THE ROLE OF RISK MANAGEMENT IN PROJECT SUCCESS – AN ANALYSIS OF FOOD INDUSTRY IN THE UK

MSc in Project Management

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DEDICATION

I dedicate this dissertation to the unwavering pillars of my life—my parents. Your boundless love, endless encouragement, and steadfast belief in my abilities have been the driving force behind this academic journey. Mom and Dad, your sacrifices and unyielding support have shaped the person I am today. Together, you form the bedrock upon which this achievement stands. This dissertation is as much yours as it is mine. Thank you both with immeasurable gratitude and love.

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Abstract

The food industry operates within a complex ecosystem characterized by multifaceted challenges, including stringent regulations, volatile market conditions, and diverse supply chains. This research delves into the pivotal role of risk management in ensuring project success within this dynamic environment. Through a comprehensive analysis spanning various sectors of the food industry, including production, processing, distribution, and retail, the study identifies key factors influencing project outcomes. Supply Chain Risk Management (SCRM) and Enterprise Risk Management (ERM) emerge as critical strategies for mitigating operational disruptions, ensuring food safety, and maintaining regulatory compliance. SCRM approaches, ranging from comprehensive risk management strategies to focused responses to specific disruptions, play a vital role in minimizing food wastage and enhancing supply chain resilience. Institutional interventions, such as insurance and social protection programs, complement agricultural technologies, optimizing risk management and fostering sustainable agricultural production. Furthermore, the integration of technologies like Radio-frequency identification (RFID) and Enterprise Resource Planning (ERP) systems enhances supply chain risk management capabilities, providing greater security and traceability.

The study also explores the impact of technological advancements, such as block chain and artificial intelligence, on enhancing risk management practices and improving operational performance. These technologies offer innovative solutions to enhance food safety and quality control, reduce waste, and prevent counterfeiting. Block chain technology, in particular, provides security, traceability, and decentralization of data related to food products, effectively mitigating risks and improving operational performance in the food industry. Additionally, Enterprise Risk Management (ERM) plays a crucial role in safeguarding the integrity of food products, ensuring compliance with regulations, and maintaining consumer trust.

Furthermore, the research examines emerging challenges, such as food fraud and environmental concerns, and offers insights into future opportunities for stakeholders aiming to enhance project success and resilience in the ever-evolving food industry landscape. Emerging risks in the food chain necessitate timely identification and mitigation to prevent potential adverse impacts on human health, strategic planning, and decision-making processes. Despite challenges related to

trust, cost, and personnel training, implementing technologies like block chain offers promising avenues for addressing food quality issues and ensuring drug safety.

Lastly, the research examines emerging challenges, such as food fraud and environmental concerns, and offers insights into future opportunities for stakeholders aiming to enhance project success and resilience in the ever-evolving food industry landscape. This comprehensive analysis contributes to a deeper understanding of risk management dynamics and their implications for project success in the food industry.

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Chapter 1: Introduction

Food is considered as the highly competitive industry in the current era. Projects in the food industry encompass various endeavors such as product development, supply chain optimization, and technological advancements. However, these projects are often accompanied by inherent uncertainties and potential challenges that can impede their success. This study focusses on the role of risk management in project success in food industry. This chapter includes research aims, objectives questions, problem statement, rationale and lastly the structure of the overall dissertation. This research aims to contribute valuable insights that can guide practitioners, policymakers, researchers, and academics in understanding how effective risk management strategies can be employed to enhance project outcomes in the ever-evolving landscape of the food industry.

1.1 Background of the Research

The food industry (FI), characterized by its rapid innovation (Purba *et al.,* 2018), changing consumer preferences, and stringent regulatory requirements, is subject to a myriad of risks that can significantly impact project outcomes. Food sectors are facing different challenges including financial problems, lack of technical skills and investment in the business ETC (Singh et al., 2019). These risks span across diverse facets, including but not limited to market volatility, supply chain disruptions, regulatory compliance, and technological advancements. The failure to identify, assess, and mitigate these risks can lead to project delays, cost overruns, and, in extreme cases, project failure (Rasul *et al.,* 2021).

Dealing with project risks poses a significant challenge due to their dual origins: uncertainties inherent in the project and the actions of individuals associated with it. Addressing these risks is complex because uncertainty is inherently difficult to manage and can become overwhelming without the use of simplified models (Anantatmula *et al.,* 2018). By recognizing, analyzing, and developing risk response plans at the outset, the potential impact can be reduced. This proactive strategy enables project teams to adeptly navigate uncertainties and proactively address potential challenges throughout the entirety of the project's lifespan.

Effective risk management practices play a pivotal role to boost project success in food industry as well. By proactively identifying and addressing potential challenges and uncertainties, organizations can not only protect their investments but also create a foundation for sustainable growth and competitiveness (Singh *et al.,* 2019). The intricacies of the food industry, with its complex network of stakeholders and global supply chains, necessitate a comprehensive understanding of risk factors and a strategic approach to managing them. From the initial conversion of raw materials to the concluding packaging phase, this process encompasses the entire procedure, guaranteeing a thorough approach to quality and efficiency. The goods within the food industry are susceptible to numerous risk factors. These factors can contribute to the production of hazardous goods, posing potential threats to consumer health and exerting irreversible negative financial repercussions on the sector as a whole (Raak *et al.,* 2020).

Significant amounts of food-grade material face rejection from the production line, the imperative to minimize losses underlines the significance of healthy risk management in project success. The rejection of materials can stem from various factors, including visual imperfections, physical defects, microbiological concerns, or compositional issues. Implementing effective risk management strategies becomes crucial in addressing these challenges and mitigating the financial impact on projects (Sadeh *et al.,* 2022).

By recognizing and proactively handling the risks associated with material rejection, companies can enhance their ability to control costs, optimize raw material usage, and ultimately improve project outcomes (Waqar *et al.,* 2023). This aligns with the broader understanding that effective risk management, particularly in anticipating and addressing challenges at the source, contributes significantly to project success in the dynamic and resource-intensive landscape of the food industry.

Food producers and manufacturers must prioritize the reduction of raw material wastage to the greatest extent feasible. Additionally, they should focus on identifying process options and associated risks that lead to a decreased waste burden, ultimately contributing to overall project success (Lamprou *et al.,* 2022). This research aims to figure-out the unique challenges faced by the food industry, the current state of risk management practices, and the potential areas for improvement. Through a systematic analysis of existing literature and empirical studies, the dissertation aims to provide a comprehensive framework that organizations in the food industry

can leverage to optimize their risk management strategies and, consequently, bolster the success of their projects.

1.2 Statement of Problem

The food industry is famous for its changing nature and complex operational challenges, grapples with the crucial question of whether effective risk management practices significantly impact project success. Despite its acknowledged importance, a comprehensive understanding of how risk management practices specifically contribute to project success within the unique context of the food industry remains lacking. This research addresses the gap in knowledge by focusing on the intricate interplay between risk management strategies and project success. The overarching question guiding this investigation is: How does the strategic application of risk management influence the success of projects in the food industry? The complexity of the food sector, characterized by evolving consumer trends, stringent regulations, and supply chain intricacies, necessitates a tailored analysis. Through this research, we aim to unravel the specific dynamics at play, providing insights that can inform and enhance risk management approaches, ultimately contributing to more successful project outcomes in the dynamic and critical domain of the food industry.

1.3 Rationale of the Research

The rationale for conducting this research lies in the imperative need to comprehensively understand the interplay between risk management and project success within the specific context of the food industry. The significance of successful project outcomes in the active and competitive landscape of the food sector is undeniable, given the industry's complexities, including evolving consumer preferences, stringent regulatory requirements, and intricate supply chains.

In the fiercely competitive and constantly evolving food manufacturing industry, an exceptional project management strategy is indispensable for organizational success. Within this industry, project managers often contend with considerable environmental unpredictability, which can significantly impact their stress levels and, consequently, their performance (Najla, 2023).

As projects inherently involve uncertainties and unknowns when active risk management becomes crucial for achieving project success. There exists a critical gap in knowledge regarding its nuanced impact on project success in the food industry. This research seeks to address this gap by delving

into the specific mechanisms through which risk management strategies contribute to or hinder project success (Anantatmula *et al.,* 2018). The multifaceted nature of the food industry demands a tailored analysis that considers the unique challenges and opportunities it presents.

This research aims to offer actionable insights that can guide organizations operating in the food sector. Understanding how strategic risk management can be optimized to navigate the complexities of the industry is crucial for enhancing overall project outcomes. The outcomes of this research are expected to contribute not only to academic knowledge but also to practical applications, aiding decision-makers in developing more effective risk management strategies tailored to the specific needs of the food industry. Ultimately, the rationale behind this research is to empower organizations in the food sector to navigate uncertainties, optimize project success, and foster long-term sustainability in this critical and rapidly evolving industry

1.4 Research Aims and Objectives

Research Aim: This study aims to investigate the role of risk management in project success specifically focused on the food industry in the UK.

Research Objectives:

- To examine the linkages between risk management and project success.
- To investigate influence of risk management in different disciplines of food industry.
- To evaluate successful strategies and best practices employed by organizations in the food industry to mitigate project risks.

1.5 Research Questions

1. What is the role of risk management in project success?
2. How risk management practices influences in different disciplines of food industry?
3. How to evaluate successful strategies and best practices employed by organizations in the food industry to mitigate project risks?

1.6 Research Gap

Existing studies lack comprehensive insights into the unique challenges and opportunities inherent in food projects. This gap is essential because it highlights the need for a deeper understanding of the specific changing aspects within the food industry of UK, concerning risk management and project success. By addressing this gap, researchers can delve into the intricacies of food projects,

considering factors such as perishability, regulatory requirements, supply chain complexities, and consumer preferences. Understanding these unique challenges and opportunities will enable the development of tailored risk management strategies that can enhance project success in the food industry.

1.7 Structure of the Research

The brief of each chapter is given below:

Chapter 1: The introductory chapter sets the stage for the research, providing a comprehensive overview of the broader context within which the study is based. It includes the rationale behind the research, defines the core objectives, and clarifies the research questions and problems.

Chapter 2: The literature review chapter delves into earlier published scholarly articles. This offers a thorough inspection of existing works to establish a profound understanding of the subject matter. By critically assessing theories and concepts, this chapter ensures that the research is firmly grounded in relevant academic foundations, shaping the study's theoretical framework.

Chapter 3: The methodology chapter outlines the methodical steps taken for data collection and analysis. It serves as a director to understand the inner workings of the research. It also explains the chosen methodology and guiding principles. This chapter establishes the reliability and accuracy of the study.

Chapter 4: Raw data is distorted into meaningful results using appropriate analytical tools and techniques in this analysis chapter. This section forms the empirical backbone of the research, enabling the drawing of conclusions and providing answers to the research questions. Meticulous data analysis unlocks the possibilities of the research to pay substantively to the existing body of knowledge.

Chapter 5: Next is discussion chapter. It offers a complete response to the research questions resulting from the insights gained in the data analysis chapter. Through a rich discourse, this chapter develops the better understanding of the research topic. Also, synthesizing findings and drawing connections between theory and empirical evidence.

Chapter 6: This is final chapter. After summarizing findings, a conclusion is drawn. Furthermore, forward-looking recommendations for future research directions are provided, offering insights for

continued exploration and inquiry in the field. This chapter marks the culmination of the research journey while paving the way for further academic exploration.

Chapter 2: Literature Review

2.1 Introduction

Effective risk management is essential for ensuring the success of projects within the dynamic and multifaceted environment of the food industry. This literature review explores the interplay between risk management practices and project outcomes in food industry projects. Specifically, it investigates the moderating effect of management competency, examines risk management across various industry disciplines, and evaluates effective strategies for mitigating project risks. By synthesizing existing research, this review aims to identify key insights and areas for future exploration, contributing to enhanced project management practices in the food industry.

2.2 Risk Management and Project Success

Risk management (RM) is the systematic process of recognizing, evaluating, and justifying risks that could influence the objectives or results of a project, organization, or endeavor (Alzoubi, 2022). This entails methodically assessing potential hazards and opportunities, gauging their probability and potential consequences, and instituting measures to diminish, regulate, or capitalize on them. Risk management aims to enhance decision-making, improve resource allocation (Hu *et al.,* 2019), and increase the likelihood of achieving desired outcomes while minimizing negative consequences. It is a proactive approach that helps organizations anticipate and respond effectively to uncertainties and challenges in their operational environment.

The success and performance of a project are heavily reliant on planning. Making it a pivotal aspect during the various phases of project establishment (Naeem *et al.,* 2018). Numerous empirical studies have highlighted planning as a primary contributor to project success, underscoring its significance in project management (Urbanski *et al.,* 2019). In professional project management circles, risk has emerged as a significant concern, particularly heightened by the aftermath of the global financial crisis in 2008. Within the realm of project management, risk is commonly referred to as project risk, representing the potential for unfavorable outcomes in a project's trajectory (Alhashmi *et al.,* 2023). Previous research has underscored the importance of prioritizing planning to enhance project performance (Roeth *et al.,* 2019). Moreover, studies have demonstrated a positive correlation between organizational efficiency and the integration of risk management and planning in management practices.

However, multiple studies have explored project success from various angles, including aspects such as workplace bullying, corporate reputation, emotional intellect, business orientation, squad learning, invention, and human resource practices (Creasy *et al.,* 2020).

Risk management is intricately linked to project success, serving as a critical determinant of project outcomes. Successful risk management enables project teams to proactively address potential threats, mitigate their effects, and capitalize on favorable circumstances, thereby increasing the likelihood of achieving project objectives within scope, schedule, and budget constraints. Additionally, healthy risk management practices contribute to stakeholder satisfaction, enhance project resilience to unforeseen events, and improve overall project governance and decision-making processes (Oehmen *et al.,* 2019). In essence, integrating its management practices is essential for optimizing project success and delivering value to stakeholders.

Active risk managing is considered vital for navigating uncertainties and confirming that project objectives are met. By systematically identifying, assessing, and mitigating risks unique to the food industry context, organizations can safeguard against potential disruptions, minimize operational setbacks, and capitalize on opportunities for growth and innovation.

2.3 Role of Risk Management in Project Success in Food Industry of the UK

The FI holds significant economic importance not only for the European Union but also for other nations, given the crucial role of food in every society. Ensuring product security is of worth important for all stakeholders. Furthermore, an increasing number of consumers, who recognize the interconnectedness of food, diet, and health, are placing greater emphasis on the safety of the food they consume (Radu *et al.,* 2023). Various pathogenic factors can affect food, leading to alterations in its physical, chemical, and sensory characteristics. These pathogens may stem from factors such as pesticide overuse, environmental conditions, water quality, production processes, transportation, or handling procedures, all of which pose risks to human health. Ensuring food safety entails rigorous food quality control measures.

Furthermore, the UK food industry's focus on sustainability and environmental stewardship introduces additional risks related to resource scarcity, waste management, and climate change impacts. Effective risk management practices in this regard involve adopting sustainable sourcing practices, reducing waste throughout the supply chain, and investing in renewable energy solutions (Giannakis *et al.,* 2020).

Project risk management is acknowledged as a perpetual process that accompanies the project from its initiation through its planning, execution, monitoring, and closure stages (Urbanski *et al.,* 2019). Moreover, anticipating outcomes serves as a risk management ration, employing decision indicators to avert potential setbacks and ensure optimal resource utilization. However, despite these efforts, projects frequently encounter challenges. Examples include budget overruns, schedule delays, and compromised specifications, all of which can significantly impact project outcomes in the food industry. Risk is inherent across all phases of project planning and is often utilized to illustrate potential scenarios or challenges that a project may face (Naeem *et al.,* 2018).

Research indicates that acknowledging the significance of project risk reflects the capability of project management to address deviations from pre-established objectives. A multitude of risk types play a role in achieving project success, covering technological, human, and strategic aspects (Ahmadabadi *et al.,* 2019).

Effective risk management is integral to project success in the UK food industry. It encompasses ensuring regulatory compliance, maintaining supply chain resilience, fostering product innovation, addressing environmental sustainability, adapting to market dynamics, optimizing operational efficiency, and leveraging technological advancements. By proactively managing risks across these areas, organizations can enhance their resilience, innovation capabilities, operational efficiency, and overall competitiveness in this dynamic and challenging industry landscape.

