UNIVERSITY OF CAPE COAST

MANAGING RISKS IN NEW PRODUCT DEVELOPMENT PROJECTS IN

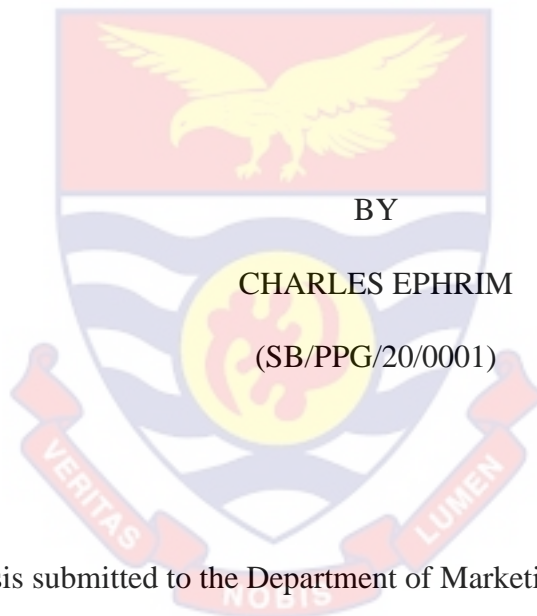THE FOOD AND BEVERAGE MANUFACTURING INDUSTRY IN

GHANA

CHARLES EPHRIM

2025

UNIVERSITY OF CAPE COAST

MANAGING RISKS IN NEW PRODUCT DEVELOPMENT PROJECTS IN

THE FOOD AND BEVERAGE MANUFACTURING INDUSTRY IN

GHANA

BY

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(SB/PPG/20/0001)

Thesis submitted to the Department of Marketing and Supply Chain
Management of the School of Business, College of Humanities and Legal
Studies, University of Cape Coast, in partial fulfilment of the requirements for
the award of Master of Commerce degree in Project Management.

APRIL 2025

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature …………………………   Date…………………...

Name: Charles Ephrim

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature…………………   Date……………………

Name: Prof (Mrs) Gloria Agyapong

Co-Supervisor's Signature………………………   Date …………………..

Name: Dr. Edmond Yeboah Nyamah

ii

ABSTRACT

New product development projects in the food and beverage sector have a host of risks that should be managed to ensure project success. This study's purpose was to determine the risk management practices within the food and beverage manufacturing industry in Ghana during new product development and how the risk management practices influence the success of new product development projects. This study adopted both qualitative and quantitative research approaches. This was because two of the study's objectives required the collection of qualitative data, while one other objective also required quantitative data to collectively answer the research questions. The study's data were analysed using both qualitative and quantitative data analysis tools. NVivo was used to analyse the qualitative data while Statistical Package for Social Sciences (SPSS version 26) was used to analyse the quantitative data. The study revealed that political, environmental/climatic, regulatory, market, technological/technical, operational, competitive, supply chain, financial, performance, and credit risks as some of the main risks associated with new product development initiatives in Ghana's food and beverage industry. This study also revealed that risk management practices positively and significantly influence the success of Ghana's new product development projects at various stages of the new product development process. Managers can, therefore, use these insights to bolster the success of their new product development projects by improving their risk identification and analysis strategies; tailoring risk management practices across product development phases; and aligning their risk management practices with international standards like ISO 31000.

KEY WORDS

Food and Beverage Industry

New Product Development Projects

Risk Management

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DEDICATION

To my parents: Mr. Cadjetan Ephrim and Mrs. Mary Ephrim and all my

siblings.

TABLE OF CONTENTS

CHAPTER TWO: LITERATURE REVIEW

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

CFA	Confirmatory Factor Analysis
CIA	Confidentiality, Integrity, and Availability
EFA	Exploratory Factor Analysis
ISO	International Standards Organisation
NPD	New Product Development
SPSS	Statistical Package for the Social Sciences

CHAPTER ONE

INTRODUCTION

Background to the Study

Consumers have been acknowledged to be showing growing interest in value-added food and beverage products that are enhanced with proteins, vitamins, calcium and other minerals, according to research (Annunziata, Mariani & Vecchio, 2019; Grumezescu & Holban, 2019). As part of this reason, a lot of food and beverage firms are also seeking efficient ways to enhance their products. Nowadays, many companies in the food and beverage manufacturing industry see the idea of manufacturing new products as a strategic tool to ensure growth and maintain their competitiveness. Salavati, Tuyserkani, Mousavi, Falahi, and Abdi (2016) assert that modern food and beverage businesses view the manufacturing of new products as one of the best ways to ensure their survival and expansion.

Kotler and Keller (2016) express that a new product development project can be a product that is new to the world, new product line within the company or an expansion of the present product line. Kowalczewski, Walkowiak-Tomczak, and Masewicz (2020) cite a number of factors, including customer demand (resulting from changing lifestyles and desire for healthier living), market pressure or competition, and new invention as reasons why modern businesses engage in the manufacturing of innovation or new food and beverage products.

Many food and beverage manufacturing companies are not always sure of the success of their new production investments. However, in a business setting, any firm that develops a new product invests time, money etc. that

1

must be recouped. Kowalczewski et al. (2020) assert that a number of variables, such as time and development costs affect a new product's financial success. These factors also affect sales, customer preferences, and product performance. Mkrtchyan, Straub, Giachino, Kocher, and Sansavini (2022) say that in new product development initiatives, product manufacturing firms generally encounter risks that may be preventable as well as those that are not. Establishing and implementing sound risk management is therefore essential for product manufacturing firms in order to reduce and address risks and improve their chances of developing successful, profitable products. Risks are uncertainties that could negatively affect any company and its activities, according to Renn (2017).

Cui and Wu (2017) are of the view that effective risk management practices are crucial for all manufacturing companies engaged in new product development projects because of the high financial resource commitments, and the competitive nature of the food and beverage industry. Thus, if a company's risk management strategies are not properly planned and executed, they may endanger the company's capital, market share, product success, and profitability. Experts Exchange (n.d.) has it that effective risk management practices aim to strike a balance between potential harm and the appropriate cost of such harm.

One of Ghana's most valuable business sectors is thought to be the food and beverage industry. Its contribution to national development and nutrition accounts for a portion of its importance. MyJoyOnline (2017) cites Report Linker (2015) that shows that the food and beverage industry

2

contributed approximately US$125 million to the nation's GDP in the 2014 fiscal year alone.

The sector also contributes significantly to Ghana's economy by creating thousands of direct and indirect job opportunities along the value chain. The fact that 41% of Ghanaians' total income goes towards food and beverage alone, according to a survey (ModernGhana, 2020), further demonstrates the sector's significance to the country's economy.

While the average Ghanaian may find this high expenditure (41%) to be quite concerning, some researchers believe that it also contributes to the sector's potential for providing a market for food and beverage products (Andam & Silver, 2016; ModernGhana, 2020). Ghana's fast population growth, tourism, and dietary shifts are all factors that Research and Markets (2019) points to as contributing to the food and beverage industry's optimistic outlook. Research and Markets, therefore, explains that companies that manufacture products in the sector need to innovate, such as creating new food and drink items, in order to be able to support themselves and satisfy the tastes and preferences of their customers.

Several scholars have claimed that a lot of manufacturing companies in Ghana have turned to launching new product development projects in the market for the food and beverage sector (Osei, Yunfei, Appienti & Forkuoh, 2016; Research & Markets, 2023). Janita and Miranda (2013), Parananond and Thawesaengskulthai (2014), and Osei et al. admit that such creative endeavours are noble but are also risky. Aadi et al. (2019) express that food and beverage items do carry a number of risks and quality control issues.

Therefore, implementing effective risk management techniques is always a key factor in new product development initiatives.

In order to ensure that the goals of new product development projects are fully realised and to reduce the time and expense required to enhance product quality, research on effective risk management practices in new product development projects within Ghana's food and beverage industry has therefore become extremely important.

Statement of the Problem

In management literature, the concept of risk management has become very essential for both practitioners and researchers. Effective risk management at the individual and organisational levels has become crucial as a result of the impact of risk according to Project Management Institute (PMI, 2017). Risks are regarded as unknowns that present businesses with either opportunities or threats (Sreedevi & Saranga, 2017). Fraser and Simkins (2017) are of the view that businesses aim to exploit opportunities and limit threats.

The global food and beverage industry continues to demonstrate strong growth potential. As reported by The Business Research Company (2024), the market expanded from approximately $6.58 trillion in 2023 to $7 trillion in 2024, reflecting a compound annual growth rate (CAGR) of 6.4%. Projections indicate that this upward trend will continue, with the market expected to reach $8.82 trillion by 2028, growing at a CAGR of 5.9%. As part of its promising nature, the industry has attracted significant investment into the subsector, leading to large-scale new product development initiatives. Notwithstanding, some researchers and project management experts have

4

noted the existence of high-risk issues within the subsector. For example, Kristina and Wijaya (2017) used the Australia/New Zealand 4360 Standard to identify 40 medium-high risks out of 59 risks acknowledged in their study of the food and beverage industry.

Even though the sub-sector is both lucrative and risky, a thorough review of the literature in the field has shown that not much has been done to explain the risks involved in new product development projects in the food and beverage sector in developing nations like Ghana (Anagnostopoulos, 2018). Thus, most current studies on risk management available in the country focus on other sectors of the economy. On the international front, Ho, Zheng, Yildiz, and Talluri (2014); Porananond and Thawesaengskulthai (2014) as well as Azanedo et al. (2020) have carried out research on risk management during new product development. However, the corporate and geopolitical circumstances in which these studies were carried out varied greatly, aside being outside of Africa. It must be noted that one essential feature of risk, according to research, is that it differs depending on the firm and the situation. Firm-specific risk thresholds and controls also differ significantly (Kristina & Wijaya, 2017). In view of that there is, therefore, a lack of knowledge on the risks involved in new product development projects in Ghana's food and beverage manufacturing sector, which may then have an impact on risk management as a whole (Adaku et al., 2018). Thus, "What are the risks associated with new product development projects in Ghana's food and beverage manufacturing industry?" was one of the objectives this study aimed to answer. The purpose of this investigation was to ascertain whether unique risks might be identified.

Despite new product development initiative being a vital tool for gaining a competitive edge and expanding the product market, Chauhan et al. (2018) and Azanedo et al. (2020) have asserted that new product development initiative can be a dangerous, expensive, and difficult venture for any firm to pursue. Salavati, Tuyserkani, Mousavi, Falahi, and Abdi (2016) as well as other researchers have said that effective risk management practices in the food and beverage industry may ensure project success among other things by providing recommendations for making sound decisions in new product development projects. Yet, Kpodo and Agyekum (2014) claim that effective risk management practices continue to be problematic in developing countries. Abotsi, Dake, and Quartey (2014) as well as Batie (2021) have stated that the strategic adoption and application of proper risk management techniques in the development of new products continue to be an issue in Ghana despite the uncertainty and complexities associated with food and beverage production. Therefore, the second objective of this study was to ascertain how companies in the sector manage risk when developing new products. "What are the risk management practices of the food and beverage manufacturing firms in Ghana during new product development projects?" was the second issue this study addressed.

For Fischbacher-Smith (2017), managerial investments might occasionally lead to a paradox. Thus, managerial investments might not always produce the desired outcomes. Jankensgård (2019) expresses that risk management does not always result in the success of projects aimed at developing new products. Consequently, a third objective of this study was to evaluate how risk management practices affected the success of new product

6

development initiatives at every stage of the process. "Do risk management practices at each stage of the new product development process have effects on the success of new product development projects in Ghana?" is the study question that the researcher developed in order to accomplish this third objective.

