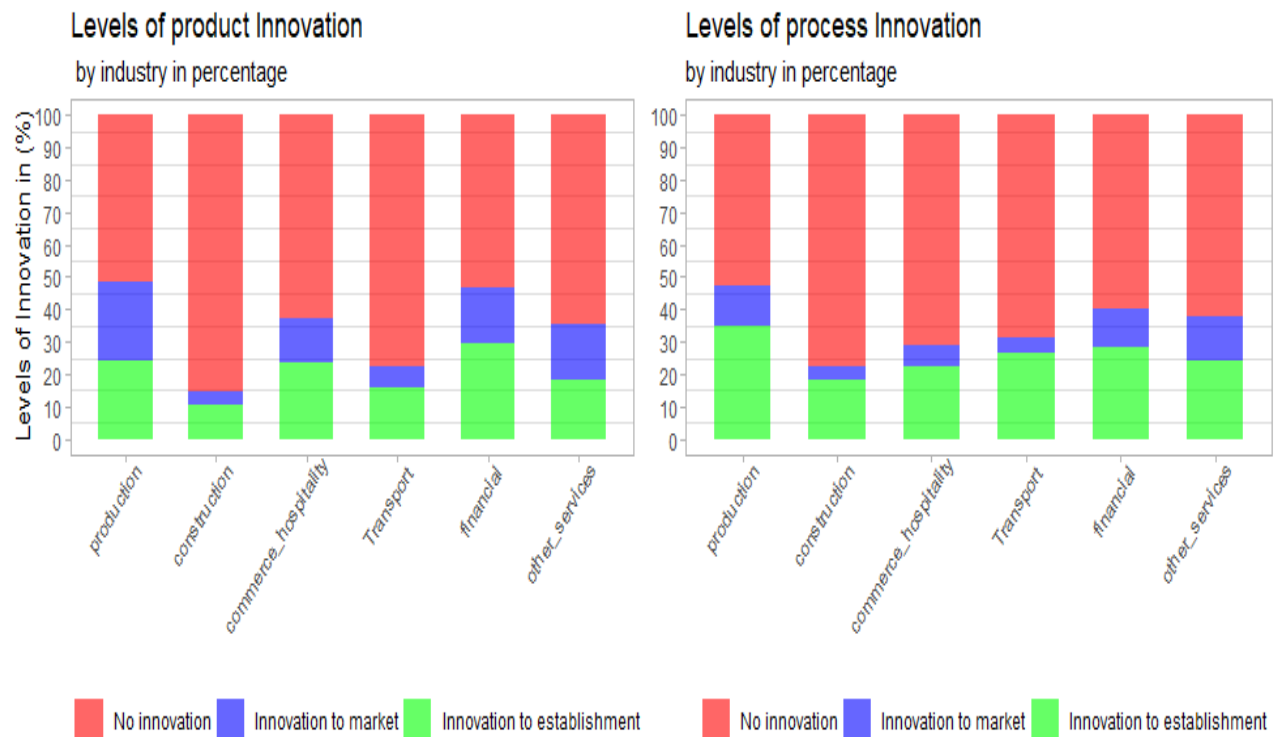


Figure 10. Product and process innovation levels across different industries.

Figure 10 shows significant variations in the levels of product and process innovation across industries. Firms in the production industry experience higher rate of product innovation (50%) than process innovation (47%) across industries. Also, innovation within establishment in Production industry is more common in process innovation (35%) than in product innovation (25%). Construction industry experiences the lowest rate of innovation both with product (10%) and process innovation (18%) across industries. Also, greater percentage of both product and process innovation in the construction industry are to the establishment.

Firms in Commerce and hospitality industry engage more in product innovation (38%) than in Process innovation (30%) and greater percentage of both innovations are to the establishment. Establishments in Transport industry engage more in process innovation (30%) than in product innovation (24%), and greater percentage of both innovations are to the establishment.

Firms in the financial industry have higher level of product innovation (47%) and process (40%) innovation after production industry. Also, greater percentage of innovation in the financial industry are to the establishment. finally, establishments in other services industry engages more in process innovation (37%) than product innovation (35%).

