

Addis Ababa University School of Commerce

Title:

PROJECT RISK MANAGEMENT PRACTICES AND THE SUSTAINABILITY OF MILK & MILK PRODUCT QUALITY AND SAFETY: A CASE STUDY OF THE BRIDGE+ PROJECT IN ADDIS ABABA

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APPROVAL

With my approval and direction as a university advisor, this research paper with the title "project risk management practices and the sustainability of milk & milk product quality and safety: a case study of the bridge+ project in Addis Ababa." has been submitted to the department of marketing management at Addis Ababa university school of commerce.

Signed by the examining committee

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CERTIFICATION

This is to certify that Ruth Desalegn carried out her thesis on the topic entitled “project risk management practices and the sustainability of milk & milk product quality and safety: a case study of the bridge+ project in Addis Ababa.” under my supervision. This work is original in nature and is suitable for submission for the award of Master of Arts Degree in Project Management.

Advisor: Dr. Bahren Asrat

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DECLARATION

I, Ruth Desalegn, hereby declare that this thesis entitled “project risk management practices and the sustainability of milk & milk product quality and safety: a case study of the bridge+ project in Addis Ababa.” is my original work prepared under the guidance of my advisor, Dr. Bahren Asrat.

This research is presented as a partial requirement for the Master of Arts Degree Award in Project Management and it has not been previously submitted to any diploma or degree in any college or university. I also certify that all sources referred in the writing of this thesis have been properly cited.

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Acronyms and Abbreviations

SPM: Sustainable project management

WHO: World Health Organization

EFDA: Ethiopian Food and Drug Authority

EAA: Ethiopian Agricultural Authority

BRIDGE +: Building Rural Income through Inclusive Dairy Growth in Ethiopia plus

PMI: Project Management Institute

ERM: Enterprise Risk Management

M&E: Monitoring and Evaluation

SDGs: Sustainable Development Goals

FAO: Food and Agriculture Organization

ISO: International Organization for Standardization

RMC: Risk Monitoring and Control (used in your data tables)

RA: Risk Analysis

RKR: Risk Knowledge and Reporting

SUS: Sustainability of milk and milk products quality and safety

UN: United Nations

Abstract

This research examined project risk management practices and the sustainability of milk & milk product safety & quality in case of BRIDEG+ project in Addis Ababa, which involves many different participants. Enterprise risk management theory and network theory form the bedrock of this work. To accomplish its objectives, the study uses a cross - sectional quantitative survey design that collected data from 380 population. Multiple regression analysis showed that the model accounted for 54.8% of the variation in project performance ($R^2 = 0.548$). Risk Monitoring and Control ($\beta = 0.357$, $p < .001$) emerged as the strongest significant positive predictor, followed by Risk Analysis ($\beta = 0.273$, $p < .001$) and Risk Knowledge and Reporting ($\beta = 0.224$, $p < .001$). The finding supports Enterprise Risk Management Theory, which suggests that risk practices should be managed as an integrated system rather than separately. The research finds that Risk Monitoring and Control is the most significant predictor of sustainability. The BRIDGE+ project needs to strengthen risk knowledge reporting through registers and local language bulletins, while donors ought to transfer monitoring responsibilities to local institutions before funding ends.

***Keywords*:** Risk Management, Sustainability, Food Safety and quality, Milk Quality, Dairy Products, BRIDGE+ Project, Ethiopia, Project Management, Value Chain, Public Health.

CHAPTER ONE

INTRODUCTION

Introduces the study by providing an overview of the research context, purpose, and scope. It presents the background of the study, highlighting the importance of project risk management in achieving sustainable project outcomes. The chapter also outlines the research problem, objectives, research questions, and significance of the study. Finally, it defines key terms and presents the structure of the proposal.

1.1 Background of the Study

A project is a temporary assignment aimed at producing a distinct product, service, or outcome. (PMI, 2021, p. 4), Projects involve uncertainty, as they consist of activities and results that have not been performed in precisely the same way before. This distinctiveness subjects' projects to multiple risks, rendering efficient risk management a crucial aspect of successful project execution. More and more, the assessment of project success takes into account not just immediate outputs but also the long-term sustainability of project benefits (Silvius & Schipper, 2014).

Sustainability has emerged as an important factor in project management, especially in development-focused projects where donor funding is limited in time and ongoing benefits are crucial. The idea of sustainable development was traditionally defined by the World Commission on Environment and Development as development that "addresses the needs of the present while ensuring that future generations can meet their own needs" (Brundtland, 1987). This definition highlights the importance of sustainable social, economic, and environmental equilibrium over the long term. Sustainability includes economic development, social fairness, environmental safeguarding, and enhancements in human welfare (Diesendorf 2000).At the project level, sustainability signifies the persistence of project advantages and results once external aid concludes (PMI, 2021).

The concepts of project management and sustainability are usually considered as two separate domains. However, it is currently acknowledged that project management and sustainability are interconnected both in research literature and practical implementation. Project sustainability is

more than just achieving immediate results, but rather it is about maintaining benefits produced by the project. Introducing sustainability into project management requires a change in the priorities of project management beyond the classical “iron triangle.” (Silvius and Schipper 2014),

One key aspect that determines sustainable outcomes for projects is risk management. The process of risk management is a well-organized technique, which makes it possible for project teams to be able to identify, assess, and respond to uncertainties that affect project objectives (Srinivas, 2018). Studies have shown that risk management inefficiency contributes greatly to project failure and cost overrun and delay of time schedules (Iqbal et al., 2015; Serpell et al., 2015). Effective risk management, on the contrary, enhances performance through improved decision-making and utilization of resources and increased chances of achieving desirable outcomes (Kuma, 2018).

Risk management is the organized approach of recognizing, assessing, and addressing project risks, and it aims to diminish the risk aspects throughout the project life cycle. Effectively managing risks at the project's outset aids in averting crises and enhances problem-solving capabilities. Risk management starts with identifying potential threats and then eliminating or mitigating the damage that could result from the occurrence of those risks. As the project advances, the nature of the risk evolves. Existing risks fade away while new ones emerge (Project Management Institute, 2008). As a result, managing risks is an ongoing process, requiring regular reviews and reassessments of risks. The initial step is to recognize and evaluate the possible risks linked to the project

Worldwide, Lee, Lam, and Lee (2015) performed research in Canada regarding risk management strategies in energy contracting projects. The research found that uncertainties, including initial measurements, rising overruns, and project complexity, stem from project managers' inability to recognize risks during the project's start phase. In Nigeria, Augustine, Ajayi, Ade, and Edwin (2013) assessed the risk management practices utilized by construction companies in Lagos; the research found that the implementation of risk management practices has led to decreased costs and reduced overtime, thereby enhancing the quality of construction projects.

Amandin and Kule (2016) undertook a study in Kigali, Rwanda focusing on risk management strategies in construction projects. The research found that project delays commonly arise from

the lack of a formal and structured risk management approach during project planning, with participation from the project team, professionals, and end users. In Kenya, Macharia (2016) found the impact of risk management strategies on the performance of public schools in Nairobi. The study results showed that out of four risk management practices, risk avoidance significantly impacted the completion of construction, and it determined that risk reduction, risk sharing, and risk retention positively affected the successful completion of construction projects. Mbada (2016) states that the inability of private and public construction projects to achieve cost, time, and quality standards has led to inadequate performance and resource waste.

In projects focused on development, managing risks is essential because of the presence of various stakeholders, intricate institutional setups, and reliance on funding from donors. The Building Rural Income through Inclusive Dairy Growth in Ethiopia Plus (BRIDGE+) Program is a developmental program that aims at improving dairy production efficiency and food safety through activities such as capacity building, provision of infrastructure, and creating awareness in the dairy value chain. This program includes different parties such as the farmers, cooperatives, dairy processors, regulatory bodies including EFDA and EAA, as well as consumers.

Despite the improvement in quality and safety of milk and milk products, sustainability is another factor of worry in this regard. Several initiatives that have been implemented through BRIDGE+ programs have been donor-based initiatives, and in the absence of proper risk management and institution-building at the local level, there is a possibility that the benefits will not be sustained once the aid ends. Thus, it is important to examine the risk management strategies of these projects and the effect of such risk management strategies on sustainability of quality and safety standards of milk and milk products. The objective of this study is to examine the risk management strategies of dairy processors in Addis Ababa and understand how they help sustain quality and safety outcomes of the BRIDGE+ projects.

1.2 Statement of the Problem

Project risks in different industries and geographical regions have inherent uncertainties that pose significant dangers to the achievement of desirable results (PMI, 2013; Institute of Risk

Management, 2018). While the importance of risk management of projects as part of project management is not in doubt, the existing literature mostly describes the success of projects based on time, cost, and scope without any consideration for the sustainability of results after the completion of projects. In addition, studies conducted in relation to milk and dairy products usually center on supply chain or food safety issues while neglecting project risk management as a determinant of sustainability.

There is evidence from different situations indicating the significant role that risk management plays in achieving better project and organization outcomes. There are researches done in Ethiopia that indicate that having structured risk management procedures and greater risk management maturity positively affect project results and sustainability (Belete, 2023; Belachew, 2024). Similar conclusions have been made for other parts of Africa, where the effectiveness of risk identification, monitoring, and risk control contributes to better continuation of project benefits (Wesa, 2024). This has also been proved in research in developed countries; postgraduate research carried out in the US indicates that inadequate risk identification, monitoring, and communication negatively affect project sustainability results (Marinich, 2020). The same conclusions can be made according to the results of doctorate research conducted in Europe; insufficient integration of sustainability risk management and inadequate institutionalization of risk management increase the possibility of disappearing project benefits after the period of funding is over (Silvius, 2017; Gareis et al., 2019).

However, there still exist sector-based gaps despite the increasing amount of evidence that has been accumulated. As for the dairy sector, sustainability is complicated by various risks concerning food safety, enforcement of regulations, stakeholders' alignment, and behavior changes within the value chain. Current dairy studies are concentrated on discussing the mentioned challenges using the approach of supply chain risk management, not project management. Although a doctoral study on sustainable supply chain risk management in the dairy industry demonstrated that unmanaged risks undermine sustainability outcomes (Nasir, 2016), it did not explicitly examine project risk management practices or their role in sustaining project-based interventions. Furthermore, many risk management studies are concentrated in sectors such as construction, engineering, and information technology, with very limited attention given to dairy-related development projects.

Despite having many studies done in Ethiopia concerning project management approaches related to construction, engineering, information technology and other areas, there is an absence of studies conducted in relation to project risk management and sustainability outcomes of the dairy sector. Research works related to the dairy industry in Ethiopia now tend to examine technical issues of food safety and supply chain efficiency (Girma et al., 2021; Tadesse & Desta, 2022); however, there is no clear connection between project risk management practices and sustainable improvement of milk quality and safety. This study contributes to the growing number of empirical studies by examining the effect of risk assessment, risk control and monitoring, and risk knowledge and reporting on the sustainability of milk and milk product quality and safety in the BRIDGE+ project in Addis Ababa.

BRIDGE+ Project has engaged in several activities that are geared towards improving the quality and safety of milk and dairy products in Addis Ababa through training, upgrading of infrastructure, and awareness. Despite the above activities having proven to be successful in implementation, the extent to which the upgrades have been sustained after the completion of the projects is an area worth investigating empirically. This study, therefore, seeks to investigate the contribution of project risk management tools in sustaining milk quality.

1.3 Research Questions

I. What is the relationship between project risk analysis practices and the perceived sustainability of milk & milk product quality and safety under the BRIDGE+ project in Addis Ababa?

II. How are project risk monitoring and control practices associated with the sustainability of milk & milk product quality and safety under the BRIDGE+ project in Addis Ababa?

III. To what extent do project risk knowledge and reporting influence the sustainability of milk & milk product quality and safety under the BRIDGE+ project in Addis Ababa?

1.4 Research Objectives

General Objective

To examine project risk management practices on sustainability of milk & milk product quality and safety under the BRIDGE+ project in Addis Ababa

Specific Objectives

I. To determine the effect of project risks analysis on sustainability of milk & milk product quality and safety under the BRIDGE+ project in Addis Ababa

II. To assess the effect the risks monitoring and control on sustainability of milk & milk product quality and safety under the BRIDGE+ project in Addis Ababa

III. To assess the effect of project risks knowledge and reporting on sustainability of milk & milk product quality and safety under the BRIDGE+ project in Addis Ababa

1.5 Significance of the Study

This study is significant as it provides evidence on how structured risk management practices specifically risk analysis, risk monitoring and control, risk knowledge, communication, and reporting contribute to the sustainability of milk & milk product quality and safety under the BRIDGE+ project in Addis Ababa. Through the analysis of these relationships, the research is useful in detecting practical risk management gaps in the dairy value chain that can threaten quality, safety, and trust in products. This information would be useful to implementers of the projects, policy makers, dairy co-operatives, processors, and regulators by helping design strategies that will improve food safety systems and ensure adherence to quality standards. In the end, the research is useful in contributing towards the objectives of the BRIDGE+ project on dairy development in an inclusive way.

1.6 Scope of the Study

1.6.1 Conceptual scope

The conceptual scope of this study focuses on understanding how the project risk management Practices effects the Sustainability of Milk & milk product Quality and Safety in case study of the BRIDGE+ Project in Addis Ababa and around Addis Ababa like sheger sub city and sululuta area. It examines 3 variables for project risk management: risk analysis, risk monitoring & control and risk knowledge & reporting.

1.6.2 Target audience

The target audiences are the project managers, project staff, M&E staff, regulatory officers & processors. Primary data is used in this study; respondents are selected through a census sampling method from the study area.

1.6.3 Methodological scope

A census sampling technique is employed to collect data from these groups. The study utilizes a descriptive survey design and uses both primary and secondary data. Secondary sources included relevant academic books, journal articles, and publications related to risk management & sustainability. For primary data, a well-structured questionnaire distributed to the selected sample to fulfill the research objectives and test the proposed model.

1.7 Limitations of the Study

The research evaluates sustainability by examining stakeholder views on product advantages related to competitive edge, financial gains, and consumer contentment, instead of performing lab tests to assess the quality and safety features of the milk produced. While perceptual measures reflect significant aspects of sustainability, especially regarding stakeholder engagement and value perception, they cannot replace objective evaluations of product quality and safety factors, like total bacterial count, coliform count, somatic cell count, and aflatoxin M1 concentration.

The results of this case study have restricted the statistical generalization of results. The research focused solely on the BRIDGE+ initiative in Addis Ababa and its surrounding areas. The study employed a cross-sectional approach, collecting data at a single moment in time. Due to the inherently lengthy nature of sustainability, cross-sectional data cannot indicate the extent to which quality changes are maintained after the project concludes. However, due to the constrained timeframe, this was the only practical approach to take.

Certain milk processors and project stakeholders might have been hesitant to share details regarding the risks associated with the projects and the advantages obtained by the companies from

executing the project. The constraint was reduced since the participants were guaranteed their anonymity. Despite the aforementioned limitations, the study offers insights into the relationship between project risk management practices and the perception of sustainability related to the benefits of milk and milk products linked to the BRIDGE+ project.

Additional studies should assess quality and safety concerns along with current research outcomes, which can be more broadly applied by integrating the findings into other projects

1.8 Organization of the Study

The study will be organized into five chapters:

i. Introduction (background, problem statement, objectives, significance).

ii. Literature Review (global and local perspectives on milk and milk products quality and safety risk management and sustainability).

iii. Methodology (research design, sampling, data collection, analysis).

iv. Results and Discussion (findings on risk management practices and sustainability).

v. Conclusion and Recommendations (strategies for localization and policy implications).