Purpose of the Study

The study's primary purpose was to determine the risk management practices within the food and beverage manufacturing industry in Ghana during the production of new products and how risk management practices influence the success of new product development projects at various levels of the product development process.

Research Objectives

The specific objectives of the research were:

1. To determine the risks associated with new product development projects in the Ghana's food and beverage manufacturing industry.

2. To determine the risk management practices of the Ghana's food and beverage manufacturing firms during the development of new products.

3. To examine the effects risk management practices at the stages of the New Product Development process have on the success of new product development projects.

Research Questions

The research questions for the study were:

1. What are the risks associated with new product development projects in Ghana's food and beverage manufacturing industry?

7

2. What are the risk management practices the food and beverage manufacturing firms employ during the development of new products in Ghana?

3. What effects do risk management practices at the different stages of the new product development process have on the success of new product development projects?

Research Hypotheses

These hypotheses were formulated for the objective three (3) of the study, which sought to examine the effects of risk management practices at the various stages of the new product development process on the success of new product development projects in the food and beverage industry in Ghana.

Hypothesis 1

H_0: There is no significant relationship between risk management practices at the Idea Generation stage of the new product development process.

H_1: There is a significant relationship between risk management practices at the Idea Generation stage of the new product development process.

Hypothesis 2

H_0: There is no significant relationship between risk management practices at the Idea Screening stage of the new product development process.

H_1: There is a significant relationship between risk management practices at the Idea Screening stage of the new product development process.

Hypothesis 3

H_0: There is no significant relationship between risk management practices at the Concept Development stage of new product development process.

8

H_1: There is a significant relationship between risk management practices

at the Concept Development stage of the new product development

process.

Hypothesis 4

H_0: There is no significant relationship between risk management practices

at the Marketing Strategy stage of the new product development process

H_1: There is a significant relationship between risk management practices

at the Marketing Strategy stage of the new product development process

Hypothesis 5

H_0**:** There is no significant relationship between risk management practices

at the Product Development stage of the new product development

process.

H_1: There is a significant relationship between risk management practices

at the Product Development stage of the new product development

process.

Hypothesis 6

H_0: There is no significant relationship between risk management practices

at the Test Marketing stage of the new product development process.

H_1: There is a significant relationship between risk management practices

at the Test Marketing stage of the new product development process.

Hypothesis 7

H_0: There is no significant relationship between risk management practices

at the Product Launch stage of the new product development process.

H_1: There is a significant relationship between risk management practices

at the Product Launch stage of the new product development process.

9

Significance of the Study

This study's contribution to knowledge, practice, and policy demonstrates its importance. In an industry where a number of the manufacturing firms are creating new food and beverage products due to a variety of factors, such as changing consumer needs and preferences, it is important that such businesses adopt and follow appropriate risk management practices in order to be effective and avoid wasting limited resources.

In terms of practices, the results of this study have shed light on risk management strategies used in the food and beverage manufacturing sector. The research has specifically shed more light on some unique risks associated with new product development initiatives, such as inflation, foreign exchange risk (caused by the importation of certain ingredients), technology risk, market risk, environmental/climatic risk, and market risk. The study has also offered recommendations for effective risk management practices when developing new products, such as making sure that companies have appropriate cross-functional risk management teams whiles enhancing risk identification, assessment, and control measures.

As regards policy, the results of this study have impacted national and organisational policy choices. Occupational health and safety policies, such as safety training programs; supply chain management policies, such as the creation of backup plans for supply chain interruptions; and quality assurance and control policies, such as adherence to quality standards, are a few of the organisational-level policies that were impacted by the research. As a result, companies in the industry must learn that, in order to effectively manage risk, they must develop policies for quality assurance and control, occupational

10

health and safety, and appropriate supply chain management. Since many studies have demonstrated that the adoption of appropriate project risk management practices and standards has positive outcomes for firms' survival and growth, the results of this study have also informed policymakers at the national level about the necessity of ensuring that firms in the industry adopt and implement proper risk management practices. This study had an impact on a number of national policies, including those pertaining to risk management. Policies for quality control and assurance, such as those concerning food and beverage standards, are also included. The Ghana Standard Authority (GSA), the Environmental Protection Agency, the Food and Drugs Authority (FDA), and other pertinent regulatory agencies can then put measures in place to ensure compliance and effective risk management practices in the sector.

With regard to knowledge, the study has broadened the body of knowledge regarding risk management in the food and beverage manufacturing industry, particularly when new products are being developed in the developing countries like Ghana. It has also extended the application of the Kano Model and the Theory of Constraints, showing how they can benefit the food and beverage sector, particularly with regard to risk management in new product development initiatives.

Delimitations

Marshall and Rossman (2016) have hinted that researchers establish study parameters to make clear what the study does not include. The Ghanaian food and beverage manufacturing sector is the exclusive focus of this study. Only food and beverage manufacturing businesses in Ghana, specifically those based in Greater Accra and the Central regions, were included in the study. In

11

particular, the study comprised all manufacturing businesses operating in the aforementioned regions that have been actively engaged in new product development initiatives in the course of the last 10 years. The study's quantitative component was restricted to the Greater Accra region whiles the qualitative component was based on both regions. The entire study's respondents were mainly project managers, general managers, operational managers, risk managers or heads of risk, quality control/assurance officers etc.

Limitations of the Study

The study's limiting factor was the unwillingness of some respondents to participate in the study which slightly affected the response rate. Although letters were secured and sent from the University's Institutional Review Board, some respondents were reluctant to respond to the instruments (i.e., interview and questionnaire).

Definition of Terms

The following are some concepts used in the study that have been operationally defined:

New product: This refers to a product that the business firm has not previously sold. In other words, it refers to an original or existing product that has been improved or modified (Gürbüz, 2018).

New Product Development: It refers to the complete creation and market entry of new products to the market (Kuka, 2018). It may also refer to the complete process of bringing a new product to market. This applies to developing an entirely new product, improving an existing one to make it

12

attractive and competitive, or introducing an old product to a new market (Silinevica & Amantova-Salmane, 2016).

Risk: It refers to any event that may negatively affect the viability of a project (Pinto, 2019).

Risk Management: It refers to the art and science of identifying, analysing and responding to risk factors throughout the life of a project and in the best interests of its objectives (Pinto, 2019; PMI, 2017).

Food and beverage industry: It refers to the sector that encompasses all companies involved in processing, packaging, and distributing raw food and beverage materials. The foods include fresh, prepared, and packaged foods. The beverages include alcoholic and non-alcoholic beverages. Companies in this industry include restaurants, cafes, fast-food joints, food manufacturing operations, catering businesses, and any other establishments that process, distribute, and sell food and beverages (EHL Insights, n.d.; Infiniti Research, 2023).

Organisation of the Study

This study is presented in five chapters. Chapter One consisted of the background to the study, statement of the problem, objectives of the study, research questions, research hypotheses, significance of the study, scope or delimitation of the study, limitations of the study, definition of relevant terms, and the organisation of the study. Chapter Two presents the theoretical review, the conceptual review, the empirical review, and the conceptual framework or model used in the study. Chapter Three is the research methods used in the study. These research methods included research design, research paradigm, research approach, research population, sampling and sampling techniques,

13

data collection methods and instruments, data analysis, and ethical issues. Chapter Four presents the results, analysis, and discussion of the research findings. Chapter Five presents a summary of the study, conclusions, recommendations, and areas for further research.

14

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter reviews the relevant literature on the subject. The review covers key areas, such as theoretical, conceptual, and empirical reviews. This chapter also presents the conceptual framework or model for the study. The theoretical review states and explains the proposed theories. The conceptual review defines and explains key concepts and operational definitions from various authors and researchers, whereas the empirical review examines the work done in the study area. The conceptual framework deals with the relationships between the variables in the study and how the researcher intends to achieve the research objectives.

Theoretical Review

The application of theories to this study is critical for providing the appropriate theoretical framework within which to situate the study, define variables and constructs, and link the study to authorities within the domain of study. After reviewing numerous theories and frameworks on the study's two variables—risk management and the new product development project—the researcher identified the following theories and models as suitable for the study: the Kano Model, the theory of Constraints, and the New Product Development Process Model.

The Kano Model

Professor Noriaki Kano developed the Kano Model in the 1980s as a theory for product development and customer satisfaction. Customer satisfaction in this research was operationalised as a variable for measuring the

15

success of new product development projects. According to Szymczak and Kowal (2016), the Kano model divides new product qualities into multiple groups based on their influence on consumer satisfaction. The model was adopted in this study because it provides a guide on how manufacturers can reduce risks in new product development projects by tailoring new product qualities to meet customers' satisfaction. The model proposes that product attributes can be divided into five distinct qualities or groups. These groups are as follows: Must-be qualities (M), One-dimensional qualities (O), Attractive qualities (A), Indifferent qualities (I), and Reversed qualities (R). These divisions are explained in the following sections:

One, Must-have qualities (M): These product qualities address the fundamental demands of products. They are essential product features that customers expect from a product. If these features are absent, customers will be dissatisfied. However, their presence does not necessarily increase customer satisfaction because those qualities are considered as standard requirements. They also serve as the price of entry into a market. These product qualities are, therefore, required in a new product to at least reduce customer dissatisfaction and allow the product to stay in the market.

The next product attribute is One-dimensional quality (O). Kano asserts that there are certain product features whose presence and performance will make customers more satisfied. Thus, the better the performance of such features, the higher the customer satisfaction. The worse the performance of such features, the lower the satisfaction. The import of this attribute for risk management is that manufacturers of new products must ensure that their products deliver exactly what they claim

to deliver to customers to avoid customer dissatisfaction. Flamboyant advertisement messages that promise what the product cannot deliver pose a serious risk to customer satisfaction.

Attractive quality (A) is another category of product quality that is required based on the model. This group of product qualities is considered as 'bonus' features, as they are said to boost pleasure if they are included in the products but have no substantial negative influence if they are not. It is asserted that providing such features will ensure some level of competitive advantage among similar products in the market.

Indifferent product quality (I) represents another group in the Kano model. Per the model, these are product qualities whose presence will not make customers satisfied even if they are present in the product. Customers will also not be dissatisfied either if they are not featured in the product. These qualities do not actually result in customer satisfaction or dissatisfaction. Kano asserts that it is interesting to identify these attributes in products to reduce them in order to reduce production cost since they have no impact on a customer's buying decision.