Successful risk management in the UK food industry involves implementing robust quality control measures to ensure regulatory compliance and mitigate food safety risks. Additionally, strategies for enhancing supply chain resilience, such as diversifying suppliers and implementing contingency plans, are essential for mitigating risks associated with raw material shortages, transportation delays, and unforeseen market fluctuations.

2.4 Risk Management Practices in Food Production and Processing

Risk management practices in food production and processing are crucial for ensuring the safety, quality, and efficiency of food manufacturing operations. Some key techniques and practices are:

1. **Hazard Analysis and Critical Control Points (HACCP):**

In 1971, the Pillsbury food company unveiled an innovative HACCP system at the Conference on Food Protection (CFP), which was sponsored by the Food and Drug Administration (FDA). This

system revolutionized food safety management by presenting three fundamental principles. Firstly, it emphasized the importance of identifying and assessing hazards associated with food from farm to fork, encompassing the entire journey of food manufacture and ingesting. Secondly, it highlighted the need to determine Critical Control Points (CCPs) crucial for controlling any identified health hazards during food processing. Lastly, it stressed the establishment of monitoring systems dedicated to overseeing these critical control points effectively. This presentation marked a significant milestone in food safety protocols, paving the way for enhanced quality control measures across the industry (Ibrahim *et al.,* 2020).

HACCP (Hazard Analysis and Critical Control Points) is a proactive food safety system wherein every stage of the food manufacturing process, including food product storage and distribution, undergoes scientific analysis and control for biological, chemical, and physical hazards. The current seven fundamental principles of HACCP, developed and adopted internationally, (Ibrahim *et al.,* 2020) are explained in the figure below:

Figure 1: Principles of HACCP Plan to ensure food safety

(Source: Ibrahim *et al.,* 2020)

HACCP is a comprehensive managing system meticulously crafted to guarantee food safety. It achieves this by meticulously identifying and managing biological, chemical, heavy metal, and physical hazards present in raw materials and across the entire food manufacturing process, distribution chain, retail, and consumption phases of food products. Physical hazards in food

encompass foreign objects like broken glass or metal fragments, which, if consumed, pose a potential risk to consumers. The HACCP system seven key principles are widely implemented and proven effective across various sectors of the food industry, including manufacturing, distribution, retail operations, and food service establishments, ensuring consistent adherence to rigorous food safety standards worldwide (Dominguez *et al.,* 2021).

Currently, the implementation of HACCP plans in small food businesses, particularly in developed nations, is constrained by cost considerations, prompting extensive discussions among organizations such as the World Health Organization (WHO) and other food regulatory bodies. However, the advantages derived from effective HACCP plan systems are manifold. These include enhanced food safety standards, expanded market access opportunities, streamlined operational activities, decreased instances of costly recalls and wastage, and bolstered consumer confidence (Overbosch *et al.,* 2023).

2. Good Manufacturing Practices (GMP):

GMP constitutes a set of operational requirements addressing both food safety and quality aspects that are not deemed critical for the mitigation of food safety hazards. These guidelines and procedures aim to ensure consistent production and control of food products in accordance with established quality standards (Hasnan *et al.,* 2022). They offer directives for food manufacturing, sanitation protocols, testing methodologies, and quality assurance practices to mitigate the risk of foodborne illnesses and ensure the manufacturing and distribution of safe food products that meet acceptable quality standards for human consumption. Numerous countries adhere to Good Manufacturing Practice (GMP) procedures and have formulated their own GMP guidelines to align with their respective legislations.

Good Manufacturing Practice offers directives for manufacturing, sanitation, testing methodologies, and quality assurance within food operations. Its core objective is to minimize the risk of foodborne illnesses and guarantee the manufacturing and distribution of safe food for human consumption (Mtewa *et al.,* 2020). Numerous countries have formulated their own rules tailored to their respective laws. These customized GMP guidelines serve as the cornerstone for crafting effective HACCP plans, providing a solid foundation for ensuring food safety standards are met across various jurisdictions (Ibrahim *et al.,* 2020).

3. Quality Assurance and Quality Control:

Food safety and quality audits are extensively employed within the food industry for diverse purposes. Going from evaluating management systems to obtaining warranties for specific food safety and quality morals. Also assessing the condition of facilities and products, and ensuring lawful compliance. In recent times, the heightened consumer interest in food safety and quality issues, primarily driven by recent food scandals, has spurred both public and private sectors to develop a myriad of food safety and quality standards. While these standards offer certain advantages, they also pose drawbacks, and their effectiveness hinges on various factors such as the competence and expertise of auditors and the specific standard applied in each scenario (Kotsanopoulos *et al.,* 2019).

Within the food industry, Quality Assurance (QA) holds significant importance in guaranteeing that food products meet pre-established quality benchmarks and comply with regulatory mandates. This involves the establishment of robust Quality Management Systems (QMS) to define processes, procedures, and responsibilities for maintaining quality control throughout the production process (Radu *et al.,* 2023). Regular audits and inspections are conducted to evaluate compliance with these quality standards and to identify areas for enhancement.

Quality control measures, such as testing, sampling, and inspection, are implemented to verify the quality and safety of food products (Mota *et al.,* 2021). Documentation of quality control activities is essential, with records maintained to track product specifications, test results, and any corrective actions taken. By implementing comprehensive QA practices, the food industry can uphold high standards of quality and safety, ultimately ensuring consumer confidence in the products they produce and distribute (Kotsanopoulos *et al.,* 2019).

4. Allergen Management:

In the food industry, managing allergens is of paramount importance to safeguard consumers with food allergies and prevent cross-contamination (Fu *et al.,* 2019). This comprehensive approach involves several key measures. Firstly, it entails identifying allergenic ingredients and thoroughly assessing their risk throughout production processes. Implementation of strict procedures for segregating allergenic ingredients is essential, including the establishment of separate storage, handling, and processing areas to minimize the risk of unintentional mixing (Smjecanin, 2023)

Regular cleaning and sanitization of equipment and production areas are vital to remove allergen residues and prevent contamination. Accurate labeling of products with allergen information is crucial to inform consumers and prevent accidental exposure, ensuring their safety (Yeung *et al.,* 2019). Moreover, providing allergen training to staff is essential to increase awareness and ensure compliance with allergen management protocols, thereby enhancing overall food safety practices within the industry. By diligently adhering to these measures, the food industry can effectively mitigate the risk of allergic reactions and uphold consumer trust and safety (Galvez *et al.,* 2018).

5. Contingency Planning and Crisis Management:

In the food industry, developing contingency plans and crisis management protocols is vital (Matthews, 2021). This includes identifying risks, establishing communication procedures, conducting drills, and partnering with relevant organizations to ensure swift and effective responses to unexpected events that could jeopardize food safety or product quality.

Contingency planning emerges as a crucial element of preparedness, encompassing planning, organization, and procedures (WHO, 2021). This includes communication protocols, capacity-building through training and exercises, redundancy measures, pre-arranged agreements, and early warning systems. Planning serves as the bedrock of preparedness endeavors (Matthews, 2021).

Figure 2: Crises Management Cycle

(Matthews, 2021).

The crisis management cycle offers a framework for addressing crises, with resilience-building measures being crucial. Early warning systems, foresight studies, and cooperation with private supply chains are essential for effective contingency planning. Developing contingency plans and crisis management protocols is crucial for responding to unexpected events such as product recalls, foodborne illness outbreaks, or equipment failures. These plans should outline procedures for communication, recall management, product disposal, and corrective actions to minimize the impact on consumers and the business.

2.5 Impact of Risk Management across Food Industry Disciplines in the UK

Risk management has a profound impact across various disciplines within the food industry, influencing food safety, supply chain resilience, product innovation, regulatory compliance, consumer relations, and financial management.

Risk management is integral to **supply chain management** within the UK food industry, where complex supply chains pose various challenges and uncertainties. Effective risk management in supply chain management within the UK food industry ensures the reliability, resilience, and efficiency of supply chains (Ali *et al.,* 2023). By proactively identifying and mitigating risks associated with suppliers, transportation, logistics, and information technology, organizations can minimize disruptions, improve supply chain visibility, and enhance responsiveness to changing market conditions. This leads to improved working efficiency, cheap costs, and better customer satisfaction.
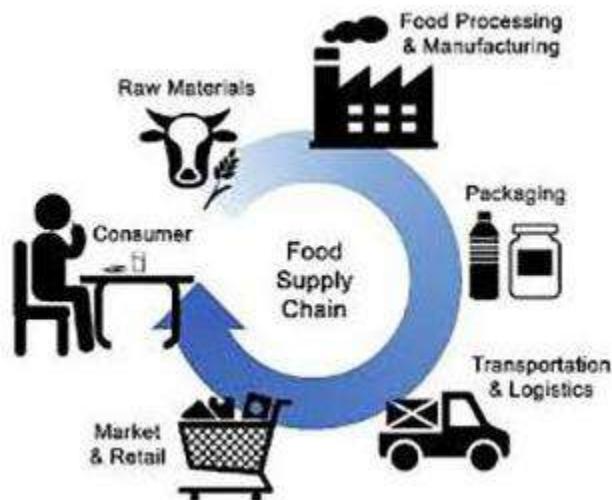
Figure 3: Food Supply Chain

Financial risk management strategies in food industry projects help organizations optimize capital allocation, stabilize cash flows, and mitigate financial losses (Polukhin *et al.,* 2022). By hedging against market risks such as price volatility, currency fluctuations, and commodity price risks, organizations can protect profit margins, enhance investment returns, and ensure financial stability. Additionally, effective credit risk management practices reduce the risk of bad debts and payment defaults, improving overall financial performance and resilience.

Technological innovation in food product development introduces both opportunities and risks. Effective risk management ensures the successful adoption and integration of new technologies while mitigating potential technical, legal, and operational risks. By conducting risk assessments, safeguarding intellectual property rights, and ensuring data security and privacy compliance, organizations can accelerate innovation, improve product quality, and maintain a competitive edge in the market. The demand for innovative food products throughout the year is on the rise due to evolving lifestyles, increased incomes, and heightened consumer awareness (Guine *et al.,* 2020).
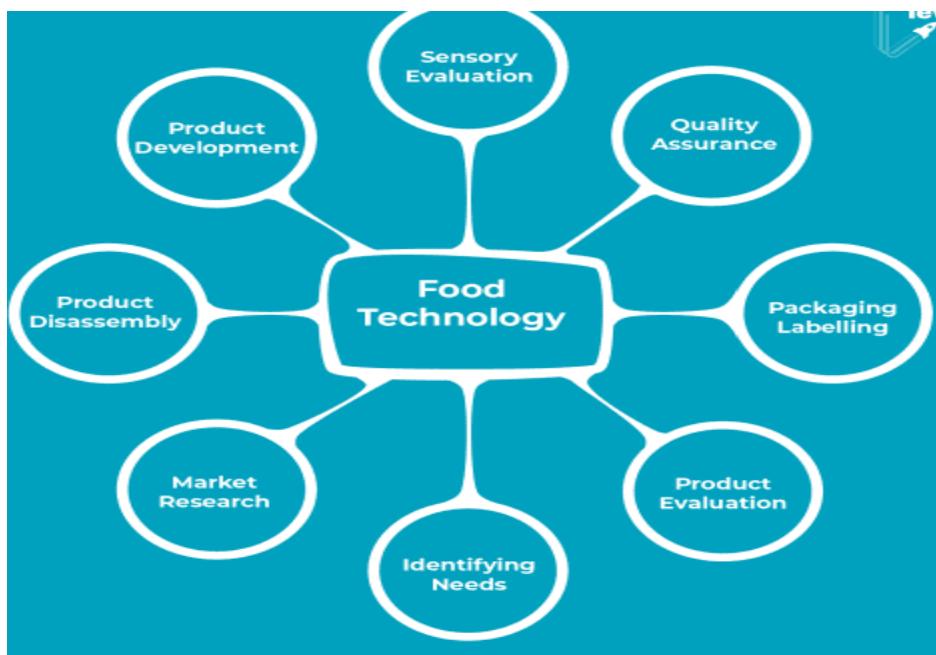

Figure 4: Innovation in Food Technology

(Source: Guine et al., 2020)

Currently, the food sector stands as one of the most significant contributors to the global economy. Food industry and companies encounter many challenges in product management and market competition. The food manufacturing industry has been identified as a sector with considerable rates of new product failure (Horvat *et al.,* 2019).

Risk management in **human resource management** within food industry projects enhances employee safety, job satisfaction, and organizational resilience (Malik *et al.,* 2020). By implementing health and safety protocols, providing training and development opportunities, and ensuring compliance with labor laws and regulations, organizations create a safe and supportive work environment. This leads to increased employee productivity, reduced turnover rates, and improved project performance.

Regulatory compliance and risk management are closely linked in the food industry, where adherence to stringent regulations is essential for ensuring consumer safety and trust. Effective risk management practices help organizations navigate complex regulatory landscapes, mitigate compliance risks, and avoid costly penalties and legal liabilities (Kotsanopoulos *et al.,* 2019). By proactively addressing regulatory requirements, implementing quality assurance measures, and maintaining transparency and accountability, organizations can uphold regulatory compliance, protect brand reputation, and sustain long-term success in the market.

Moreover, risk management practices in **marketing and consumer relations** protect brand reputation, build consumer trust, and maintain market competitiveness. By conducting market research, consumer surveys, and trend analysis, organizations can anticipate consumer preferences, perceptions, and purchasing behaviors, while implementing risk communication strategies, crisis management plans, and social media monitoring to address consumer concerns and maintain brand integrity (Roy *et al.,* 2022).

Risk management practices guide **product development and innovation efforts**, helping organizations identify opportunities and potential risks associated with new product launches, formulation changes, and technology adoption. By conducting market research, feasibility studies, and risk assessments, organizations can minimize the risk of product failures, market rejection, and financial losses, while fostering innovation and meeting consumer demands.

Lastly, risk management practices are paramount for **ensuring the safety and quality of food products** (Farber *et al.,* 2021). By identifying and mitigating potential hazards throughout the production process, such as microbial contamination, chemical residues, allergens, and physical hazards, organizations can minimize the risk of foodborne illness outbreaks, product recalls, and reputational damage.

2.6 Strategies for Mitigating Project Risks in the Food Industry in the UK

Mitigating project risks in the UK food industry requires a comprehensive approach that addresses the unique challenges and complexities of the sector. Horizon scanning has emerged as a crucial strategy for safeguarding food businesses against food fraud. A variety of tools are employed for this purpose, ranging from open-source databases like national and international governmental alerts, the Rapid Alert System for Food and Feed (RASFF), European Commission's Joint Research Centre (JRC) Food Fraud Monthly summaries, and media sources to paid databases (Soon-Sinclair *et al.,* 2023). Information and data sources encompass procurement teams, suppliers, Environmental Health Officers, customers, and auditors. Access to information enables food companies to identify opportunities for addressing food fraud proactively.

Figure 5: Key Risk Mitigation Strategies

(Source: Kumar *et al.,* 2021)

Risk Identification and Assessment are foundational steps in this process. By conducting thorough risk assessments at various stages of the project lifecycle, organizations can identify potential

hazards, vulnerabilities, and uncertainties (Zio *et al.,* 2020). Engaging stakeholders, including internal teams, suppliers, regulatory agencies, and industry experts, facilitates a comprehensive understanding of risks from diverse perspectives. Leveraging risk assessment tools such as HACCP, FMEA, and SWOT analysis systematically evaluates and prioritizes risks based on their likelihood and impact. Despite facing considerable disruptions, the UK food system has demonstrated notable adaptive capabilities. Establishing trust and maintaining open, effective communication channels, (Sharma *et al.,*2022), with suppliers and stakeholders played a significant role in enhancing organizational resilience amidst the pandemic. Factors such as risk awareness, responsiveness, robust IT capabilities, and flexibility were identified as key contributors to resilience within food supply chains (Kazancoglu *et al.,* 2021).