1.9 Definition of Key Terms

Risk Management Practices: Procedures and systems used to identify, assess, and mitigate risks in dairy processing (Project Management Institute [PMI], 2021, p. 45).

Food Safety Interventions: Actions aimed at improving the safety and quality of milk and products and the dairy value chain (Food and Agriculture Organization [FAO], 2019, p. 12).

Sustainability: The ability of interventions to continue delivering benefits without external support (Silvius & Schipper, 2014, p. 68; PMI, 2021, p. 89).

Value Chain Actors: Stakeholders involved in the various functions along the dairy value chain that include milk production, marketing, processing, regulation, and consumption (Kaplinsky & Morris, 2001, p. 3).

CHAPTER TWO

REVIEW OF RELATED LITERATURE

A literature review aids in comprehending the chosen research topic. It describes the work that has been completed on the subject and outlines relevant key matters. It details who examined what, for what reasons, and what findings they uncovered regarding a specific subject (Hart, 1998). This part aims to examine pertinent literature related to risk management and sustainability in projects. The literature is collected from various secondary sources like published books, articles, and journals. Significant literature was incorporated through a review of available documents that aid in supporting the research.

2.1 Meaning and nature of risk management & Sustainability

Risk refers to a potential danger that influences the progress and achievement of a project (Barber, 2005). Conversely, uncertainty is characterized as the likelihood of an event happening where the probability is unfamiliar (Smith et al., 2014). In simple terms, uncertainty refers to a scenario under evaluation by decision makers that lacks historical data to gauge the probability of its happening (Flanagan, 1993).

Risk management strategies significantly influence the effectiveness of process management in reaching project success. Integrating risk management during various phases of the project ensures that any disturbances are anticipated and managed beforehand, hence maximizing the utilization of resources and the output of the project. Project activities where the process and risk management strategies align result in increased project effectiveness as uncertainties are minimized (Moeuf et al., 2020).

The moderating role of risk management strategies helps to enhance the effectiveness of process management in achieving success in projects. When risks management strategies are used during all stages of a project, then all the potential risks are identified beforehand and dealt with. Project

success can be achieved through synchronizing the process management and risk management strategies. (Mohsin 2021)

Efficient risk management strategies enhance project success indicators, such as timely delivery, budget alignment, and scope fulfillment. Nguyen, Do, and Macchion (2023) show that projects that efficiently handle risks during their entire lifecycle regularly fulfill or surpass stakeholder expectations, resulting in improved project results and client contentment. Risk management has emerged as a crucial element of the management process for every project. Indeed, for the last twenty years of the 20th century, risk management has prominently featured in commercial literature (Loosemore et al., 2006).

Definitions of sustainability in project management texts differ based on their disciplinary backgrounds. Initial definitions of the environment, like those proposed by Gilbert and his team in 1996, highlighted the importance of preserving nature's ability to regenerate resources and process waste without deterioration fundamentally, ensuring that extraction levels remain below renewal levels. Further research has expanded from this perspective. Sustainability in a project context should also consider issues such as social equity (not depleting human capacity by exhaustion or exploitation) and economic sustainability. Silvius & Schipper (2014)In development projects such as BRIDGE+, a comprehensive understanding is crucial enhancements in milk quality and safety are not sustainable if they result from overburdened employees (social unsustainability) or costly imported testing tools (economic unsustainability). This research consequently embraces the comprehensive definition suggested by the Project Management Institute (PMI, 2021, p. 89): "sustainability represents the continuation of project benefits and outcomes after external support ends."

Multiple publications in the sample examine or outline how integrating sustainability affects the processes and/or practices of project management. In the research conducted by Eid (2009), a group of project management professionals was inquired about their evaluation of how sustainable development affects project management processes. In more detail, for every project management process group (following the PMBOK Guide categories: initiating, planning, executing, controlling, closing), Eid's research solicited their opinions on the integration of sustainability factors. The research offered several distinct leverage points for incorporating sustainability into

project management. Additionally, Maltzman and Shirley (2010), Silvius et al. (2012), Tharp (2013), and numerous other sources outline how sustainability affects project management in ‘impact areas’.

In recent times, organizational sustainability has been attracting increasing attention in scholarly literature (García-Rosell and Mäkinen, 2013; Johnston, 2014; Kornilaki et al., 2019). Embracing sustainable options should come instinctively for both companies and their clients across different domains (Gössling, 2017). The idea has historically been associated with the triple bottom line, focusing on aligning the social, environmental, and financial results of a company (Hall et al., 2010; Gupta and Kumar, 2013). Johnson (2017) defined sustainability as an approach that harmonizes the social, economic, and environmental dimensions of development. From a commercial perspective, sustainability suggests that a company's success must not stem from a damaged environment and/or the neglect and exploitation of individuals (Tsvetkova et al., 2020)

Organizational sustainability is seen as vital for fostering sustainable development, which is defined as a development “that fulfills the needs of the present without jeopardizing the capacity of future generations to satisfy their own needs” (WCED, 1987, p. 43). Sustainable business growth has integrated into various organizations, including both large (Isaksson and Steimle, 2009) and smaller ones (Tsvetkova et al., 2020). Firms are urged to leverage their social capital to enhance their abilities for the creation, dissemination, and administration of knowledge, aiding them in achieving organizational sustainability and broad sustainable economic growth (Bueno et al., 2004; Bhatti et al., 2020).

Organizations can discover various recommendations on implementing sustainability initiatives in their operations and strategies (Baumgartner and Rauter, 2017), on how these efforts can enhance their success compared to less sustainable organizations (Eccles et al., 2012), or on ways to elevate their corporate value (Soyka, 2012). Chow and Chen (2012) state that organizations that aim for sustainable performance must incorporate social, economic, and environmental development into their operations. Additionally, these three facets of development must be intertwined and viewed as a whole, and organizations should manage them in a rational manner (Van Kleef and Roome,

2007). El-Kassar and Singh (2019) demonstrated how the elements of green innovation influence competitive advantage, as well as environmental and organizational performance.

Safety refers to the condition of being free from causing or experiencing harm, injury, or damage. Food safety involves guaranteeing that the food does not threaten the consumer's health when it is being prepared and/or eaten as intended (FAO, 1997). It is an escalating worldwide issue that requires adequate focus, not just for its ongoing relevance to public health, but also due to its adverse effects on global commerce (Burros, 1997).

Safety management entails implementing suitable procedures to prevent or minimize accidents, injuries, and damage to facilities, equipment, and neighboring properties (Anumba and Atkinson, 1997).

The main factor to determine if a specific milk is safe and of good quality is understanding the chemical, microbiological, and physical standards for milk products (Mansel, 2010). Thus, food safety is critically vital in safeguarding people from infectious organisms such as bacteria and parasites that may be spread through eating. Practicing safe food handling can help reduce the incidence of illnesses and deaths. Safe food handling begins during production and extends throughout the preparation process. If improper handling occurs at any point, there could be a risk. Safety in food handling is essential for consumers since many individuals have ingested contaminated food due to a lack of knowledge. Preventing food contamination can be achieved by maintaining hygiene prior to handling food and by ensuring that all utensils and surfaces are clean. The safest method to thaw food is to do so in a refrigerator. Cross-contamination is believed to have been a frequent source of food contamination. Consequently, utilizing sanitized utensils and surfaces that haven't come into contact with other food items can significantly lower the risk of cross-contamination (WHO, 2002).

Quality management involves fine-tuning efforts to guarantee that requirements are fulfilled effectively and correctly on the initial attempt (Husin et al., 2008). Milk quality denotes a combination of traits (chemical, physical, bacteriological, and aesthetic) that enhance the appeal of the milk product. Ensuring milk safety and quality has become a crucial concern and

requirement for consumers, retailers, manufacturers, and regulators. Worldwide, the prevalence of food-borne illnesses has risen, and international food trade has been affected by ongoing disputes regarding safety and quality standards (Lemma et al., 2008; FAO, 2010). Milk and dairy products intended for the international market must adhere to the highest quality standards. To meet the established quality standard, it is essential to oversee and manage the quality of milk at the fundamental level. Milk quality assurance involves the use of globally recognized tests to verify adherence to accepted practices, standards, and regulations related to milk and its derivatives (FAO, 2011). Tests for milk quality aim to verify that milk products meet established standards for chemical makeup and purity, along with certain levels of various microorganisms (Kavitha and Archana, 2015).

2.2 Importance of risk management & Sustainability

Risk management is a crucial aspect of project management that no project manager should overlook. Consequently, in planning projects, project managers and their teams must focus more on identifying and understanding the causes of risks, types of risks, and potential responses to those risks. The team needs to create a document known as a risk management plan that directs them in handling risk. Every project activity involves a degree of risk, representing uncertainties that may impact the project positively or negatively. Recognizing the distinction between project risks and business risks is essential. Business risks pertain to the organization as a whole, while project risks focus specifically on the project's objectives. Risks are unforeseen events that can harm or improve project goals. Thus, it is essential for the project team to recognize and separate all potential risk factors related to the project.

Risk is a crucial idea that spans various fields and thus needs adequate focus to reduce its effects when it happens. In project management, the importance of possessing a solid risk plan cannot be overstated. Projects are temporary efforts characterized by their duration, scope, and resources aimed at generating distinct outcomes (PMI, 2019). Consequently, companies cannot spare substantial resources for an initiative that is plagued by significant vulnerabilities. Due to the

defined timeline of projects, significant efforts must be made to guarantee that they reach their goals as intended. Nonetheless, risk remains the most daunting adversary to project success, emphasizing the importance for project team members to grasp the concept of risk and its efficient management in projects.

Risk is characterized as an unforeseen event or situation that could lead to either beneficial or detrimental impacts on project goals (Eldash, 2012). The project's objectives are the defined goals that the project team aims to accomplish during implementation and, therefore, act as the standard for evaluating project success. Any occurrence that could harm or improve these goals might be called a risk. While risk and uncertainty are terms that are often used interchangeably in project management, they are not the same concept. Risk is a situation in which the potential results of a decision are understood. In other words, risk actions may be forecasted according to the likelihood and effects of happening. Conversely, uncertainty denotes a scenario in which a person is unclear about future results. Decision makers cannot ascertain the result of such an event likely due to insufficient or lacking information, which renders uncertainty a challenging issue to overcome. Risk can be managed, unlike planning for uncertainty.

Risk management plays a crucial role in the decision-making process within construction project management (Tang et al., 2007), especially concerning project integrity, scope, timing, costs, quality, human resources, communications, and procurement. Risk management enhances the project's future outlook by identifying uncertainties and opportunities (Borg, 2001). It is described as "a method focused on recognizing and evaluating all risks that the project faces, enabling a knowledgeable decision on risk management" (Zou et al., 2007).

Sustainability is a crucial aspect of the construction sector. It encompasses enhancements in energy, waste management, construction techniques, etc. (CII, 2008). Nonetheless, as shown by Shen and Tam (2002), the sector has gained from obstacles and strategies for executing environmental management instead of focusing on economic, environmental, and social sustainability effects. This contrasts with the construction industry in nearby mainland China, where economic considerations outweigh social and environmental factors in assessing project viability (Shen, Tam, Tam, and Ji, 2010).

2.3 Scope/process and stages/components of risk management & Sustainability

Project management and sustainability represent distinct fields of expertise. Numerous scholars and researchers are establishing an associated body of knowledge. In the new millennium, project development is influenced by sustainability impact assessment regarding economic, environmental, and social risks. Nonetheless, the prospects and obstacles of sustainable development in project management have not been thoroughly examined (Gareis, Huemann and Martinuzzi, 2009; 2010). Consequently, examining sustainability features for the advantage of the project management community is an unexploited field. Project management, an academic field and professional practice that is continually evolving, arises to meet societal demands (Bredillet, 2006; Bredillet, 2007a, 2007b, 2007c, 2008; Kloppenborg and Opfer, 2002; Shenhar and Dvir, 2004; Kwak and Anbari, 2008). The meaning of project success has evolved as well. During the initial phase of contemporary project management, the emphasis on success was centered around effective assessments of time, cost, and quality (Barne, 1969). Lately, it emphasizes a structure to evaluate efficiency, effects on customers and teams, business outcomes, and readiness for the future (Shenhar and Dvir, 2007). It now takes into account stakeholders' perspectives and external factors. Up until the 1990s, sustainability as a project external factor had minimal impact on the historical evolution of contemporary project management. Daniel (1961), a groundbreaking scholar studying success factors in business, highlighted the need to gather environmental insights to address a management information void, encompassing the social, political, and economic dimensions of the environment in which a business currently or may operate.

The Risk Management Institute (2018, p. 8) describes risk as “the impact of uncertainty on goals.” This definition is elaborated on by a note indicating that risk is typically articulated through risk sources, possible events, their outcomes, and their probability. It defines risk management as “coordinated efforts to direct and oversee an organization concerning risk” (ISO, 2018, p.) Every project carries inherent risks; while some projects may involve more or fewer risks than others, none are entirely devoid of risk. Projects are begun to enable an organization to meet goals that

provide value in alignment with its purpose; nevertheless, uncertainties always accompany the project that can impact the success of reaching these goals.

A risk is “an uncertain occurrence or situation that, if it happens, influences one or more project objectives either positively or negatively” (PMI, 2013, p. 559). Risks are uncertainties or occurrences that planning cannot fully manage or eliminate. Risk planning involves pinpointing particular actions that can be proactively executed in the project to manage the effects of possible risks. These tasks are incorporated into the project's scope, budget, and timeline (PMI, 2013).

Risk management is an anticipatory strategy instead of a responsive one. It is a proactive approach aimed at minimizing surprises and limiting the adverse effects linked to unfavorable occurrences. Effective risk management in a project provides the project manager with enhanced control over future outcomes and can greatly increase the likelihood of achieving project goals on schedule, within budget, and fulfilling performance standards (Ntibiramira, 2017). Risk management involves recognizing, evaluating, and tracking risks. It additionally performs tasks like risk management and reduction, in addition to monitoring and adjusting processes (Kinyar, 2020).
Risk management seeks to recognize possible risks to projects and their capacity to implement suitable measures to tackle these risks while assessing their probability; acknowledging these scenarios prompts actions that can mitigate these dangers (Al Mhirat & Irtemeh, 2017).

PMI (2013) suggests the following risk management processes: in the planning phase, risks need to be identified and assessed, and response strategies must be developed; during project execution, risks should be observed and regulated. During the planning phase, the project team must create and record their strategies for executing the risk response procedures to manage identified risks during the project execution phase

2.3.1 Risk Identification

Within organizations, at the project management level, the risk identification process serves as the first step in risk management, aiming to identify potential events during the project implementation phase that could adversely affect the project goals. These occurrences need to be recognized and expressed explicitly so the project team can proceed to analysis and response planning.

Risk planning starts with recognizing potential risks that might affect the project. The project manager, the project team, and essential stakeholders should all be involved in recognizing potential risks for a project. Risks may encompass technological, economic, cultural, environmental, organizational, resources, schedule, budget, and quality of deliverables (PMI, 2013).

Common techniques for identifying risks include SWOT analysis, brainstorming sessions, examining comparable projects, utilizing checklists of typical risks, conducting interviews, and reviewing project documents or plans like schedules and budgets for any assumptions that may turn into risks (Marinich, 2020; PMI, 2013).