The Reverse quality (R) is the final product quality that the model focuses on. According to the model, these are product qualities that negatively impact customer satisfaction and should be avoided. It is asserted that even if these qualities are to be present in a product at all, they should be present in moderation. This is because when they become excessive in a product, they result in customer dissatisfaction. For example, in a given food and beverage product, Kano asserts that the product must not be embedded with too many extra or complex features that would cause ordinary customers to suffer

17

unduly before they can use the product. An excessive presence of these qualities in a product can make customers even bored or dissatisfied and then lead them to consider an alternative product. Figure 1 shows a sample of the Kano Model.
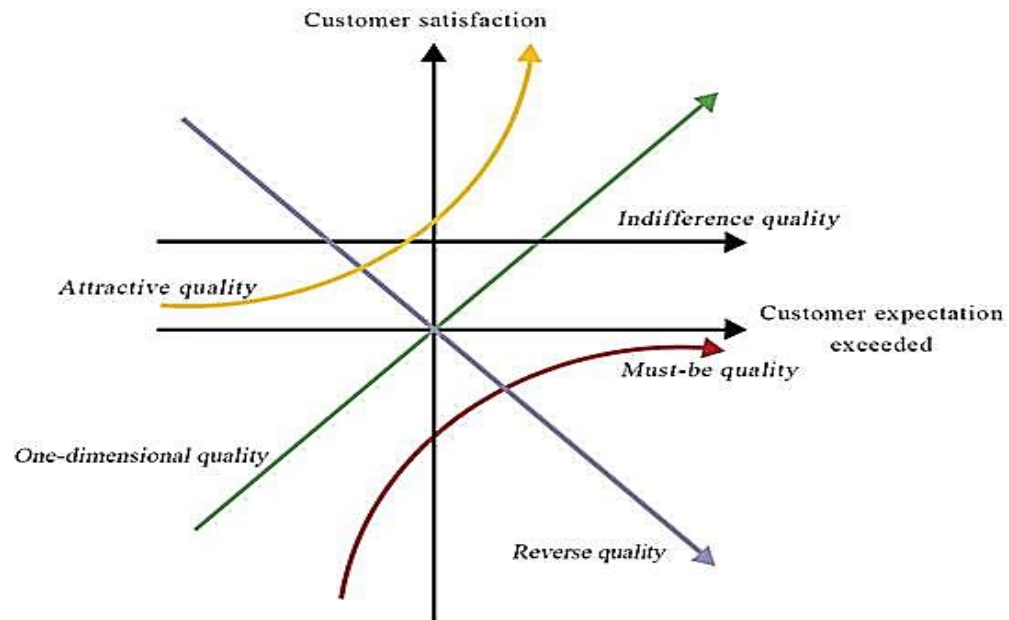
Figure 1: The Kano Model

Source: Szymczak and Kowal (2016)

In all, when it comes to risk management and new product development (NPD) in the food and beverage sector, the Kano model can assist in determining which product features are most important to customer satisfaction and ought to be given priority. By ensuring that key features are sufficiently developed and avoiding overinvesting in aspects that are less significant to customers, businesses can better control the risks associated with NPD. This strategic approach can lead to more successful product launches and sustained market competitiveness (Wimarnaya et al., 2021).

Theory of Constraints

The theory of Constraints, abbreviated as TOC, is a management theory developed by Goldratt in 1984. The theory has been applied across multiple industries to optimise processes and manage risks associated with bottlenecks and constraints. The theory comprises five focal steps. The initial step involves identifying constraints, which pertains to determining the processes or factors that limit overall system performance. The second step involves leveraging the constraint, which pertains to optimising its utilisation without incurring substantial additional costs. The third step involves subordinating all other elements, which pertains to aligning all processes to support the constraint. The fourth step involves elevating the constraint, which pertains to implementing measures to either eliminate or enhance the capacity of the constraint. The final step entails reiterating the procedure; this step indicates that upon resolving a constraint, one should proceed to the next limiting factor.

The theory of constraints serves as a robust theoretical foundation for this study, as it posits that every project has at least one constraint, bottleneck, or risk that impacts the achievement of the project's objectives and necessitates resolution or mitigation. In the context of new product development, the theory of Constraints (TOC) can assist in pinpointing the most significant limitations that may hinder advancement and help in devising strategies to alleviate project development risks. Trojanowska, Justyna, Dostatni, and Ewa (2017) assert that employing the theory of Constraints in new product development projects will aid management in fostering creativity, initiating, and executing strategies that provide optimal solutions for addressing project

19

risks. Pinto (2019) asserts that the effective application of the theory of Constraints will aid manufacturing firms in producing new products, thereby enhancing profitability, sustainability, and value creation, among other benefits.

Marris (2020) examined the implementation of TOC in NPD and its effect on project results. He found that focusing on the primary constraints in the product development process can significantly enhance project timeliness and resource utilisation. The research emphasises that by resolving bottlenecks, organisations can enhance risk management and expedite product delivery without sacrificing quality.

New Product Development Process Model

The New Product Development Model as the name suggests is a model for new product development. It is considered as a model whose development has been shaped by the contributions of various researchers as well as practitioners over time. Thus, no single individual is attributed with its entire formulation. However, significant contributions from scholars such as Philip Kotler, Kevin Lane Keller, Karl Ulrich, Steven Eppinger, and Robert Cooper have been realized as having shaped and refined the model into the comprehensive framework being used today (Kotler & Keller, 2016; Ulrich & Eppinger, 2016).

The seven-step new product development process model is a well-established framework that offers a systematic method for introducing new products to the market. Every phase in the process model aims to identify, enhance, and verify the product concept. This study adopts the model because Cooper (2019) posited that one of the effective strategies for risk management

20

during a new development process is the implementation and adherence to the new product development process model. Adhering to the guidelines of the new product development model substantially mitigates risks according to Copper. Owen (2009) delineates the seven principal stages. Figure 2 illustrates the phases of the new product development process.

Figure 2: New Product Development Process Stages

Source: Owens (2009)

Conceptual Review

A conceptual review categorises and describes concepts pertinent to the study. This section discusses concepts such as project risk management, risk management standards and frameworks, new product development, risks associated with new product development projects, food and beverage manufacturing industry, and food and beverage value chain.

Project Risk Management

The Project Management Institute (PMI, 2017) asserts that a risk is an unknown occurrence or condition that, if it happens, impacts at least one project goal. Similarly, ISO 31000 (2018) asserts that risk is the possibility of anything occurring that will influence an aim. The opinion of Pinto (2019) is not different when he asserted that a risk refers to any possible event that can negatively affect the viability of a project. According to the definitions of risk that have been mentioned, it is important to understand that risk affects the goals of an organisation either positively or negatively.

21

Regarding risk management, Project Management Institute (2017) asserted that risk management is about the process of identifying, analysing, and responding to uncertainty, which includes optimising the results of good occurrences and reducing the effects of negative events. This view is also shared by Al-Nimer et al. (2021), who describe risk management as a systematic method of recognising and reducing uncertainties and risks through the alignment of strategy, organisational processes, people, technology and, knowledge. A comprehensive and integrated risk management strategy then provides a comprehensive and integrated framework for an organisation to proactively reduce business risk, allowing it to strike a balance between strategic business needs and risk thresholds to improve overall competitiveness and shareholder value.

Sweeting (2016) stated that risk management entails recognising risks, balancing the danger against the organisation's risk appetite, deciding on mitigating factors, putting them into action and, regularly reporting and analysing these activities. Bryson (2018) asserted that risk management is a strategic method for analysing and evaluating the effects of hazards in a firm. The central idea that can be drawn from the various descriptions of risk management is that risk management is a concerted effort to steer and control an organisation against risks when performing business operations. It is anticipated that risk management will help prevent prospective losses as much as possible or, if feasible, turn risks into opportunities to generate corporate profits.

Project Management Institute (PMI, 2017) asserts that project risk management is about strategy for managing project risk. It involves

22

comprehensively integrating project risk management techniques into financial and business objectives. Project risk management, therefore, is a series of strategic actions for efficiently managing risk. The purpose of project risk management according to Okudan, Budayan, and Dikmen (2021), is to improve business and project results by providing insight, knowledge, and improved decision-making capabilities. Project risk management then seeks to anticipate risk events by identifying internal or external causes of project risk, assessing their impact on project progress, and recommending appropriate treatment measures. An effective project risk management system, according to Committee of Sponsoring Organisations of the Treadway Commission (COSO, 2004), strives to safeguard an organisation's capital and profitability while not impeding growth.

Risk Management Standards and Frameworks

Regulatory bodies, both internationally and locally, recommend or impose a variety of standards and frameworks for business organisations in the area of risk management. The international standards and frameworks include the International Organisation for Standardisation (ISO 31000, 2018) and the Committee of Sponsoring Organisations of the Treadway Commission (COSO, 2004).

The ISO 31000 framework aims to establish a globally acknowledged standard for professionals and organisations involved in risk management. In an uncertain environment, the framework serves as an exemplary framework for any organisation pursuing a definitive risk management strategy. The principles in the framework are considered as relevant to all organisations, irrespective of their size, function, or industry. Talbot (2022) asserted that the

implementation of ISO 31000 by businesses can enhance an organisation's likelihood of achieving objectives, refine the identification of opportunities and threats, and optimise the allocation and utilisation of risk treatment resources.

Similarly, COSO (2004) is also an international standard for risk management. The organisation asserts that several essential components must be incorporated when any business firm develops an effective risk management framework. These encompass analysing the internal environment; establishing objectives; recognising risks; quantifying and evaluating risks; mitigating risks; reporting and monitoring risks; and governing risks. Table 1 presents the dimensions of risk management and their corresponding descriptions in the context of designing a risk framework as per COSO.

Table 1: Description of Risk Management Framework

A) Strategic Objectives of risk Management B) RM Dimensions	Consists of strategy, operations, reporting and compliance of an organisation Descriptions
i. Internal environment	This critical element represents an organisation's approach to and handling of risk. This encompasses the entity's stance on risk management, its operational approach, tolerance for risk, commitment to integrity and ethics, competence, organisational framework, delegation of authority and responsibility and standards related to human resources.
ii. Objective setting	A foundational element in the initial phases of a risk management process that links to various levels is a prerequisite for successfully identifying events, evaluating risks, and implementing appropriate risk responses.
iii. Event identification	When considering event identification, it can result in either positive or negative outcomes, leading to recognition of opportunities and threats. Organisations can draw from various methods outlined by COSO and AICPA to assess this process, which offers implicit guidance for their operations.

24

Table 1: (Continued)

iv. Risk assessment	Risk evaluation is the procedure of assessing risk profiles in terms of their likelihood and impact using both quantitative and qualitative methodologies. Qualitative techniques involve categorising potential risks as "high," "medium," or "low." In quantitative assessment, risks are measured by assigning numerical scores and considering their economic implications.
v. Risk response	A series of measures, such as risk avoidance (A), Risk Reduction (R), Risk Acceptance (A), Risk Sharing (S) etc. are employed to align risks with the organisation's risk tolerance and appetite, as described by Tillman in 2011.
vi. Control activities	These measures are implemented to mitigate risks in accordance with the organisation's policies and procedures to ensure that risk responses are effectively executed.

Source: Committee on Sponsoring Organisations of the Treadway Commission (COSO, 2004)

New Product Development

New Product Development (NPD) is an essential strategy for organisations seeking to sustain competitiveness and foster growth in rapidly evolving markets (Salavati et al., 2016). It entails a sequence of systematic stages, each requiring strategic management and cross-functional cooperation. This review consolidates contemporary viewpoints on new product development, focusing on key stages.

Silinevica and Amantova-Salmane (2016) define new product development as the comprehensive process of introducing a new product to the market. This pertains to creating a novel product, enhancing an existing one for increased appeal and competitiveness, or launching an old product in a new market. New product development concentrates on cultivating an entirely novel concept—from ideation to development to launch. The principal phases of the new product development process encompass the following stages:

Idea generation: It pertains to the origins of new product ideas**.** Ruiz-Pava and Forero-Pineda (2020) contend that organisations utilise various sources

25

for idea generation, including internal research and development (R&D), customer feedback, brainstorming, competitive analysis, and market trends.