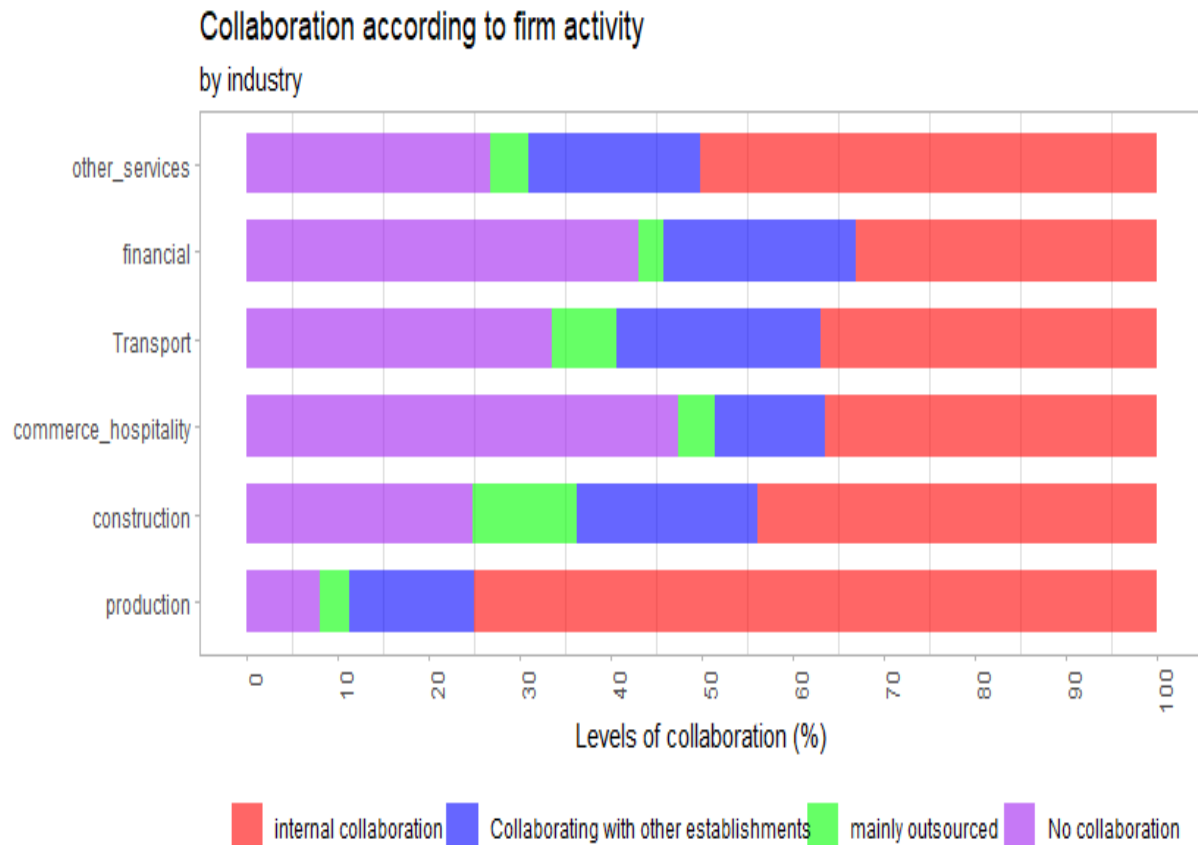


Figure 11. levels of collaboration according to firm activity by industry.

In figure 11 Commerce and hospitality (18%) have the least amount of collaboration with other establishments, while Transport (22%) and financial (20%) industries have the highest percentage of collaboration with other establishments. Establishments in production industry (75%) are found to engage mostly in internal collaboration, followed by establishments in other services (50%). While establishments in financial industry have the least amount of internal collaboration. Establishments in construction (12%) industry are most likely to outsource service provision and production while establishments in financial (5%) and production (5%) industries are least likely to outsource. Establishments in financial (43%) industry, and commerce and hospitality (47%) industry are likely not to engage in any form of collaboration.

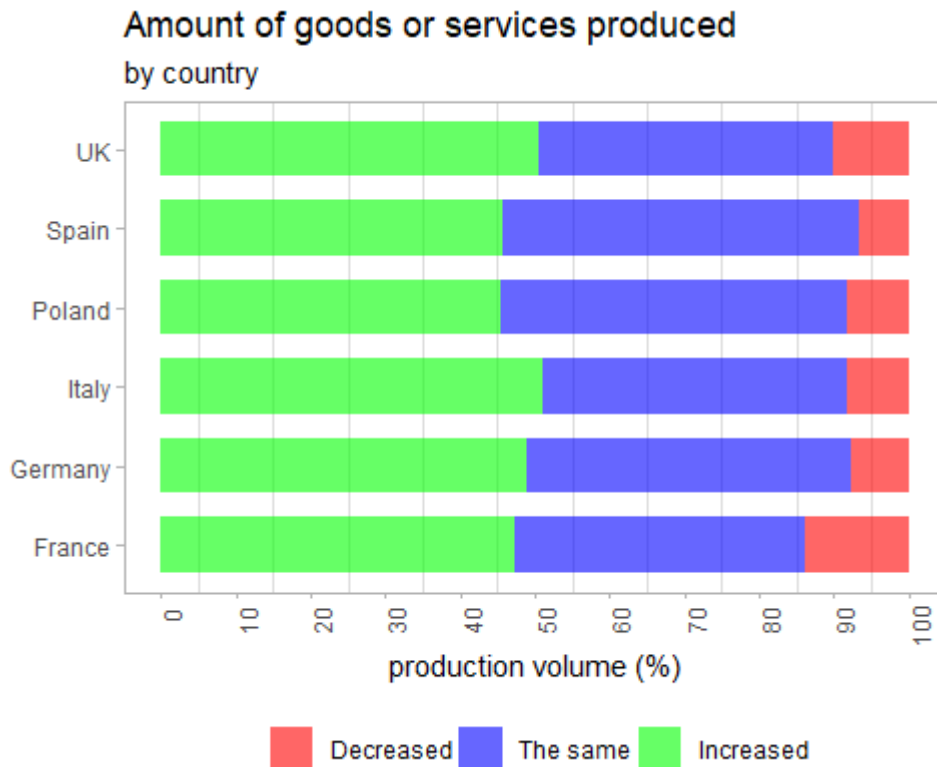


Figure 12. variations in production volume between countries.

Figure 12 indicates that industries in the UK (50%) and Italy (50%) have the highest percentage of increase in productivity. Followed by Germany (48%) and France (47%). However, France (14%) and UK (10%) scores the highest decrease in productivity which indicates a great degree of instability and unpredictability in the productivity of both countries. Industries in Poland (38%) have the least increase in productivity followed by Spain with 37%. However, they are more likely to be stable in their productivity.