Proactive Planning and Contingency Preparation are essential components of risk management in the UK food industry (Matthews, 2021). Developing comprehensive project plans and risk mitigation strategies is critical. Incorporating risk management considerations into budgeting and resource allocation processes guarantees adequate resources are allocated for risk mitigation activities, enhancing project preparedness and resilience. Staff awareness and competency in their roles serve as the primary line of defense against food fraud. Consequently, investing in staff development is crucial for mitigating this risk.

Implementing a healthy Supplier Quality Assurance program emerged as a critical strategy. Strengthening Supply Chain Resilience is imperative for mitigating project risks in the UK food industry. **Global Food Safety Initiative (GFSI)** certified businesses provided a high level of assurance within the food supply chain. Building strategic partnerships with reliable suppliers and vendors enhances supply chain visibility, transparency, and collaboration (Soon-Sinclair *et al.,* 2023). Diversifying the supplier base and establishing redundant supply sources mitigates risks associated with supplier failures, raw material shortages, and geopolitical uncertainties. Implementing supply chain monitoring systems and performance metrics enables organizations to track supplier performance, identify early warning signs of potential disruptions, and take proactive measures to address them, ensuring continuity of operations.

Resilience within food systems refers to their ability to recover from disruptions and challenges, enabling food producers, distributors, and consumers to address various factors that threaten food access and equity (Oliver *et al.,* 2018).

Enhanced Food Safety and Quality Assurance are fundamental aspects of risk management in the UK food industry. Implementing robust quality control measures, including GMPs, HACCP plans, and allergen management protocols, ensures compliance with food safety regulations and standards. Investment in advanced technologies and automated systems for real-time monitoring, testing, and traceability of food products enhances product safety and quality. Conducting regular audits, inspections, and internal reviews verifies compliance with quality standards, identifies areas for improvement, and facilitates timely corrective actions, safeguarding consumer health and trust (Soon-Sinclair *et al.,* 2023).

Regulatory Compliance and Risk Governance are integral to effective risk management in the UK food industry. Staying up-to-date of evolving regulatory requirements, industry standards, and best practices ensures compliance with food safety, labeling, packaging, and environmental sustainability regulations (Overbosch *et al.,* 2023).

Implementing monitoring systems and performance metrics in the food sector enables organizations to track project progress, identify emerging risks, and measure the effectiveness of risk mitigation strategies. Regular reviews and assessments of risk management processes, procedures, and controls identify areas for improvement and facilitate timely corrective actions (Jayaratne *et al.,* 2023).

Apart from the aforementioned impacts of food crime, there are associated other charges that play a crucial role. These costs encompass investments in expertise, gears, product genuineness, quality declaration, training programs, and risk mitigating protocols. Such investments are essential to ensure the integrity of food. Various measures, including horizon scanning, models like Vulnerability Analysis and Critical Control Points (VACCP), reporting systems, and human intelligence, have been proposed as effective strategies for preventing food crime (Cox *et al.,* 2023).

2.7 Theoretical Framework

A theoretical framework is a structured arrangement of concepts and principles drawn from one or more theories, developed by a researcher to underpin a study. It entails defining pertinent concepts and theories, establishing logical linkages between them, and connecting these concepts to the research under investigation. Essentially, a theoretical framework represents the researcher's

endeavor to apply theory to a particular study, furnishing a basis for comprehending and scrutinizing the research topic (Varpio *et al.,* 2020).

Figure 6: Theoretical Framework of the Research

(Source: Self-Made)

In the food industry, theories and frameworks guide practices across various domains. Food Safety Management Systems (FSMS) and Hazard Analysis and Critical Control Points (HACCP) ensure safety by identifying and controlling hazards. Quality Management Systems (QMS) maintain consistent product quality through continuous improvement. Crisis management theory aids in response to incidents. Supply chain management theories govern product movement, and sustainability theories inform responsible practices. These frameworks collectively shape strategies for safety, quality, sustainability, and consumer behavior in the food industry.

2.8 Summary

The literature review chapter provides an in-depth exploration of risk management practices in the UK food industry, encompassing various dimensions such as project success, risk identification, assessment, and mitigation strategies. It underscores the critical role of risk management in ensuring project success and examines its impact across different disciplines within the food

industry. Furthermore, the review delves into specific risk management practices in food production and processing. The chapter also addresses the importance of regulatory compliance, supply chain resilience, financial risk management, technological innovation, human resource management, and consumer relations in effective risk management strategies. After this conceptual framework is discussed. By synthesizing existing literature, the review sets the stage for the dissertation's investigation into strategies for mitigating project risks in the UK food industry.

Chapter 3: Methodology

3.1 Introduction

This chapter serves as a map of guidance for upcoming chapters. This chapter outlines the methodological approach used for this research. In this chapter, research approach and philosophies are discussed. In this chapter, we delve into the intricate processes of gathering, analyzing, and interpreting data, ensuring the rigor and validity of our research. By meticulously outlining the research design, data collection methods, analysis techniques, and ethical considerations, we aim to provide readers with a clear understanding of our systematic approach. This transparency enables readers to assess the reliability and credibility of our findings.

Table 1: Research Methodology Table

Methodology	Type
Research Philosophy	Interpretivism Philosophy
Research Approach	Inductive Approach
Research Strategy	Case-Study Research
Research Choice	Mono Method
Time Horizon	Cross-Sectional
Data Collection	Secondary Data Analysis
Data Analysis Technique	Thematic Analysis

3.2 Onion Ring Model

In this current research, the researcher employs the "**onion ring model**" as a conceptual framework for methodological organization. This model is suggested by Saunders. This model has layers that suggests a systematic approach to research design and analysis (Zheng el al., 2022). The outer layers encompass various research methods, such as quantitative surveys, qualitative interviews, and data analysis techniques, each adding depth and complexity to the investigation. By peeling away these layers, the researcher can progressively delve deeper into the research inquiry, revealing nuanced insights and interpretations.
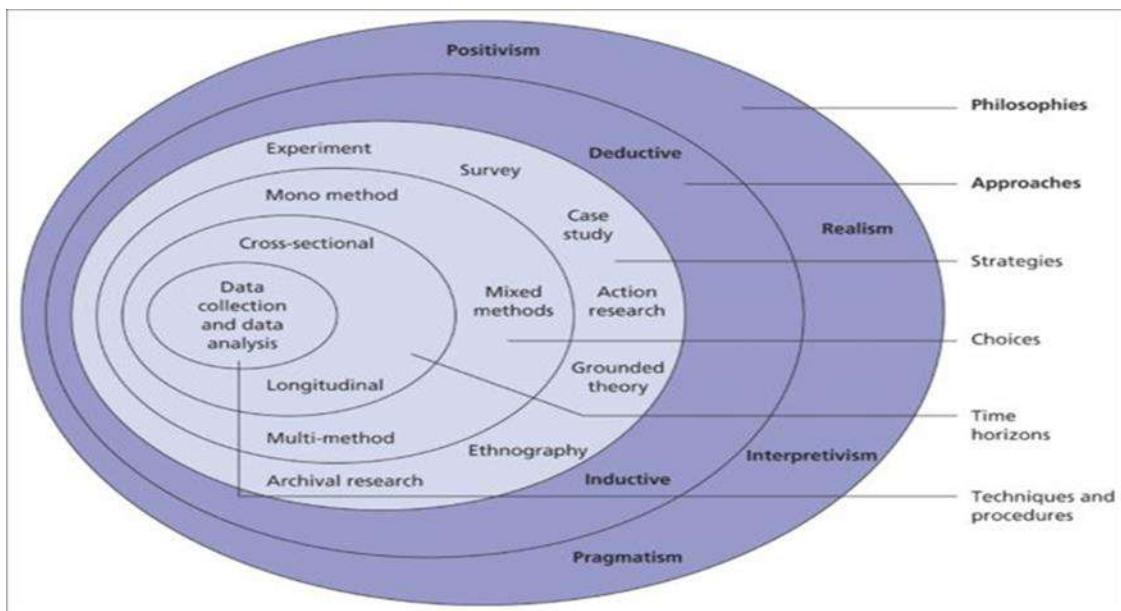
*Figure 7: Onion Ring Model*

(Source: Orth et al., 2021)

3.3 Research Philosophy

Numerous research studies have investigated various methodologies for categorizing research philosophies within the domain of research methods. There are 4 categories of research philosophy: positivism, pragmatism, realism, and interpretivism (Mbanaso *et al.,* 2023).

Figure 8: Types of Research Philosophy

Positivism relies on empirical evidence and scientific methods, seeking universal laws through observation and experimentation. Pragmatism prioritizes practical outcomes over abstract principles (Kelly *et al.,* 2020). Realism asserts an objective reality existing independently of perception (Charan *et al.,* 2021). Interpretivism emphasizes understanding subjective experiences within social contexts through individual interpretations (Ryan, 2018).

For this research, researcher choose **interpretivism philosophy** as it justifies the nature of research objectives. Interpretivism aligns well with the complexity of human behavior and the contextual nuances inherent in the food industry (Rapely, 2019). Given that risk management involves subjective perceptions, decision-making processes, and organizational cultures, interpretivism offers a suitable lens to explore these aspects. Unlike positivism, which emphasizes objectivity and generalizable laws (Park *et al.,* 2020), interpretivism acknowledges the importance of subjective experiences and social constructs in shaping reality.

Interpretivism provides a complete philosophical foundation for understanding the multifaceted nature of risk management and project success within the food industry (Casula *et al.,* 2021), emphasizing the significance of individual perspectives, organizational culture, and contextual influences in shaping outcomes. Researcher choose interpretivism as it allows for a deep exploration of experiences attached to risk management practices within the food industry. By prioritizing individuals' perspectives and the social context in which they operate, interpretivism enables a richer understanding of the complexities inherent in project success and risk management.

Moreover, interpretivism acknowledges the importance of context in shaping human behavior and decision-making (Dehalwar *et al.,* 2023), making it particularly relevant in the food industry where cultural, organizational, and regulatory factors play significant roles. This framework provides a means to explore how these contextual factors influence risk management strategies and project outcomes, offering insights into the industry's unique challenges and dynamics.

Interpretivism also offers flexibility and encourage the use of diverse qualitative research methods such as interviews, observations, and textual analysis (Thompson *et al.,* 2021). Furthermore, interpretivism emphasizes the practical implications of research findings, focusing on how insights

can inform real-world decision-making and practice (Meena *et al.,* 2023). By prioritizing relevance and applicability, interpretivist research in the context of the food industry can offer actionable recommendations for enhancing risk management strategies and improving project outcomes.

3.4 Research Approach

In research, two primary methods are commonly employed: deductive and inductive (Abdukarimova *et al.,* 2021). Deductive research begins with a theory and evaluates it against data, while inductive research commences with data and progresses towards formulating theories or generalizations.

Figure 9: Deductive Inductive Reasoning

(Source: Stephens *et al.,* 2020)

In this study, the researcher has opted for the **inductive approach**. With this approach, the data is observed initially, and conclusions are subsequently drawn. Unlike deductive reasoning, which begins with general principles and derives specific conclusions, inductive reasoning starts with specific instances or data points and then identifies patterns or trends (Cramer-Petersen *et al.,* 2019). This form of reasoning is frequently employed informally in everyday situations.

The inductive approach in research allows findings to emerge naturally from raw data. Unlike structured methods, which have strict rules, inductive reasoning lets researchers explore common themes in the data. These themes might be hidden or overlooked when using deductive methods. Deductive approaches are often used in experiments and hypothesis testing, but inductive reasoning provides more flexibility (Hayes *et al.,* 2018).

Figure 10: Steps Involved in Inductive Approach

(Source: Self-Made)

3.5 Research Strategy

The researcher utilized the **case study technique** to acquire a complete understanding of the importance of achieving success within food sector project teams. Qualitative data, obtained through interviews, observations, and other qualitative methods, offer the opportunity to delve deeply into the perspectives, experiences, and perceptions of project teams regarding risk management practices. This qualitative approach involves gathering extensive narrative and visual data, which is then analyzed and interpreted to gain a detailed understanding of a specific topic. Qualitative research diverges from the pursuit of broad generalizations; instead, it strives to offer an in-depth understanding of a phenomenon as perceived by individuals (Daher *et al.,* 2018). Considering the complexity of risk management, a case study approach allows you to delve deeply into specific food industry projects and their risk management practices.

Concurrently, the case study technique enables the researcher to explore real-world examples of risk management implementation and project outcomes within the food industry, providing detailed narratives of specific projects and shedding light on the challenges faced, strategies employed, and outcomes achieved. This combined approach not only yields rich and nuanced insights but also facilitates the contextualization of findings within the unique context of the food industry. By gathering data from multiple sources and methods, the researcher enhances the validity and trustworthiness of the study findings.

3.6 Research Choice

The subsequent layer of the research onion is termed "choices," which offers three options: mono, mixed, and multi-method approaches (Vaughn *et al.,* 2020).
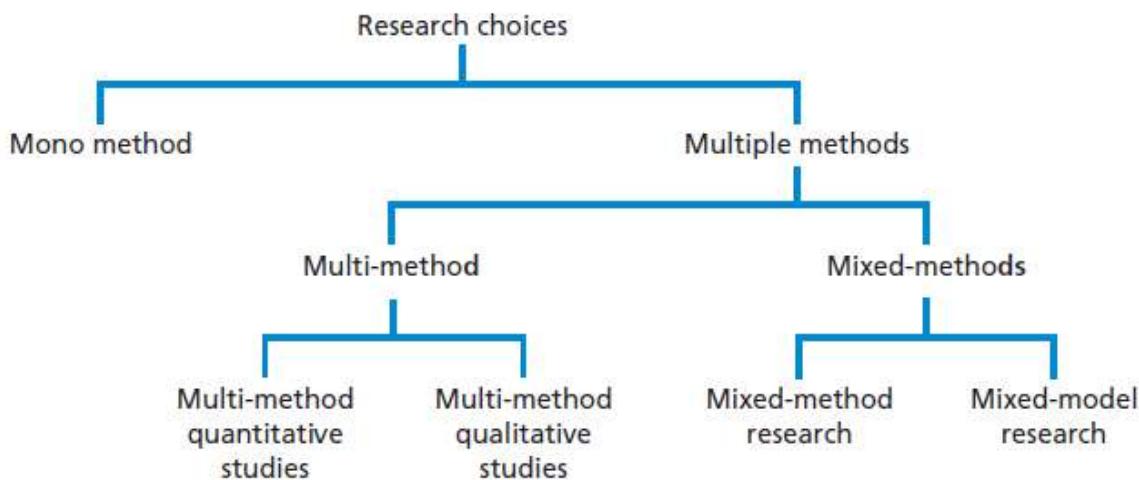
Figure 11: Research Choices

(Source: Vaughn *et al.,* 2020)

In this research, researcher choose **mono method**. It means this study use only qualitative data. One reason to adopt this choice is its richness. By using techniques such as open-ended interviews, observations, or content analysis, researchers can delve deeply into complex phenomena. Moreover, qualitative methods allow researchers to understand the context in which phenomena occur (Levitt *et al.,* 2021). They go beyond surface-level observations and explore the cultural, organizational, and environmental factors surrounding risk management. In the food industry, where risk factors can vary significantly (from supply chain disruptions to food safety concerns), this flexible approach allows researchers to adapt to changing circumstances effectively. Lastly, mono-method qualitative research often involves smaller sample sizes. Researchers can focus on a few in-depth cases, allowing them to extract rich data (Moser *et al.,* 2018). In this analysis of risk management practices, a smaller sample of food industry projects can yield valuable insights.