Idea screening: It involves assessing a multitude of generated concepts. Cooper (2019) asserts that evaluating ideas based on feasibility, market potential, and strategic alignment is essential for the early elimination of nonviable options. Techniques such as SWOT analysis and cost-benefit analysis are frequently used in the evaluation of new product development project concepts.

Concept Development and Testing: This entails formulating a product concept and evaluating it**.** Homburg, Jozić, and Kuehnl (2017) assert that formulating product concepts and evaluating them with prospective customers to authenticate ideas and collect feedback is essential. Prototyping and minimum viable product (MVP) testing are regarded as some of the standard practices.

Business Analysis: Kahn (2018) posited that this phase involves performing a comprehensive financial analysis of project expenditures, income, and profitability, in conjunction with risk evaluations to pinpoint potential challenges and strategies for mitigation.

Product Development: This stage concerns converting ideas into physical products (PMI, 2017).

Test Marketing: Hanahara (2021) asserted that converting concepts into physical products necessitates meticulous engineering, design, and interdepartmental collaboration. Kotler and Keller (2016) have it that this phase involves launching the product in a restricted market to evaluate marketing strategies and enhance the product in response to consumer

26

feedback. The pilot program facilitates the collection of essential data regarding consumer responses and market dynamics.

Commercialisation: This entails the large-scale introduction of a new product into the market. Crawford and Di Benedetto (2021) emphasised the necessity of formulating comprehensive go-to-market strategies and monitoring product performance post-launch to facilitate requisite adjustments in response to market dynamics and consumer feedback.

Types of Risks in New Product Development

In the earlier submissions in this research, risk has been considered as an undesirable event or condition that ought to be mitigated to achieve success in the new product development process. A number of researchers therefore have documented types of risks evident during new product development. Dewi, Syairudin, and Nikmah (2015) categorised technology, performance, market, organisational, supply chain, commercial, competitive, and financial risks as types of risks in new product development. They are discussed as follows:

Technological and technical risks in New Product Development

This risk manifests when a company implements new technology in the development of a new product. Dewi, Syairudin, and Nikmah (2015) explained that a team may possess blind spots or deficiencies in certain capabilities, potentially resulting in bottlenecks during development. MoldStud (2023) asserts that engaging consulting experts to bridge knowledge gaps and enhance the project team's competencies can effectively mitigate technological risks.

27

Olechowski, Eppinger, and Joglekar (2017) elucidate that technical risk is an intrinsic risk that includes several subdivisions, including product design, manufacturing technology, and intellectual property. These primarily concern the firm's internal talents and its ability to execute and fulfil certain goals using the resources at its disposal. Chauhan, Nepal, Soni, and Rathore (2018) elucidated that one of the primary challenges in this case is that it can make a new product fail to meet the safety and performance criteria at the end of the development process.

Performance risk in New Product Development

Dewi et al. (2015) assert that a performance risk occurs when a firm is uncertain about the function and reliability of a product in real-world conditions until it is built and tested. Such latent performance issues can be a significant challenge when developing desired new products. This is often addressed by creating a functional prototype and testing it to confirm its function and reliability.

Market risks in New Product Development

External factors, including market dynamics, consumer sentiment, economic conditions etc. can influence the success of a new product. This category of risk is referred to as market risk. Schmidt (2015) asserts that market risks are frequently mitigated through market research, which companies undertake to understand their customers' needs and wants. For Hudáková et al. (2017), market risks encompass customer acceptance, competitive threats, and substitution risks within the business's competitive landscape.

28

Organisational risks in New Product Development

Zacca, Dayan, and Elbanna (2017) purport that organisational factors such as internal conflict, can negatively influence any new product development efforts. This type of risk is seen as organisation risk**.** It is said that this type of risk can be fixed by defining capacity issues and ensuring buy-in from major stakeholders in the firm. Olechowski, Eppinger, and Joglekar (2017) allude to the fact that organisational risk in new product development process includes internal communication issues while striving to produce new products.

Supply Chain risks in New Product Development

While sourcing materials from suppliers can facilitate cost reduction and alleviate internal workloads in product development, Silinevica, Igavens, and Amantova-Salmane (2016) contend that it may also lead to disruptions in the supply chain. This category of risk is referred to as supply chain risk. Thus, some suppliers may fail to fulfil their contractual obligations. Juranić, Marjanović, and Pavković (2016) asserted that managers can mitigate this type of risk by evaluating suppliers based on both cost and reliability.

Financial risks in New Product Development

Hong and Ren (2024) indicated that managers may face challenges related to limited access to capital or financial constraints that impede the timely development of new products. This category of risk is referred to as financial risk.

Commercial risks in New Product Development

Landes (2023) asserts that commercial risk as the degree to which a product or concept is financially viable for the producing company. Adafin,

29

Rotimi, and Wilkinson (2021) explained that commercial risk includes the fact that a product under development may violate resource limits, such as a development project's budget, which must be reduced through effective budgeting and forecasting procedures.

The Food and Beverage Manufacturing Industry: A Ghanaian Perspective

The food and beverage sector in Ghana is a diverse and vital sector that contributes significantly to the country's economy. The sector comprises diverse players, each essential to the production, processing, distribution, and consumption of food and beverage. Some of the key players of the industry in Ghana include agricultural producers, food processors and manufacturers, beverage producers, food retailers and distributors, hospitality facilities, regulatory agencies, support services, research and development organisations, financial institutions, consumers, and industry associations (Omari et al., 2020; Farrelly & Mitchell, 2022; GCB Bank Ltd., 2022).

Agricultural producers include farmers who cultivate crops, raise livestock, and engage in both marine and inland fisheries. Food processors and manufacturers encompass primary processors that mill, can, and freeze agricultural products. It also encompasses secondary processors engaged in the production of value-added products, including dairy items, juices, confections, and packaged foods. Additionally, food processors and manufacturers include enterprises that convert cocoa beans into products like cocoa butter and chocolate. The beverage manufacturers comprise both alcoholic and non-alcoholic producers. Food retailers and distributors include supermarkets, grocery stores, markets, street vendors, and wholesalers that supply food and

30

beverage products to retailers and other enterprises (Omari et al., 2020; Farrelly & Mitchell, 2022; GCB Bank Ltd., 2022).

The hospitality segment of the food and beverage industry encompasses restaurants, fast food establishments, hotels and resorts, as well as catering services that provide food for events, corporate functions, and private gatherings. The regulatory bodies of the industry comprise the Food and Drugs Authority (FDA), responsible for ensuring the safety, quality, and efficacy of food and beverages; the Ghana Standards Authority (GSA), which formulates and enforces standards for food and beverage products; and the Ministry of Food and Agriculture (MoFA), which supervises agricultural policies and programs. Support services encompass packaging firms offering solutions for food and beverage items; logistics and transportation services facilitating efficient nationwide distribution; and marketing and advertising agencies promoting food and beverage products through diverse channels (GCB Bank Ltd., 2022; Fofana, 2024).

The sector's research and development entities encompass universities and research centres that conduct research to improve food production, processing, and safety, alongside agricultural extension services that offer training and assistance to farmers and food producers. Financial institutions encompass banks and microfinance entities that offer financial assistance and credit to food and beverage enterprises. The consumer segment of the industry encompasses households that acquire and consume food and beverage products, as well as institutions such as schools, hospitals, and corporate entities that procure food and beverages in bulk (Omari et al., 2020; Farrelly & Mitchell, 2022; GCB Bank Ltd., 2022).

31

The industry's associations comprise the Ghana Food and Beverage Association (GFBA), which advocates for the interests of businesses within the sector, and the Ghana National Chamber of Commerce and Industry (GNCCI), which promotes trade and industrial development, including that of the food and beverage industry. The stakeholders collectively constitute the backbone of Ghana's food and beverage industry, enhancing the nation's food security, economic development, and employment (Food and Beverage Association of Ghana [FABAG], n.d.; Ghana National Chamber of Commerce and Industry [GNCCI], n.d.).

Field data collected in 2021 by the researcher from the Head Office of the Association of Ghana Industries (AGI, 2021) indicates that the food and beverage sector in Ghana consists of 121 registered manufacturing companies. Twenty-eight (28) of these companies function within the beverage industry. Ninety-three (93) businesses are situated in the food manufacturing sector. Additionally, the data indicates that 38 enterprises in the industry are large-scale, 23 are medium-scale, and 60 are small-scale. These classifications primarily rely on annual sales turnover, capital investments, and employment levels (AGI, 2021).

Manufacturing companies in Ghana include Cocoa Processing Company Limited, which produces chocolate bars, spreads, beverages, and butter; Nestle Ghana Limited, known for Carnation Milk, Chocolim, Chocomilo, Cerelac, and Nescafe 3-in-1; and Nobac Food Processing Limited, which cultivates and processes rice. The sector also encompasses companies like Home Foods Processing and Cannery Limited, which specialises in the processing and packaging of diverse ethnic foods, alongside the importation of

32

partially processed food products for reprocessing and packaging with global flavours and spices to cater to both domestic and international markets (Yen.com.gh, 2018).

Additional companies in the sector comprise Nkulenu Industries Limited, which produces nearly all Ghanaian vegetables and products; Piccadilly Biscuit Limited, which manufactures ALL-Time, Digestive, Malt, and Milk biscuits, as well as the esteemed Hye Me Ma cookies. Companies such as Pepsi Cola Ghana, which manufactures Pepsi beverages; Ghana Brewery Limited, involved in wine and beer production; Guinness Ghana Limited, producer of Guinness and related products; and Kasapreko Company Limited, known for Alomo bitters and similar items, constitute Ghana's food and beverage sector (Yen.com.gh, 2018).

The Food and Beverage Industry Value Chain

The food and beverage industry value chain includes all activities and processes required to transform raw food and beverage products into finished goods for consumers. This encompasses several critical phases: production, processing, distribution, retailing, marketing, consumption, and post-consumption. Gereffi and Fernandez-Stark (2016) indicated that the primary production component encompasses activities such as agriculture, involving crop cultivation and livestock rearing; fisheries, entailing the harvesting of fish and seafood; and raw material procurement, which includes sourcing ingredients from farms and fisheries. The processing and manufacturing segment of the value chain encompasses activities such as processing raw materials into food products (e.g., milling, canning, and freezing), manufacturing beverages and packaged food items, and quality control to

ensure food safety and regulatory compliance (Yadav, Kumar, & Singh, 2023).

Chopra and Meindl (2016) assert that distribution and logistics encompass transportation, which entails the movement of products from production facilities to distribution centres; warehousing, which involves the storage of products prior to their delivery to retailers; and inventory management, which ensures the availability of the correct products at the appropriate time. Kotler and Armstrong (2017) assert that retailing encompasses the sale of products to consumers via supermarkets, grocery stores, and online platforms; marketing entails the promotion of products through advertising, sales promotions, and public relations; and customer service involves addressing consumer enquiries and complaints.

Sheth and Sisodia (2012) elucidated that the consumption component of the value chain encompasses activities such as purchasing, which pertains to consumers acquiring food and beverage products; consumption, which involves the actual ingestion of these products; and feedback, wherein consumers offer feedback on products, which influences future product development. Verghese, Lewis and Fitzpatrick (2012) clarified that the post-consumption aspect pertains to waste management, encompassing the disposal of packaging and food waste; recycling, which involves the processing of waste materials for reuse in production; and sustainability practices, which entail the adoption of eco-friendly measures to mitigate environmental impact.