Kinyar (2020) states that various techniques for recognizing risks and creating a risk portfolio include surveys, internal audits, interviews, and brainstorming sessions. Recognized risks need to be recorded in a document known as a Risk Register, which will act as the primary reference for both risk planning and monitoring, as well as control throughout the project's execution phase. The measurement of risk identification is based on how thoroughly an organization engages in producing risk reports and risk registers (Al-Awadhi, 2022; PMI, 2013)

2.3.2 Risk Analysis

Risk analysis constitutes the second phase in the risk management process (PMI, 2013). Within this study's framework, Risk Analysis (RA) is considered the primary independent variable. The aim of RA in the BRIDGE+ initiative is to recognize and rank risks that put milk quality and safety in jeopardy throughout the dairy value chain encompassing biological threats (e.g., E. coli, Brucella), chemical threats (e.g., aflatoxin M1, antibiotic traces), and physical threats (e.g., adulteration) (Girma, Abera, & Tola, 2021; EFDA, 2020).

Project management literature indicates that successful risk analysis necessitates evaluating recognized risks according to their likelihood of happening and possible effects on project goals (Kinyar, 2020; PMI, 2013). Different types of analysis could be used, including qualitative risk

assessment, sensitivity assessment, scenarios assessment, and stress testing (Kinyar, 2020). As far as the case of dairy quality is concerned, it means that the risk which has a high probability of occurring (for example, bacterial contamination in wet seasons) and has considerable impacts (illness among customers and rejection from markets) would be addressed first.

Studies reveal that projects which undertake comprehensive risk assessment during the planning phase are better prepared for devising targeted and sustainable solutions (Djekic & Tomasevic, 2016). In relation to milk production in Ethiopia, Girma et al. (2021) found that projects which undertake systematic hazard mapping are effective in guiding interventions in the right direction without resorting to the generic and "one-size-fits-all" approach that generally fails in the absence of any external funding. This study therefore suggests that RA techniques influence the sustainability of milk and dairy products' quality and safety positively (see Hypothesis H1, Section 2.7).

2.3.3 Risk Response

Risk response planning constitutes the third phase in the risk management process. It includes formulating comprehensive strategies and measures for each of the major risks, prioritizing risk mitigation actions, and establishing a risk management plan to be incorporated with the project management plans.

As noted by Al-Awadhi (2022) and Kuma (2018), risk response planning involves creating alternatives, choosing approaches, and identifying measures to maximize opportunities and mitigate risks to the project's goals. A risk response is a proactive measure implemented to tackle the risk beforehand, aiming to entirely eliminate it, reduce its effects and/or likelihood, or shift the risk to another party (PMI, 2013).

Risk response outlines the choices taken by the project manager to mitigate the effects of recognized risks on the project (Marinich, 2020). Kinyar (2020) states that there are different strategies for responding to risk, including risk avoidance, risk acceptance, risk mitigation, and

risk sharing. Moreover, it emphasizes creating a series of measures to align risks with the organization's risk tolerances.

For risks that could adversely affect the project, there are four strategies to address them: accept, mitigate, avoid, and transfer. Moreover, at times, risks can signify opportunities for the project. In these situations, there are four ways to address the potential benefits of a risk: accept, enhance, exploit, and share (Rochester Institute of Technology [RIT], 2019).

2.3.4 Risk Monitoring and Control

Risk monitoring and control is the fourth step in the risk management process (PMI, 2013). For this study, RMC stands for the second independent variable. According to BRIDGE+ framework, monitoring includes regular testing of the raw milk, temperature control during transport, and inspection of hygiene in processing plants. As for control, it implies actions to take if quality standards are not met (EFDA, 2020).

Based on the results found in (Project Management Institute 2021, p 245-278), monitoring and control involves overseeing the execution of risk response actions, continuously monitoring identified risks, identifying new risks, and evaluating the efficiency of the process throughout the project lifecycle. With regard to quality of milk products, this means that monitoring should always take place on an ongoing basis and not as separate events and corrective action is to be taken immediately upon deviation from quality standards.

However, the ability of improvements made in the quality of milk to be sustainable depends on how well the task of monitoring is incorporated in local organizations rather than being entrusted to outsiders involved in the project. (Tadesse & Desta, 2022) have carried out a study on dairy cooperatives in Addis Ababa and found that cooperatives that entrusted the task of monitoring to local committees were able to sustain their improvements in quality for 22 months after the end of the project, while others sustained improvement for just 6 months.

Similarly, research carried out on food programs supported by donors in Kenya showed that those that had an evaluation framework were more sustainable than those without such a framework (Tong'l, Otieno, & Osoro, 2019). These results bolster the hypothesis that RMC practices have a beneficial impact on the sustainability of quality and safety in milk and milk products (refer to Hypothesis H2, Section 2.7).

2.3.5 Risk Knowledge and Reporting

A fifth practice in risk management is Risk Knowledge and Reporting (RKR) is gaining acknowledgment in literature related to development projects, even though it is not explicitly identified as a distinct process within conventional PMBOK frameworks (Assefa, Tefera, & Bekele, 2023). In this study, RKR is considered the third independent variable. It involves the organized recording, sharing, and establishment of risk-related data among all participants in the value chain (farmers, processors, regulators).

The risk communication model recognizes three kinds of communication flow: upward communication from farmers to project managers, downward communication from project managers to farmers, and horizontal communication between peers (Lundgren & McMakin, 2018). According to these authors, successful sustainable risk management requires communication in all these three directions, but most donor projects tend to concentrate only on upward communication (Lundgren & McMakin, 2018).

In the Ethiopian Dairy setting, it has been established by (Assefa and et al., 2023) that activities based on risk communication framework, which included easily available risk register shared with community members, quality bulletins on quality delivered in local language, and multi-stakeholder review meetings for reviewing quality have lasted longer than those without these frameworks. Nonetheless, they noted that many projects funded by donors view risk reporting merely as a compliance task for donors instead of a means for empowering local actors, leading to a loss of risk knowledge when project personnel leave (Assefa et al., 2023)

An assessment of projects by the African Development Bank in various sectors revealed that those with established knowledge management systems recorded lessons learned, readily available reporting archives, and plans for post-project knowledge transfer achieved notably higher sustainability ratings [Koffi-Tessio, 2021]. These results back the theory that RKR practices have a beneficial impact on the sustainability of milk and the quality and safety of milk products (refer to Hypothesis H3, Section 2.7).

2.4 Theoretical review

Kothari (2003) asserts that the theoretical review grants the researcher a chance to adopt a philosophical perspective. Theoretical framework influences the choices made during the research process. The research was informed by two frameworks: Network Theory and the Enterprise Risk Management Theory.

2.4.1 Enterprise Risk Management Theory

Nocco and Stulz (2006) assert that Enterprise Risk Management (ERM) is a risk management approach that promotes the assessment and oversight of significant risks confronting an entity collectively instead of handling each risk separately. Its primary objective is to unify the risk management silos within an organization into a singular, cohesive framework. The ERM framework for risk management highlights that top company leaders and staff must engage actively in the risk management process to assess and address a variety of company risks (Hallowell, Molenaar, & Fortunato, 2013). This idea promotes the involvement of all organization members in risk management rather than just a select few.

The ERM stresses the need for clearly defined procedures and guidelines to handle risks. According to Olson & Wu (2010), the theory indicates that by adopting formal procedures of risk appetite, strategies, tolerances, and processes in organizations, they will be able to develop risk identification, analysis, and management skills. Furthermore, the ERM theory advocates for the creation of a risk management culture where everyone is involved in handling risks. According to

Cormican (2015), adoption of ERM practices results in competitive advantage, stakeholder confidence, and sustainable nature of organizations in the future. Even though the theory was developed with regard to risk management in corporations, it has found application in project management approaches. According to Drumll (2001), adoption of ERM principles within the construction industry is the right decision because the principle applies to industries that have extremely high levels of failures, such as the construction industry. Such failures result from failure to handle risks in the organizations, hence the importance of this theory to the research.

2.4.2 Network Theory

Network theory is one of the concepts used in explaining the structure and workings of social systems. According to Fang et al. (2015), the theory holds that social structures such as organizations and projects should be viewed as a network with nodes and connections between those nodes. In a particular project, for instance, the nodes can include project members, the project manager, the suppliers, the owner of the project, and the financiers of the project. There are several connections that connect the different nodes including those of the suppliers and buyers, financial, legal, and operational connections among others. The theory argues that disturbance of any node or any connection in the system creates a progressively greater impact on all other nodes and connections. The theory is commonly applied in risk management in explaining the risk assessment process.

Moreover, according to Zingrand (2010), this theory puts more emphasis on the need for the project team to use a systematic approach when assessing and understanding risk instead of just concentrating on the risk outcome itself as part of the project. The theory notes that the project team needs to take into account how the different components of the project are related and how a problem in one component affects other components of the project. This theoretical approach to risk assessment allows the project manager to make a more rational analysis of the effects of a certain risk. This theory implies that in order to judge the success of different management theories of projects, the researcher needs to consider the extent of its holisticness.

As mentioned before, the two theories play a significant role in choosing variables for this study. Enterprise Risk Management (ERM) Theory (Nocco & Stulz, 2006) underpins the assumption that risk analysis (RA), risk monitoring and control (RMC) and risk knowledge and reporting (RKR) can be regarded as interdependent components of risk management rather than individual practices. The ERM theory stresses the importance of active participation in the process of risk management of senior management and employees. Furthermore, ERM theory states that the development of policies specifying risk appetite and risk tolerance makes it easier for companies to identify, evaluate and manage risks (Hallowell, Molenaar, & Fortunato, 2013). Within the scope of this research, the impact of RA, RMC and RKR on sustainability performance is studied.

Network Theory (Fang, Marle, Zio, & Bocquet, 2015) supports the involvement of various stakeholder groups (project managers, project staff, M&E officers, regulatory officers, processors, and consumers) in the research design for this study. Network theory perceives social structures, including projects, as networks made up of nodes (stakeholders) and connections (relationships) that connect these nodes (Fang et al., 2015). The theory posits that alterations or disturbances in any node or link in the system result in impacts on all other nodes and links. In the context of the BRIDGE+ project, a disruption in risk knowledge and reporting (RKR) among processors will influence monitoring and control (RMC) by regulators, subsequently impacting sustainability results. Network theory highlights the importance of a structured approach to risk analysis instead of concentrating solely on risk results as just one element of the project (Zingrand, 2010)

2.5 Review of Empirical Studies

Research based on observation in the discipline developed after Atkinson. International initiatives by Maldonado-Fortunet (2002) and Silvius et al. (2013) serve as effective examples. Maldonado-Fortunet (2002), in his analysis of international construction projects, recognized multiple elements that support project sustainability from a process viewpoint.

In Australia, rating systems like the Infrastructure Sustainability (IS) rating scheme and the Green Star rating system have been created to assist projects and their initiatives in attaining

sustainability. Despite the fact that the Infrastructure Sustainability Council of Australia (ISCA) and the Green Building Council of Australia (GBCA) acknowledge the impact of project sustainability goals on reaching local, regional, and national strategic sustainability aims, sustainability remains largely viewed as an independent project management factor, separate from time, cost, and quality goals, and is generally taken into account only if the project sponsor has explicitly defined sustainability aims. Despite the clear evidence outlined earlier that projects play a significant role in achieving sustainability goals at local, regional, and national levels, the theoretical foundation of project management models and methodologies has largely stayed the same (Svejvig and Andersen, 2015).

Muriungi [2015] studied participatory monitoring and evaluation initiatives within Kenyan government institutions and discovered that proactive, community driven monitoring efforts improved risk management results. This discovery is directly linked to the Risk Monitoring and Control (RMC) variable in the present study. Muriungi's finding that local stakeholders should be assigned monitoring responsibilities instead of external project staff reinforces the idea that RMC practices affect sustainability results. The research also acknowledged the questionnaire as a vital tool for carrying out monitoring and evaluation tasks [Muriungi, 2015].

Martin's (1994) study represented the initial empirical investigation into the risk management strategies of pastoral farmers in New Zealand. Specifically, she analyzed the significance assigned by farmers to every risk management approach to address the related risk. Ten years later, Pinochet-Chateau et al. (2005) utilized Martin’s (1994) compilation of risk management strategies and investigated how farmers’ perceptions of these strategies had evolved during the twelve years from 1992 to 2004. Building on the research of Fetsch, Bastian, Kaan, and Koontz (2001), they incorporated strategic planning as an additional collection of risk management approaches into their analysis. Eight years later, Shadbolt and Olubode-Awosola (2013) applied the same risk management strategies and examined the significance of these strategies in 2012. Routine spraying and drenching, along with maintaining feed reserves, consistently occupied the top two positions for the initial two years of analysis. Notably, the third ranked choice of maintaining low debt decreased in significance during this time and dropped to the ninth rank. Rather, in 2011, managing

debt, planning capital expenditures, and various business planning strategies became part of the higher-ranking set of risk management strategies employed (Shadbolt & Olubode-Awosola, 2013).

While the construction sector in Hong Kong adapted to the shift, it primarily emphasized an environmental sustainability viewpoint (Shen and Tam, 2002). Project managers in Hong Kong's construction industry lack access to empirical studies regarding project sustainability management. As a result, grasping the multiple facets of sustainability in project development is challenging for them. International project management scholars are conducting empirical research in interdisciplinary studies concerning project management and sustainability. Certain researchers are focusing on project sustainability maturity. Different researchers are carrying out investigations from a process viewpoint. Nonetheless, resources and expertise are scarce to assist local project managers in cultivating sustainability skills within a changing project landscape. The requirement for project managers to have sustainability knowledge (economic, environmental, and social) is not clearly defined. It is essential to empirically evaluate the factors identified from the literature review within each sustainability construct. The absence of research and dialogue regarding sustainability standards for successful project implementation in the local project management community has led to a deficit in knowledge generation and sharing. This research will address the lack of understanding in the existing knowledge gap.

Singh, Deep, and Banerjee (2017) investigated risk management practices within Indian construction firms and discovered that risk mitigation approaches such as safety audits, safety protocols, contingency plans, and detailed work strategies enhanced project outcomes. Although this research centers on the construction industry instead of dairy, its results are pertinent to the Risk Analysis (RA) variable in the present study. The authors found that projects systematically identifying and prioritizing risks prior to implementation produced superior results compared to those that overlooked these steps (Singh et al., 2017). The research involved 152 individuals, which included project managers, project team members, supervisors, and general managers from three different construction firms.

A research project by Hamimah (2008) in Malaysia showed that regulations and policies addressing risks in the workplace must be implemented to clarify the industry’s productive life

cycle in a specific operational site. The research employed a descriptive design, with a total of 234 individuals contributing to the responses for the research questions. The research results indicated that risk management aids current industries in establishing new plant sites with a strong focus on productivity.

Aduma & Kimutai (2018) have examined risk management methods in National Hospital Insurance Fund (NHIF), Nairobi, Kenya. According to their findings, risk management through outsourcing, cost of risk premium, and insurance policies from outside parties played a key role in the outcome of the projects carried out by NHIF. The findings relate to risk response strategies that are not the focus of this study. However, their methodology (descriptive research design, proportionate stratified random sampling, self-administered questionnaire) is relevant to the methodology used for this research.

The influence of the monitoring and evaluation process on the success of food programs supported by donors in Kibwezi District, Kenya was investigated by Tong'l, Otieno, and Osoro in 2019. The study was based on a descriptive design approach, using a combination of qualitative and quantitative methodologies. In total, 284 respondents of the target population were used. The study proved that incorporation of the monitoring and evaluation process in the productive sector greatly impacts project sustainability (Tong'l et al., 2019). The finding directly contributes to the Risk Monitoring and Control (RMC) variable of the current study.