3.7 Time Horizon
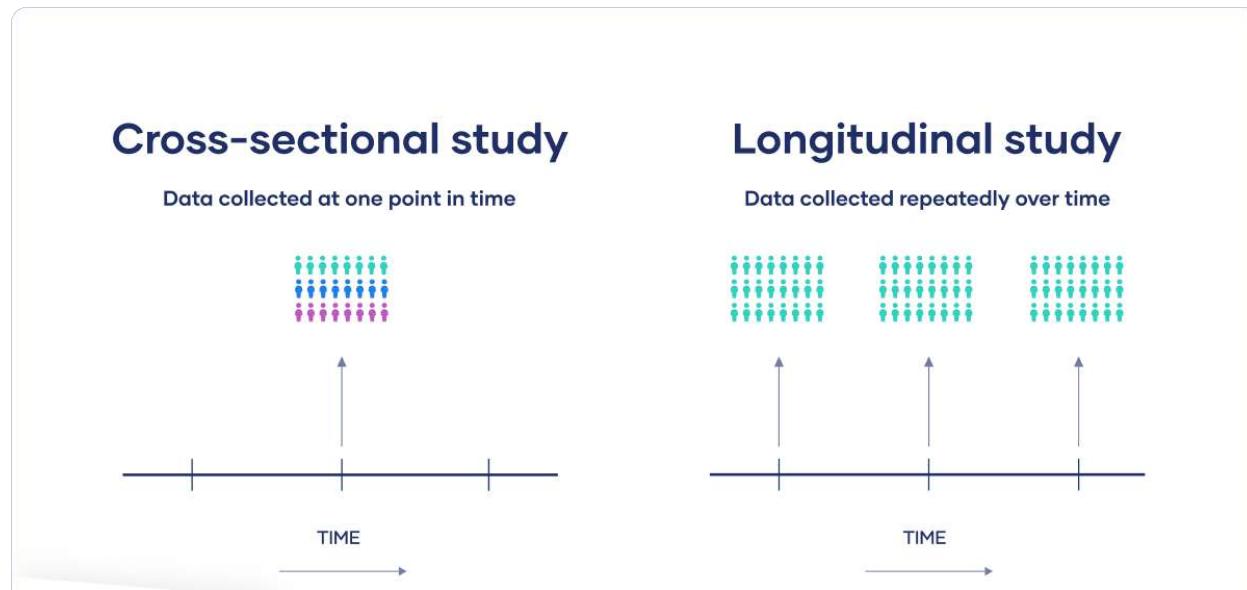
Figure 12: Type of Time Horizon

(Source: Haber *et al.,* 2020)

In layer 5, how many points in times data is collected is discussed. Cross sectional and longitudinal are two types that are included in time horizon. Cross-sectional includes one-time data collection while longitudinal includes multiple time data collection of the same sample. In this research, researcher chose **cross-sectional study**. It includes qualitative, quantitative or both types of data.

3.8 Data Analysis Process

The two primary procedures for data collection involve primary and secondary methods (Fowler *et al.,* 2023). This research solely relies on **secondary data analysis** as its main method. Given the complexity and multifaceted nature of risk management practices and project outcomes within the food industry, researchers may find existing datasets, industry reports, regulatory documents, or case studies that contain relevant information.
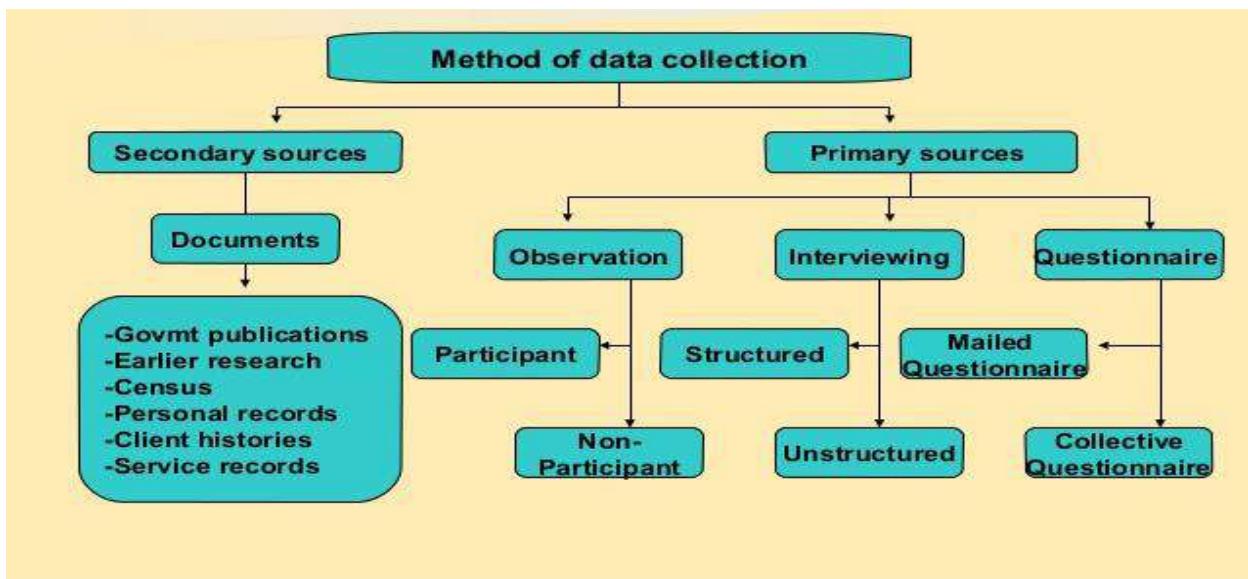
Figure 13: Methods of Data Collection

(Source: Mazhar *et al.,* 2021)

By utilizing secondary data analysis, researchers can access a wealth of information without the need for costly and time-consuming primary data collection (Steelman *et al.,* 2019). They can explore historical trends, industry benchmarks, and previous studies related to risk management strategies and project success metrics within the food industry. This approach allows researchers to leverage existing knowledge and insights to inform their research questions, hypotheses, and analysis.

Furthermore, researchers can identify patterns, correlations, or trends in risk management practices and project outcomes across different segments of the food industry or over time. They should consider factors such as data reliability, validity, completeness, and the context in which the data was collected. Additionally, researchers should be transparent about the limitations and assumptions associated with secondary data analysis in their research findings and interpretations.

3.9 Data Collection Sources

Secondary data collection involves the utilization of existing sources (Murrar et al., 2024). It is important to recognize that all collected data possesses a qualitative nature. The PRISMA model, (Page *et al.,* 2021), encompasses both a checklist and a flow diagram. This model encompasses a wide array of components including the rationale behind the study, the methodology of the search

strategy employed, the process of study selection, methods for data extraction, evaluation of study quality, data synthesis, and interpretation of results. The flow diagram visually represents the progression of information through distinct stages of the review process, depicting the steps of identification, screening, eligibility assessment, and inclusion of studies.

The researcher conducted a comprehensive review of published articles related to the research topic, from previous 5 years, utilizing various databases such as Scopus and Google Scholar. Initially, a total of 600 papers were identified, which underwent refinement using specific keywords, ultimately narrowing down the selection to 395 papers closely aligned with the research focus. Subsequently, the application of inclusion and exclusion criteria further scrutinized these papers, leading to 270 articles meeting specific requirements for relevance and methodology. Quality screening was then applied to reduce the pool to 90 papers by eliminating off-topic, non-peer-reviewed, or non-English papers. Finally, after final screening process ensured alignment with research objectives, researcher got 23 papers. Repeating the same process again resulting in a rigorous set of 13 papers selected for the study.
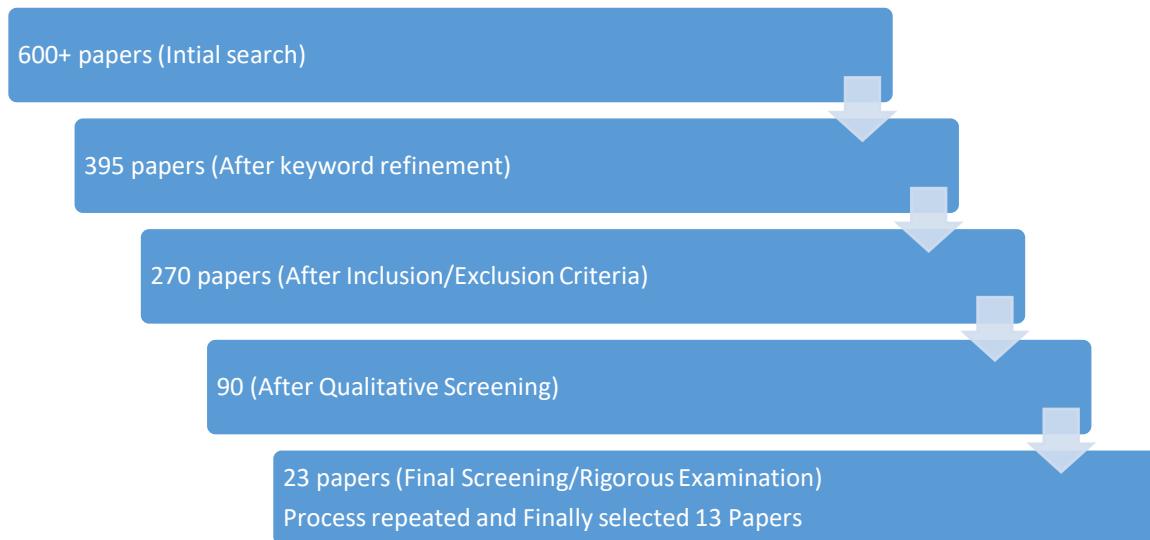
Figure 14: Flow Diagram of Selection Process

3.9.1 Inclusion Criteria

- Data from reliable sources like governmental bodies and scholarly journals is preferred for accuracy.
- Emphasis is on recent data to reflect current trends in risk management.

- Comprehensive data covering relevant variables is sought for a thorough understanding.

- Ethical considerations guide data inclusion from sources compliant with research standards.

- Only qualitative secondary data is used for detailed analysis in this dissertation.

- Data included in the research is limited to English language and latest publications to maintain consistency and accessibility.

3.9.2 Exclusion Criteria

- Data obtained from unreliable sources will be omitted to safeguard the integrity of the research findings.

- Paid articles will not be considered in this research to maintain impartiality and transparency.

- This study intentionally excludes any form of primary information to focus solely on secondary data analysis.

- Only articles published in English are included in this study to maintain consistency and accessibility of the data.

3.9.3 Keywords

Keywords used for this research were Risk Management, Project Success, Food Industry, Decision-making, Risk Mitigation, Risk Assessment, Project Management, Industry Trends, Food industry success etc.

3.10 Data Analysis Technique

In qualitative research, assessing information involves procedures like identification, inspection, and interpretation, utilizing appropriate logical and cognitive perspectives. This study employed **thematic analysis** as a method to organize and analyze the collected information. Thematic analysis is particularly well-suited for exploring complex phenomena and gaining in-depth insights into the research topic (Braun *et al.,* 2022).

Thematic analysis works by systematically organizing and analyzing qualitative data to identify recurring patterns or themes (Castleberry *et al.,* 2018). This involves several iterative steps: familiarization with the data, generating initial codes to label relevant segments of the data,

identifying broader themes that capture the essence of the data, reviewing and refining themes through iterative analysis, and finally, interpreting and writing up the findings.
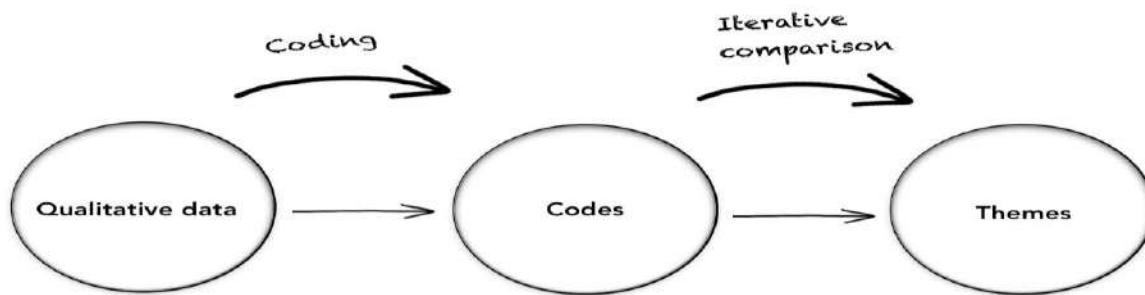
Figure 15: Steps Involved in Thematic Analysis

(Source: Barun *et al.,* 2022)

This analysis is flexible in nature. It accommodates diverse data sources and research questions, making it applicable across various disciplines and research settings. Additionally, thematic analysis offers a structured yet nuanced approach to data analysis, enabling researchers to uncover rich and detailed insights from qualitative data.

Moreover, thematic data analysis is a versatile and rich approach for qualitative research. Another justification for the researcher's selection of thematic analysis is its role in contributing to theory development by generating new insights and theoretical propositions from the data (Delgosha *et al.,* 2022).

3.11 Trust Worthiness

Another aspect of establishing trustworthiness in research involves ensuring data reliability through rigorous validation procedures. Researchers employ various techniques such as triangulation, member checking, and peer debriefing to corroborate findings and enhance the credibility of the study. Triangulation involves using multiple data sources to reduce the risk of bias or error. Member checking entails obtaining feedback from participants to confirm the accuracy and interpretation of collected data, ensuring their perspectives are accurately represented. Researcher ensures the validation of the study's trustworthiness. By implementing

these validation strategies, researchers strengthen the reliability and validity of their findings, bolstering confidence in the research outcomes.

3.12 Ethical Consideration

Given the potential sensitivity of discussing risk management practices within organizations, it's crucial to protect the identities and personal information of participants involved in the study. This may include project managers, team members, or other stakeholders within the food industry who provide insights or data for the research. By safeguarding participant confidentiality, you not only adhere to ethical principles but also create a safe and trusting environment for individuals to share their experiences and perspectives openly. Respecting participant privacy enhances the credibility and validity of your research findings, as it demonstrates your commitment to upholding ethical standards while conducting rigorous and respectful research within the food industry.

Chapter 4: Data Analysis

4.1 Introduction

In the analysis chapter, the researcher outlines the process or technique used to collect relevant data types. While primary sources are not emphasized in this research. So, secondary sources, such as case studies and articles, play a crucial role. These sources are specifically related to the core objectives and keywords of our research.

The researcher's approach involves gathering qualitative information from these subjects, allowing for a deeper understanding of the relevant topic. By systematically testing the already collected information from previous chapters, the research aims to arrive at specific conclusions.

4.2 Thematic Analysis

Thematic analysis (TA) stands as a qualitative research approach designed to unveil and scrutinize recurring patterns or themes inherent within a dataset (Braun *et al.,* 2021). It includes systematically establishing and understanding textual or pictorial data to uncover underlying meanings and concepts (Xu *et al.,* 2020). Researchers use TA to explore participants' experiences, attitudes, and perspectives by examining recurring themes across their responses.

Researchers using thematic analysis typically engage in a constant-comparative method, reading and re-reading transcripts systematically to identify themes that are strongly linked to the data rather than the researcher's theoretical interests (Terry *et al.,* 2018). Thematic analysis represents a valuable technique in qualitative data analysis, providing researchers with a flexible and systematic framework for revealing patterns, themes, and insights inherent within their datasets.

Table 2: Table for Themes

Codes	Themes	Objective
Leadership skills Communication abilities Planning Team management Risk assessment Project success	Role of management competencies between risk management and project success.	**Based on objective 1** (To examine the moderating effect of management competency and the linkages

Team management		between risk management and project success)
Financial risk management Supply chain management Operational risk management Product management Enterprise risk management Crises Management	Risk management practices across various disciplines within the food industry.	**Based on Objective 2** (To investigate influence of risk management in different disciplines of food industry)
Risk identification Resource allocation Risk mitigation strategies Project outcomes Project success Contingency measures	Organization with effective risk mitigation strategies experience better project outcomes.	**Based on Objective 3** (To evaluate successful strategies and best practices employed by organizations in the food industry to mitigate project risks)
Risk identification Risk assessment Project success Food safety management Project related risks Hazards focused risks Project management	Risk identification and risk assessment in food industry	**General Recurring Theme**

4.3.1 Theme 1: Role of management competencies between risk management and project success.

Within Theme 1, the focus is on understanding the intricate relationship between management competencies, practices, and victory within the context of the food industry. This theme aims to explore how the competencies of project managers and organizational leaders influence the effectiveness strategies and ultimately influence the outcomes of FI projects.

A project achieves success when it meets predetermined standards for expected outcomes, sustains its achievements over time, adheres to the specified timeline, and remains within the allocated budget. Additionally, success encompasses a multidimensional concept that encompasses project efficiency, organizational and business achievements, customer satisfaction, and readiness for future endeavors (Irfan *et al.,* 2021). Research indicates that successful projects contribute positively to the social, economic, and environmental well-being of diverse stakeholders. Moreover, a study concluded that project management success entails a combination of both typical and unique elements.