The value chain in the food and beverage industry is intricate and encompasses several stages, ranging from raw material production to consumption and waste management. Every phase enhances the final product,

34

guaranteeing its alignment with consumer requirements and regulatory standards. Comprehending this value chain is essential for process optimisation, product quality enhancement, and sustaining market competitiveness (Natural Capital Coalition, 2016; Owusu-Mensah, Ren, Brako, Boateng & Darkwa, 2020). Figure 3 illustrates the value chain of the food and beverage sector. The figure illustrates that each stage of the value chain is essential to the industry's overall success.
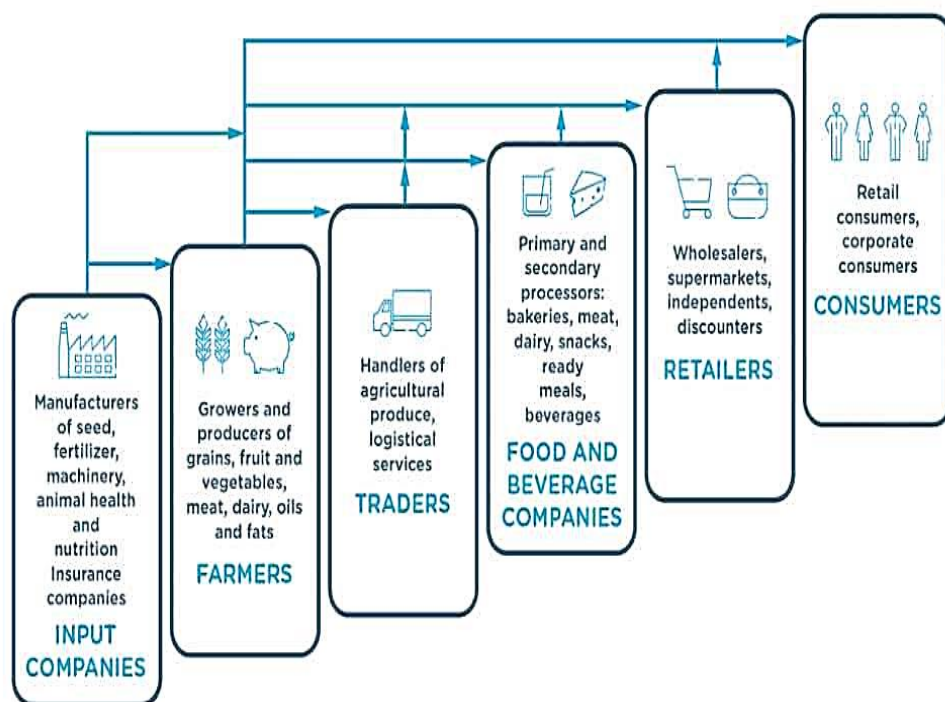
Figure 3: Food and Beverage Value Chain

Source: (NCC, 2016)

35

Empirical Reviews

This section evaluates the findings of past studies and discusses them in relation to the study's objectives.

Objective One: Risks Associated with New Product Development

Researchers have documented the various categories of risks evident during product development. Dewi et al. (2015) for example categorised technology, performance, market, organisation, supply chain, commercial, competitive, and financial risks as types of risks in new product development. Dewi et al. defined technology or technical risks as risks that manifest when a company implements new technology in the development of a new product. They believe that when developing a new product, a team may have blind spots or deficiencies in specific capabilities, potentially resulting in bottlenecks during the development process. MoldStud (2023) posits that technological risks can be mitigated by employing experts to bridge knowledge gaps and enhance the team's competencies.

Dewi et al. (2015) contend that performance risk arises when a company is uncertain about the functionality and reliability of a new product in real-world conditions until it is built and tested. This risk can be mitigated by developing a functional prototype and conducting tests to verify its functionality and reliability prior to large-scale deployment. Researchers such as Ganesh et al. (2024) emphasize that external factors, including market dynamics, can influence the success of a new product. Market dynamics may encompass consumer sentiments, economic conditions, and other unpredictable events such as pandemic outbreaks. This category of risk is referred to as market risk. According to Hudáková et al. (2017), companies

36

can reduce this risk by conducting market research to understand the wants and needs of their customers.

Olechowski et al. (2017) are of the view that organisational factors, including internal conflict, can adversely affect new product development initiatives. Elements such as internal communication during product realisation, acceptance of ideas by diverse stakeholders, and the availability of essential resources for new product development can constitute sources of organisational risk. As a risk, it believed that any capacity issue could be fixed by defining such issue and ensuring buy-in from major stakeholders in the firm.

Silinevica et al. (2016) explains that manufacturing enterprises encounter supply chain disruptions during the development of new products. There exists a risk that certain suppliers may fail to fulfil their contractual obligations. Juranić et al. (2016) assert that manufacturers can mitigate this risk by evaluating suppliers based on both cost and reliability.

Hong and Ren (2024) assert that managers may face challenges related to limited access to capital or financial constraints that impede the timely development of new products. This category of risk is referred to as financial risk. Landes (2023) identified the commercial risks linked to new product development initiatives. They believe that those risks pertain to the degree of financial viability of a product or its concept for the company producing it. Commercial risk encompasses the possibility that a product in development may exceed resource constraints, such as the project's budget, necessitating reductions through efficient budgeting and forecasting methods.

Objective Two: Risk Management Practices of Food and Beverage Firms

Salavati et al. (2016) emphasize that implementing effective management practices in new product development can expedite time to market by mitigating potential obstacles and barriers during the product development process. In some cases, this means making changes, and it speeds up the product development phase by making sure it's cost-effective, reducing the chance of failures, design flaws, and defects, reducing the need for extra design work, and increasing reliability by quickly understanding high-probability failures. Oehmen, Olechowski, Kenley, and Ben-Daya (2014) assert that risk management must be integrated into the new product development process, as modifications needed in the initial stages incur lower costs compared to alterations during the implementation phase. The essential elements in most risk management practices include the following:

Identification of Risks

This is the juncture at which potential challenges in product design and project development can be analysed, along with the strategies for their resolution, applicable not only in the initial stages but at any subsequent phase (Product School, n.d.). This evaluation involves identifying the origin of the risk and its effect on the project. Risk identification strategies encompass brainstorming, conducting interviews, and reviewing past risk documents.

Risk Analysis

Upon identifying the risks, it is necessary to assess their characteristics. This will assist in ascertaining whether further investigation is warranted. When a risk necessitates additional examination, the project team must determine suitable methods to address the risk factors. These methods may be

38

qualitative or quantitative. Risks are typically analysed based on two criteria: risk probability and risk impact (Dishar & Altaie, 2022). The probability of risk denotes the potential occurrence of a risk event. Risk impact, commonly referred to as risk severity, signifies the consequence resulting from the manifestation of a risk. The ramifications of risk probability and impact are referred to as risk magnitude, which is evaluated subsequent to risk assessment, indicating that both risk probability and effect must be thoroughly examined (Shad et al., 2019).

Risk Evaluation

Risk events are prioritised, and mitigation strategies are selected during the risk assessment process. This is informed by variables such as prior experience, organisational expertise, project team knowledge, established best practises, and industry standards (Pinto, 2019). During risk evaluation, particular aspects of the project, such as schedule or budgets, are considered in relation to a risk event to determine the most effective mitigation strategy among available options. Risk evaluations in new product development initiatives take the form qualitative, semi-quantitative or quantitative approaches. PMI asserts that qualitative risk evaluations are often descriptive and lacks risk quantification, serving to complement quantitative evaluation. The quantitative approach employs statistical instruments, including risk matrices and failure modes and effects analysis (FMEA). Mixed or semi-quantitative methodologies utilise both qualitative and quantitative instruments.

Risk Mitigation

The primary function of risk management in new product development is to study all components of the new product to develop a risk mitigation strategy for all possible events. Two risk mitigation strategies generally exist for risk reduction programs (PMI, 2017). They are the reactive and proactive strategies. The reactive approach pertains to risk mitigation measures implemented subsequent to the manifestation of a risk event. The proactive approach, also termed the feed forward strategy, pertains to risk mitigation measures that are executed prior to the occurrence of risk events. Majka (2024) argues that utilising the services of an insurance company exemplifies an effective proactive risk mitigation strategy. A third strategy that is also employed is the hybrid system to mitigate, transfer, and to reduce the likelihood of risk.

Monitoring and controlling risks

This phase is generally regarded as the final stage in most product risk management frameworks and is typically finalised with the documentation of lessons learnt for future reference. The PMI (2017) indicated that this phase encompasses the monitoring, controlling, and documentation of the execution of planned risk response strategies; tracking identified hazards; identifying and analysing emerging risks; and evaluating the effectiveness of the risk management process. The International Standards Organisation (ISO 21500, 2012) asserts that this phase allows organisations to monitor and manage risks, facilitating a prudent approach to potential future risks and their consequences. This phase is crucial for guaranteeing the success and viability of a project.

Objective Three: Risk Management Practices and Success of New

Product Development Projects within the NPD process

Risk management practices are critical for navigating the complexities and uncertainties of New Product Development (NPD) projects, especially in the food and beverage industry. This empirical review explores the impact of risk management at various stages of NPD: idea generation; idea screening; concept development and testing; marketing strategy and business analysis; product development; test marketing; and product launch.

Idea Generation

The idea generation phase is the initial stage during which potential product ideas are brainstormed. Effective risk management at this stage involves identifying market trends, consumer preferences, and technological challenges. Maze (2023) emphasizes that companies employ formal risk assessment tools during the idea generation phase are better equipped to filter out impractical ideas early on, thus saving time and resources.

Idea Screening

Idea Screening involves evaluating the generated ideas to select the most viable ones. Risk management practices at this stage focus on assessing feasibility, market potential, and alignment with company goals. Cooper (2019) highlighted that a structured risk assessment process during idea screening helps eliminate high-risk ideas that are unlikely to succeed and enhances the focus on more promising concepts.

Concept Development and Testing

This phase involves developing and testing product concepts with potential consumers. Effective risk management ensures that technical,

41

market, and regulatory risks are addressed. Ahern, Leavy, and Byrne (2017) found that using agile risk management practices, such as iterative prototyping and feedback loops, significantly improves the accuracy and reliability of concept testing.

Marketing Strategy and Business Analysis

In this phase, the marketing strategy and financial viability of the new product are analysed. Risk management practices focus on market analysis, competitive assessment, and financial forecasting. Davis (2017) emphasised the importance of involving cross-functional teams to manage risks related to market entry and pricing strategies and ensure a well-rounded business analysis.

Product Development

The Product Development phase involves transforming the concept into a tangible product. Risk management practices here include technical risk assessments, supply chain evaluations, and quality assurance processes. Ho, Wu and Huang (2019) demonstrated that integrating predictive analytics and real-time monitoring tools during the product development phase helps identify and mitigate production risks early.

Test Marketing

Test marketing phase involves introducing the product to a limited market to gather feedback and assess performance. Effective risk management practices include market testing, consumer feedback analysis, and iterative improvements. FasterCapital (2025) highlighted that companies that actively monitor and adapt based on test market results are better positioned to mitigate risks related to broad market acceptance.

42

Product Launch

The Product Launch phase is critical because it involves the full-scale introduction of the product to the market. Risk management practices focus on supply chain management, marketing execution, and post-launch monitoring. According to TrueProject (2025), comprehensive risk management strategies during the launch phase, including contingency planning and real-time performance monitoring, significantly enhance the likelihood of successful market entry.