Contamination Levels in Raw Milk Along the Ada'a Dairy Value Chain in Ethiopia by Girma, Abera & Tola (2021), established the presence of risk factors such as poor hygiene practice and absence of cold chain facilities which caused high levels of microbial contamination of the raw milk. This finding is directly related to the Risk Analysis (RA) variable used in this paper as it demonstrates the need to identify the risk factors systematically in order to implement the interventions. The research demonstrated the need for constant monitoring and training programs, which is also related to the RMC variable.

In addition to this, Tadesse and Desta (2022) have evaluated the effectiveness of cooperatives in enhancing the quality of milk in urban Addis Ababa. As per their findings, although the quality of

milk improved initially due to cooperative actions, its sustainability declined owing to a lack of technical assistance from outside. Such a finding is relevant to Risk Monitoring and Control (RMC) and Risk Knowledge and Reporting (RKR) in the current study. According to Tadesse and Desta (2022), a significant cause for this decline was the lack of risk management techniques.

In their study about the impact of donor-funded dairy safety projects in Oromia, Ethiopia, Assefa, Tefera, and Bekele (2023) found that dairy safety projects which involved structured risk communication and reporting systems were more likely to continue quality improvements even after the termination of the project. The results of the study clearly stress the significance of the RKR variable in the present research. Assefa et al. noted that dairy safety projects that had structured risk communication systems such as risk registers, local language updates about the quality, and multi-stakeholders' meeting sessions sustained quality improvements much longer than those without these risk communication structures (Assefa et al., 2023).

Several trends emerge that are especially relevant to the BRIDGE+ project. In relation to Ethiopian dairy studies (Girma et al., 2021; Tadesse & Desta, 2022; Assefa et al., 2023), one can observe a pattern indicating that technical measures such as training or providing equipment for farmers will not be sufficient to keep up with milk quality improvements. Quality improvements projects are marked with the presence of well-established risk management processes within the institutional framework rather than depending on project employees.

Risk monitoring and control is one of the most frequently cited practices that impact sustainability. According to Tong'l et al. (2019), projects that have been financed by the donors with effective systems of monitoring and evaluation have a much greater probability of producing sustained results at the end of the project. Muriungi (2015) also found out that participant monitoring, which involves the locals rather than project employees in collecting and evaluating data, helps to increase the sustainability of manufacturing project benefits. Thus, in the dairy industry, such an approach can be used by giving the assessment of milk quality and hygiene to cooperative committees or local EFDA representatives.

In relation to the dairy programs in Ethiopia, however, there is an important lack of knowledge with respect to the reporting of risks. According to Assefa et al. (2023), "program efforts that involved organized systems of risk communication, such as timely quality reports, easily accessible risk documents, and joint reviews" made quality improvements more sustainable than those projects that did not have such systems in place. It should be noted that the researchers found that most of the dairy projects that received financial support from external sources consider the reporting process as a task for meeting donor compliance requirements rather than as a tool for developing local capacity.

According to empirical studies, risk assessment techniques specifically, the identification of the context-specific threats within the dairy value chain, are important for achieving sustainability. According to Girma et al. (2021), initiatives which were capable of doing detailed mapping of the hazards (such as mapping of the seasonal contamination trends, transportation routes, farms where hygiene problems are common) were capable of concentrating their efforts in a more effective manner than the general and "one size fits all" approaches which usually fail once the external funding dries up.

These studies confirm that while certain technologies have been applied, lack of an integrated approach to managing risks remains a major impediment to sustainability in the dairy industry of Ethiopia.

2.6 Conceptual Framework

It has been stated by Sekaran & Bougie (2003) that the use of the conceptual framework is helpful in finding a particular problem so as to make a rational connection between independent and dependent variables. The theoretical framework of this study has been developed based on consulting literature that will help in finding out the dimensions of both independent and dependent variables, as depicted in figure 1 below.

2.6.1 Project risks Analysis

Industrial Risk Assessment is a process that incorporates the following four processes that are interlinked: Identification of sources of risks, Knowledge of pathways and initiators that can cause these risks to arise, Impact evaluation on risks under varying situations, and Methods of mitigating the impact of these risks. After specific risks are recognized, they are typically assessed based on the likelihood of happening and the severity of their effects (Verhaegen, 2015). Project risk analysis is the procedure aimed at eliminating or minimizing the risks that jeopardize the attainment of project goals. Project risk assessment begins at the phase of the project life cycle and may extend to the expenses associated with its utilization. Expenses associated with the project differ based on the extent of work and dedication to the process (Rabechini Junior & Monteiro de Carvalho, 2013).

2.6.2 Project risks Monitoring and Control

Risk monitoring is the ongoing activity of gathering, examining, recording, and communicating information concerning risks associated with advancing toward established project goals. This data aids prompt decision-making, guarantees responsibility, and serves as the foundation for assessment and learning. Monitoring offers initial signs of advancement and the attainment of industrial goals.

Monitoring and control involve evaluating project execution to ensure the project remains on course and attains the desired outcomes. The project manager is accountable for consistently overseeing and managing risks in the manufacturing sector, and collaborators in the manufacturing sector should also play an active role in the efficient monitoring and management of project risks (KOFFI-TESSIO, 2021).

Ongoing oversight and management of project tasks are crucial for spotting discrepancies and implementing corrective measures swiftly. PMI (2021) emphasizes that monitoring performance metrics in real time allows project teams to tackle new risks and ensure project coherence with

organizational objectives. Projects that apply strict monitoring and control strategies attain greater success rates concerning project results (Project Management Institute, 2021).

2.6.3 Project risk Knowledge and reporting

Cartea (2015) asserts that risk management relies on skills, knowledge, or the capacity to acquire skills-related abilities. Individuals with knowledge and communication abilities can handle risks effectively since they can influence and participate in decision-making related to risk management. For environmental protection, assessing risks and communicating them is essential to implement preventive actions.

Lundgren (2017) states that effective communication requires conveying information from a sender to a recipient. This is relevant to risk communication too, which involves sharing information about risk between different parties such as risk assessors, managers, media organizations, interest groups, and the public. Communication is essential in handling risks as it enables individuals to engage in risk avoidance, helps in mitigating risks, and supports decision-making for project risk management approaches. It further facilitates sustainable choices by enhancing comprehension.

2.6.4 Sustainability of Milk & milk products Quality and Safety

Sustainability includes the capacity to last and continue over time, and it is essential to sustainable growth. This requires efficiently handling resources to guarantee that human welfare remains sustainable over time. Nevertheless, measuring sustainability can be difficult since it involves assessing value judgments regarding specific projects and evaluating if they will offer enduring advantages (Saad, 2020). Sustainability denotes a project's ability to generate enduring and beneficial impacts. The global Sustainable Development Goals (SDGs) encourage discussions on development that focus on enhancing quality of life, protecting the environment, and fostering peace and prosperity globally. Sustainability-focused projects seek to deliver lasting advantages, uphold environmental balance, and guarantee equitable distribution of benefits while consistently engaging the community (Project Management Institute, 2021).

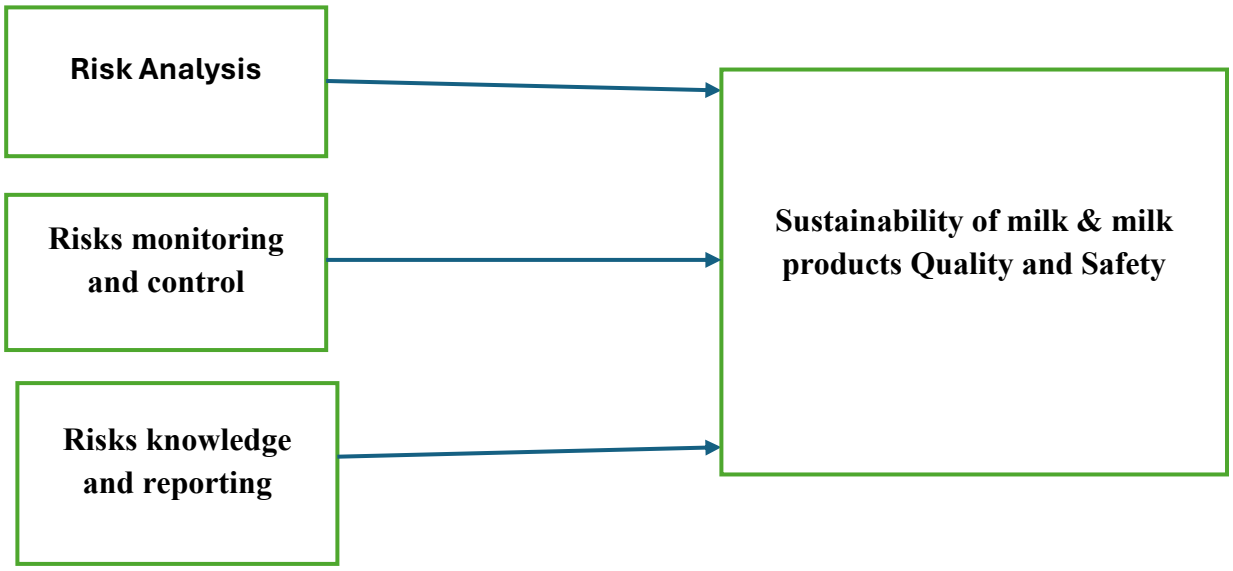


Figure 1 ***Conceptual Framework***

Source: Adapted from Project Management Institute (PMI, 2013; 2021), Silvius & Schipper (2014), and Nocco & Stulz (2006)

2.7 Research Hypothesis

The following hypotheses are formulated to examine the relationships among risk analysis, risk monitoring & control, risk knowledge & communication reporting on sustainability of milk & milk products Quality and Safety under BRIDGE+ project in Addis Ababa.

H1: Risk analysis has a positive and significant relationship with the sustainability of Milk & milk products Quality and Safety.

H2: Risk monitoring and control has a positive and significant relationship with the sustainability of milk and milk products quality and safety.

H3: Risk knowledge and reporting has a positive and significant relationship with the sustainability of milk and milk products quality and safety.

CHAPTER THREE

RESEARCH METHODOLOGY

According to Chekaluk and Batchelor (2016), research methodology refers to a set of principles that guides a research study. This chapter presents the methodology planned to be used to investigate the influence of project risk management practices on the sustainability of milk & milk products quality and safety under the BRIDGE+ project in Ethiopia. The chapter presents information about the research methodology that covers the design of the research, the approach used, variables involved, geographical location and the population of study, the sampling procedure, data collection process, data analysis, measures for reliability and validity, and the ethics issues. The methodology was carefully chosen to make sure that the study will produce reliable, valid, and actionable results concerning project management.

3.1 Research Design

In conducting this research, a case study research method was employed with both descriptive and explanatory purposes and cross-sectional temporal orientation (Yin, 2018; Saunders, Lewis, & Thornhill, 2019). With respect to design scope, a case study design was selected because the research focuses on one bounded system; namely, the BRIDGE+ intervention in Addis Ababa and its surrounding areas (Sheger sub-city and Sululta region). Within this single case, an embedded design was adopted where embedded units of analysis such as different processor locations (Addis Ababa city area, Sheger peri-urban area, and Sululta rural-urban interface), different stakeholder categories (project managers, project personnel, M&E personnel, regulatory officials, dairy processors), and different interventions components (farmers' training, infrastructure support, awareness initiatives) (Yin, 2018). As for the purpose of the design, both descriptive and explanatory purposes are fulfilled by research (Saunders, Lewis, & Thornhill, 2019). The first is descriptive, since the goal of the research is to describe the current state of risk management practices of the BRIDGE+ project with respect to the extent of RA, RMC, and RKR practices and SUS of milk quality and safety results.

The objective of the explanation is to reveal relationships among the identified variables through testing three hypotheses examining the presence of positive and significant relationships between RA, RMC, and RKR and SUS using the correlation and multiple regression analyses (see Section 3.7 for more information). Regarding the period of the study design, a cross-sectional view of time was applied, which means that the data collection was performed at one point in time (April 2026) (Sekaran & Bougie, 2016). Considering time constraints for the master's thesis research and the ongoing BRIDGE+ project at the time of data collection, a cross-sectional approach seemed to be the most appropriate way.

3.2 Research Approach

This study adopted quantitative research design. Data was collected through structured questionnaires that had closed ended questions in the Likert scale format. Quantitative approach is applicable in this research since the objectives of the study include measuring the extent of risk management practices, testing hypotheses on variables, and generalizing findings to the population of the BRIDGE+ project stakeholders.

3.3 Description of Study Variables

The variables in the study will be categorized into independent and dependent variables to analyze thoroughly the relationship that exists between the risk management practices and the sustainability of quality and safety of milk & milk products in relation to the BRIDGE+ project. Some of the independent variables include risk analysis, risk monitoring and control, risk knowledge and reporting. Risk analysis is the identification, evaluation, and prioritization of the risk that could affect the quality and safety of milk & milk products. Risk monitoring and control refer to the ongoing surveillance and mitigation of risks during the project lifetime. On the other hand, risk knowledge, communication, and reporting involves the organized collection, dissemination, and sharing of information related to risk within the project team. The dependent variable in sustainability of milk & milk products quality and safety can be described as the capability of the project to maintain the standards of quality and safety throughout and beyond the

life of the project. The proper definition of these variables makes it possible for us to align them with the principles of project management and conduct empirical analysis of the relationship between them.

3.4 Description of Study Area and Target Population

A population refers to a collection of individuals that are part of a group where research is conducted and share similar observable traits (Barasa, Ikamari, Kiplang'at & Oladipo, 2015). Study Area: The investigation took place in Addis Ababa and its vicinity, specifically in Sheger sub-city and the Sululta region, where the BRIDGE+ initiative functions.

Target population: The target population for this study consisted of a total of 380 respondents which includes 10 project managers, 120 project staffs, 40 M&E officers, 110 regulatory officers, 100 processors.

3.5 Sampling Techniques & Sample size

Sampling is a process that involves selection of members of a population that represents entire population (Ogula, 2005). Barasa, et al. (2015) defines sampling as a process of selection of a section of respondents from the target population in a manner that is representative.

Sampling Method: This research utilized a census sampling approach, including all 380 individuals from the target population in the study. A census method was considered suitable due to the manageable scale of the target population and the requirement to gather thorough data from all stakeholder groups participating in the BRIDGE+ project. This method removes sampling error and offers the most precise depiction of the population.

From the 384 questionnaires distributed, 380 were returned, reflecting a 99% rate of response. The 4 non-respondents (1%) did not return the questionnaire within the stipulated time. According to Finchman (2008), the minimum required rate of response in most research works is about 60%. Therefore, the 99% rate of response achieved in the current study goes beyond the threshold and is exceptional.

3.6 Data Collection: Sources, Types, and Instruments

The study aims to uses both primary and secondary data. A well-designed five-point Likert scale close-ended survey was employed to gather primary data from all 380 participants to achieve the research goals. The Likert scale varied from 1 (Strongly Disagree) to 5 (Strongly Agree). The survey was segmented into parts addressing demographic data, risk assessment methods, risk oversight and management techniques, risk awareness and reporting practices, and the sustainability of milk and milk product quality and safety. For secondary data sources, publications, books, and journal articles on the subject are included. According to Kothari (2004), data collection instruments are tools and methods used in collection of data. Primary and Secondary methods are the two ways of collection of data.