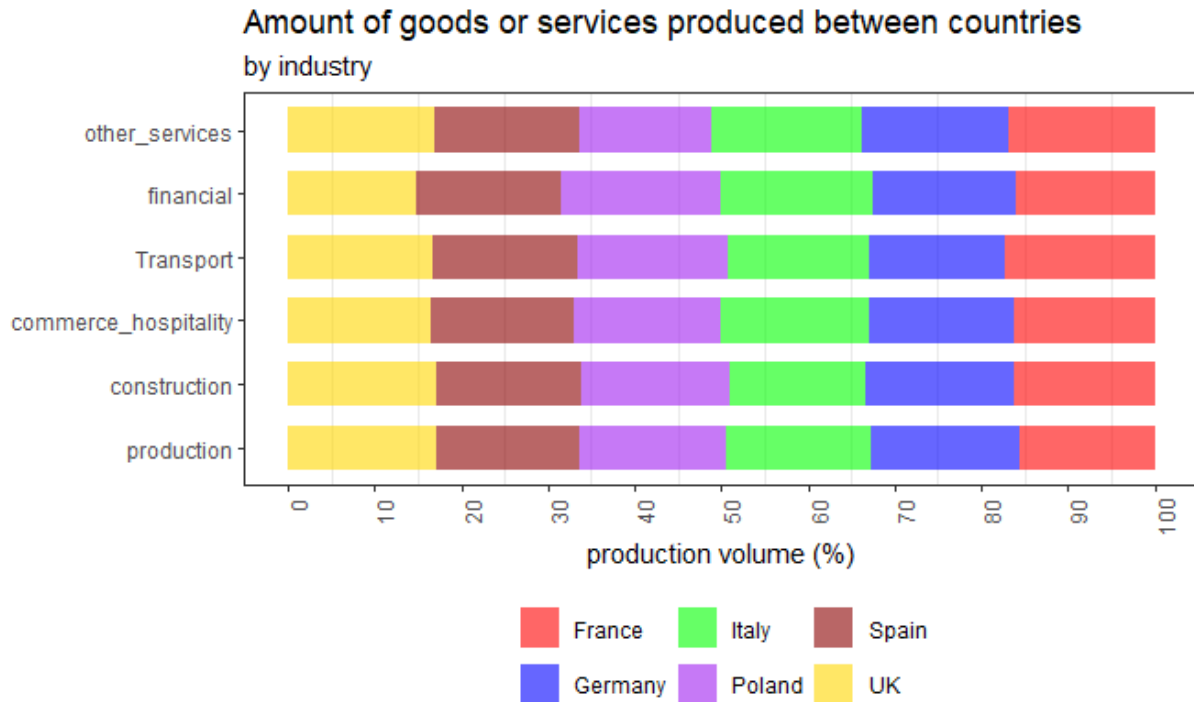


Figure 13. Productivity output between countries by industry.

Figure 13 shows variations in productivity across industries between countries in the study. UK and France (both 18%) are likely to have higher productivity in other services compared to other countries. UK (15%) had the least productivity in financial services compared to other countries. Spain and Poland have the least productivity in Transport industry (both 11%) with France scoring the highest by 17%. UK (18%), Italy (19%) and France (19%) had the highest productivity in commerce and hospitality compared to other countries. UK (19%) had the highest productivity in construction industry while Italy (16%) had the lowest productivity. All countries had relative productivity in the Production industry. However, Spain (15%) had the lowest productivity compared to other countries.

4.4 Testing For Correlation And Multicollinearity

The Variance Inflation Factor (VIF) is a crucial tool in regression analysis to assess multicollinearity and correlation among predictor variables. A VIF greater than 5 indicates serious multicollinearity, indicating a coefficient's variance is five times larger than it would be without the correlation. High VIF values indicate strong correlations, potentially resulting in inaccurate and less interpretable regression coefficients (Sonnberger 1989). The VIF assessment helps researchers identify and mitigate multicollinearity problems, enhancing the accuracy and resilience of regression models, leading to accurate inference and trustworthy

predictions (James et al. 2014). Table 5 below indicates that all the factors fall below the five thresholds, that being so, we can conclude that the regression model lacks any multicollinearity and can be used to empirically examine the role of organizational culture and innovation in firm performance across diverse industries and selected countries.

Table 5. Variance inflation factor.

Explanatory variables	"GVIF"	"Df"	"GVIF ^{1/(2*Df)} "
country Italy	1.80680054815924	1	1.34417281186581
country Spain	1.98301588807778	1	1.40819596934439
country Germany	1.45418349020975	1	1.20589530648798
country Poland	1.57846904219352	1	1.25637137908881
country UK	1.46119631710988	1	1.2087995355351
industry production	3.98817293368686	1	1.9970410445674
industry Transport	1.69266813581673	1	1.30102580136473
industry other_services	3.62858878357485	1	1.90488550405919
industry commerce_hospitality	3.40739687757631	1	1.84591356178352
industry financial	1.2775576079334	1	1.13029093950779
product innovation	1.65001927631755	1	1.28453076114103
process innovation	1.66374526289345	1	1.28986249766921
marketing innovation	1.31799265824122	1	1.14803861356716
factor(collaboration)	2.05319529530487	4	1.09409184902641
factor(design collaboration)	2.31164798495186	4	1.11042751014145
factor(training)	1.54022412704562	3	1.07464243804622
monetary reward	1.16518457921443	1	1.07943715852959
vision mission	1.61380232455839	1	1.27035519621812
work stimulation	1.66983044442865	1	1.29221919364659
upskilling	1.23717283028139	1	1.11228271149083
employee involvement	1.2309512674835	1	1.10948243225546
factor(technology adoption)	1.11181592439289	1	1.05442682268277
employee retention	1.08318981611012	1	1.04076405400557
market demand	1.05103344328393	1	1.02519922126577
market competition	1.09618671089986	1	1.04698935567648

suggestion scheme	1.21904433706353	1	1.10410340868215
manager approach	1.12048747147893	1	1.05853080799707
teamwork	1.13805643699421	1	1.06679728017755
Static employee	1.12929962296192	1	1.06268510056457
employee turnover	1.09402315153968	1	1.04595561642915
size	1.17510434295753	1	1.0840222981828

4.5 Multiple Regression Model

Table 6 below shows the influence of organizational culture, innovation, and control variables on firm performance across different industries and countries. The dependent variable, production volume, is a crucial indicator of firm performance. Table 6 shows the regression results of three models examining various combinations of independent variables. Model 1 includes only organizational factors, Model 2 incorporates all organizational factors and innovation practices, and Model 3 includes innovation practices and few organizational factors.