Conceptual Framework

The conceptual framework underlines how the researcher intends addressing the research problem.

Conceptual Modelling and Hypothesis Formulation

The New Product Development Process Model served as a guide for the conceptual framework of this study. The elements of the New Product Development Process Model were modified to create the sub-elements of risk management in this context and were examined concerning the success of new product development. Considering the study's objectives and the manner in which the research questions were to be addressed, the researcher had the following conceptual framework, which is elaborated upon in this section. Within this framework, risks are perceived to be inherent in every production initiative, including new product development projects in the food and beverage manufacturing sector. The management of these risks, as per the framework, is a continuous and often overlapping process rather than a singular event. Consequently, these risks must be mitigated to facilitate the achievement of industry stakeholders' objectives.

43

Risk Management at the Idea Generation Level and Its Impact on the Success of New Product Development Projects

Owens (2009) asserts that the generation of ideas for new product development entails brainstorming innovative product concepts or enhancing existing products. He elaborated that to mitigate risks during product discovery, a company must analyse market trends, perform research, and thoroughly investigate users' desires and requirements to pinpoint issues and suggest innovative solutions. The process should be assessed utilising frameworks like SWOT analysis to identify the organisation's strengths, weaknesses, opportunities, and threats (Kabala & Seshamani, 2016).

This analysis identifies problematic product areas and elucidates where the greatest opportunities exist (Asana, 2025). Risk management at this level entails gathering internal ideas from various departments within the organisation, including marketing, customer support, sales, and technical divisions, as well as external insights from external sources, such as competitor analysis and, crucially, feedback from the target audience. Upon the completion of these tasks, the firm significantly enhances its likelihood of successful product development. In light of this context, the researcher posits that:

Hypothesis 1: Risk Management at the idea generation level impacts the success of new product development

Risk Management at the Idea Screening Level and Its Impact on New Product Development Success

Sukhov (2019) expresses that idea screening in new product development has to do with the process of evaluating all generated ideas and

44

selecting only those with the greatest likelihood of success. This substantially mitigates risk. This entails choosing which concepts to advance and which to discard in light of various aspects such as anticipated consumer benefits, necessary product enhancements, technical viability, and marketing potential. Asana (2025) asserts that the idea screening phase can mitigate risk within the organisation by utilising experts from various teams to evaluate factors such as technical specifications, necessary resources, and market viability of the concept. Upon the completion of these tasks, the firm significantly enhances its likelihood of successful product development and ultimately securing a competitive advantage in the market. Against this background, the researcher hypothesises that:

Hypothesis 2: Risk Management at the Idea Screening level impacts the success of new product development

Risk Management at the Concept Development and Testing Level and Its Impact on the Success of New Product Development

At the Concept Development and Testing Level, the ideas that passed the screening phase are elaborated into a product concept, essentially a comprehensive description or blueprint of the idea (Kazimierska & Grębosz-Krawczyk, 2017). This is essential for mitigating risk. The document must specify the target market for the product, outline the features and advantages of the solution that may attract customers, and present the proposed pricing for the product (Owens, 2009). Additionally, a product concept must include the projected expenses associated with the design, development, and launch of the product.

The company must also create alternative product concepts to assess their appeal to customers and choose the one that offers the greatest value to the organisation. Upon the thorough development of concepts, they must be evaluated on a chosen cohort of consumers. Concept testing facilitates the validation of product ideas with users prior to committing time and resources to their development. Furthermore, concept testing aids in market validation. Asana (2025) asserts that prior to committing to new product development, the firm must present the concept to potential buyers to gather insights and assess the product idea's viability in the target market. Upon completion of these steps, the firm possesses an increased likelihood of successful new product development. Against this background, the researcher hypothesises that:

Hypothesis 3: Risk Management at the Concept development and testing levels impacts the success of new product development

Risk Management at the Marketing Strategy and Business Analysis Level and Its Impact on the Success of New Product Development

Upon selecting the concepts, the subsequent phase involves formulating a marketing strategy and conducting a business analysis. This phase presents the product to the market and evaluates the solution's value from a business standpoint (Kotler & Keller, 2016). This is essential for mitigating risk. The marketing strategy directs the positioning, pricing, and promotion of the new product. Upon the formulation of the marketing strategy, product management can assess the commercial viability of the product concept. The business analysis includes an evaluation of sales forecasts, anticipated expenses, and profit projections to ascertain their alignment with the company's objectives (FreshBooks, 2025). Upon

46

implementation, the product can advance to the development stage with diminished risk, thereby increasing the likelihood of successful product development. Against this background, the researcher hypothesises that:

Hypothesis 4: Risk Management at the marketing and business analysis levels impacts the success of new product development

Risk Management at the Product Development Level and Its Impact on the Success of New Product Development

The product development phase entails transforming the product concept into a completed, market-ready item (Kotler & Keller, 2016). Effectively managing this phase is essential for mitigating risks. This phase primarily hinges on a company's inclination towards development methodologies, be it agile product development, waterfall development, or another feasible option. The prototype development phase typically entails constructing the prototype and evaluating it with users to assess their interactions and gather feedback. Prototype testing enables product teams to confirm design choices and detect defects or usability problems prior to transferring designs to a development team. This substantially mitigates risks. Usability testing is essential for selecting the optimal flow and refining it to ensure clarity for users (Dewi et al., 2015). Upon completion of usability testing, managers can finalise the workflow and prepare it for transfer to developers. Upon completion, the company possesses an increased likelihood of successful new product development. In light of this context, the researcher posits that:

Hypothesis 5: Risk Management at the Product Development level impacts the success of new product development

Risk Management at Test Marketing Level and Its Impact on New

Product Development Success

This phase entails the company engaging with customers and gathering research data to ascertain what is effective and appealing to the target audience, as well as what is not (Kotler & Keller, 2016). This is essential for mitigating risk. Results may also be utilised to compose a copy and convey the launch (Owens, 2009). Test marketing entails launching the completed product in a select market to assess its efficacy within a specified marketing strategy. To mitigate risks, both alpha and beta testing methods must be conducted.

The former utilises software to detect potential bugs prior to the product's public release. The latter is conducted to allow actual users to utilise the product and offer feedback regarding it. This phase facilitates the validation of the concept underlying the new product and secures its market introduction. Upon completion of these steps, the firm possesses an enhanced likelihood of successful new product development. Against this background, the researcher hypothesises that:

Hypothesis 6: Risk Management at the test marketing level impacts the success of product development.

Risk Management at the Product Launch Level and Its Impact on New

Product Development Success

To successfully launch a product, the firm must set its key results as early as possible, understand how to track them, and determine how to use the learning to make changes or adapt (Juranić et al., 2016). This is crucial for risk reduction (Kotler & Keller, 2016). To reduce risk at this level, the firm must

48

ensure that product, marketing, sales, and customer support teams are in place to guarantee a successful launch and monitor its performance (Dewi et al., 2015). This finding agrees with the views of Yin and Zhang (2021), who reported similar findings. Once these steps are completed, the firm has a higher chance of successful new product development. Against this background, the researcher hypothesises that:

Hypothesis 7: Risk Management at the product launch level impacts the success of new product development

Figure 4 shows the conceptual model for the study with particular reference to the Objective Three.
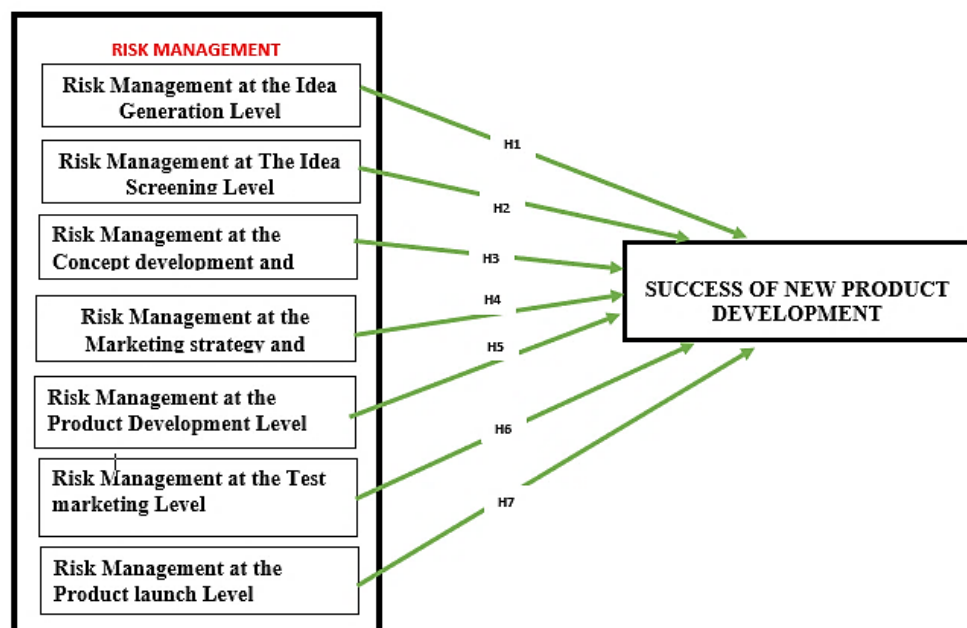
Figure 4: Conceptual Model of the Objective three

Source: Author's Construct.

Chapter Summary

This chapter reviewed the relevant literature that is significant to the study. The chapter began with an introduction; it further reviewed and adopted theories and models that were considered relevant for the study. The chapter

49

also conducted a conceptual review of the necessary concepts that supported the investigation. Empirical literatures relevant to the study were also reviewed in this chapter. A conceptual model for the study was also developed in this chapter.

CHAPTER THREE

RESEARCH METHODS

Chapter Introduction

This chapter discusses the research procedures and methodologies used in the study. It identifies research paradigms, approaches, and designs and justifies their use. This chapter describes the kind of data that was collected; it underscores the research population, sample and sampling procedures, data gathering processes, research instruments, and data analysis tools.

Research Paradigm

The researcher employed two research philosophies for this study. The philosophies in question are positivism and interpretivism. The researcher undertook this action due to the inherent characteristics of the research questions. Research questions 1 and 2 necessitated qualitative data for their resolution. Qualitative research adheres to interpretivist philosophy. This is due to its foundation in the concept that reality is subjective, multifaceted, and socially constructed. Furthermore, the third research question of the study necessitated quantitative data to resolve it. Quantitative research is consistent with the positivist philosophy, which asserts that reality is objective and necessitates hypothesis testing.

Research Design

This study adopted a descriptive-correlational research design. This is because the research employed both qualitative and quantitative approaches. The descriptive design was selected as it enabled the researcher to accurately depict the situations as they existed. The correlational design was also used because it allowed the researcher to test hypothesis. Thus, the descriptive-

51

correlational research design was employed due to its alignment with the research questions and objectives.

Research Approach

In terms of approaches, the study employed both qualitative and quantitative approaches. The researcher did so because of the nature of the research objectives. The study had three objectives, of which the first two required qualitative data with the last objective requiring quantitative data. The use of these approaches is supported by Kim, Sefcik, and Bradway (2017), who are of the view that this strategy enables researchers to benefit from the collection and analysis of both numerical and non-numerical data to better comprehend respondents' knowledge, experiences, thoughts, or opinions about the subject matter.