3.7 Data Analysis: Models, Techniques, and Software

As per Mugenda and Mugenda (2003), the collected data should be edited, cleaned, and analyzed to ensure its accuracy, completeness, consistency, and utility. The process of arranging data to draw conclusions and make inferences to discover accurate responses to the research questions is referred to as data analysis (Barasa et al., 2015). The analysis of data was conducted using SPSS version 26 in four consecutive stages. At first, descriptive statistics (frequency, percentage, mean, and standard deviation) were conducted to capture the demographic profile of respondents and central tendency of every variable. Secondly, reliability was tested using Cronbach's Alpha (α), with coefficient of 0.70 or above indicating adequate internal consistency (Nunnally & Bernstein, 1994). Third, Pearson correlation test was done to examine the nature and strength of the relationship between the independent variables (RA, RMC, RKR) and the dependent variable (SUS), with coefficients falling into weak (0.20-0.39), moderate (0.40-0.59), strong (0.60-0.79), or very strong (≥0.80) according to Papageorgiou (2022). Fourth, multiple linear regression analysis was carried out to examine the three hypotheses at once using the following formula: $SUS = \beta_0 + \beta_1(RA) + \beta_2(RMC) + \beta_3(RKR) + \varepsilon$, whereby SUS represents sustainability of milk quality and safety, β_0 is the intercept, β_1 to β_3 represent regression coefficients for each independent variable, while ε represents error term. Finally, diagnosis test was conducted to establish the model

assumption before interpreting regression results, including normality through skewness and kurtosis (acceptable range: -2 to +2 per George & Mallery, 2010), linearity using Normal P-P plot, and multicollinearity through Tolerance (>0.1) and Variance Inflation Factor (VIF <10) according to Field (2018).

3.8 Reliability and validity

Validity indicates the extent to which a tool assesses what it is designed to assess (Hair & Lukas, 2014). Content validity was achieved by creating the questionnaire informed by recognized project management literature (PMI, 2013, 2021) and dairy safety studies (EFDA, 2020; Assefa et al., 2023. The construct validity was done using the Kaiser-Meyer-Olkin (KMO) measure along with Bartlett's Test of Sphericity. As per recent studies on validation, if the KMO is more than 0.60, then it means that data is ready for factor analysis, while the Bartlett Test must be statistically significant ($p<0.05$) to prove that there are relationships among the variables (Popoola & Olapoju, 2025; Olapoju & Popoola, 2026). It was found that: RA (KMO=0.813), RMC (KMO=0.815), RKR (KMO=0.765), and SUS (KMO=0.721); furthermore, Bartlett's Test was also statistically significant.

Reliability, defined as the consistency of measurement outcomes (Hassan, 2024), was evaluated using Cronbach's Alpha (α) based on the data gathered from the 380 respondents. The findings indicated that Risk Analysis (RA) had $\alpha = 0.864$ (excellent), Risk Monitoring and Control (RMC) had $\alpha = 0.845$ (excellent), Risk Knowledge and Reporting (RKR) had $\alpha = 0.809$ (good), and Sustainability (SUS) had $\alpha = 0.809$ (good). Every Cronbach's Alpha value surpassed the acceptable limit of 0.70 (Nunnally & Bernstein, 1994), indicating that the questionnaire is dependable for this research. Comprehensive reliability tables, featuring "Cronbach's Alpha if Item Deleted" for every variable.

3.9 Ethical Considerations

According to ethical behavior, it is the researcher's job to carefully examine the likelihood of harm to research participants, and to the degree practicable, the possibility of harm should be minimized (Bryman & Bell, 2007). Ethical considerations are maintained throughout the study to protect the rights and well-being of participants. All participants are fully informed about the purpose and

scope of the research, and their voluntary participation will be emphasized. The data collected are exclusively used for academic purposes, and the study adhere to both institutional and national ethical research guidelines to maintain integrity and ethical compliance throughout the research process.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

The objective of the study was to determine the project risk management practices and the sustainability of milk & milk product quality and safety in case study of the BRIDGE+ project in Addis Ababa. The collected data from the project manager, project staff, M&E officers, processors are summarized and analyzed in order to realize the ultimate objective of the study. Online questionnaires were sent to 384 target audience and there were only 380 respondents. This gave the study a response rate of 99% with the other 1% not responding and could not answer the questionnaire in time required for the study. Finchman (2008) suggests that a response rate of approximately 60% is generally acceptable and expected in most research studies. Therefore, the response rate achieved in this study exceeds the standard benchmark and is considered satisfactory.

The questionnaire starts by gathering demographic information from the respondents. This allows us to understand the population sample's demographic trends. Table 4.1 provides a summary and description of the variables related to the respondents' demographic characteristics.

4.1 Demographic Information of the respondents

Demographic analysis plays a crucial role in project management research since stakeholder attributes like gender, age, position, and experience can affect views on risk management practices and sustainability results (Sekaran & Bougie, 2016). Creswell and Creswell (2017) state that gaining insight into the demographic characteristics of respondents helps researchers evaluate if the sample properly reflects the target population and highlights possible biases in the responses.

Consequently, analyzing the demographic characteristics of participants is an essential initial step prior to interpreting the key results of this research. Table 1 displays the demographic features of all 380 participants in one unified table

Table 1 Demographic Profile of Respondents (N=380)

Demographic Characteristic	Category	Frequency (%)
Gender	Female	165 (43.4%)
	Male	215 (56.6%)
Age	18-25 years 26-35 years	36 (9.5%) 201 (52.9%)
	36-45 years	107 (28.2%)
	46 years and above	36 (9.5%)
Role	Project managers	10 (2.6%)
	Project staffs	120 (31.6%)
	M&E officers	40 (10.5%)
	Regulatory officers	110 (28.9%)
	Dairy processors	100 (26.3%)
Experience	1-3 years	97 (25.5%)
	4-6 years	88 (23.2%)

	Above 6 years	195 (51.3%)

Source: Own survey result 2026

Gender Distribution: As seen from Table 1, male respondents (56.6%) slightly outnumbered female respondents (43.4%). This pattern of gender distribution is similar to what prevails in the dairy industry across Ethiopia, where traditionally, it has been observed that men dominate the dairy processing and regulations while women participate in informal milk transactions and production activities within households (Lemma et al., 2008; Girma et al., 2021). However, the presence of 43.4% female participants is an indication that the BRIDGE+ project has achieved remarkable levels of gender inclusiveness in line with the goal of achieving inclusive growth in the dairy industry. In terms of risk management, having gender diversity in the stakeholder group will be beneficial in the process of identifying risks, since men and women face and perceive different risks in the value chain of dairy (FAO, 2011).

Age Distribution: The highest number of respondents (52.9%) belonged to the age group 26-35, while the second highest proportion of respondents (28.2%) fell within the age range of 36-45. This means that the BRIDGE+ program comprises mostly mid-career employees, which is positive from the point of view of sustainability, as younger employees may remain in the company for longer periods and continue to disseminate their risk management skills (Assefa et al., 2023). The relatively small number of respondents aged above 46 (9.5%) implies a possible brain drain, which creates a risk associated with the RKR challenges outlined by Assefa et al. (2023).

Role Distribution: Major stakeholder categories consisted of project personnel (31.6%), regulatory personnel (28.9%), and dairy processors (26.3%). Equitable representation of different stakeholders is very important because efficient management of risks in dairy value chain requires cooperation between all stakeholders (Tadesse & Desta, 2022). According to the Network Theory (Fang et al., 2015), projects can be seen as network of interconnected nodes, and thus understanding of perspectives of different stakeholders is vital for conducting proper risk analysis. Including 10 project managers (2.6%) provide leadership level perspectives while inclusion of 40 M&E officers (10.5%) adds perspectives about monitoring and control measures. Variety of roles

represented in the sample increases validity of results as the perceptions of sustainability have been obtained from multiple perspectives of the project.

Experience Distribution: Over half of the survey participants (51.3%) have been in their current jobs for more than six years, meaning that the sample consists of relatively experienced respondents. As noted by Sekaran and Bougie (2016), individuals that have spent more time in their current positions provide a more accurate evaluation of the organizational practices since they have witnessed the same events in a more extended period of time. It is especially important when it comes to sustainability since individuals that have spent more time working in an organization are able to assess whether the improvements were sustainable (Tong'l et al., 2019). Nevertheless, it should be considered that respondents may have 1-3 years of experience (25.5%) and 4-6 years of experience (23.2%).

4.2 Descriptive Statistics

Descriptive statistics are meant to organize data in an understandable way by employing such tools as mean, median, mode, and standard deviation (Sekaran & Bougie, 2016; Saunders, Lewis, & Thornhill, 2019). The mean is the average score indicating central tendency of data, while standard deviation represents dispersion of response scores from the mean (Field, 2018). Low standard deviation implies agreement on the part of respondents, while a high standard deviation means that there was considerable disagreement or difference of opinions (Pallant, 2020). In project management research, descriptive statistics play an important role in the understanding of current practices before exploring relationships between variables (PMI, 2021). As indicated in the conceptual framework provided in Chapter 2 (see Figure 1), the three independent variables are Risk Analysis (RA), Risk Monitoring and Control (RMC), Risk Knowledge and Reporting (RKR), and one dependent variable Sustainability (SUS). The values for average, midpoint, mode, standard deviation, and range for all four variables can be seen in Table 2 below.

Table 2 Descriptive Statistics of Variables (N=380)

	RA	**RMC**	**RKR**	**SUS**
Mean	3.7651	4.1072	3.5645	3.9386
Median	3.7500	4.2500	3.5000	4.0000

Mode	4.00	4.00	3.25	4.00
Std. Deviation	.77600	.76114	.64755	.80985
Range	4.00	4.00	4.00	4.00

Source: Own survey result 2026

Risk Analysis (RA) had a mean score of 3.7651. The results show that risk analysis activities are perceived as being done to a moderate level. Respondents agree that the project identifies and takes into consideration risks; however, the fact that the mean is less than 4.0 shows that there is room for improvement. It agrees with the results obtained by Djekic and Tomasevic (2016) who found out that risk analysis in dairy supply chain is often done as a planning task rather than being embedded in the routine process.

Risk Monitoring and Control (RMC) This implies that the participants agreed to a great extent that monitoring and control practices are indeed present in the BRIDGE+ project. An average above 4.0 on a scale of five shows that activities such as frequent milk testing, monitoring temperature while transporting milk, and sanitation inspections are being done routinely. This finding is consistent with findings by Tadesse and Desta (2022), who found out that dairy cooperatives in Addis Ababa with proper monitoring practices achieved better quality results. A standard deviation of 0.761 shows that there was variability in opinions, possibly showing differences based on processor location (urban Addis Ababa versus peri-urban Sheger and rural Sululta). In answering research question two, which aims to establish the relationship between RMC and sustainability, it can be seen that the participants consider monitoring practices as an asset to the project.

Risk Knowledge and Reporting (RKR) recorded the lowest average (3.5645). This is very significant in terms of RQ3 since RKR is the one most related to sustainability. The fact that the average is less than 3.6 shows that the participants do not fully agree that risk knowledge is adequately documented, communicated, and incorporated into the BRIDGE+ project. The relatively low standard deviation of 0.647 implies that this agreement is fairly consistent across

the stakeholder groups and thus it is an organizational problem and not a few isolated cases. This finding is in line with Assefa, Tefera & Bekele (2023), who found that many donor-funded dairy projects perceive reporting as a process of fulfilling donors' requirements rather than building capacity of the local stakeholders. According to Lundgren and McMakin (2018), successful risk communication requires that the information flow be multidirectional (upward, downward, and horizontal), but this is not true in the case of the BRIDGE+ project.

Sustainability (SUS) This variable achieved the second-highest average score (3.9386). It implies that the participants perceive the quality and safety sustainability of milk to be relatively high. The closeness of the average score to 4.0 implies that the participants believe the quality gains that have been realized through the project will last even after the completion of the external support. This finding is consistent with the concept of sustainability employed in this study by PMI (2021) in terms of the continued presence of benefits that have been realized in a project even after the completion of the external support. The standard deviation value (0.810) of this variable is the largest among all variables, which means there is high variance in opinion among the participants. Field (2018) asserts that a standard deviation above 0.80 for a 5-point scale implies high variance in opinion.

4.3 Reliability & Validity Test

4.3.1 Reliability Test

Reliability concerns the consistency of results obtained by applying the same test to comparable subjects in comparable conditions (Hassan, 2024). In the context of survey research, reliability implies the stability of results of a questionnaire, i.e., the consistency of answers provided to comparable questions concerning the same concept (Nunnally & Bernstein, 1994). As explained in the research methodology found in Chapter 3 (Section 3.8), Cronbach's Alpha (α) was utilized to evaluate reliability. Cronbach's Alpha assesses the internal reliability or mean correlation between items in a survey tool (Field, 2018). A coefficient of 0.70 or greater is typically viewed as satisfactory for social science studies, suggesting that the items assess the same fundamental construct (Nunnally & Bernstein, 1994; Pallant, 2020). Table 3 displays the Cronbach's Alpha values for each of the four variables.

Table 3 Project Risks Analysis

Cronbach's Alpha	N of Items
.864	4

Source: Own survey result 2026

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Risks taking management allow the management to design appropriate strategies	11.3053	5.711	.732	.819
Risks analysis has reduced risk aversion of low return	11.3737	5.348	.807	.788
Risks analysis provided the attitude towards risks neutral	11.5053	5.865	.702	.832
Risks analysis has brought idea of establishing possible strategies of risks avoidance and elimination	10.9974	5.734	.623	.866

Source: Own survey result 2026

Table 4 Project Risks Monitoring and Control

Cronbach's Alpha	N of Items
.845	4

Source: Own survey result 2026

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Allocation funds based of project risks monitoring and control abilities	12.4605	5.574	.626	.827
Project risks monitoring and control involves having appropriate project risks planning	12.1368	5.680	.738	.783
Risks monitoring and control provides good decision for ongoing progress on milk & milk product quality and safety	12.3921	5.263	.694	.798
Project risks monitoring and control helps to estimate costs of risks reduction, in milk & milk product quality and safety	12.2974	5.418	.677	.805

Source: Own survey result 2026

Table 5 Project risks knowledge and reporting

Cronbach's Alpha	N of Items
.809	4

Source: Own survey result 2026

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
There is sufficient knowledge to achieve the sustainability of milk & milk product quality and safety	10.4921	4.208	.605	.770
Sustainability of the milk & milk product quality and safety resulted to having skilled / knowledgeable employees	10.9816	3.585	.634	.762
An appropriate communication enhanced the sustainability of milk & milk product quality and safety	10.6263	3.902	.719	.717
Upward and downward communication was used to share information on how to achieve the sustainability of milk & milk product quality and safety	10.6737	4.363	.563	.788

Source: Own survey result 2026

Table 6 Sustainability of milk & milk products Quality and Safety

Cronbach's Alpha	N of Items
.809	4

Source: Own survey result 2026

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
An appropriate and effective sustainability of Milk & milk products quality & safety is determined by project competitive advantage	7.8132	2.933	.733	.838
The sustainability of Milk & milk products quality & safety is indicated by economic value-added system	7.8816	2.638	.808	.769
The sustainability of milk products quality & safety project is determined by level of customer satisfaction	7.9368	2.803	.724	.847

Source: Own survey result 2026

Every Cronbach's Alpha value surpasses the acceptable limit of 0.70 suggested by Nunnally and Bernstein (1994). The greatest reliability is noted for RA ($\alpha = 0.864$), suggesting that the four items assessing risk analysis practices are very consistent with one another. George and Mallery (2010) state that Cronbach's Alpha values exceeding 0.90 are viewed as excellent, those from 0.80 to 0.89 as good, and values between 0.70 and 0.79 as acceptable. As per this criterion, RA (0.864) and RMC (0.845) can be considered "good," whereas RKR (0.809) and SUS (0.809) are also categorized as "good." The lowest value of the coefficient is ($\alpha = 0.809$) and is well above the acceptable threshold value. It has been confirmed that the questionnaire measures the intended constructs.