Table 6. Multiple Regression Analysis			
	<i>Dependent variable:</i>		
	production volume		
	Model (1)	Model (2)	Model (3)
country Italy	0.070***	0.055**	0.046*
	(0.024)	(0.024)	(0.024)
country Spain	-0.014	-0.040	-0.048*
	(0.025)	(0.026)	(0.025)
country Germany	0.098***	0.095***	0.083***
	(0.030)	(0.029)	(0.029)
country Poland	0.095***	0.096***	0.072**
	(0.030)	(0.030)	(0.029)
country UK	0.060**	0.062**	0.074**
	(0.030)	(0.030)	(0.029)
industry production	-0.043	-0.067**	-0.049

	(0.033)	(0.033)	(0.032)
industry Transport	-0.009	-0.017	-0.029
	(0.043)	(0.042)	(0.042)
Industry other services	-0.058 [*]	-0.073 ^{**}	-0.067 ^{**}
	(0.032)	(0.032)	(0.032)
Industry commerce & hospitality	-0.028	-0.053	-0.067 ^{**}
	(0.033)	(0.033)	(0.032)
industry financial	0.029	0.009	0.005
	(0.062)	(0.062)	(0.062)
product innovation		0.054 ^{***}	0.063 ^{***}
		(0.013)	(0.012)
process innovation		0.054 ^{***}	0.064 ^{***}
		(0.015)	(0.014)
marketing innovation		0.020	0.029 ^{**}
		(0.014)	(0.014)
factor(collaboration)2	-0.018	-0.021	
	(0.037)	(0.036)	
factor(collaboration)3	0.025	0.022	
	(0.029)	(0.028)	
factor(collaboration)4	-0.022	-0.011	
	(0.039)	(0.039)	
factor(collaboration)5	-0.050 ^{**}	-0.047 ^{**}	
	(0.021)	(0.020)	
Factor (design collaboration)2	0.017	0.018	
	(0.044)	(0.044)	
Factor (design collaboration)3	-0.023	-0.018	
	(0.032)	(0.032)	
factor (design collaboration)4	-0.041	-0.024	

	(0.059)	(0.059)	
factor (design collaboration)5	-0.096***	-0.047**	
	(0.019)	(0.020)	
factor(training)2	-0.020	-0.016	
	(0.022)	(0.021)	
factor(training)3	-0.014	-0.011	
	(0.026)	(0.026)	
factor(training)4	-0.135**	-0.142**	
	(0.057)	(0.057)	
monetary reward	0.035***	0.033***	
	(0.011)	(0.011)	
vision & mission	0.031**	0.029**	
	(0.012)	(0.012)	
work stimulation	0.015	0.013	
	(0.014)	(0.014)	
upskilling	0.057***	0.048***	0.066***
	(0.013)	(0.013)	(0.013)
factor (technology adoption)2	-0.046***	-0.029*	-0.040**
	(0.016)	(0.016)	(0.016)
employee involvement	-0.005	-0.001	
	(0.012)	(0.012)	
market demand	0.086***	0.087***	0.094***
	(0.012)	(0.012)	(0.012)
market competition	0.027**	0.023**	0.031***
	(0.011)	(0.011)	(0.011)
suggestion scheme	-0.010	-0.004	
	(0.017)	(0.017)	
manager approach	0.025	0.025	
	(0.018)	(0.018)	
employee retention	0.021*	0.022*	

	(0.012)	(0.011)	
static employee	0.006	0.007	0.0004
	(0.005)	(0.005)	(0.005)
teamwork	-0.028	-0.017	
	(0.019)	(0.019)	
employee turnover	-0.242***	-0.235***	-0.242***
	(0.007)	(0.007)	(0.007)
size	0.037***	0.038***	0.035***
	(0.012)	(0.012)	(0.012)
Constant	2.339***	2.113***	2.270***
	(0.115)	(0.118)	(0.083)
Observations	5,593	5,593	5,593
R ²	0.228	0.238	0.228
Adjusted R ²	0.223	0.233	0.225
Residual Std. Error	0.572 (df = 5556)	0.569 (df = 5553)	0.572 (df = 5572)
F Statistic	45.684*** (df = 36; 5556)	44.479*** (df = 39; 5553)	82.179*** (df = 20; 5572)
Note:	*p<0.1; **p<0.05; ***p<0.01		

In table 6, coefficients for each country indicate their impact on production volume compared to the reference country France. Holding other variables constant each of these countries; Italy, Germany, Poland, and the UK have positive coefficients, suggesting an increase in production volume between these countries. Spain shows a negative coefficient, but with less significance. Different industries have varying effects on production volume. When industry moves from construction to Production, productivity reduced by 0.067% the same goes for other services where production volume reduced by 0.073%. Transportation and financial industries exhibit mixed impacts with coefficients near zero. Commerce and hospitality have negative coefficients which shows a potential reduction in production volume.

Product, process, and marketing innovation all show positive significant coefficients, indicating a unit increase in each innovation practices while holding other variables constant will increase production volume respectively. Collaboration and design collaboration have a significant effect on production volume, hence not collaborating reduces production volume by 0.050%. Furthermore, firms that never provide opportunities for training will have a

decline in production volume by 0.135% compared to those that often provide training to their staff which is the reference category.

Monetary rewards, upskilling, vision and mission positively impact production volume, with varying significance levels with upskilling being highly significant. Employee retention has a positive significant impact on production volume, but only at a lower level. Technology adoption has a significant impact of production volume, firms that do not use new technology will have a decline of 0.046% in production volume. Employee involvement and teamwork are not significant.

Market demand and market competition show significant positive effects on production volume, with high significance across the three models. thus, 1% increase in market demand and market competition increases production volume by 0.08% and 0.02%, respectively. Employee turnover significantly impacts production volume, with higher turnover rates leading to lower production volumes. Size positively influences production volume consistently across all models, indicating a unit increase in the size of a firm will increase production volume.

The three models explain around 22.8% to 23.8% of the variance in production volume, suggesting a moderate explanatory power. The models' R-squared values indicate the proportion of variance in production volume explained by the independent variables. model 2 have a slightly higher R-squared values compared to other models, suggesting better fit. Adjusted R-squared values provide more precise model fit measurements, Model 2 with the highest adjusted R-squared could be the most well-fitting model. F-statistics for each model show overall significance. Residual standard error measures the average distance between observed and predicted data. Better model fit is indicated by lower values. Given that Model 2 has the lowest residual standard error, the best forecasts could come from it.