Study Area

The research focused on food and beverage manufacturing companies in Ghana. As of 2021, the Association of Ghana Industries (AGI) reported that there were 121 registered food and beverage manufacturing companies in Ghana. Of these, twenty-eight (28) pertained to the beverage sector, whereas the remaining ninety-three (93) were associated with the food sector. Furthermore, the data reveal that thirty-eight (38) of these firms were large-scale food and beverage manufacturing companies. Twenty-three (23) were medium-scale companies, while sixty (60) were small-scale enterprises. The classifications were elucidated as being predicated on companies' capital investments, annual sales turnover, and employment capacity (AGI, 2021; NBSSI, 2015; MoTI, 2018; GSS, 2021; GIPC, 2022).

Small-scale firms generally employ fewer than 10 individuals. Medium-scale enterprises employ between 10 and 99 individuals. Large-scale enterprises employ a minimum of 100 individuals. Small-scale enterprises have an annual turnover of up to GH¢ 200,000; medium-scale companies have an annual turnover ranging from GH¢ 200,000 to GH¢ 5 million; large-scale firms have an annual turnover surpassing GH¢ 5 million. Small-scale enterprises make capital investments of up to GH¢ 10,000. Medium and large-scale enterprises undertake capital investments ranging from GH¢ 10,000 to GH¢ 1 million and exceeding GH¢ 1 million, respectively (NBSSI, 2015; MoTI, 2018; GSS, 2021; GIPC, 2022).

The manufacturing firms in the sector produce fresh, semi-prepared, fully prepared, and packaged foods. It encompasses both alcoholic and non-alcoholic beverages. Table 2 illustrates the distribution of food and beverage manufacturing firms in Ghana from which the samples were derived.

Table 2: Distribution of food and beverage manufacturing companies in Ghana

No.	Food and Beverage Industry	Number of Companies
1	Large-scale companies	38
2	Medium-scale companies	23
3	Small -scale companies	60
	Total	121

Source: Field data (AGI, 2021)

Research Population and Sample

The population of a study refers to the entire unit from which a sample is drawn for the investigation of a phenomenon (Kumekpor, 2002). This study

used a total population of 55 food and beverage manufacturing firms situated in the Greater Accra and Central regions of Ghana for its qualitative data. The AGI data (2021) collected from their headquarters in Accra, Ghana, estimated that roughly 45% (i.e., 55) of the food and beverage manufacturing companies in Ghana are located within the Greater Accra and Central regions.

The researcher employed purposive sampling to select 20 from the 55 food and beverage manufacturing firms located in the Greater Accra and Central regions for the qualitative component of the research. The 55 companies in the two regions from which respondents were chosen included Nestle Ghana Ltd, Ghana Brewery, Fan Milk Ghana Ltd, Kasapreko, Unilever Ghana, and Ekumfi Fruit Juice. Consequently, one participant was selected from each of the 20 firms. The focus was on participants who engage directly or indirectly in risk management, including general managers, operational managers, project managers, heads of risk or designated members of the risk management team, supply chain managers, quality control or assurance officers etc.

To address objective 3, concerning the impacts of risk management practices on the success of new product development projects at different stages of the NDP process, the researcher also employed a purposive sampling method. Although, purposive sampling is usually used for qualitative data, the researcher strategically adopted this same technique because of certain factors including time, budget and accessibility. Again, it was used because it was still strategically possible to draw statistical conclusions from the selected subgroups about the subject matter under discussion (Petersen, 2021). In all, 400 respondents were earmarked or sampled using Cochran's formula (95%

confidence level, 5% margin of error), ensuring statistical reliability, from 10 of the medium- large scales firms located within the Greater Accra region. 40 respondents were selected from each of the 10 firms to quantitatively assess their responses on the question. The participants included project managers, general managers, operational managers, heads of risk or risk management team leaders, quality control managers, financial manager, marketing managers, and product development leads.

Sampling Procedure

As stated previously, the study adopted purposive sampling techniques. The purposive sampling helped in terms of selecting respondents who knew about the phenomena or issues at stacks, as indicated by (Palinkas et al., 2016; Clark & Creswell, 2008). Using purposive sampling, some individuals knowledgeable in the matter as stack such as project, general, operational, risk, supply chain, financial, marketing, and quality assurance managers with necessary skills and competence in risk management were identified, selected and use for the study. Thus, 20 out of the 55 foods and beverage firms located within both the Greater Accra and Central regions were used for the qualitative aspect of the study. It must be noted that the initial response rate was 65% as participants from 13 of the firms responded to the interview. However, to maintain the sample size of 20 and also to ensure adequate responses to enrich the study, the researcher replaced the 7 unavailable participants with additional 7 from 7 different food and beverage companies within the same regions, using the same criteria. Table 3 presents the sample distribution of the participants for the qualitative aspect of the study.

Table 3: Sample Distribution of Participants

Company	Number of participants
1. Unilever Ghana Ltd	1
2. Piccadilly Biscuits Ltd	1
3. Nestle Ghana Ltd	1
4. Home Foods Processing and Cannery Ltd	1
5. Cocoa Producing Company Ltd	1
6. Cocoa Producing Company Ltd	1
7. Frutelli Ghana Ltd	1
8. Pepsi Cola Ghana	1
9. Ghana Brewery Ltd	1
10. Fan Milk Ghana Ltd	1
11. Twifo Oil Palm Plantation	1
12. Special Ice Company Ltd	1
13. Adom Foods Company Ltd	1
14. Accra Brewery Ltd	1
15. Ekumfi Fruit Juice Factory	1
16. Nobac Food Processing Ltd	1
17. Voltic Ghana Ltd	1
18. Pepsi Cola Company Ltd	1
19. Promasidor Ghana Ltd	1
20. Pepsi Cola Company Ltd	1

Source: Author's Construct

For the quantitative data, as said earlier, the researcher purposively sampled 400 respondents from 10 firms. The respondents were selected from

56

food and beverage companies categorised as follows: food only, beverage only, and both food and beverage. The respondents were mainly consisted of senior, mid-level, and operational managers. The response rate for the quantitative data was 75% (i.e. 300 responses). The application of purposive sampling enabled the researcher to gather rudimental data for the study while ensuring quality and fulfilling the objectives. Table 4 illustrates the distribution of respondents for the quantitative study.

Table 4: Sample Distribution of Participants

Company	Category	Number of Participants
1. Unilever Ghana Ltd	Food	40
2. Piccadilly Biscuits Ltd	Food	40
3. Nestle Ghana Ltd	Food	40
4. Home Foods Processing and Cannery Ltd	Food	40
5.Cocoa Producing Company Ltd	Food	40
6. Frutelli Ghana Ltd	Beverage	40
7. Pepsi Cola Ghana	Beverage	40
8. Ghana Brewery Ltd	Both	40
9. Ghana Guinness Ltd	Both	40
10.Fan Milk Ghana Ltd	Both	40

Source: Author's Construct

Data Collection Instruments

This study used primary data, enabling data collection via interviews and questionnaires. Interviews were conducted with food and beverage companies in Greater Accra and Central regions. The interview guide

57

comprised five sections. Section A comprised the demographic characteristics of the respondents. Section B provided general background information regarding the companies. Section C addressed the identification of project risks. Section D addressed risk management practices. Section E addressed the ISO risk framework and certification.

The decision to use questionnaire for this study was guided by the third research objective, which aimed to determine the impact of risk management practices on the success of new product development projects at each phase of the new product development process. The questionnaire data were gathered using Google Forms. The user-friendliness, accessibility, and data analysis features of Google Forms were key factors that influenced the adoption of such medium. The questionnaire comprised solely closed-ended questions and was structured into three main sections. Section A comprised a preamble and an ethical assurance. Section B comprised enquiries designed to gather demographic information from the respondents. The Section C contains questions related to each concept outlined in the conceptual model. Respondents were required to evaluate the questionnaire items using a five-point Likert scale, which ranged from 1 *strongly disagree* to 5 *strongly agree.*

Both the interview guide and the questionnaire underwent pretesting. Pre-testing was performed at the Ekumfi Juice Factory located near Mankessim in the Central Region, involving certain personnel from the risk department. The purpose of pre-testing the instruments was to confirm their validity and reliability for the study. The pre-testing exercise enabled the researcher to evaluate the feasibility of administering the instruments and refine them prior to their application in the main study. The pre-tests also

indicated to the researcher where the primary research protocols might not be adhered to. Finally, they were pre-tested to enhance the internal validity of the instruments employed in this study.

Data Collection Procedure

An ethical clearance letter was acquired from the Institutional Review Board of the University of Cape Coast, bearing the serial number IRB/C3/Vol.1/0114, and copies were disseminated to the management of various food and beverage manufacturing companies for their consent to engage with the respondents. The researcher informed the participants about the study's objectives. An interview date was arranged with participants from each of the 20 firms. The average duration of each interview session was between 25 and 30 minutes.

Seven (7) of the respondents were unavailable on their designated interview days. After multiple unsuccessful attempts, the researcher ultimately obtained permission from management of other seven firms within the same two regions to make complete the twenty (20) firm targets earmarked for the study. Data gathered during the interview sessions were documented using an audio recorder following the respondents' consent. The interview sessions spanned two months, from May 1 to July 31, 2023.

With the questionnaire, it was administered digitally via Google Forms. The researcher did not employ any field assistants for data collection. The data was collected following the issuance of an ethical clearance letter from the university to the management of all the companies listed in Table 3 to obtain their consent. Email addresses of personnel capable of offering insights on risk management from each of these companies were solicited between

59

April 20th and May 25th, 2023. A Google Form link was dispatched through personalised email to the designated contacts provided to the researcher. The questionnaire highlighted the research's purpose, the intended use of the data, and assurances of confidentiality. The researcher established a notification system to alert him upon the submission of a new response. Follow-up messages were dispatched as reminders one week after the initial emails were sent to respondents who had not yet replied. In all, it took the researcher four (6) weeks to gather the 300 responses. Thus, the online data collection process ended on 25th May, 2023. The responses were exported to Excel for analysis in SPSS.

Data Processing and Analysis

Data processing and analysis is a systematic approach to rigorously evaluating and scrutinising a dataset to derive reliable information for informed decision-making. For the qualitative component of the study, data collected from the field via interview sessions were personally recorded using an audio recorder following the respondents' consent. The data were subsequently analysed using a computer-assisted qualitative data analysis software (CAQDAS) tool known as NVivo. The software was selected due to its capability to assist the researcher in organising, analysing, and reporting qualitative data. Also, the analysis tool was found to be easy to use by the researcher.

For the quantitative segment of the study, the primary instrument adopted to help analyse the collected data was SPSS (version 26). In the initial stage, the gathered data were examined to verify their quality and ascertain whether they were accurately completed. The data were then structured in a

manner that eased the analysis. Additionally, the percentages derived from questionnaire responses were evaluated and analysed in connection with the study's objectives and research questions. The researcher ultimately created frequency tables and additional charts to summarise the observed data patterns as descriptive statistics. Furthermore, and of paramount importance, additional quantitative analysis employing structural equation modelling was performed.

Reliability and Validity

A reliability analysis was conducted to assess the questionnaire's reliability. The Cronbach's alpha coefficient demonstrated strong internal consistency among the items. The statistical reliability of each item was assessed. Taber (2018) asserts that a Cronbach's alpha value of 0.70 signifies the instrument's reliability.