4.3.2 Validity Test

The construct validity of the study was established using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and the Bartlett's Test of Sphericity. The KMO measures how appropriate the data is to run factor analysis on it. As per the validation tests conducted recently, a KMO measure greater than 0.60 indicates that it is okay, but a KMO measure greater than 0.80 is great (Han et al., 2024). Moreover, Bartlett's test of sphericity must be significant ($p<0.05$).

Table 7 Validity Test

Variable	KMO	Bartlett's Test (Sig.)
RA	0.813	< .001
RMC	0.815	< .001
RKR	0.765	< .001
SUS	0.721	< .001

For the study, all four constructs were above the required threshold level, which is shown by the following values: Risk Analysis (RA): KMO value was 0.813 (Highly Satisfactory); Risk Monitoring and Control (RMC): KMO value was 0.815 (Highly Satisfactory); Risk Knowledge and Reporting (RKR): KMO value was 0.765 (Acceptable); Sustainability (SUS): KMO value was 0.721 (Acceptable). All the four constructs also showed a significant Bartlett's test of sphericity ($p < .001$). The above-mentioned findings indicate that all constructions are acceptable.

4.4 Correlation Analysis

Correlation analysis is a statistical method that assesses the direction and intensity of the linear association between two variables (Field, 2018). This research utilized the Pearson correlation coefficient (r), suitable for continuous data assessed on interval or ratio scales (Pallant, 2020). The correlation coefficient varies from -1 to +1; a positive value suggests that when one variable rises, the other does too, while a negative value indicates a reverse relationship (Papageorgiou, 2022). Papageorgiou (2022) interprets correlation coefficients as follows: 0.20-0.39 = weak, 0.40-0.59 = moderate, 0.60-0.79 = strong, and ≥0.80 = very strong. Correlation analysis is performed before regression analysis to evaluate the fundamental relationships between variables and identify

possible multicollinearity concerns (Field, 2018). Table 8 displays the correlation matrix for every variable in this research.

Table 8 Pearson Correlation analysis

		RA	RMC	RKR	SUS
RA	Pearson Correlation		1	.631***	.607***
	Sig. (2-tailed)			<.001	<.001
RMC	Pearson Correlation	.631***	.631***	1	.610***
	Sig. (2-tailed)	<.001	<.001		<.001
RKR	Pearson Correlation	.607***	.607***	.610***	1
	Sig. (2-tailed)	<.001	<.001	<.001	
SUS	Pearson Correlation	.634***	.634***	.666***	.608***
	Sig. (2-tailed)	<.001	<.001	<.001	<.001

Source: Own survey result 2026

Risk Monitoring and Control (RMC) exhibits the highest correlation with SUS ($r = 0.666$, $p < 0.001$), succeeded by Risk Analysis (RA) ($r = 0.634$, $p < 0.001$) and Risk Knowledge and Reporting (RKR) ($r = 0.608$, $p < 0.001$). As stated by Papageorgiou (2022), all three correlations are categorized as "strong" (0.60-0.79). These significant correlations offer preliminary backing for each of the three research hypotheses (H1, H2, and H3). The statistical significance at $p < 0.001$ suggests that these associations are extremely improbable to have arisen by chance (Field, 2018).

This suggests that out of all three strategies used for managing risks, monitoring and controlling are closely associated with perceived sustainability. It agrees with the research done by Tong'l, Otieno, and Osoro (2019) who found out that good monitoring and evaluation mechanisms are the most important predictors of sustainable outcomes in donor-based food programs. This result

supports the Enterprise Risk Management (ERM) Theory since it clearly shows that monitoring and controlling are vital for successful risk management (Nocco & Stulz, 2006). In the context of the BRIDGE+ program, this implies that it is important to maintain the current monitoring (routine tests, audit, temperature checks).

(RA-RMC: 0.631, RA-RKR: 0.607, RMC-RKR: 0.610) are similarly robust. This suggests that the three risk management practices are closely connected, reinforcing the idea in the Enterprise Risk Management (ERM) theory that risk practices ought to be handled as a unified system instead of separately (Nocco & Stulz, 2006). Hallowell, Molenaar, and Fortunato (2013) state that ERM encourages the evaluation and management of major risks together instead of addressing each risk in isolation. The correlations identified in this research offer empirical backing for this theoretical viewpoint. These inter-correlations, however, also create the potential for multicollinearity, which is examined in the regression diagnostics that follow (Section 4.5.3)

4.5 Regression Analysis

Multiple linear regression analysis is a statistical method that investigates the connection between a single dependent variable and several independent variables (Field, 2018). Hair, Black, Babin, and Anderson (2010) state that regression analysis enables researchers to forecast the value of a dependent variable using the independent variables' values and evaluate the significance of each predictor. The specification of the regression model, detailed in Chapter 3 (Section 3.7).

As stated by Pallant (2020), unstandardized coefficients (B) indicate the variation in the dependent variable for each one-unit shift in an independent variable while keeping other variables fixed. Standardized coefficients (Beta) facilitate the comparison of the relative significance of each independent variable since they are expressed in standard deviation units (Field, 2018). Prior to analyzing the regression outcomes, three diagnostic assessments were performed to check the assumptions of the model: normality, linearity, and multicollinearity.

4.5.1 Model Diagnosis Tests

4.5.1.1 Normality Test

Normality signifies the expectation that the residuals (errors) in a regression model follow a normal distribution (Field, 2018). As stated by George and Mallery (2010), skewness and kurtosis statistics can be utilized to evaluate normality. The measure of skewness indicates whether there is symmetry in the distribution, while kurtosis measures the "peakedness" or flatness of a distribution (Pallant, 2020). Skewness and kurtosis values between -2 and +2 are considered acceptable for the normality assumption (George & Mallery, 2010). The values of kurtosis from -7 to +7 show an almost normally distributed sample (West et al., 1995; N > 300). The statistics for skewness and kurtosis of the variables are shown in Table 9.

Table 9 Skewness and Kurtosis test

	Skewness		**Kurtosis**	
	Statistic	Std. Error	Statistic	Std. Error
RA	-.965	.125	1.696	.250
RMC	-1.689	.125	4.021	.250
RKR	-.791	.125	2.972	.250
SUS	-1.147	.125	2.555	.250

Source: Own survey result 2026

All the values of skewness fall within the acceptable range of -2 to +2 as per George and Mallery (2010). RMC has the highest skewness value (-1.689), which implies there is a slight negative skew (responses being clustered towards the higher end of the scale) consistent with the high mean of RMC (4.107). In regard to kurtosis, West et al. (1995) recommend that in cases where sample size is large (in this case N=380), if the kurtosis value falls between -7 and +7, then this can be said to be normally distributed. By this rule, all the variables (kurtosis of RMC = 4.021) are good for regression.

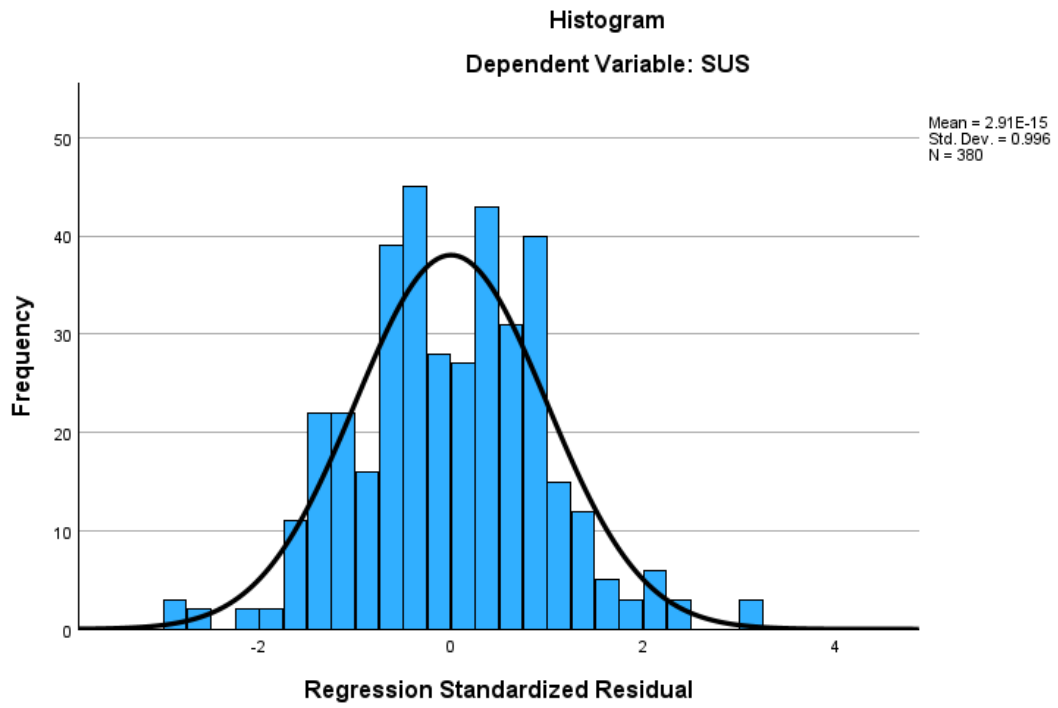


Figure 2: **Histogram of Standardized Residuals**

As shown in Figure 2 below, the histogram plot of the standardized residuals shows a bell-shaped curve that is normally distributed. The normal distribution plot shows that the residual data are evenly spread about the mean, which is zero. There are no signs of skewness or outliers evident from the distribution plot.

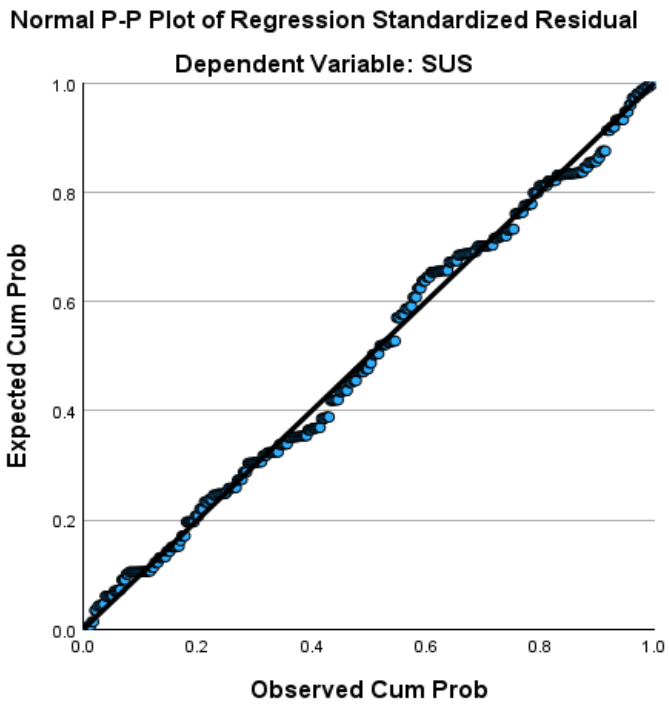


Figure 3: **Normal P-P Plot of Regression Standardized Residual**

Figure 3 above depicts the Normal Probability-Prognosis (P-P) graph that compares the observed cumulative distribution of the standardized residuals against the expected cumulative distribution under normality assumption. The straight line running diagonally from the bottom left to the top right indicates normality. When the residuals are normally distributed, all data points lie exactly on this straight line. The plotted points in the figure align closely with the diagonal reference line across the full range, from the lower tail to the upper tail. There are no consistent divergences or trends away from the line. The data points do not exhibit any S-shaped curve, which would suggest non-normality, nor do they demonstrate any grouping away from the diagonal. The close correspondence between the observed and expected distributions validates that the residuals follow a normal distribution. Pallant (2020) states that when the points on a P-P plot are near the diagonal line, the assumption of normality is met. Consequently, the assumption of normality is satisfied for this regression model.

4.5.1.2 Linearity Tests

Linearity is a crucial assumption in multiple linear regression, indicating that the connection between each independent variable and the dependent variable must be linear and additive

(Osborne & Waters, 2002). This indicates that any alteration in the dependent variable can be proportionately attributed to changes in the independent variables (Field, 2018). To evaluate this assumption, a scatter plot illustrating standardized residuals against standardized predicted values is examined (Pallant, 2020). In case of a model that adheres to linearity assumption, the residuals must be randomly scattered around zero with no specific shape or curvature observed (Hair et al., 2010). The scatter plot used in checking linearity is presented in figure 4.

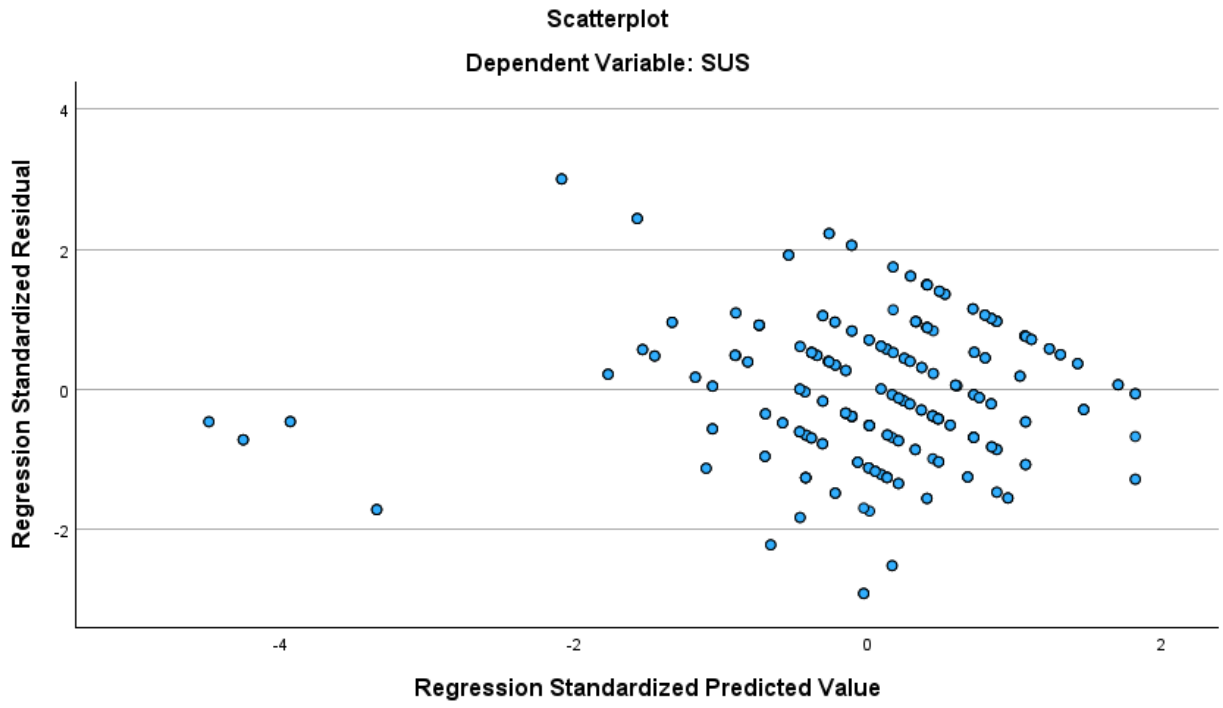


Figure 4: **Scatter Plot of Standardized Residuals against Standardized Predicted Values**

F Figure 4 represents the scatterplot of standardized residuals (ZRESID) along the y-axis and standardized predicted values (ZPRED) along the x-axis. The scatter plot is used to examine two regression assumptions: linearity and homoscedasticity (constant variance of residuals). It can be seen from the scatterplot that the residuals are scattered in a random manner on both sides of the horizontal zero line, without any pattern or curve shape. The distribution of the points is uniform across the whole range of the predicted values that lie between -3 and +2. There is no funnel shape that may indicate heteroscedasticity, nor any U-shape or inverted U-shape that might represent a

violation of linearity assumption. The lack of a recognizable pattern suggests that the connection between the independent variables and the dependent variable is linear. As per Osborne and Waters (2002), a scatter plot displaying residuals randomly dispersed around zero without a distinct pattern signifies that the linearity assumption holds true. Furthermore, the fairly consistent distribution of residuals over all predicted values indicates that the homoscedasticity assumption is satisfied as well. Consequently, the linearity assumption holds true for this regression model.