Conclusively, table 6 highlights the role of a range of factors in a firm's performance, with production volume largely influenced by innovation, organizational culture, and control variables. Model 2, which incorporates innovation variables, provides the most comprehensive understanding of firm performance. Further investigation and robustness tests will be conducted to confirm these findings.

4.6 Prediction Regression Model

Table 7 shows the forecast of production volume based on various organizational culture, innovation, and control variables which is the goal of the prediction regression model. To assess the predictive accuracy of Model 2, the dataset was partitioned into two subsets: 25% was reserved for testing purposes, while the remaining 75% was utilized for training the model.

Table 7. Prediction Regression Model

	<i>Dependent variable:</i>
	production volume
country Italy	0.047 [*]
	(0.028)
country Spain	-0.042
	(0.030)
country Germany	0.080 ^{**}
	(0.034)
country Poland	0.094 ^{***}
	(0.035)
country UK	0.061 [*]
	(0.034)
industry production	-0.080 ^{**}
	(0.038)
industry Transport	-0.033
	(0.049)

Industry other services	-0.076**
	(0.037)
Industry commerce and hospitality	-0.067*
	(0.038)
industry financial	0.045
	(0.072)
factor(collaboration)2	-0.056
	(0.041)
factor(collaboration)3	0.026
	(0.033)
factor(collaboration)4	-0.057
	(0.045)
factor(collaboration)5	-0.065***
	(0.024)
factor(design collaboration)2	0.034
	(0.050)
factor(design collaboration)3	-0.029
	(0.037)
factor(design collaboration)4	-0.068
	(0.068)

factor(design collaboration)5	-0.051**
	(0.024)
product innovation	0.060***
	(0.015)
process innovation	0.055***
	(0.017)
marketing innovation	0.014
	(0.016)
monetary reward	0.030**
	(0.012)
vision mission	0.036**
	(0.014)
work stimulation	0.020
	(0.016)
factor(training)2	-0.023
	(0.025)
factor(training)3	-0.003
	(0.030)
factor(training)4	-0.151**
	(0.066)
upskilling	0.050***
	(0.015)

Employee involvement	0.004
	(0.013)
factor(technology adoption)2	-0.038**
	(0.019)
employee retention	0.017
	(0.013)
market demand	0.082***
	(0.014)
market competition	0.025*
	(0.013)
suggestion scheme	-0.010
	(0.020)
manager approach	0.037*
	(0.021)
static employee	0.007
	(0.006)
teamwork	-0.004
	(0.022)
size	0.049***
	(0.014)
employee turnover	-0.235***

	(0.009)
Constant	2.072***
	(0.137)
Observations	4,195
R ²	0.244
Adjusted R ²	0.237
Residual Std. Error	0.571 (df = 4155)
F Statistic	34.360*** (df = 39; 4155)
Note:	*p<0.1; **p<0.05; ***p<0.01

Positive coefficients in Italy, Germany, Poland and UK indicate that firms in these countries have higher production volumes compared to the reference category France with firms in Poland having the highest positive impact on production volume. The negative coefficient in Spain suggests that firms in Spain have lower production volumes compared to France, though this result is not statistically significant. Production, Services, Commerce and hospitality show negative impacts on production volume compared to Construction Industry. Financial industry though not significant, suggests a positive but weak impact on production volume.

Product and process innovations exhibit highly significant positive coefficients, indicating a substantial positive impact on production volume. Marketing innovation showed positive but not significant. Factors such as collaboration and design collaboration reveal that firms that do not engage in collaborative activities will experience a decline in production volume. Additionally, the absence of training opportunities for staff results in a significant negative impact on production volume compared to firms that frequently provide training.

Monetary rewards, vision and mission, upskilling, and technology adoption positively influence production volume with upskilling demonstrating a particularly high level of significance. Market demand and market competition also show significant positive effects on production volume. Specifically, a 1% increase in market demand and market competition corresponds to increases in firm productivity by 0.082% and 0.025%, respectively. Finally, managerial approach has a slight positive impact on production volume.

Table 8. RMSE Prediction Regression model.

RMSE	value
Train data	0.568
Test data	0.563

The average magnitude of the errors between predicted and observed values is measured by the Root Mean Square Error (RMSE). The training RMSE (0.568) in table 8 represents the average error between the predicted production volume and the observed volume in the training dataset, indicating the model's fit. A lower RMSE indicates better model fit, which shows the model's predictions are closer to the real values in the training dataset. The test RMSE (0.563) in table 8 measures the average error between the actual production volume and the predicted production volume, assessing the model's effectiveness using hypothetical data. A lower test RMSE indicates better predictive performance.

The RMSE values for the training and test datasets are similar, with the test RMSE slightly lower than the training RMSE. This suggests that the model is not overfitting the training data, which can lead to deficient performance on new data. The lower test RMSE indicates that the model's predictions generalize well to new data, which is a desirable outcome. Further analysis, including cross-validation will be conducted to validate the prediction regression model's robustness and identify areas for improvement.