Table 3: Short term and Long Term Dimensions of Project Success

(Source: Irfan *et al.,* 2021)

Construct	Coverage	Dimensions
Project success	Common elements	Time, Cost, and Quality
	Uncommon Elements	Organizational Benefits Project Impact Future Potential Stakeholder Satisfaction

The table offers a comprehensive overview of the dimensions of project success that have been subject to discussion. Synthesizing the literature reveals the evolution of project success from a mere efficiency measure to a holistic concept encompassing five major dimensions, incorporating both common and uncommon elements.

Likewise, effective planning and scheduling are pivotal aspects in the execution of successful infrastructure projects. Planning typically involves the identification of necessary actions, tasks, and resources required to accomplish project objectives.

Experience, efficiency, efficacy, and effectiveness are all regarded as integral components of competency within any workplace (Borg *et al.,* 2023). However, from an employer's viewpoint, competency represents a vital attribute that individuals must demonstrate to fulfill organizational strategic goals. The competency of a project manager is gauged by their capacity to make prompt

decisions and their understanding of the roles and responsibilities of the project team involved (Atan *et al.,* 2019).
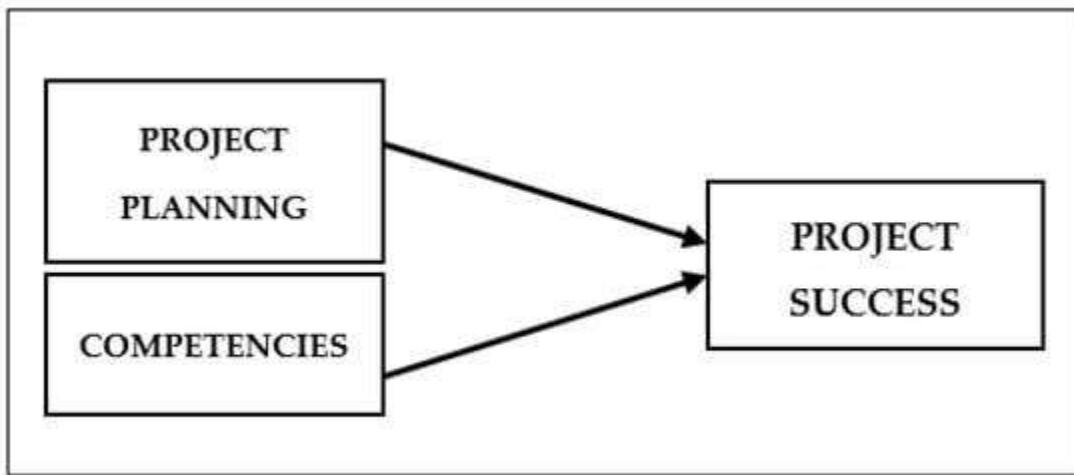
Figure 16: Relationship between Project Planning, Competencies, and Success

(Source: Irfan *et al.,* 2021)

The connection between project planning, project manager competencies, and project success is depicted schematically in the above Figure. It's evident from the diagram that both planning and competencies can act as precursors to project success.

The phrase "food industry" encompasses enterprises engaged in the production, processing, manufacturing, sale, and provision of food, drinks, and dietary additions. It encompasses all phases of the process, from design and construction to maintenance and delivery of solutions to customers in both the animal nutrition and food and beverage sectors (Luque *et al.,* 2019).

Research indicates that the food industry currently lacks a specific roadmap to navigate through the industrial revolution 4.0 (Akyazi *et al.,* 2020). Urgent action is required to develop a strategy for identifying and fulfilling present and future skill requirements within the sector. To address this need, the food industry must devise tools for applying new skills and competencies. Reviewing approaches adopted by other sectors such as construction, steel, automotive, etc., could offer valuable insights in this endeavor. Moreover, it is crucial for the sector to collaborate with education policy-makers and continuous training programs with these skill requirements.

Risk communication as integrated into organizational routines and methods of arranging actions that extend beyond specific officials. It is closely linked with "risk work," which encompasses various organizational activities related to budgeting, strategizing, goal attainment, and learning within a structural framework (Boholm *et al.,* 2019).

Studies have revealed that the planning coupled with collaboration and accountability, are among the most prevalent success factors for risk communication (Ren, 2020).

Through this theme, current research seeks the role of management competencies in shaping the outcomes of risk management practices and project performance within the food industry. By understanding the shades of management's influence, stakeholders can gain valuable insights to enhance their approach to risk management and project leadership in this dynamic and challenging environment.

4.3.2 Theme 2: Risk management practices across various disciplines within the food industry.

This theme seeks to explore the breadth and depth of risk management strategies implemented in numerous areas of the food business, including production, dispensation, distribution, and retail.

Figure 17: Framework for Managing Risks

(Source: Ali *et al.,* 2019)

Several scholars have identified that supply chain (SC) risks can be classified into two main categories: operational risks and disruption risks (Singh *et al.,* 2022). Supply chain risk management (SCRM) encompasses two main approaches:

1. Comprehensive strategy: Addresses a wide range of risks through proactive assessment and mitigation across the supply chain.
2. Focused approach: Targets specific disruptions with tailored strategies, prioritizing efficiency in risk mitigation.
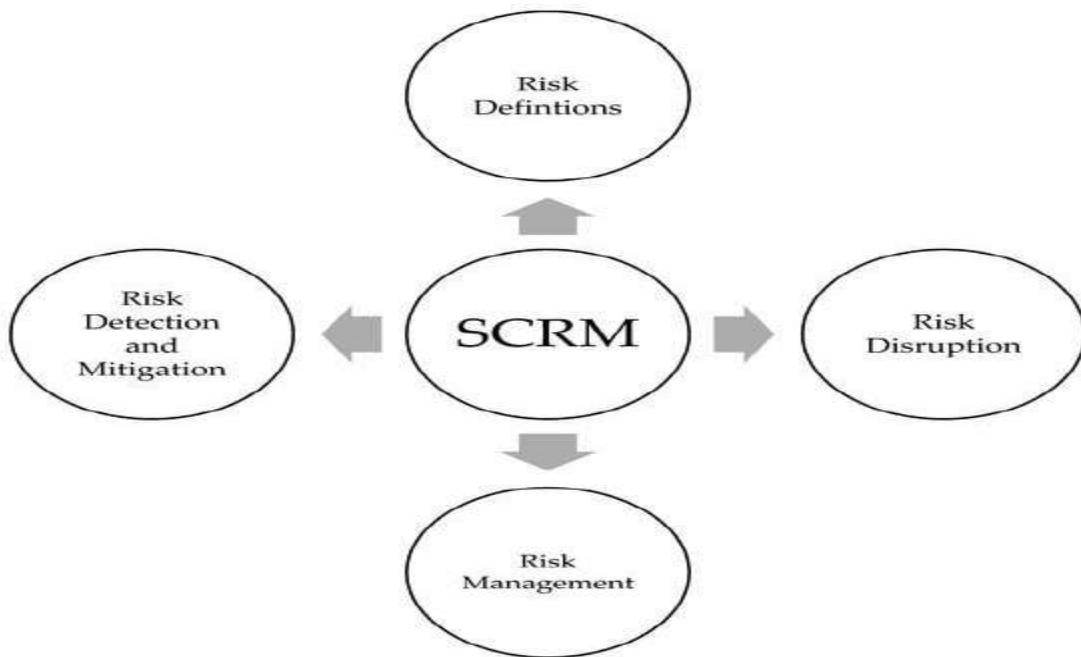
Figure 18: Supply Chain Risk Management Categories

(Source: Gurtu *et al.,* 2021)

In order to mitigate food wastage, risk assessment within food supply chain (FSC) management entails the identification and evaluation of supply chain risks to formulate suitable risk mitigation strategies (Ali *et al.,* 2019).

The notable advancements in food security and the reduction of rural poverty, attributed to the Green Revolution, stemmed from a confluence of investments aimed at boosting production, mitigating risk, and improving market access (Hansen *et al.,* 2019). An increasing body of research connects climate-related risks to the magnitude and duration of rural poverty in such settings.

Stochastic shocks undermine the long-term livelihood prospects of smallholder farmers by causing the loss of productive assets.

Food Fraud, which involves intentional deception for economic gain within the food industry, stands as one of the most pressing and dynamically evolving research and regulatory domains. Various types of food fraud exist, including adulteration (involving dilution, substitution, concealment, and unauthorized enhancements), mislabeling, gray market activities, diversion, smuggling, theft, and counterfeiting of intellectual property rights (Spink *et al.,* 2019).

Institutional interventions like insurance and social protection programs complement agricultural technologies (Scognamillo *et al.,* 2021). Insurance acts as a risk transfer mechanism, covering losses from events like natural disasters, while bundling technologies with insurance optimizes risk management, reducing costs and enhancing resilience. This integration improves risk management across disciplines, fostering sustainable agricultural production.

Organizational preparedness for crisis management starts with a clear understanding of various crisis types. Executives assess crisis capabilities across five key areas: technical, human factors, infrastructure, culture, and emotional/beliefs. This evaluation ensures proactive and effective responses, tailored to specific organizational needs (Pearson *et al.,* 2019). The culture of an organization mirrors the beliefs of top executives. Managers who enhance their crisis management skills acknowledge organizational vulnerability and take proactive steps to boost resilience.

Contemporary technologies like Radio-frequency Identification (RFID), Enterprise Resource Planning (ERP), and General Packet Radio Service (GPRS) are poised to become crucial tools for Supply Chain Risk Management (SCRM). A key determinant of success in risk management lies in identifying and aligning strategies for various types of risks. Effective management of disruptive risks will necessitate the design of supply chains where critical resources, such as parts inventory or the number of suppliers, are not entirely centralized (Gurtu *et al.,* 2021).

Significantly, Enterprise Risk Management (ERM) has gained prominence in addressing external factors such as the institutional environment, mitigating losses stemming from rapid environmental changes, volatility, and industrial competition, among others. However, the successful implementation of ERM can only be empirically associated with internal factors. These include

supportive leadership, a culture of risk awareness, readiness of corporate strategic plans, and the availability of ERM resources.

Figure 19: Enterprise Risk Management

(Source: Spink *et al.,* 2019)

In the food industry, where factors such as food safety, supply chain disruptions, and market volatility pose significant risks, ERM safeguards the integrity of products. It also ensures laws to maintain the trust of consumers and stakeholders (Sai-Lim, 2019). By adopting ERM principles, food industry companies can enhance resilience, minimize losses, and capitalize on emerging opportunities in a rapidly evolving business environment.

4.3.3 Theme 3: Organization with effective risk mitigation strategies experience better project outcomes.

Ensuring the safety of food products and maintaining consistent quality are becoming increasingly vital in the global food industry. This necessitates the development and implementation of robust management systems. This emphasis stems from the growing awareness of the potential health risks associated with food products (Radu *et al.,* 2023). Various pathogenic factors can compromise the physical, chemical, and sensory qualities of food. At the EU level, Directive 93/43/EEC mandates economic operators to utilize the Hazard Analysis and Critical Control Points

(HACCP) method ensures food safety. Then, we have Quality Management System (QMS). Food industries are responsible to formulate and implement those (Odintsova *et al.,* 2022).

Figure 20: Quality Management Control

(Radu *et al.,* 2023)

Researchers have investigated the utilization of artificial intelligence (AI) within the food industry to enhance quality control and reduce waste (Neethirajan *et al.,* 2019). Drawing from the HACCP principles, as well as prerequisite programs outlined in the food safety plan, companies have devised their own Quality Management Systems (QMS), as depicted in Figure 19 above (Radu *et al.,* 2019).

Enforcing food quality standards poses challenges for companies, particularly small businesses with few employees. Implementing HACCP analysis, particularly establishing critical control points and identifying hazards, demands extensive skills and expertise from quality managers. Hence, food companies must appoint qualified, well-trained managers who possess a comprehensive understanding of HACCP principles (Rosak *et al.,* 2020).

Food companies implementing HACCP must assess its performance and implementation. This includes evaluating the effects of encountered obstacles:

- Firms need to recognize the specific challenges encountered at each stage and develop its overcoming strategies.

- HACCP leads to reduced production costs and enhanced customer satisfaction (Guzman *et al.,* 2023).

- It enhance the rapidity and accuracy of manufacturing operations.

- HACCP-based systems effectively prevent foodborne illnesses and promote a heightened sense of safety.

- Implementing HACCP-based systems improves food safety by enhancing good communication and risk mitigating strategies.

- A combination hygienic and physical control is crucial for food safety (Ferris *et al.,* 2022).

- Perfect training and monitoring methods leads the system towards success (Gehring *et al.,* 2020).

The agricultural research-for-development (AR4D) community has pioneered various agricultural production technologies and practices to address challenges posed by climate variability. These innovations aimed at mitigating risk and enhancing resilience in agricultural systems. Through these advancements, the aim is to bring about transformations in food production, land management, water conservation, and related areas (Advisory, 2023).

The food industry stands out as one of the primary sectors grappling with significant environmental challenges. This is attributed to heightened concerns regarding food safety, manufacturing practices, and environmental factors such as deforestation, climate change, and energy consumption, garnering global attention. Achieving sustainability goals within the industry can be facilitated by the adoption of a green supply chain management (GSCM) framework, implemented from the early stages of production through to consumption by the end-user (Ayubi *et al.,* 2023).

Consequently, enhancing supply chain interactions to achieve high environmental performance remains a common priority within the food industry. Moreover, the environmental repercussions of food supply chains have attracted attention due to factors such as globalization, technological advancements, and the utilization of agrochemicals. Changes occurring at one level can exert ripple effects on other levels throughout the chain necessitating thorough scrutiny (Azizsafaei *et al.,* 2021).
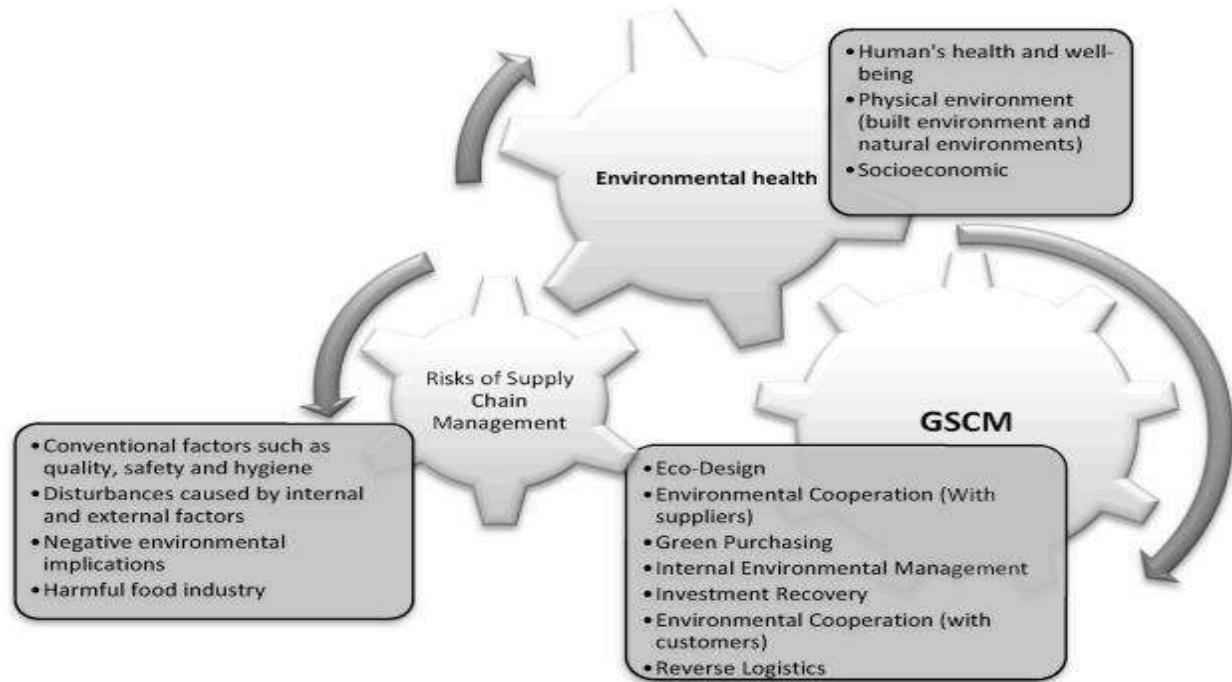
Figure 21: Relationship between SCM risks, Environmental Health, GSCM

(Source: Ayubi *et al.,* 2023)

An integral aspect of supply chain risk management involves integrating risk-mitigation strategies, which encompass various practices such as implementing standards and certifications, monitoring supply chain members, and engaging stakeholders.