Source: Own survey result 2026

4.5.1.3 Multicollinearity Test (Tolerance and VIF)

Multicollinearity denotes a condition where independent variables within a multiple regression model show a strong correlation with one another (Field, 2018). Shrestha (2020) states that multicollinearity may result in inaccurate or skewed outcomes when assessing the separate impacts of each predictor. Tolerance and Variance Inflation Factor (VIF) are frequently used to evaluate multicollinearity (Pallant, 2020). Tolerance quantifies the share of variation in a specific independent variable that remains unexplained by other predictors, determined as 1 minus the square of the multiple correlation coefficient ($1 - R^2$) for that variable (Field, 2018). VIF is the inverse of Tolerance. Field (2018) states that for there to be no significant multicollinearity issues, Tolerance must be greater than 0.1 and VIF should remain under 10. Table 4.5.2 displays the diagnostics for multicollinearity in this research.

Table 10 Multicollinearity Test

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics	
		B	Std. Error	Beta		Tolerance	VIF
1	(Constant)	.305	.175				
	RA	.285	.050	.273		.523	1.910
	RMC	.380	.051	.357		.520	1.923
	RKR	.281	.059	.224		.546	1.832
a. Dependent Variable: SUS							

Source: Own survey result 2026

Every Tolerance value is over 0.1 (between 0.520 and 0.546), and all VIF values stay under 10 (between 1.832 and 1.923). Field (2018) states that these findings suggest multicollinearity is not an issue in this regression model, allowing for the retention of all three independent variables at once.

4.5.2.1 Model Summary Results

The model summary in regression analysis offers insights into the effectiveness of the independent variables combined in predicting the dependent variable (Hair et al., 2010). The multiple correlation coefficient (R) reflects the strength of the linear connection between the observed and forecasted values of the dependent variable (Field, 2018). The R Square (R^2) indicates the percentage of variation in the dependent variable accounted for by all independent variables together (Pallant, 2020). Papageorgiou (2022) indicates that a correlation coefficient ranging from 0.60 to 0.79 signifies a strong relationship. The Adjusted R Square is a revised form of R^2 that considers the quantity of predictors in the model, penalizing the inclusion of unnecessary predictors (Field, 2018). Table 11 provides the summary of the model for this research.

Table 11 Model Summary result

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.740[a]	.548	.544	.54690	.548	151.679	3	376	<.001
a. Predictors: (Constant), RKR, RA, RMC									

Source: Own survey result 2026

The multiple correlation coefficient (R = 0.740) suggests a robust positive relationship between the real and estimated values of sustainability. Papageorgiou (2022) states that a correlation coefficient ranging from 0.60 to 0.79 indicates a strong relationship. The R Square value of 0.548

shows that around 54.8% of the variability in sustainability (SUS) is accounted for by the three independent variables together (RA, RMC, RKR). This represents a moderate-to-high level of explanatory power for research in social sciences (Hair et al., 2010). The Adjusted R Square (0.544) is nearly identical to the R Square (only a 0.004 difference), indicating that all three predictors significantly contribute to the model and that overfitting is not an issue (Field, 2018).

4.5.2.2 ANNOVA COEFFICIENTS

In regression analysis, Analysis of Variance (ANOVA) assesses if the entire regression model is statistically significant (Field, 2018). The F-statistic assesses the variance clarified by the model against the variance that remains unexplained (error) (Pallant, 2020). A notable F-statistic ($p < 0.05$) suggests that the model fits better than a model lacking predictor (Hair et al., 2010). Field (2018) states that a greater F-value along with a low p-value suggests that the independent variables together significantly influence the dependent variable. The ANOVA findings for this study are displayed in Table 12.

Table 12 ANNOVA Coefficients

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	136.104	3	45.368	151.679	<.001[b]
	Residual	112.463	376	.299		
	Total	248.567	379			

Source: Own survey result 2026

The above table 4.5.2.2 Test of Analysis of variance is used to assess the overall significance of the regression model. It tests the whether the independent variable collectively explain a statistically significant amount of the variance in the dependent variable. According to field (2013), a significant F statistic ($p < 0.005$) indicates the model as a whole is statistically valid and a

statistically significant F statistics confirms that the regression model provides a better fit than a model with no predictors. According to Hair et al. (2010) higher F value mean is a better fitting model especially when paired with a low p value. The Analysis of Variance validates the R Square from the model summary by statistically evaluating the combined effect of predictors. Thus, the examination verifies that the general importance of the regression model is F (3,376) = 151.679 and $p < 0.001$. This group of independent variables (risk analysis, risk monitoring and control, and risk knowledge and reporting) significantly forecasts the sustainability of quality and safety in milk and milk products.

4.5.2.3 Multiple Regression Results

Regression coefficients reflect the direction and strength of the association between each independent variable and the dependent variable (Field, 2018). Unstandardized coefficients (B) indicate the variation in the dependent variable for every one-unit change in an independent variable while keeping other variables fixed (Pallant, 2020). Standardized coefficients (Beta) enable the comparison of the relative significance of each independent variable as they are measured in units of standard deviation (Hair et al., 2010). The t-statistic assesses if each coefficient differs significantly from zero, while the p-value (Sig.) signifies the likelihood of achieving the observed result by random chance (Field, 2018). A p-value below 0.05 signifies statistical significance. Table 13 displays the regression coefficients for every variable in this research.

Table 13 Multiple Regression Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.305	.175		1.744	.082
	RA	.285	.050	.273	5.690	<.001
	RMC	.380	.051	.357	7.426	<.001
	RKR	.281	.059	.224	4.780	<.001
a. Dependent Variable: SUS						

Source: Own survey result 2026

The regression coefficient for RA (B = 0.285, β = 0.273, p < 0.001) shows a positive value and is statistically significant. This indicates that for each one-unit rise in risk analysis practices (on the 5-point scale), sustainability is expected to grow by 0.285 units, assuming other variables remain unchanged. This result corresponds with the work of Girma, Abera, and Tola (2021), who demon strated that projects utilizing systematic hazard mapping resulted in more effective interventions a nd improved sustainability. The result aligns with the work of Bennett and Lassa (2019), who exa mined 47 agricultural projects funded by donors and discovered that projects that included structu red risk analysis were 2.3 times more likely to achieve lasting outcomes. The standardized coeffi cient (Beta = 0.273) shows that RA is the second most significant predictor of sustainability amo ng the three factors. Therefore, H1 is accepted

The regression coefficient for RMC (B = 0.380, β = 0.357, p < 0.001) is positive, significant, and the highest among the three predictors. This indicates that RMC exerts the strongest impact on su stainability: a one-unit rise in RMC practices forecasts a 0.380-unit rise in sustainability. The stan dardized Beta (0.357) indicates that RMC is the most significant predictor in the model. This resu lt aligns with Tadesse and Desta (2022), who discovered that locally-owned monitoring was the m ost significant predictor of ongoing milk quality results (22 months compared to 6 months), and w ith Tong'l, Otieno, and Osoro (2019), who recognized active M&E systems as essential for the su stainability of donor-funded food initiatives. As stated by the Project Management Institute (2021), efficient monitoring and control offer continuous evaluation of project operations and facilitate prompt corrective measures, thereby directly promoting sustainability. Therefore, H2 is accepted.

The regression coefficient for RKR (B = 0.281, β = 0.224, p < 0.001) is positive and significant s tatistically, although it is the least among the three predictors. This indicates that with each one-u nit rise in RKR practices, sustainability is expected to increase by 0.281 units. Although the relati onship is important, the lower coefficient (in contrast to RA and RMC) and the average score for RKR (3.56) suggest that this practice represents the weakest aspect of the BRIDGE+ project. Thi s discovery strongly aligns with the work of Assefa, Tefera, and Bekele (2023), who noted that ri sk awareness and reporting are consistently lacking in Ethiopian dairy projects funded by donors, with the majority of these initiatives viewing reporting as merely a compliance task for donors in

stead of a means for developing local capacities. Lundgren and McMakin (2018) state that succes sful risk communication necessitates information flow in upward, downward, and horizontal dire ctions; however, the low RKR scores indicate that this type of multidirectional communication is lacking. Therefore, H3 is accepted.

The constant value (0.305) is not statistically significant ($p = 0.082$). This suggests that when all risk management practices are nonexistent, the baseline sustainability level is not notably different from zero, which is anticipated since some degree of risk management is consistently involved in project environments (Field, 2018)

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter outlines the discussion, conclusions, and suggestions of the research. This chapter has three main aims: first, to examine the results from Chapter 4 concerning the literature in Chapter 2; second, to present conclusions that specifically respond to each research question and meet the research objectives outlined in Chapter 1; and third, to offer practical suggestions for the BRIDGE+ project as well as for future studies. The organization of this chapter aligns with the sequence of the research questions and goals outlined in Chapter 1.

5.1 Conclusion

In regard to the first research hypothesis, it was found that risk analysis has a positive and significant effect on the sustainability of milk and dairy products' quality and safety ($\beta = 0.273$, $p < 0.001$). The correlation between risk assessment and sustainability turned out to be rather high ($r = 0.634$). Hence, with the development of the BRIDGE+ project which involves systematic risk identification, assessment, and prioritization (such as biological, chemical, and physical risks), the opportunities for preserving improvements in milk quality increase. It is evident that the average score of the risk analysis variable is relatively high (3.77/5), but still, it is far from being perfect. Therefore, it could be concluded that risk analysis is vital for sustainability, supporting Hypothesis H1.

As to the second research objective, it can be observed that risk monitoring and control have the greatest influence on the sustainability of milk and dairy product quality and safety ($\beta = 0.357$, $p < 0.001$). The relationship between sustainability and risk monitoring and control was the strongest out of the three practices ($r = 0.666$). The mean score of the practice under analysis was the greatest one (4.11), which indicates that such actions as testing of the milk samples, temperature control during transportation, and hygiene control are well implemented within the framework of the BRIDGE+ program. Hence, it can be concluded that risk monitoring and control is an essential practice for ensuring the quality and safety of milk products (H2).

Concerning the third hypothesis, it has been found that the relationship of knowledge and risks reporting on the sustainability of the quality and safety of milk and dairy products is positive but weak ($\beta = 0.224$, $p < 0.001$). The correlation of risk awareness and reporting with sustainability has also been found to be positive ($r = 0.608$). However, this practice scored the lowest mean (3.56), indicating that there is an inadequate documentation of risk knowledge. Thus, it can be said that even though risk knowledge plays a great role in sustainability, it is the weakest area that requires improvement.

As per the findings of the research, all three risk management approaches considered, which include risk analysis (RA), risk monitoring and control (RMC), and risk knowledge and reporting (RKR), have a positive and significant impact on the sustainability of milk and milk product quality and safety in the context of the BRIDGE+ project. Together, these three factors explain 54.8% of the variation in sustainability ($R^2 = 0.548$). Risk monitoring and control emerge as the most influential predictor followed by risk analysis and risk knowledge and reporting. The BRIDGE+ project demonstrates strong capabilities for monitoring and controlling risks but lacks knowledge management and reporting systems. Failure to address the shortcomings makes the sustainability of milk quality improvements questionable without any donor support.

5.2 Recommendation

There is a need for immediate improvement of risk awareness and reporting mechanisms. With RKR being the worst performer in both average score and the smallest effect (3.56 and $\beta = 0.224$, respectively), the project should create accessible risk registers, generate good quality newsletters in local languages (Amharic and Afan Oromo), and conduct periodic review meetings involving different stakeholders. Secondly, there is a need for maintaining and institutionalizing the current monitoring and controlling mechanisms. In view of the fact that RMC scored the best performance in both average score (4.11) and the largest effect ($\beta = 0.357$), such mechanisms should be incorporated into the local organizations (cooperatives, EFDA, processors) before the end of the project. Finally, there is a need for incorporating risk assessment processes into a standardized operational guide. Even though RA processes are available (average score = 3.77), their full potential has not been exploited.

The processors should assign quality officers specifically for each cooperative. The high impact of RMC (β = 0.357) implies that continual monitoring should be done. Processors should not rely on BRIDGE+ people to do quality control after completion of the projects. Second, the processors should develop internal risk register. The low value of RKR indicates that risk awareness is not documented. Each processor should document all the quality problems, actions taken, and lessons learned. Finally, the processors should network for knowledge sharing. The processors should have meetings regularly to share lessons about risk management techniques, as advocated by Network Theory (Fang et al., 2015).

The skills of risk management should also form part of the inspection process by EFDA. Regulators should not only check compliance of processors but should also look at how processors keep risk registers and monitoring. Second, there should be the development of standardized templates for risk reporting by EFDA for dairy producers. The low level of RKR score shows that risk reporting is done in a patchwork approach.

5.3 Future direction

Considering the limitations described above and the findings of this research, several possible directions for future research have been outlined. First, a longitudinal study needs to be conducted in order to assess sustainability outcomes after 12, 24, and 36 months after the official completion of the BRIDGE+ project. This will enable an evaluation of whether any improvements in quality have persisted in the absence of external support. Second, future studies need to combine perceptual and empirical assessments of quality through conducting milk samples testing (bacterial counts, coliform counts, somatic cell count, aflatoxin M1 levels) for processors under study and comparing the findings with stakeholders' perceptions. Third, a comparative study of different dairy programs needs to be conducted, in addition to that, including the control group of processors who do not participate in BRIDGE+ will help in understanding the actual effects of the project. Fourth, a qualitative study with interviews conducted with processors, farmers, and regulators will help understand the reasons for poor RKR scores despite the efforts of the project, such as language problems, technology limitations, organization issues, and others. Finally, future research can focus on mediation models and whether RMC is mediating the effect of RA on SUS or the effect

of RKR on the relation between RMC and SUS, since the current regression model considers variables additively.

Reference

Al Mhirat, M., & Irtemeh, H. (2017). Impact of risk management on project success: An empirica l investigation in Jordanian Ministry of Environment. *European Journal of Business and Manag ement*, 9(19), 55-61.

Anumba, C. J., & Atkinson, A. R. (1997). Safety management in construction: A review of curre nt practice. *Journal of Construction Procurement*, 3(2), 21-34.

Barasa, F. S., Ikamari, L., Kiplang'at, J., & Oladipo, O. (2015). *Research methods for business a nd social sciences*. Nairobi: CUEA Press.

Barber, R. B. (2005). Understanding internally generated risks in projects. *International Journal of Project Management*, 23(8), 589-595.