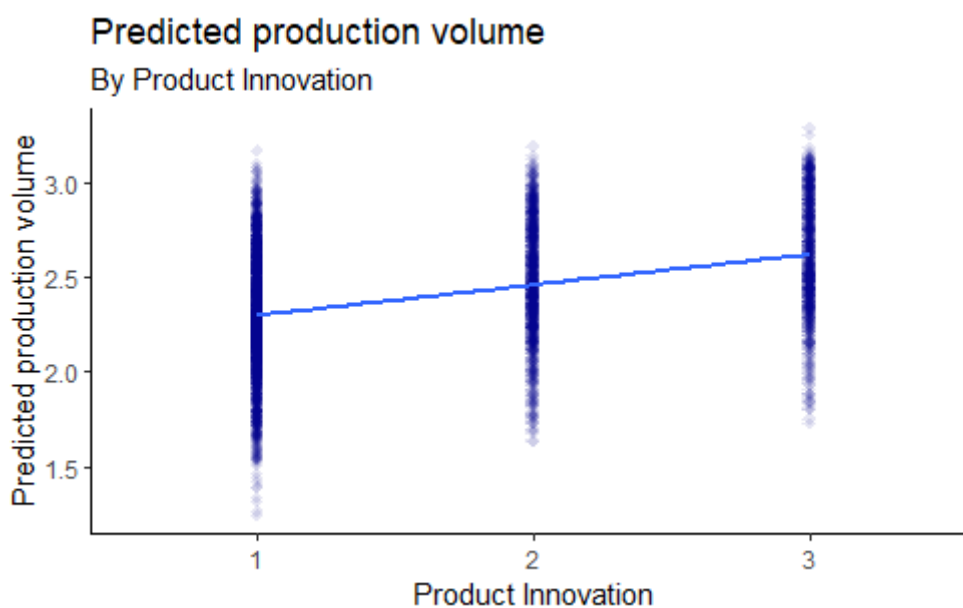
**Figure 14. Predicted production volume by product innovation.**

Figure 14 indicates that introducing new products or services to the market and to the establishment increases production volume.

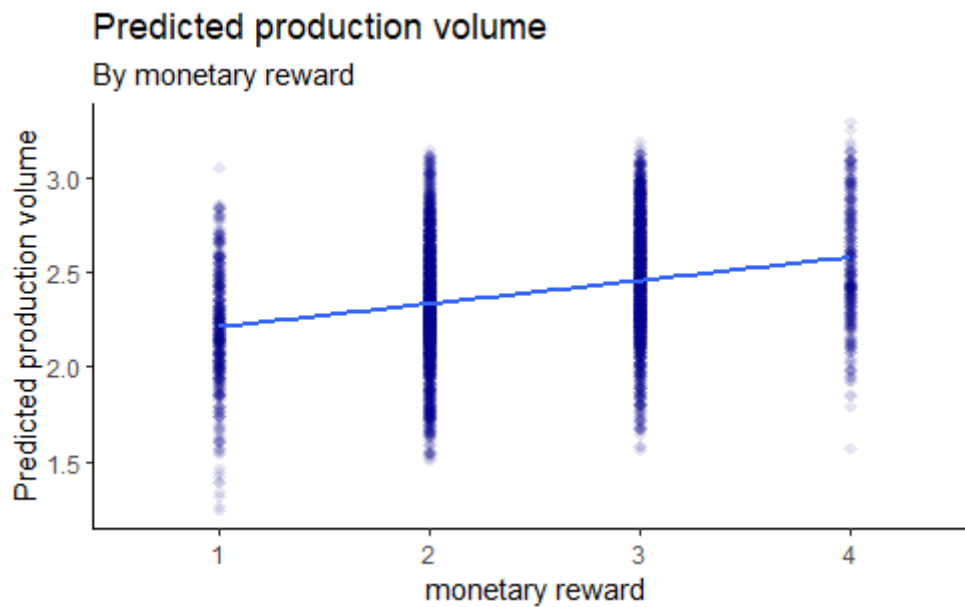


Figure 15. Predicted production volume by monetary reward.

Figure 15 shows that offering monetary incentives to motivate and retain employees increases production volume.

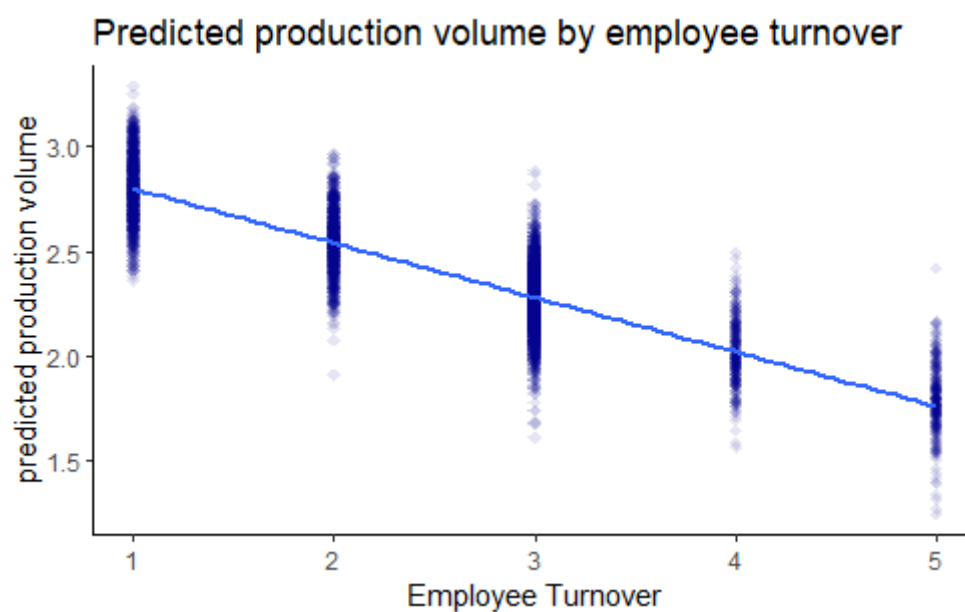


Figure 16. Predicted production volume by employee turnover.

Figure 16 indicates that as more employees leave the firm because of poor organizational culture production volume declines.

4.6.1 Cross Validation With K-Fold And Lasso Regression Analysis

The mean absolute error (MAE) measures the average absolute difference between predicted and actual values. In table 9 below both models, linear model (lm) K-folds and lasso, have similar MAE values, indicating comparable performance in terms of the absolute prediction error. Both linear model and lasso model show similar RMSE values, indicating comparable performance in overall prediction error, with the lasso model slightly lower.