Effective supply chain management is pivotal for ensuring food quality and drug safety, given the imperative of meeting the demands of the global population for these essential commodities (Barbosa, 2021). It encompasses various stages within the food and drug supply chains. Over the past decade, researchers and practitioners have diligently examined the management of these supply chains.

Utilizing a risk governance perspective for Food System Risks (FSRs) and their responses offers insights into how different countries have approached FSR governance and how governance arrangements influence capacities and measures for addressing these risks. Framework summarize the interaction between the phases and policy networks is depicted in the figure below:
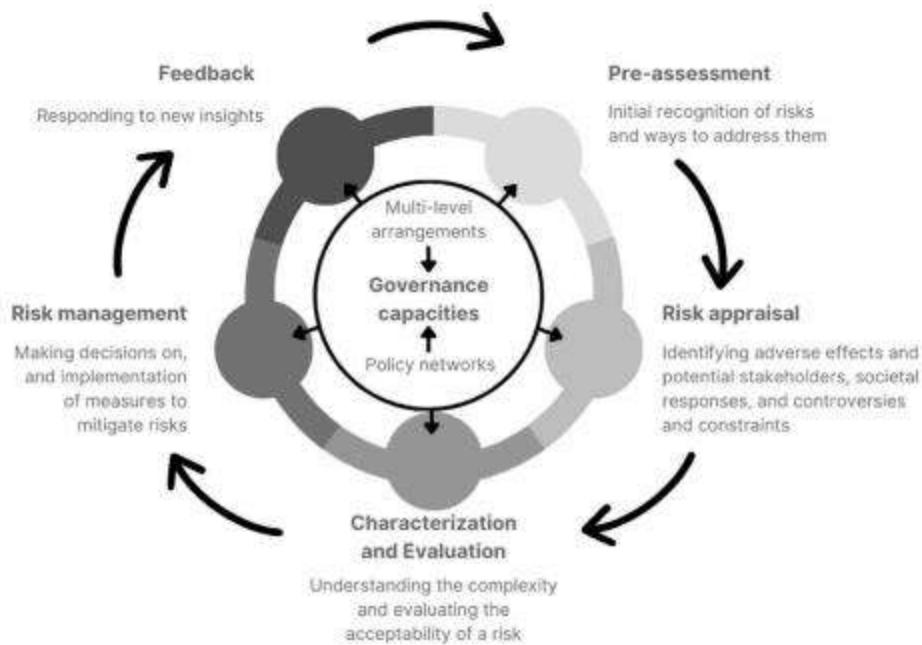
Figure 22: Analytical Framework for Food Risk Management

(Source: Polman *et al.,* 2023)

Moreover, a recent study has recommended that food companies prioritize HACCP over QMS due to its effectiveness in detecting hazards and safeguarding food products, thereby directly enhancing the quality and safety of end products. Subsequently, our next research endeavor, conducted through qualitative research methodology, focused on examining the impact of HACCP implementation on operational performance (Liu *et al.,* 2021).

Block chain technology offers enhanced safety, traceability, and decentralized data management to food industry. It functions is to allocate data across all network nodes instead of centralizing it in a single file. This approach effectively mitigates risk related to food (Haji *et al.,* 2020).

4.3.4 Theme 4: Risk identification and risk assessment in food industry projects.

The food industry is inherently complex due to its multifaceted nature involving various stakeholders, stringent regulations, volatile market conditions, and diverse supply chains. This complexity poses challenges in accurately identifying and assessing risks as they can emerge from multiple sources and have interconnected impacts.

The objective of identifying emerging risks within the food chain is multifaceted. Early identification of emerging risks enables the implementation of necessary mitigation actions, preventing risks from escalating (Farkas et al., 2023). Identifying emerging risks within the food chain presents a challenging task. Uncertainties and information gaps often surround an issue before it reaches a critical stage, further complicating the identification process.

Unlike many other industries, the food industry faces unique risks such as food safety hazards, contamination issues, perishability concerns, and seasonality fluctuations (Ndraha *et al.,* 2020). These risks can have severe consequences not only on project timelines and budgets but also on public health and brand reputation. Identifying and assessing these specific risks require specialized knowledge and expertise.

The food service sector faces growing scrutiny concerning food management, particularly regarding food waste. Large quantities of food are disposed of during preparation and storage, and there are limitations on reusing prepared but unsold food. A study highlights that reducing food waste is a critical challenge for the sustainable development of the food service industry. Not only does food waste have negative economic and environmental impacts, but it is also considered ethically reprehensible (Bilska *et al.,* 2020).

Ensuring food security is a fundamental goal for countries striving to protect public health and well-being among all citizens. However, food security is globally threatened by various factors such as conflict, political instability, and economic crises, impacting both developed and developing nations alike. On the other hand, food safety minimize the risk of foodborne illnesses (Fung *et al.,* 2018). It's crucial to emphasize the importance of implementing comprehensive training and education programs on livestock and food safety for populations to promote public health and mitigate risks associated with foodborne diseases.

Apart from food-related hazards, food security factors has emerged as a significant concern (Haji *et al.,* 2022). Studies have actively contributed to lecturing food quality issues. For instance, guaranteeing the quality of restaurant supply chains through a combination of mathematical prototypes and blockchain technology enhances transparency and traceability. This ensures that customers receive only high-quality ingredients thus fostering trust and satisfaction (George et al. 2019). Similarly, the potential of IoT for enhancing the functionality of Food Supply Chains by analyzing the associated challenges (Aamer et al., 2021). Food quality stands as a fundamental

expectation of consumers and stakeholders, who closely monitor food processing companies' products and practices. Food counterfeiting, driven primarily by economic motives, occurs in both unintentional and intentional forms, as depicted in the figure below.
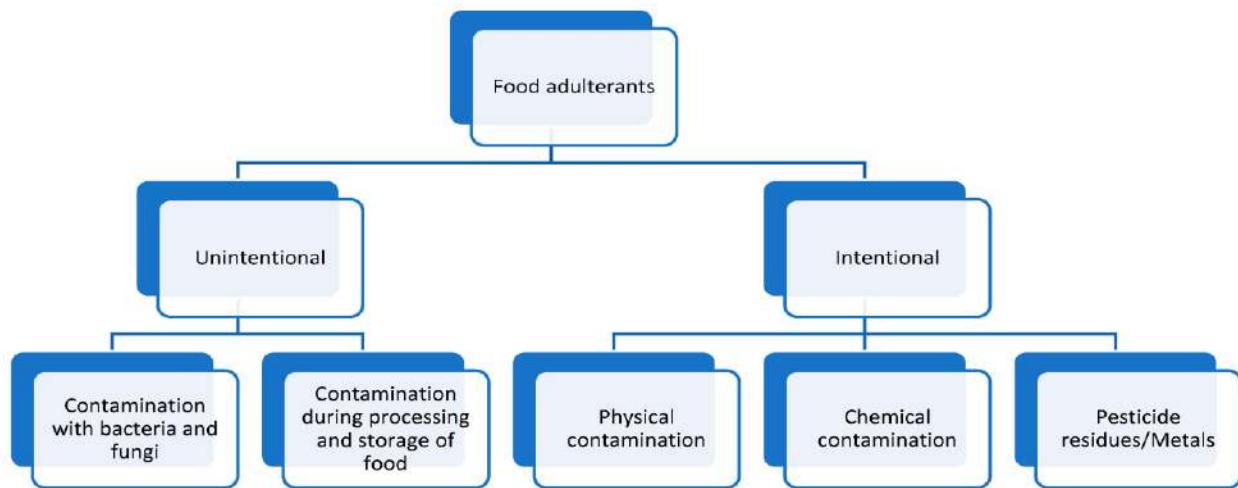
Figure 23: Type of Food Counterfeiting

(Source: Haji *et al.,* 2022)

As per the World Health Organization (WHO), counterfeit drugs can result in various socio-economic repercussions. These include diminished productive capacity, income loss, reduced social well-being, heightened poverty levels, resource wastage, erosion of confidence, elevated mortality rates ETC (Mamtashanti *et al.,* 2020).

Certain environmental factors, including temperature fluctuations and excessive moisture content in the air contributes to the deterioration of food quality. However, the presence of enzymatic or chemical induction cascades can lead to denaturation of the food (Loveday *et al.,* 2019).

Radiation exposure poses a significant risk to food products by potentially altering their active ingredients, thereby posing a serious health threat upon consumption. Radiation disrupts the bonds between food residues, leading to a loss of stability before the products are utilized. Additionally, high moisture content during rainy seasons can compromise the integrity of ingredients in dry foods that further exacerbating the risk of food deterioration (Han *et al.,* 2018).

Food quality and drug safety have emerged as paramount public health concerns worldwide. Policymakers, governments, and various stakeholders are actively seeking and implementing

solutions to effectively tackle the challenges in these crucial domains. These solutions are categorized into four main points as illustrated in the figure:
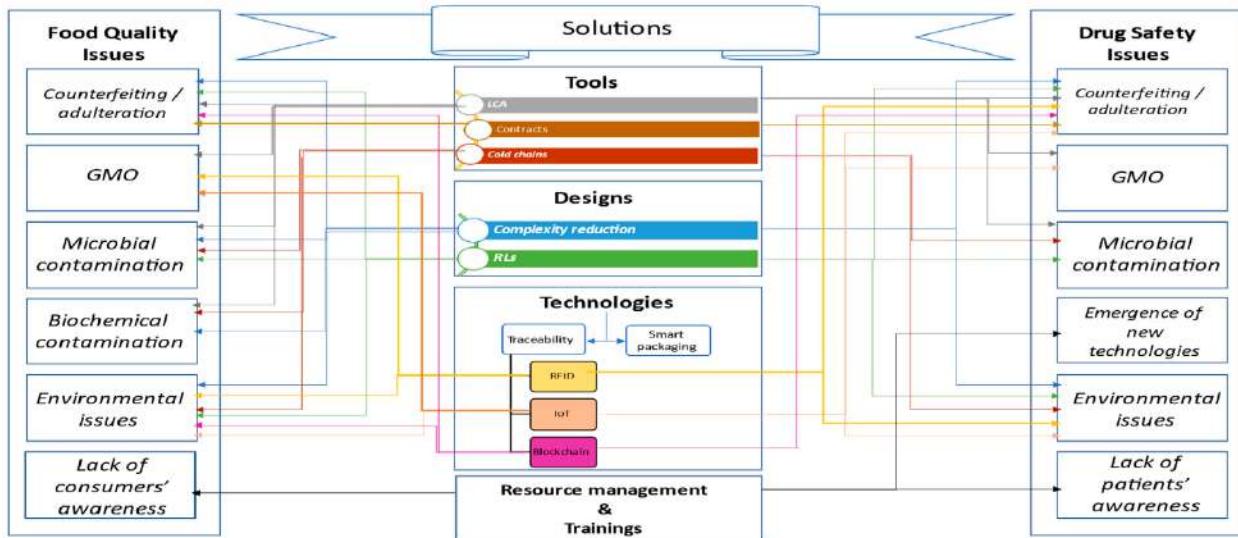
Figure 24: Framework for Solving Food Quality and Drug Safety Issues

(Source: Haji *et al.,* 2022)

Research indicates that Block-chain technology encounters trust as a significant issue among stakeholders. Despite each data transaction being recorded in a Block-chain to prevent hacking or corruption by any stakeholder, initial implementation of the technology is prohibitively expensive due to maintenance requirements, server management, and bug prevention, leading to increased costs and a competitive disadvantage in the market, subsequently resulting in revenue decline (Menon *et al.,* 2021). Furthermore, successful implementation of this technology necessitates well-trained personnel to ensure proper data utilization and, consequently, high-quality outcomes. According to Figure 22, Block chain has the potential to address food quality issues particularly when the source of the supply is known (Pearson et al., 2019), as well as environmental concerns (Majdalawieh *et al.,* 2021).

Effectively mitigating and preventing emerging risks within the food chain necessitates an identification system enabling timely detection of potential issues and tracking their status following expert evaluations (Farkas *et al.,* 2023).

Risks in the food industry are dynamic and can evolve rapidly due to factors such as changes in consumer preferences, technological advancements, and emerging food safety threats. Traditional risk assessment methods may not adequately account for these dynamic risks, necessitating a more agile and adaptive approach to risk management.

However, challenges such as information asymmetry, data limitations, and the need for interdisciplinary collaboration pose obstacles to effective risk identification and assessment. Overcoming these challenges requires innovative strategies, including improving data collection methods, enhancing regulatory compliance efforts, and fostering collaboration among professionals with diverse expertise in food science, supply chain management, and risk management.

Chapter 5: Discussion

This chapter delves into the examination of research questions and themes, followed by the presentation of findings derived from our thematic analysis, leading to a specific conclusion.

5.1 Research Question 1

Theme 1 delves into the intricate relationship between management competencies, risk management practices, and project success within the food industry. It aims to explore how the competencies of project managers and organizational leaders impact the effectiveness of risk management strategies and ultimately influence project outcomes.

Risk management entails the systematic identification, assessment, and mitigation of risks that could potentially impact project objectives or outcomes. It is a proactive approach aimed at enhancing decision-making processes, optimizing resource allocation, and minimizing the adverse effects of uncertainties (Alzoubi, 2022). Research indicates that project success is heavily contingent upon effective planning, with risk management emerging as a significant concern in professional project management circles.

Project success in the food industry encompasses various dimensions, including time, cost, quality, future potential, and stakeholder satisfaction. Success in projects encompasses multiple dimensions, ensuring not only project efficiency but also organizational and business success, customer satisfaction, and readiness for future endeavors (Irfan *et al.,* 2021). Research indicates that project success positively impacts the social, economic, and environmental well-being of stakeholders. A comprehensive understanding of project management success incorporates both common and uncommon elements, as highlighted in various studies.

Research found that planning and scheduling are essential for project success, requiring competencies like experience, efficiency, efficacy, and effectiveness. Experienced project managers anticipate challenges and apply lessons learned. Efficiency involves optimizing resources and workflows, while efficacy ensures strategies achieve goals. Effectiveness aligns project activities with objectives and fosters collaboration for success in the food industry.

Prioritizing planning and integrating risk management into management practices have been identified as key factors associated with organizational efficiency and improved project performance. Studies have shown a positive correlation between the integration of risk

management and planning in management practices and organizational efficiency (Ahmed, 2012). Furthermore, various other factors, such as work bullying, emotional intelligence, and team learning, have also been examined in relation to project success within the broader context of management competencies (Creasy *et al.,* 2020).

The food industry lacks a clear roadmap for navigating the challenges of the Fourth Industrial Revolution (Akyazi *et al.,* 2020). Urgently, the sector needs a strategy to identify and meet current and future skills requirements. Learning from other industries can guide the development of tools and competencies needed for innovation and efficiency. Collaboration with education policymakers is vital to align academic programs with industry needs. Embracing technological advancements will enhance competitiveness and ensure compliance with evolving standards, driving innovation and adaptation in the food sector.

Competency in the workplace encompasses various qualities such as experience, efficiency, efficacy, and effectiveness, all of which contribute to individual and organizational success (Borg *et al.,* 2023). Employers seek individuals who display these traits to achieve strategic objectives effectively. Specifically, in project management roles, competency is measured by the ability to make timely decisions and possess comprehensive knowledge of project team responsibilities and roles (Atan *et al.,* 2019). This competency ensures that project managers can navigate challenges, coordinate team efforts, and drive project success within the food industry and beyond.

Competency in project management is measured by the ability to make informed decisions and possess knowledge of project team responsibilities and roles. The schematic illustration highlights the interplay between project planning, competencies, and success, indicating that both planning and competencies act as antecedents to project success.