Barne, M. (1969). The modern management of projects. *International Journal of Project Manag ement*, 1(1), 25-32.

Baumgartner, R. J., & Rauter, R. (2017). Strategic perspectives of corporate sustainability manag ement to develop a sustainable organization. *Journal of Cleaner Production*, 140, 81-92.

Bhatti, S. H., Vorobyev, D., Zakariya, R., & Christofi, M. (2020). Social capital and knowledge s haring in project-based organizations. *International Journal of Project Management*, 38(5), 27 8-289.

Borg, P. (2001). Risk management in construction projects. *Journal of Construction Engineerin g and Management*, 127(4), 287-293.

Bredillet, C. N. (2006). The future of project management: A paradigm shift. *Project Managem ent Journal*, 37(3), 5-8.

Bredillet, C. N. (2007a). Exploring research in project management: Nine schools of thought. *Pr oject Management Journal*, 38(3), 3-4.

Bredillet, C. N. (2007b). From the editor: The ecology of project management. *Project Manage ment Journal*, 38(4), 3-5.

Bredillet, C. N. (2007c). Investigating the future of project management. *Project Management J ournal*, 38(1), 3-4.

Bredillet, C. N. (2008). Learning and acting in project contexts. *Project Management Journal*, 39(1), 3-5.

Brundtland, G. H. (1987). *Our common future: Report of the World Commission on Environmen t and Development*. Oxford: Oxford University Press.

Bueno, E., Salmador, M. P., & Rodríguez, O. (2004). The role of social capital in knowledge man agement. *Journal of Knowledge Management*, 8(6), 28-41.

Cartea, P. Á. (2015). Risk communication and public participation. In *Environmental risk asses sment and management* (pp. 145-162). Springer.

Chekaluk, E., & Batchelor, J. (2016). *Research methodology in the social sciences*. Sydney: Pe arson Education.

Chow, W. S., & Chen, Y. (2012). Corporate sustainability and triple bottom line. *International J ournal of Business and Social Science*, 3(14), 34-42.

CII (Construction Industry Institute). (2008). *Sustainability in construction: A guide for project managers*. Austin: CII Publications.

Cormican, K. (2015). Enterprise risk management in practice: A case study. *International Journ al of Project Management*, 33(6), 1245-1256.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Thousand Oaks: Sage Publications.

Daniel, D. R. (1961). Management information crisis. *Harvard Business Review*, 39(5), 111-12 1.

Diesendorf, M. (2000). Sustainability and sustainable development. In *Sustainability: The corpo rate challenge of the 21st century* (pp. 19-37). Sydney: Allen & Unwin.

Drumll, D. (2001). Enterprise risk management in the construction industry. *Construction Mana gement and Economics*, 19(5), 521-528.

Eccles, R. G., Ioannou, I., & Serafeim, G. (2012). The impact of corporate sustainability on organ izational processes and performance. *Management Science*, 60(11), 2835-2857.

Eid, M. (2009). Sustainable development and project management: A survey of project managers . *Project Management Journal*, 40(4), 45-58.

El-Kassar, A. N., & Singh, S. K. (2019). Green innovation and organizational performance: The i nfluence of big data and the moderating role of management commitment. *Journal of Cleaner P roduction*, 231, 483-493.

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). London: Sage Publ ications.

Finchman, J. E. (2008). Response rates in survey research. *Journal of Business Research*, 61(1), 78-85.

Flanagan, R. (1993). *Risk management and construction*. Oxford: Blackwell Scientific Publica tions.

García-Rosell, J. C., & Mäkinen, M. (2013). An integrative framework for sustainable business. *Journal of Business Ethics*, 118(2), 345-360.

Gareis, R., Huemann, M., & Martinuzzi, A. (2009). Sustainability in project management: A revi ew of current practices. *Project Management Journal*, 40(4), 5-16.

Gareis, R., Huemann, M., & Martinuzzi, A. (2010). The role of sustainability in project managem ent. *International Journal of Project Management*, 28(6), 567-576.

Gencbas, D., Ozdemir, S., Yaman Uzumcu, L., & Bulut, Y. E. (2025). A psychometric analysis f or the adaptation of the comprehensive breast cancer knowledge test for the male population: A m ethodological study. *Frontiers in Public Health*, 13, 1535564.

George, D., & Mallery, P. (2010). *SPSS for Windows step by step: A simple guide and reference* (10th ed.). Boston: Pearson.

Gilbert, R., Stevenson, D., Girardet, H., & Stern, R. (1996). *Making cities work: The role of env ironmental sustainability*. London: Earthscan Publications.

Gössling, T. (2017). Corporate sustainability and consumer behavior. *Journal of Consumer Beh aviour*, 16(4), 312-325.

Gupta, S., & Kumar, V. (2013). Sustainability and triple bottom line: A conceptual framework. *International Journal of Business and Management*, 8(7), 45-53.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7 th ed.). Upper Saddle River: Pearson Prentice Hall.

Hall, J. K., Daneke, G. A., & Lenox, M. J. (2010). Sustainable development and entrepreneurship : Past contributions and future directions. *Journal of Business Venturing*, 25(5), 439-448.

Husin, H. N., Chew, B. C., & Hamid, S. R. (2008). Quality management in construction: A revie w of current practices. *Journal of Quality in Maintenance Engineering*, 14(3), 234-248.

Isaksson, R., & Steimle, U. (2009). What does GRI reporting tell us about corporate sustainabilit y? *The TQM Journal*, 21(2), 168-181.

Johnson, M. P. (2017). Sustainability and sustainable development: A review of definitions. *Bus iness Strategy and the Environment*, 26(6), 745-762.

Johnston, A. (2014). Organizational sustainability: A literature review. *Journal of Business Ethi cs*, 121(3), 345-362.

Kloppenborg, T. J., & Opfer, W. A. (2002). The current state of project management research: Tr ends and future directions. *Project Management Journal*, 33(4), 5-18.

Kornilaki, M., Thomas, R., & Font, X. (2019). The sustainability behaviour of small firms in tour ism. *Journal of Sustainable Tourism*, 27(7), 1025-1042.

Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Delhi: New Age International.

Kuma, G. (2018). *Role of project risk management for project success: The case of Commercial Bank of Ethiopia projects* [Master's thesis, Addis Ababa University].

Kwak, Y. H., & Anbari, F. T. (2008). History of project management. In *The Wiley guide to pro ject organization and project management competencies* (pp. 1-26). Hoboken: Wiley.

Lundgren, R. E. (2017). *Risk communication: Theory and practice*. Hoboken: Wiley.

Maltzman, R., & Shirley, D. (2010). Green project management: Sustainability in projects. *Proj ect Management Journal*, 41(5), 98-105.

Moeuf, A., Pellerin, R., Lamouri, S., Tamayo-Giraldo, S., & Barbaray, R. (2020). The industrial management of SMEs in the era of Industry 4.0. *International Journal of Production Research* , 58(5), 1360-1383.

Mohsin, A. (2021). Risk management and project success: A review of emerging trends. *Project Leadership and Society*, 2, 100-112.

Mugenda, O. M., & Mugenda, A. G. (2003). *Research methods: Quantitative and qualitative ap proaches*. Nairobi: African Centre for Technology Studies.

Nguyen, T. H., Do, T. T., & Macchion, L. (2023). Risk management practices and project perfor mance in developing countries. *International Journal of Project Management*, 41(3), 102-118.

Ntibiramira, J. D. (2017). *Risk management and project success: A case of Kabuye Sugar Cane Company* [Master's thesis, Mount Kenya University].

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw -Hill.

Ogula, P. A. (2005). *Research methods in education*. Nairobi: CUEA Publications.

Olapoju, P. M., & Popoola, N. F. (2026). Evaluating the items of trust enhancement measuremen t in the manufacturing organizations in Nigeria through exploratory factor analysis. *Internationa l Journal on Integrated Education*, 9(1), 135-140.

Olson, D. L., & Wu, D. D. (2010). A review of enterprise risk management in supply chain. *Kyb ernetes*, 39(5), 694-706.

Osborne, J. W., & Waters, E. (2002). Four assumptions of multiple regression that researchers sh ould always test. *Practical Assessment, Research, and Evaluation*, 8(2), 1-9.

Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (7th ed.). London: Routledge.

Papageorgiou, S. N. (2022). On correlation coefficients and their interpretation. *Journal of Orth odontics*, 49(1), 75-77.

PMI (Project Management Institute). (2013). *A guide to the project management body of knowle dge (PMBOK guide)* (5th ed.). Newtown Square: Project Management Institute.

PMI (Project Management Institute). (2019). *What is project management?* Newtown Square: Project Management Institute.

PMI (Project Management Institute). (2021). *A guide to the project management body of knowle dge (PMBOK guide)* (7th ed.). Newtown Square: Project Management Institute.

Popoola, N. F., & Olapoju, P. M. (2025). Measuring the items of information technology in the m anufacturing companies in Nigeria through the exploratory factor analysis. *International Journa l of Academic Research in Economics and Management Sciences*, 14(4), 194-200.

Rabechini Junior, R., & Monteiro de Carvalho, M. (2013). Understanding the impact of project ri sk management on project performance. *Journal of Technology Management & Innovation*, 8(6), 145-158.

Ren, X., Zhu, A., Yu, J., & Guo, C. (2025). KMO and Bartlett's sphericity test. *PLOS ONE*. htt ps://doi.org/10.1371/journal.pone.0313603.t004

Risk Management Institute. (2018). *Risk management standard*. London: Institute of Risk Man agement.

Saad, M. (2020). Measuring sustainability in project management. *International Journal of Proj ect Management*, 38(4), 229-241.

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th e d.). Harlow: Pearson Education.

Shenhar, A. J., & Dvir, D. (2004). Project management evolution: Past, present and future. *Proj ect Management Journal*, 35(4), 5-11.

Shenhar, A. J., & Dvir, D. (2007). *Reinventing project management: The diamond approach to s uccessful growth and innovation*. Boston: Harvard Business School Press.

Shen, L. Y., Tam, V. W. Y., Tam, C. M., & Ji, Y. B. (2010). Project feasibility assessment in mai nland China: A sustainability perspective. *International Journal of Project Management*, 28(6) , 614-623.

Shrestha, N. (2020). Detecting multicollinearity in regression analysis. *American Journal of App lied Mathematics and Statistics*, 8(2), 39-42.

Silvius, A. J. G., & Schipper, R. P. J. (2014). Sustainability in project management: A literature r eview and impact analysis. *Social Business*, 4(1), 63-96.

Silvius, A. J. G., Schipper, R. P. J., Planko, J., van den Brink, J., & Köhler, A. (2012). *Sustainab ility in project management*. Farnham: Gower Publishing.

Smith, N. J., Merna, T., & Jobling, P. (2014). *Managing risk in construction projects* (3rd ed.). Chichester: Wiley-Blackwell.

Soyka, P. A. (2012). Creating a sustainable organization: Approaches for enhancing corporate va lue through sustainability. *Environmental Quality Management*, 21(4), 1-14.

Srinivas, K. (2018). Process of risk management. *National Institute of Construction Managemen t and Research Journal*, 12(3), 45-58.

Tang, W., Qiang, M., Duffield, C. F., Young, D. M., & Lu, Y. (2007). Risk management in the C hinese construction industry. *Journal of Construction Engineering and Management*, 133(12), 944-956.

Tharp, J. (2013). Sustainability in project management: Practical applications. In A. J. G. Silvius & J. Tharp (Eds.), *Sustainability integration for effective project management* (pp. 182-193). H ershey: IGI Global.

Van Kleef, J. A. G., & Roome, N. J. (2007). Developing capabilities for sustainable business man agement. *Journal of Cleaner Production*, 15(1), 38-51.

Verhaegen, P. (2015). Risk analysis in project management: A practical approach. *Project Mana gement Today*, 27(4), 22-28.

WCED (World Commission on Environment and Development). (1987). *Our common future*. Oxford: Oxford University Press.

West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation modeling with nonnormal va riables. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 56-75). Thousand Oaks: Sage Publications.

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Thous and Oaks: Sage Publications.

Zou, P. X. W., Zhang, G., & Wang, J. Y. (2007). Understanding the key risks in construction proj ects in China. *International Journal of Project Management*, 25(6), 601-614.

Appendix

QUESTIONNAIRE: PROJECT RISK MANAGEMENT PRACTICES AND THE SUSTAINABILITY OF MILK & MILK PRODUCT QUALITY AND SAFETY: A CASE STUDY OF THE BRIDGE+ PROJECT IN ADDIS ABABA

My name is RUTH DESALEGN KASSA, a student from Addis Ababa university, school of commerce, department of project management. Am carrying out a research on project risk management practices and the sustainability of milk & milk product quality & safety: A case study of BRIDGE+ project in Addis Ababa. I therefore request for your cooperation in answering the questionnaire. Please note that, names and personal information will not be disclosed to ensure privacy and confidentiality.

(Tick where appropriate)

Part. A: Demographics.

1. Gender of the respondent

Female ☐

Male ☐

2. What is your age?

1. 18 - 25 years ☐
2. 26-35 years ☐
3. 36-45 years ☐
4. 46 & above years ☐

3. What is your role?

1. Project Managers ☐
2. Project staffs ☐
3. M & E officers ☐
4. Regulatory officers ☐
5. Dairy processors ☐

4. How long have you worked?

1. 1-3 years ☐
2. 4-6 years ☐
3. Above 6 years ☐

Part. B:

Direction: Please read each question and indicate your agreement or disagreement by marking the appropriate response category.

I) project risks analysis

SA – Strongly agree A – Agree N - Not sure D- Disagree SD – Strongly disagree

No.	Item	SD	D	N	A	SA
1	Risks taking management allow the management to design appropriate strategies					
2	Risks analysis has reduced risk aversion of low return					
3	Risks analysis provided the attitude towards risks neutral					
4	Risks analysis has brought idea of establishing possible strategies of risks avoidance and elimination					

II) Project Risks Monitoring and Control

SA – Strongly agree A– Agree N - Not sure D- Disagree SD – Strongly disagree

No.	Item	SD	D	N	A	SA

1	Allocation funds based of project risks monitoring and control abilities					
2	Project risks monitoring and control involves having appropriate project risks planning					
3	Risks monitoring and control provides good decision for ongoing progress on milk & milk product quality and safety					
4	Project risks monitoring and control helps to estimate costs of risks reduction, in milk & milk product quality and safety					

III) Project risks knowledge and reporting

SA – Strongly agree A – Agree N - Not sure D- Disagree SD – Strongly disagree

No.	**Item**	**SD**	**D**	**N**	**A**	**SA**
1	There is sufficient knowledge to achieve the sustainability of milk & milk product quality and safety					
2	sustainability of the milk & milk product quality and safety resulted to having skilled / knowledgeable employees					
3	An appropriate communication enhanced the sustainability of milk & milk product quality and safety					
4	Upward and downward communication was used to share information on how to achieve the					

	sustainability of milk & milk product quality and safety					

IV) Sustainability of milk & milk products Quality and Safety

SA – Strongly agree A – Agree N - Not sure D- Disagree SD – Strongly disagree

No.	Item	SD	D	N	A	SA
Sustainability of milk & milk products Quality and Safety						
1	An appropriate and effective sustainability of Milk & milk products quality & safety is determined by project competitive advantage					
2	The sustainability of Milk & milk products quality & safety is indicated by economic value-added system					
3	The sustainability of milk products quality & safety project is determined by level of customer satisfaction					

Source: (Primary Data, 2023)