Table 9. Cross validation results for K –folds and Lasso Regression

MAE	Min	1st Qu.	Median	Mean	3rd Qu.	Max
Lm(k-fold)	0.44	0.46	0.46	0.46	0.47	0.48
lasso	0.44	0.46	0.46	0.46	0.47	0.48
RMSE						
Lm(k-fold)	0.55	0.56	0.57	0.57	0.57	0.59
lasso	0.55	0.55	0.57	0.57	0.57	0.59
R Squared						
Lm(k-fold)	0.17	0.22	0.23	0.22	0.24	0.25
lasso	0.17	0.20	0.22	0.23	0.26	0.29

The regression prediction model's performance in table 7 is validated by the cross-validation results in table 9, with similar metrics (MAE, RMSE, R squared) suggesting consistency across different datasets. The regression prediction model's RMSE (0.563) value in table 8 for the test data aligns with cross-validation values, indicating its performance on the test dataset is consistent with its cross-validation performance.

Conclusively, the cross-validation results validate the regression prediction model's performance, demonstrating consistent performance across various datasets, as evidenced by comparable metrics from both the model and cross-validation.

4.7 Discussion And Finding

This section summarises the findings on the comparative study of the influence of organizational culture and innovation on firm performance across various industries, while

comparing the results of this findings to the past literature. The study found that organizational culture and innovation often reject all null hypotheses, enhancing firm performance in Poland, Germany, Spain, Italy, France, and the UK. The analysis involves descriptive statistics, multiple regression model, prediction regression and cross validation to comprehensively understand the role of organizational culture and innovation in firm performance (production volume). The findings are summarized in Table 10 below, along with the corresponding judgments made at the 0.05 level of significance.

Table 10. Hypothesis Summary Table.

	H1	H2	H3	H4
Model	There is a significant positive relationship between organizational culture and firm performance across various industries.	Innovation has significant positive effect on firm performance across various industries.	There are significant differences in the impact of organizational culture and innovation on firm performance across various industries in Poland, Germany, Spain, Italy, France, and the UK.	There is a significant relationship between collaboration and firm performance across various industries.
Multiple Regression	Reject Null	Reject Null	Reject Null	Reject Null
Prediction Regression	Reject Null	Reject Null	Reject Null	Reject Null

The descriptive statistics provided an overview of key variables, revealing moderate innovation levels across the sample, with notable variability among industries. The comparative analysis of countries highlighted the UK's unique position with the lowest percentage of establishments in the production industry but the highest in the service industry. This result agrees with the UK economic output by industry in figure 1. Additionally, the UK, Italy, and Germany emerged with the highest percentage of increase in

production volume respectively compared to other countries, highlighting the differences in industrial developments between countries.

Table 6 and table 7 provide valuable insights into the factors influencing production volume in firms, including country, industry, organizational factors, and innovation variables. Notably, the study found significant variations in coefficients across industries and countries, indicating the diverse innovation pursuits among firms. This aligns with existing literature emphasizing the effects of organizational culture and innovation on firm performance (Tidd and Pavitt 2011). Furthermore, Table 6 and Table 7 shows that the country where a firm operates affects the relationship between organizational culture, innovation, and firm performance. This result agrees with Tian et al.'s (2020) systematic review of 100 articles on innovation and organizational culture which reveals that cultural variables significantly impact every aspect of the innovation ecosystem in international business contexts. Different industries and countries emphasize distinct aspects of organizational culture (Groysberg et al. 2018). In addition, Transport and financial industries were not significant across the three models in Table 6, which agrees with the comparative study by Prajogo (2006) between manufacturing and service industries where Prajogo concluded that manufacturing firms have a stronger association with innovation and firm performance compared to service firms.

Organizational factors such as monetary reward, vision and mission with collaboration and training reference category have shown positive impact on production volume, this result agrees with the finding of Abodunde et al. (2021) when they used regression model to test the impact of organizational culture and innovation on bank performance in Nigeria, the study established that organizational culture directly and positively influence firm performance. Furthermore, manager approach in table 7 showed positive significance to production volume, this result can be related to the fact that organizational leadership significantly influences firm performance (Kim and Yoon 2015).

The second Hypothesis (H2) examines the relationship between innovation and firm performance, exploring whether organizations that emphasize innovation tend to exhibit better performance. The findings show that innovations in product, process, and marketing, positively influence production volume, with product and process innovation showing the most significant effects. This result agrees with the findings of past scholars (Gunday et al. 2011; Damanpour and Aravind 2012; Walker et al. 2015). For instance, Gunday et al. (2011) examined the effects of product, process, and marketing innovations on manufacturing firms

in Turkey, the results revealed a positive impact on firm performance. Furthermore, organization innovation practices such as upskilling and technology adoption have shown significant effects on firm performance. Hence, innovation involves not only creating new products or services but also continuously improving an organization's procedures, frameworks, and operational methods (Walker et al. 2015), this calls for a culture that values innovation (Machmud 2020).

The third hypothesis (H3) investigates whether the effects of organizational culture and innovation on firm performance are consistent across industries or if industry-specific factors significantly influence it. Table 6 and Table 7 showed significant differences in the impact of organizational culture and innovation on production volume across different industries. The coefficients for different industries varied significantly with Certain industries, such as production and other services, showing negative coefficients when compared to construction industry which is the reference category, suggesting negative impact on production volume. This result aligns with the CVF theory which noted that different organizational culture types significantly impact innovation and performance across various industries (Cameron and Quinn 2011). Furthermore, organizations that align their innovation goals with their culture are better equipped to adapt to changing market conditions, as evidenced by a meta-analysis by Büschgens et al. (2013), where most Turkish construction companies had a combination of clan and hierarchical cultures that did not meet their competitive needs.

Furthermore, Collaboration strategies proved to have a significant impact on firm performance across various industries. This finding agrees with existing literature, theory of Open innovation, which emphasizes "openness," utilizing external networks, cooperative collaborations, and both inward and outward open innovation. Chesbrough (2003) concluded that collaboration strategy can reduce costs, accelerate innovation, and reduce risk by utilizing external resources and expertise. Moreover, the empirical research suggested a strong and positive correlation between organizational innovation, open innovation, and firm performance (Chesbrough 2006).