Additionally, risk communication and management within agencies are influenced by organizational routines, decision-making processes, collaboration, responsibility, and strategic planning. Understanding the pivotal role of management competencies in shaping risk management practices and project performance provides valuable insights for stakeholders aiming to enhance their approach to project leadership in this dynamic industry landscape.

Studies such as those by Irfan *et al.* (2021) emphasize the multidimensional nature of project success, encompassing factors such as time, cost, quality ETC. Effective risk management directly

contributes to achieving these success dimensions by identifying potential threats and opportunities, allowing project teams to develop strategies to mitigate risks and capitalize on opportunities.

Furthermore, the competencies of project managers and organizational leaders play a crucial role in shaping the effectiveness of risk management strategies. Competencies such as decision-making ability, knowledge of project responsibilities, and planning skills are essential for implementing risk management practices effectively. Figure 15 presented in the data depicts how project planning and competencies act as antecedents to project success, emphasizing the interconnectedness of these factors (Irfan *et al.,* 2021))

Moreover, the data underscores the significance of risk communication and organizational planning in enhancing risk management effectiveness. Effective risk communication, integrated into organizational routines and decision-making processes, facilitates collective understanding and action regarding risk issues. Quality and substance of organizational planning and strategic decision-making processes are identified as common success factors for risk communication, further emphasizing the importance of organizational competence in risk management.

In the food industry, effective risk management practices are of paramount importance for navigating uncertainties, ensuring project objectives are met, and delivering value to stakeholders. By systematically addressing risks unique to the food industry, organizations can enhance project resilience, minimize operational setbacks, and capitalize on opportunities for growth and innovation. Therefore, management competencies play a crucial role in effectively integrating risk management practices into project management and ultimately contributing to project success within the dynamic and challenging environment of the food industry.

5.2 Research Question 2

The second theme explores the comprehensive landscape of risk management strategies deployed across various sectors of the food industry, encompassing production, processing, distribution, and retail. Scholars have categorized supply chain risks into operational and disruption risks, highlighting the importance SCRM in mitigating these risks (Singh *et al.,* 2022). SCRM approaches range from comprehensive risk management strategies to focused responses to specific disruptions, as illustrated in Figure 17 (Gurtu *et al.,* 2021).

Risk assessment and mitigation strategies are crucial for managing food supply chain (FSC) risks and minimizing food wastage (Ali *et al.,* 2019). Investments in risk reduction, such as insurance and social protection programs, complement agricultural technologies and contribute to sustainable agricultural production (Scognamillo *et al.,* 2021). The integration of technologies like RFID and ERP systems enhances supply chain risk management capabilities (Gurtu *et al.,* 2021).

Additionally, the theme addresses emerging challenges such as food fraud, which poses significant threats to food safety and consumer trust. Various types of food fraud, including adulteration, mislabeling, and intellectual property rights counterfeiting, necessitate robust risk management measures (Spink et al., 2019). Enterprise Risk Management (ERM) has emerged as a critical approach for addressing external factors such as market volatility and regulatory compliance in the food industry (Sai-Lim, 2019).

The integration of ERM principles helps food industry companies safeguard product integrity, ensure regulatory compliance, and maintain stakeholder trust amidst evolving risks and uncertainties.

The food industry holds a significant economic role globally, with product safety being a paramount concern for both traders and consumers. Pathogenic factors pose threats to food safety, affecting its physical, chemical, and sensory quality, thereby emphasizing the importance of food quality control (Radu *et al.,* 2023). In addition to traditional food safety concerns, the UK food industry faces emerging risks related to sustainability and environmental stewardship. Risks associated with resource scarcity, waste management, and climate change necessitate effective risk management practices, including sustainable sourcing, waste reduction, and renewable energy adoption (Giannakis *et al.,* 2020).

Project risk management is crucial throughout the lifecycle of projects in the food industry, from inception to closure. Despite risk management efforts, projects often encounter budget overruns, schedule delays, and compromised specifications, highlighting the complexity of managing risks associated with project planning (Urbanski *et al.,* 2019). Recognizing the importance of project risk, studies have identified various risk types, including technological, human, and strategic risks, which must be addressed comprehensively to ensure project success (Ahmadabadi *et al.,* 2019).

Effective risk management practices influence various disciplines within the food industry, spanning regulatory compliance, supply chain resilience, product innovation, environmental sustainability, market adaptation, operational efficiency, and technological integration. Proactive risk management enables organizations to navigate regulatory complexities, ensure food safety, enhance supply chain resilience against disruptions, drive innovation in product development, address environmental concerns, adapt to market dynamics, optimize operational processes, and leverage technological advancements (Giannakis *et al.,* 2020).

5.3 Research Question 3

The third theme explores various risk management strategies implemented across different sectors of the food industry, including production, processing, distribution, and retail. These strategies encompass comprehensive approaches to identifying, assessing, and mitigating risks to ensure food safety, quality, and regulatory compliance.

One prominent risk management strategy highlighted is Supply Chain Risk Management (SCRM), which categorizes risks into operational and disruption risks. Effective SCRM involves developing comprehensive risk management strategies and focusing on specific disruptions to minimize food wastage and enhance supply chain resilience. Additionally, institutional interventions such as insurance and social protection programs complement agricultural technologies, optimizing risk management and fostering sustainable agricultural production.

Enterprise Risk Management (ERM) also plays a crucial role in safeguarding the integrity of food products, ensuring compliance with regulations, and maintaining consumer trust. By adopting ERM principles, food industry companies can enhance resilience, minimize losses, and capitalize on emerging opportunities in a rapidly evolving business environment.

The implementation of risk management practices, particularly the HACCP system, significantly influences the success of food industry projects. HACCP ensures food safety by identifying hazards, establishing critical control points, and implementing monitoring procedures. The successful implementation of HACCP-based systems depends on appropriate training, monitoring mechanisms, and the development of effective quality management systems.

Furthermore, advancements in technology, such as artificial intelligence and blockchain, offer innovative solutions to enhance food safety and quality control, reduce waste, and prevent

counterfeiting. These technologies provide security, traceability, and decentralization of data related to food products, effectively mitigating risks and improving operational performance in the food industry.

Impact of risk management practices across various disciplines within the food industry, including supply chain management, financial management, product innovation, human resource management, regulatory compliance, marketing, and consumer relations.

In supply chain management, effective risk management ensures the reliability, resilience, and efficiency of supply chains by proactively identifying and mitigating risks associated with suppliers, transportation, logistics, and information technology. It results in reducing cost and many more (Ali *et al.,* 2023).

Financial risk management strategies help organizations optimize capital allocation, stabilize cash flows, and mitigate financial losses by hedging against market risks such as price volatility, currency fluctuations, and commodity price risks. This ensures financial stability and enhances investment returns (Polukhin *et al.,* 2022).

Technological innovation in food product development introduces opportunities and risks. Effective risk management ensures successful adoption and integration of new technologies while mitigating potential technical, legal, and operational risks. This accelerates innovation, improves product quality, and maintains a competitive edge in the market (Guine *et al.,* 2020).

Risk management in human resource management enhances employee safety, job satisfaction, and organizational resilience by implementing health and safety protocols, providing training opportunities, and ensuring compliance with labor laws and regulations. This increases productivity, reduces turnover rates, and improves project performance (Malik *et al.,* 2020).

Regulatory compliance and risk management are closely linked, with effective risk management practices helping organizations navigate complex regulatory landscapes, mitigate compliance risks, and avoid costly penalties and legal liabilities. This upholds regulatory compliance, protects brand reputation, and sustains long-term success in the market (Kotsanopoulos *et al.,* 2019).

Moreover, risk management practices in marketing and consumer relations protect brand reputation, build consumer trust, and maintain market competitiveness by anticipating consumer

preferences, addressing consumer concerns, and implementing crisis management plans (Roy *et al.,* 2022).

Risk management practices also guide product development and innovation efforts, minimizing the risk of product failures, market rejection, and financial losses while fostering innovation and meeting consumer demands.

Lastly, risk management practices are crucial for ensuring the safety and quality of food products by identifying and mitigating potential hazards throughout the production process, such as microbial contamination, chemical residues, allergens, and physical hazards. This minimizes the risk of foodborne illness outbreaks, product recalls, and reputational damage (Mensah *et al.,* 2011).

The food industry faces multifaceted challenges stemming from various sources, including stringent regulations, volatile market conditions, and diverse supply chains. Emerging risks in the food chain necessitate timely identification and mitigation to prevent potential adverse impacts on human health, strategic planning, and decision-making processes (Farkas *et al.,* 2023). Unique risks such as food safety hazards, contamination issues, and perishability concerns require specialized expertise for accurate identification and assessment (Ndraha *et al.,* 2020).

Additionally, challenges related to food waste management, food security, and environmental factors further complicate risk management efforts (Bilska *et al.,* 2020; Haji *et al.,* 2022). Solutions involving technologies like blockchain offer promising avenues for addressing food quality issues and ensuring drug safety (Haji *et al.,* 2022). However, implementing such technologies requires overcoming challenges related to trust, cost, and personnel training (Menon *et al.,* 2021). Effective risk management in the food industry demands innovative strategies, enhanced data collection methods, and interdisciplinary collaboration to adapt to dynamic risks and ensure consumer safety and industry sustainability.

Chapter 6: Conclusion

This chapter provides an overall conclusion of the finding and discussion, based on research objectives.

- *Based on Research Objective 1*

The examination risk management and project success within the food industry reveals crucial insights into effective project leadership. Competencies such as decision-making ability, knowledge of project responsibilities, and planning skills are essential for implementing risk management practices effectively, as highlighted in the provided data. The interplay between project planning, competencies, and success underscores the interconnectedness of these factors, emphasizing the pivotal role of management competence in shaping risk management effectiveness and ultimately influencing project outcomes. Furthermore, effective risk communication and organizational planning are identified as common success factors for enhancing risk management effectiveness, highlighting the importance of organizational competence in managing uncertainties and delivering value to stakeholders.

So, it is concluded that the management competencies play a crucial role in navigating the complexities of the food industry, ensuring project objectives are met, and contributing to project success through the effective integration of risk management practices.

- *Based on Research Objective 2*

The exploration of risk management strategies across various disciplines of the food industry reveals their profound influence on ensuring safety, resilience, innovation, sustainability, and competitiveness. The categorization of supply chain risks into operational and disruption risks underscores the importance of supply chain risk management (SCRM) in mitigating uncertainties and enhancing supply chain efficiency. Risk assessment and mitigation strategies play a crucial role in managing food supply chain (FSC) risks, minimizing food wastage, and fostering sustainable agricultural production.

Moreover, the emergence of challenges such as food fraud and environmental risks necessitates robust risk management measures to safeguard consumer trust and environmental sustainability. ERM has emerged as a critical approach for addressing external factors and ensuring regulatory

compliance in the food industry. Integrating ERM principles helps companies safeguard product integrity, ensure regulatory compliance, and maintain stakeholder trust amidst evolving risks and uncertainties. Furthermore, effective risk management practices influence various disciplines within the food industry, including regulatory compliance, supply chain resilience, product innovation, environmental sustainability, market adaptation, operational efficiency, and technological integration. Proactive risk management enables organizations to navigate regulatory complexities, ensure food safety, enhance supply chain resilience against disruptions, drive innovation in product development, address environmental concerns, adapt to market dynamics, optimize operational processes, and leverage technological advancements.

By implementing proactive risk management practices, organizations can mitigate risks effectively, capitalize on emerging opportunities, and ensure long-term success and sustainability in this dynamic and competitive landscape.

- *Based on Research Objective 3*

Effective risk management is crucial across diverse sectors of the food industry, addressing challenges and ensuring safety, quality, and compliance. Strategies like SCRM and ERM bolster resilience and minimize losses. Implementing practices such as HACCP ensures project success by safeguarding food safety. Technological advancements like AI and block chain offer innovative solutions, albeit with implementation challenges. Risk management practices enhance operational efficiency, financial stability, innovation, employee satisfaction, regulatory compliance, and consumer trust. Emerging risks like food safety hazards, contamination, and environmental concerns necessitate proactive strategies and collaboration for sustainable success.

Ultimately, successful risk management in the food industry hinges on the adoption of proactive strategies tailored to address the dynamic and complex challenges inherent in the sector, ensuring sustainable success and resilience in an ever-evolving business landscape.

Recommendations

Researcher drawn following below recommendations from the above conclusion. It is recommended that:

- Conduct comprehensive risk assessments for all project stages, including supply chain disruptions, regulatory compliance, and emerging risks like food fraud and environmental challenges.

- Implement integrated risk management approaches like SCRM, ERM, and HACCP to effectively address diverse risks.

- Embrace technological advancements such as AI, blockchain, and data analytics for enhanced risk management capabilities.

- Establish robust monitoring mechanisms to track risk management effectiveness and adapt strategies accordingly.

- Foster stakeholder collaboration to share best practices and resources for effective risk management.

- Invest in training programs to enhance risk management skills and competencies.

- Promote a culture of continuous improvement by documenting and analyzing lessons learned from past experiences.

Future Scope of the Study

Future research could explore the potential of emerging technologies like IoT and big data analytics in food industry risk management. Additionally, assessing the impact of geopolitical factors, climate change, and global health crises on risks and integrating sustainability principles into risk management strategies is crucial. Tailoring risk management frameworks to specific industry segments and studying the influence of consumer trends and regulatory changes would provide valuable insights.

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THE ROLE OF RISK MANAGEMENT IN PROJECT SUCCESS – AN ANALYSIS OF FOOD INDUSTRY IN THE UK

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INTRODUCTION

- **Research Aims**

This study aims to investigate the role of risk management in project success specifically focused on the food industry in the UK.

- **Research Objectives**

➢ To examine the linkages between risk management and project success.

➢ To investigate influence of risk management in different disciplines of food industry.

➢ To evaluate successful strategies and best practices employed by organizations in the food industry to mitigate project risks.

- **Research Questions**

- What is the role of risk management in project success?

- How risk management practices influences in different disciplines of food industry?

- How to evaluate successful strategies and best practices employed by organizations in the food industry to mitigate project risks?

- **Problem Statement**

o The food industry faces a lot of challenges, but how risk management impacts project success remains unclear.

o Researcher identifies role of risk management and successful strategies employed in the food industry for project success.