Control factors such as size, market demand and market competition consistently influenced production volume positively across all models, highlighting their role in improving firm performance. Employee turnover significantly influenced production volume negatively, indicating its negative impact on firm performance. This result aligns with OECD (2005),

which noted that innovation enhances firm's sales, market demand, productivity, efficiency, and market competitiveness through national and industrial networks.

Conclusively, the regression models' reliability and validity were evaluated through cross-validation analysis. The cross-validation results provided insights into the predictive accuracy of the regression model. Both linear regression and Lasso regression models demonstrated similar performance metrics, indicating consistent predictive accuracy across different sample.

CHAPTER 5: CONCLUSION

5.1 Introduction

This chapter will conclude the study by summarizing the key research findings in relation to the purpose of the research, research questions, research hypothesis as well as the contribution and recommendations thereof. It will review limitations of the study and put forward opportunities for future research.

5.2 Summary

The purpose of this research is to investigate and compare the impact of organizational culture and innovation on firm performance across various industries in Spain, Italy, France, Germany, Poland, and the United Kingdom. The research explores the literature and theoretical framework of relevant definitions, while also providing arguments about the relationship between organizational culture, innovation, and firm performance. The research's methodology is explained, starting with research philosophy to data collection. The study used descriptive statistics, multiple linear regression model, and prediction regression to analyse the European company survey 2019. The key findings indicated that; organizational culture have a significant positive impact on firm performance, innovation has a significant positive relationship with firm performance across various industries, there are significant differences in the impact of organizational culture and innovation on firm performance across various industries in Poland, Germany, Spain, Italy, France, and the UK, and finally, there is a significant relationship between collaboration and firm performance across diverse industries at a significance level of 0.05.

Overall, this study provides valuable insights into the complex relationship between organizational culture, innovation, and firm performance. The findings have practical implications for firms aiming to enhance their production volume and competitiveness. By fostering a culture of innovation and utilizing collaborative strategies, organizations can effectively address industry-specific dynamics. Consequently, this enables firms to successfully navigate evolving market environments and achieve sustainable long-term growth.

5.3 Implications.

5.3.1 Theoretical Implications

The study enhances our understanding of the complex relationship between organizational culture and innovation theories by demonstrating their interdependence and impacts on firm performance, thereby enriching our understanding of the comparative examination of organizational culture and innovation on firm performance across different industries. The findings validate and extend existing theories in organizational culture, innovation, and firm performance. For example, the results support the CVF theory which emphasizes the importance of aligning innovation techniques with organizational culture for improved firm performance, which will enable organizations to capitalize on their advantages and adapt to changing market conditions (Cameron and Quinn 2011).

The study contributes to theories of organizational learning by identifying the control and explanatory variables that influence the relationship between organizational culture, innovation, and firm performance, revealing how size, market conditions, employee turnover, industry type and the country a firm operates from affect the strength and direction of this relationship. Finally, this research expanded the existing research scope in terms of industry and country by implementing a survey covering a wide range of industries, overcoming previous research limitations to a certain industry and country.

5.3.2 Managerial Implementations And Recommendations.

The research findings provide valuable insights for policy makers, organizational leaders and managers seeking to improve firm performance through strategic interventions in organizational culture and innovation. Firstly, in industries like production and services, where production volume is negatively impacted, emphasizing innovation in processes and products could help counterbalance these effects. Managers should foster a culture that encourages innovation at all organizational levels by promoting a shared vision and mission that emphasize innovation, using incentives like monetary reward to motivate employees, creating a supportive work environment and fostering open communication and collaboration among employees and external sources. Secondly, policy makers and organizational leaders should focus on building dynamic capabilities to adapt to changing market conditions. This involves creating an environment that values flexibility and continuous training, this will encourage workers to view change and innovation as opportunities for personal and

professional growth. Furthermore, factors contributing to high employee turnover should be addressed to maintain stability and continuity in production.

Moreover, Special attention should be given to understanding the lower production volumes in Spain and implementing targeted measures to address local inefficiencies. Policy makers and Organizational leaders should encourage employee participation and invest in upskilling, and technology adoption which can enhance an organization's ability to capitalize on new opportunities and adapt to evolving challenges. Finally, organization's principles and strategic goals should align with its culture, ensuring clear communication of its vision, mission, and values in all decision-making and organizational culture. Leadership behaviours, reward systems, and performance measurements should also align with desired cultural norms and behaviours of an organization.

5.4 Limitations.

While the study on the comparative examination of organizational culture and innovation's effects on firm performance across various industries provides valuable insights, it is crucial to acknowledge its limitations. Firstly, the study's findings may not be generalizable to all industries and country contexts, this is because the data in the European company survey is collected from specific industries and countries in Europe which limits the applicability of the results to a broader population. Also, the study's results may be influenced by cultural context, with cultural differences across countries and regions potentially affecting the interpretation and generalizability of the findings.

Secondly, the study's cross-sectional design provides an understanding of variables' relationships at a single point in time. Longitudinal studies will offer a more comprehensive understanding of how organizational culture and innovation evolve over time and their impact on firm performance. Finally, the study may not consider all relevant variables, such as profitability which could potentially confound the results and lead to biased estimates. By addressing these limitations, future studies in this field will be more robust leading to a more sophisticated understanding of the relationship between organizational culture, innovation, and firm performance.

5.5 Recommendations For Further Study

The study's managerial recommendations and limitations suggest that further research is needed to address knowledge gaps and enhance the relevance of the study results on the comparative examination of organizational culture and innovation's influence on firm performance across different industries. First off, future research should attempt to explore the mediating and moderating mechanisms influencing the relationship between organizational culture, innovation, and firm performance, examining how factors like organizational structure, profitability, and technology advancement influence this relationship. Furthermore, Longitudinal studies are needed to explore the long-term impact of organizational culture and innovation on firm performance, examining causal relationships, and sustainability over time. Finally, it will be interesting to a conduct Cross-cultural research which will help to understand the differences between organizational culture and innovation practices in different contexts and their impact on firm performance. This could guide the development of management techniques and tactics that are sensitive to cultural differences.

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