- **Research Gap**

o Understanding the specific contribution of risk management practices to project success in the food industry is lacking.
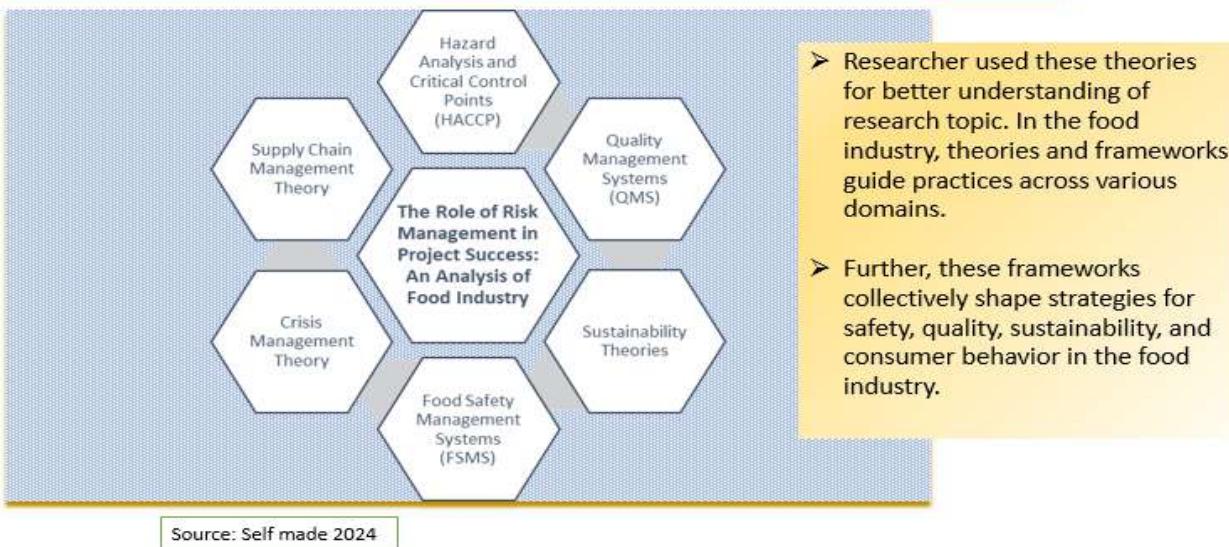
Background of the Research

- The food industry is marked by rapid innovation, evolving consumer preferences, and stringent regulatory requirements (Purba *et al.,* 2018).
- Risks in the food industry encompass market volatility, supply chain disruptions, regulatory compliance, and technological advancements.
- The failure to identify, assess, and mitigate these risks can lead to project delays, cost overruns, and, in extreme cases, project failure (Rasul *et al.,* 2021).
- Early identification and mitigation of risks during project initiation stages are crucial for minimizing impacts.
- Proactive risk management enhances project success by addressing challenges and uncertainties (Singh et al., 2019).
- This research aims to identify food industry challenges, assess current risk management practices, and propose improvements for project success.
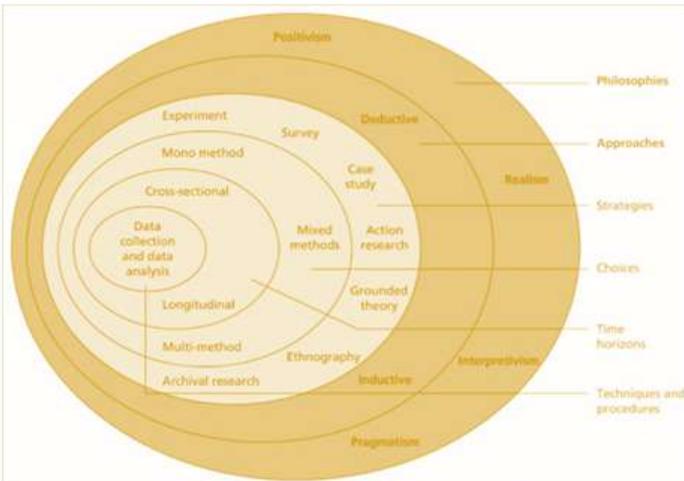
Literature Review

- Risk management entails identifying, assessing, and mitigating potential risks that could affect the objectives or outcomes of a project, organization, or activity (Alzoubi, 2022).
- Risk management seeks to improve decision-making, optimize resource allocation (Hu et al., 2019), and maximize the probability of achieving desired outcomes while minimizing adverse effects.
- Within the realm of project management, risk is commonly referred to as project risk, representing the potential for unfavorable outcomes in a project's trajectory (Alhashmi et al., 2023).
- 13 papers were read

Theoretical Framework

Source: Self made 2024

> Researcher used these theories for better understanding of research topic. In the food industry, theories and frameworks guide practices across various domains.

> Further, these frameworks collectively shape strategies for safety, quality, sustainability, and consumer behavior in the food industry.

Methodology

Source: Orth et al., 2021

Methodology	Type
Research Philosophy	Interpretivism Philosophy
Research Approach	Inductive Approach
Research Strategy	Case-Study Research
Research Choice	Mono Method
Time Horizon	Cross-Sectional
Data Collection	Secondary Data Analysis
Data Analysis Technique	Thematic Analysis

Research onion model was utilized as a framework for research methodology.

Analysis and Findings (Cont.)

Theme 1

- "Role of management competencies between risk management and project success."
- This theme is based on 1st Research Objective.
- In this theme, leadership skills, communication abilities, planning, team management, risk assessment, project success, team management were discussed and analyzed.
- Research indicates that project planning and competencies leads any project toward success (Irfan et al., 2021).

Theme 2

- "Risk management practices across various disciplines within the food industry."
- This theme is based on Research Objective 2.
- The disciplines include:
  - Financial risk management
  - Supply chain management
  - Operational risk management
  - Product management
  - Enterprise risk management
  - Crises Management

Analysis and Findings

Theme 3

- "Organization with effective risk mitigation strategies experience better project outcomes."
- Based on Research Objective 3.
- Researcher discussed:
  - Risk identification
  - Resource allocation
  - Risk mitigation strategies
  - Project outcomes
  - Project success
  - Contingency measures

Theme 4

- "Risk identification and risk assessment in food industry."
- This is a general recurring theme.
- It includes:
  - Risk identification
  - Risk assessment
  - Project success
  - Food safety management
  - Project related risks
  - Hazards focused risks
  - Project management

Conclusion

- Risk management and project success within the food industry reveals crucial insights into effective project leadership.

- Effective risk communication and organizational planning highlights the importance of organizational competence in managing uncertainties and delivering value to stakeholders.

- By implementing proactive risk management practices, organizations can mitigate risks effectively and ensures long term success.

- Risk management practices enhance operational efficiency, financial stability, innovation, employee satisfaction, regulatory compliance, and consumer trust.

- Emerging risks like food safety hazards, contamination, and environmental concerns necessitate proactive strategies and collaboration for sustainable success.

Limitations

- Focus limited to the UK food industry, potentially limiting generalizability.

- Due to limited sample size, the results may biased

- Unforeseen events or regulatory changes may influence project outcomes beyond the study's control.

- As it is secondary research so active participation from industry stakeholders is lacking in this research that may affect data richness and validity.

- Subjectivity in evaluation.

Future Scope of the Research

Future research could explore the potential of emerging technologies like IoT and big data analytics in food industry risk management.	Assessing the impact of geopolitical factors into risk management strategies is crucial.	Studying the influence of consumer trends and regulatory changes would also provide valuable insights.

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Appendix

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Global trends and research hotspots on HACCP and modern quality management systems in the food industry

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APPENDICES

Appendix A: Sources of Articles

1. https://www.academia.edu/download/80178362/pdf.pdf

Role of Project Planning and Project Manager Competencies on Public Sector Project Success

Muhammad Irfan [1], Sanam Zaib Khan [2], Nasruddin Hassan [3,*], Mazlan Hassan [4], Muhammad Habib [2], Salma Khan [5] and Hadi Hassan Khan [1]

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* Correspondence: nas@ukm.edu.my; Tel.: +60-192-145-750

2. http://m.growingscience.com/beta/msl/3349-the-role-of-transformational-leadership-style-in-enhancing-employees-competency-for-organization-performance.html

The role of transformational leadership style in enhancing employees' competency for organization performance

Jamsari bin Atan[a*] and Nik Hasnaa Nik Mahmood[a]

[a]Universiti Teknologi Malaysia (UTM), Jalan Sultan Yahya Petra, 54100 Kuala Lumpur, Malaysia

3. https://www.mdpi.com/2304-8158/9/4/492

A Guide for the Food Industry to Meet the Future Skills Requirements Emerging with Industry 4.0

by Tugce Akyazi [1],[*] ✉ ⦿, Aitor Goti [2] ✉ ⦿, Aitor Oyarbide [1] ✉ ⦿, Elisabete Alberdi [3] ✉ and Felix Bayon [4] ✉

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[3] Department of Applied Mathematics, University of the Basque Country UPV/EHU, 48013 Bilbao, Spain
[4] Sidenor Aceros Especiales, SLU, 48970 Bilbao, Spain
[*] Author to whom correspondence should be addressed.

4. https://www.sciencedirect.com/science/article/pii/S0959652619314192

Framework for evaluating risks in food supply chain: Implications in food wastage reduction

Syed Mithun Ali [a] ✉, Md. Abdul Moktadir [b] ✉, Golam Kabir [c] ⦿ ✉, Jewel Chakma [a] ✉, Md. Jalal Uddin Rumi [a] ✉, Md. Tawhidul Islam [a] ✉

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5. https://www.sciencedirect.com/science/article/pii/S095671352200398X

Analysis of the most frequent nonconformance aspects related to Good Manufacturing Practices (GMP) among small and medium enterprises (SMEs) in the food industry and their

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Noor Zafira Noor Hasnan [a] ⦿ ✉, Roseliza Kadir Basha [a], Nor Amaiza Mohd Amin [a], Sharifah Hafiza Mohd Ramli [b], John Yew Huat Tang [c], Norashikin Ab Aziz [a]

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6. https://www.sciencedirect.com/science/article/pii/S2211912418301408

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Steve Brewer [a] ✉, Luc Bidaut [b] ✉, Jeremy G. Frey [d] ✉, Gerard Parr [e] ✉,
Roger Maull [f] ✉, Andrea Zisman [g] ✉

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7. https://www.cell.com/heliyon/pdf/S2405-8440(23)05440-3.pdf

Global trends and research hotspots on HACCP and modern quality management systems in the food industry

Elena Radu [a], Adriana Dima [b], Ecaterina Milica Dobrota [a], Ana-Maria Badea [c],
Dag Øivind Madsen [d,*], Cosmin Dobrin [b], Silvius Stanciu [e]

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[d] USN School of Business, University of South-Eastern Norway, 3511 Honefoss, Norway
[e] Faculty of Food Science and Engineering, "Dunărea de Jos" University of Galați, 800008, Galați, Romania

8. https://www.sciencedirect.com/science/article/pii/S2211912423000470

A risk governance approach to mitigating food system risks in a crisis: Insights from the COVID-19 pandemic in five low- and middle-income countries

D.F. Polman [a,*], M.P.H. Selten [b], N. Motovska [b], E.D. Berkhout [b], R.H.M. Bergevoet [b],
J.J.L. Candel [a]

[a] Public Administration and Policy Group, Wageningen University and Research (WUR), Wageningen, the Netherlands
[b] Wageningen Economic Research, Wageningen University and Research (WUR), Wageningen, the Netherlands

9. https://www.sciencedirect.com/science/article/pii/S2214799319300098

The current state of food fraud prevention: overview and requirements to address 'How to Start?' and 'How Much is Enough?'

John W Spink

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10. https://www.mdpi.com/2305-6290/4/4/33

Open Access   Review

Roles of Technology in Improving Perishable Food Supply Chains

by Mona Haji [1], Laoucine Kerbache [1,2], Mahaboob Muhammad [1] and Tareq Al-Ansari [1,3,*]

[1] Division of Engineering Management and Decision Sciences, College of Science and Engineering, Hamad Bin Khalifa University, Qatar Foundation, 34110 Doha, Qatar

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[3] Division of Sustainable Development, College of Science and Engineering, Hamad Bin Khalifa University, Qatar Foundation, 34110 Doha, Qatar

[*] Author to whom correspondence should be addressed.

11. https://www.sciencedirect.com/science/article/pii/S1466856423001005

Emerging risk identification in the food chain – A systematic procedure and data analytical options

Zsuzsa Farkas [a,b], Erika Országh [a,b,*], Tekla Engelhardt [a,b], Andrea Zentai [a,b], Miklós Süth [a,b], Szilveszter Csorba [a,b], Ákos Jóźwiak [a,b]

[a] University of Veterinary Medicine Budapest, Digital Food Institute, H-1078 Budapest, István utca 2., Hungary
[b] National Laboratory of Infectious Animal Diseases, Antimicrobial Resistance, Veterinary Public Health and Food Chain Safety, University of Veterinary Medicine Budapest, H-1078 Budapest, István utca 2., Hungary

12. https://www.sciencedirect.com/science/article/pii/S2319417017304055

Review Article

Food safety in the 21st century

Fred Fung [a,b,*], Huei-Shyong Wang [c,d], Suresh Menon [e]

[a] Division of Occupational & Environmental Medicine, University of California Irvine School of Medicine, Irvine, CA, USA
[b] Department of Occupational Medicine, Sharp HealthCare/Sharp Rees-Stealy Medical Group, San Diego, CA, USA
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[d] College of Medicine, Chang Gung University, Taoyuan, Taiwan
[e] Department of Research and Development, Menon Biosensors Inc., Escondido, CA, USA

Dr. Fred Fung

13. https://www.cell.com/heliyon/pdf/S2405-8440(23)00471-1.pdf

Research article

Green food supply chain management as a solution for the mitigation of food supply chain management risk for improving the environmental health level

Mohamad Saad El Ayoubi [a,*], Mehrshad Radmehr [b]

[a] Cyprus International University (CIU)/Institute of Graduate Studies and Research, Faculty of Economics and Administrative Science, Cyprus International University, Nicosia, North Cyprus, via Mersin 10, Turkey
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MSc Dissertation – Supervisor's Meetings LogBook

Student ID: B01647961

Meeting Date	NOTES Filled in by STUDENT	Signed by Student	Approved& Signed by Supervisor
1st Meeting Date/Time INITIATION	**Summary & Feedback:** Topic Discussion Dissertation plan For next week chapter 1 and 50 articles, journals to send to the professor.	Name/ Date Priyanka Majhi 30-01-2024	Name/ Date Dr. Rakibul Hasan
2nd Meeting Date/Time CHAPTERS I	**Summary & Feedback:** Discussion on Chapter 1 Aim, objective and research question related to each other. Discussion about research gap which is specific with critical issues	Name/ Date Priyanka Majhi 05-02-2024	Name/ Date Dr. Rakibul Hasan
3rd Meeting Date/Time CHAPTERS II	**Summary & Feedback:** Discussion on Chapter 2 Secondary data used which is the theoretical base will linked with chapter 4 for the thematic analysis. Which has a small theme and data collection. Feedback Use of at least 10 graphs and table	Name/ Date Priyanka Majhi 09-02-2024	Name/ Date Dr. Rakibul Hasan
4th Meeting Date/Time CHAPTERS III	**Summary & Feedback:** Discussion on chapter 3 Discussed on research onion which is very important. A quick online meeting with the follow up of the work. Feedback Use of figures with explanation on each and every methods used	Name/ Date Priyanka Majhi 21-02-2024	Name/ Date Dr. Rakibul Hasan

	Summary & Feedback:	Name/ Date	Name/ Date
5th Meeting Date/Time CHAPTER IV	**Summary & Feedback:** Discussion on chapter 4 Findings of the data. Producing 4 themes and linking with the objectives that's mention on chapter 1 with the data analysis.	Priyanka Majhi O5-03-2024	Dr. Rakibul Hasan
6TH Meeting Date/Time CHAPTER V CHAPTER 6	**Summary & Feedback:** Discussion on chapter 5 In this chapter, research questions and themes are discussed and the findings of our thematic analysis are drawn for a specific conclusion. Chapter 6 This chapter provides an overall conclusion of the finding and discussion, based on research objectives. Brief description of making slides.	Priyanka Majhi O8-03-2024	Dr. Rakibul Hasan
7th Meeting Date/Time PRESENT ATION SLIDES	**Summary & Feedback:** Short overview on making presentation slides. Maximum of 10 slides which contains every chapter with important points	Priyanka Majhi 12-03-2024	Dr. Rakibul Hasan

8th Meeting Date/Time DRAFT	**Summary & Feedback:** Discussion on the draft and what to include in the presentation **Feedback:** Reduce the research gap	Name/ Date Priyanka Majhi 19-03-2024	Name/ Date Dr. Rakibul Hasan
9th Meeting Date/Time DRAFT	**Summary & Feedback:** Overview of the dissertation draft	Name/ Date Priyanka Majhi 21-03-2024	Name/ Date Dr. Rakibul Hasan
10th Meeting Date/Time PRESENT ATION	**Summary & Feedback:** Preparation of presentation slides **Feedback:** To change the color of the presentation slides Add the appendix slide which should include the pictures of the articles and the links of the articles that are read	Name/ Date Priyanka Majhi 25-03-2024	Name/ Date Dr. Rakibul Hasan
11th Meeting Date/Time PRESENT ATION	**Summary & Feedback:** Attending the final presentation of the dissertation **Feedback** : Focusing on the references Going through how many articles that read Resubmitting the presentation on the aula assignment page	Name/ Date Priyanka Majhi 29-03-2024	Name/ Date Dr. Rakibul Hasan

12th Meeting Date/Time DRAFT	**Summary & Feedback:** Quick update on the dissertation **Feedback:** Submitting the dissertation draft on the supervisor deadline. Adding articles pictures, links presentation slides on the appendix Focusing and rechecking on every chapters Tables, graphs on literature review, diagram on methodology	Name/ Date Priyanka Majhi 02-04-2024	Name/ Date Dr. Rakibul Hasan

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Spanovic