Factor analysis was also employed to examine the validity of constructs in the research studies. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were employed to evaluate the model's validity, the suitability of the extracted factors, and the adequacy of the collected data, as stated by Cronbach and Meehl (1955). The sample and extracted factors were deemed adequate and appropriate if i) the KMO value exceeded 0.5 and ii) Bartlett's test yielded a significant p-value (less than 0.05). The maximum likelihood analysis (PCA) method facilitated the extraction of various components. Components with eigenvalues exceeding one (1) were preserved. Assuming that all items were uncorrelated, the Varimax rotation was employed to optimise the loading factor of each item within the extracted components. Items exhibiting a loading factor value exceeding ±0.3 were deemed acceptable for loading factor (Yong & Pearce, 2013).

61

Structural Equation Modelling

According to Tomarken and Waller (2005), Structural Equation Modelling (SEM) is a comprehensive technique for testing or estimating causal relationships between constructs in a model to be tested. Similarly, Deng, Yang and Marcoulides (2018) explained that this technique is particularly useful when testing multiple variables. One of the major advantages of SEM is its ability to estimate the degree to which the researcher can decide whether the hypothesis formulated in the study is supported or not by the underlying data and its pattern observed.

Variables for Data Analysis

The collected data were grouped into two major variables: the dependent and independent variables. The risk management practices to be specific risk identification; risk assessment and analysis; risk mitigations; and risk monitoring and control served as independent variables for the data analysis. The success of new product development projects at various levels of the New Product Development process in terms of the cost of producing new product; time, quality, customer satisfaction etc. served as the dependent variable. Below are tables that outline the constructs, operationalization, items, and sources for variables measuring risk management practises and success of new product development (NPD) projects. Table 5 presents the variables measuring risk management practices. Conversely, Table 6 presents the variables measuring the success of new product development projects.

Table 5: Variables Measuring Risk Management Practices

Construct	Operationalisation	Items	Source of Items
Risk Identification	Methods and frequency of identifying risks	Number of risks identified; Frequency of risk identification sessions; Diversity of sources	Industry standards, organisational records
Risk Assessment	Consistency and accuracy of risk evaluations	Use of quantitative vs. qualitative methods; Number of high, medium, and low risks	Internal audit reports, risk assessment tools
Risk Mitigation	Implementation and effectiveness of mitigation strategies	Number of mitigation strategies; Percentage of risks with plans; Effectiveness of strategies	Risk management plans post-implementation reviews
Risk Monitoring	Ongoing tracking and reporting of risks	Frequency of monitoring; Number/type of reports; Timeliness and accuracy	Monitoring reports, risk dashboards

Source: Adopted from (COSO, 2017; Frigo & Anderson, 2014; Hillson & Simon, 2012)

Table 6: Variables measuring Success of New Product Dev. Projects

Construct	Operationalisation	Items	Source of Items
Time-to-Market	Duration from initiation to launch	Project duration; Planned vs. actual timelines; Time per phase	Project management software, project reports
Cost Management	Development cost control	Total cost vs. budget; Cost breakdown by phase; Cost variances	Financial records, budget reports
Product Quality	Product defects and customer satisfaction	Number/severity of defects; Compliance with standards; Customer satisfaction scores	Quality control reports, customer feedback
Market Acceptance	Sales and market performance	Sales performance; Market share; Adoption rate	Sales reports, market analysis
Return on Investment (ROI)	Financial returns from the product	ROI calculation; Payback period; Profitability metrics	Financial analysis, accounting records
Innovation and Uniqueness	New features/technologies introduced	Number of new features; Patent filings; Competitive differentiation	Patent records, competitive analysis
Customer Feedback	Customer satisfaction and loyalty	Net Promoter Score; Customer Satisfaction Score; Customer reviews/ratings	Customer surveys, feedback forms
Product Performance	Technical and market performance	Technical performance metrics; Benchmark comparisons; Real-world performance	Performance tests, market research
Development Process Efficiency	Efficiency of the development process	Number of iterations/changes; Team collaboration efficiency; Use of tools	Project logs, team surveys
Regulatory and Compliance	Adherence to standards / regulations	Number of approvals; Compliance with safety/ environmental standards	Regulatory filings, compliance reports
Post-Launch Performance	Long-term product performance	Product lifespan; Update/enhancement frequency; Long-term sales trends	Sales data, product lifecycle analysis
Environmental and Social Impact	Sustainability and social benefits	Product/process sustainability; Social impact; Corporate social responsibility considerations	Sustainability reports, CSR reports

Source: Adopted from (Kotler & Keller, 2016; PMI, 2017)

64

Ethical Considerations

To satisfy the ethical requirements of scientific studies, the researcher carefully followed ethical principles. The ethical principles and issues applied in this research included informed consent, confidentiality, and anonymity. In terms of informed consent, the researcher ensured that all respondents were appropriately informed on the purpose of this study; they were also given the opportunity to decide on their participation. Thus, none of the respondents were forced or tricked in any way to participate in this study. Regarding the issue of confidentiality, all respondents were assured that their responses would be solely used for research (i.e., thesis and possibly for publications). Respondents were therefore allowed to withhold any information that they thought was private to them without question. Participants were further provided with the opportunity to withdraw from the study at any time without being questioned.

Regarding the issue of anonymity, the researcher ensured that the identities of all respondents were protected. Therefore, any information that was thought to have the potential of exposing the identity of the respondents to attack or fraud them, such as their names, residential addresses, salary or wage payment details, phone numbers etc. were excluded from the data collection process, except when necessary for access-related purposes. This safeguarded the privacy and anonymity of the participants.

By upholding these ethical principles of informed consent, confidentiality, and anonymity, the researcher ensured that the study was conducted in an ethical manner, respecting the rights and privacy of the respondents throughout the research process.

CHAPTER FOUR

RESULTS AND DISCUSSION

Chapter Introduction

This chapter details the results and discusses the findings from both the interviews and the questionnaires. The interview data was analysed as the qualitative data and the questionnaire data was analysed as the quantitative data. The study's primary purpose, as previously mentioned, was to determine the risk management practices within the food and beverage manufacturing industry in Ghana during the production of new products to the market and to examine the effects of risk management practices at the various stages of the new product development process on the success of new product development projects in the industry.

Qualitative Data Presentation

The researcher selected a sample of 20 key and experienced personnel involved in project risk management, either directly or indirectly, from food and beverage manufacturing companies in the Greater Accra and Central regions for the study. The researcher sampled 20 firms but was able to interview only 13 firms initially. The researcher substituted the unavailable or unwilling participants after several trials with seven extra personnel from other firms within the same two regions, after obtaining consent from their management. Table 7 displays the demographic characteristics of the respondents used in the qualitative component of the study.

Table 7: Demographic Characteristics of Respondents

Variables		Frequency
(1) Gender	Male	12
	Female	8
(2) Age	31-40	7
	41-50	6
	51-60	6
	>60 years	1
(3) Work Experience	0-5 years	3
	6-10 years	5
	11-15 years	8
	>15 years	4
(4) Highest qualification		
	Diploma	6
	1st Degree	7
	Masters	6
	Doctorate	1
(5) Job Position	Project Manager	4
	Head of Risk	6
	General Manager	3
	Operation Manager	2
	Quality Control Officer	5

Source: Fieldwork (2023)

Among the 20 respondents who participated in the interview, 12 were male and 8 were female. This underscores the substantial representation of male professionals in the workforce. Additionally, 7 interviewees were aged 31 to 40 years; 6 were aged 41 to 50 years; 6 were aged 51 to 60 years; and 1 respondent was over 60 years old. The age distribution indicates that the

67

interviewees possessed sufficient maturity to comprehend the concepts and deliver thoughtful and coherent responses. It was revealed that 3 respondents possessed up to 5 years of professional experience; 5 had up to 10 years; 8 had up to 15 years; and the remaining 4 had over 15 years of experience. This suggests that respondents possessed substantial experience in delivering reliable information for the study. The academic qualifications of the respondents indicated that 6 possess a Diploma, 7 hold a Bachelor's degree, 6 have attained a Master's degree, and 1 is a Doctoral degree holder. The quantity of Diploma and 1st Degree holders indicates a substantial presence of entry-level professionals. The data regarding the quantity of Master's degree holders reveals a moderate representation of mid-career professionals. The data regarding the quantity of Doctorate holders indicates a minimal presence of highly educated professionals.

Chapter 3 specifies that the interviews were intentionally focused on project managers, general managers, operations managers, heads of risk departments, leaders of risk management teams, quality control officers etc. The interviews revealed that 4 respondents are project managers, demonstrating a significant presence of project management professionals, while 6 respondents are heads of risk, indicating a very significant presence of senior risk management professionals. 3 respondents occupied the role of general manager, signifying a moderate representation of senior management professionals. 2 respondents occupied the role of operations manager, suggesting a small presence of operations professionals, while 5 respondents held the position of quality assurance or control officer, indicating a significant presence of quality control professionals.

The interview disclosed an interesting phenomenon: the majority of participants possessed over a decade of experience in risk management, operations, and project management. This indicated that respondents possessed the requisite experience to furnish the necessary information for the study. Furthermore, many of the respondents comprised senior management and middle-level managers. This suggests that the information gathered was credible and that these manufacturing organisations could use the analysis.

In addition to the demographic characteristics of the respondents, the following presents general background information regarding the 20 companies. Table 8 provides the overarching background information regarding the companies.

Table 8: General Background Information about the Companies

Variables		Frequency
(1) Company age	1-5 years	8
	6-10 years	4
	11 and above	8
(2) Categories of companies	Food Manufacturing	12
	Beverage Manufacturing	4
	Both	4
(3) Company Scale	Small Scale	5
	Medium Scale	9
	Large Scale	6
(4) NPD Project	Yes	13
	No	7
(5) Product Performance	Not performing well	7
	Performing well	9
	Performing very well	4
(6) Existence of Risk Team	Yes	12
	No	8
(7) Risk Team Membership	Yes	11
	No	-
(8) Length of Membership	1–5 years	3
	6 -10 years	6
	11 and above	2

Source: Fieldwork (2023)

Table 8 indicates that 8 interviewees had their companies being in existence from 1 to 5 years; 4 had theirs from 6 to 10 years; and the remaining 8 had theirs for over 11 years. This indicates that most companies have been operational for five years or longer. This indicates the presence of developed and well-established firms. A significant number of these companies are identified as food manufacturing entities, corroborating AGI's (AGI, 2021) data that reveals the industry predominantly comprises firms in the food sector rather than the beverage sector. Concerning the size or scale of the companies, it became evident that the majority operated within the medium to large range. 6 interviewees reported that their companies were large, employing over 100 individuals; 9 identified their companies as medium-sized, with a workforce of 50 to 100; and 5 classified their companies as small, with a staff strength of 10 to 50. The majority of medium and large enterprises significantly influence the nation as a whole and employment specifically. Regarding the question of whether these firms have introduced new products in the last ten years, many respondents affirmed that their organisations have indeed developed new products during this period, with the majority indicating that these products are performing successfully in the market.

Concerning risk management, the majority of companies possess a dedicated risk management team, and most respondents are members of this team. The duration of membership among the respondents in the risk management team varies from 1 year to a maximum of 11 years. This signifies that risk management is a priority for the majority of organisations, which employ experienced personnel to supervise this function. One participant asserted, 'I oversee the risk and quality assurance team'. This underscores the

70

significance of amalgamating risk management with quality assurance. Another respondent stated, 'I am not formally a member of the risk management team, but I endorse all of the team's initiatives.' This indicates a cooperative risk management strategy within his organisation.

Risks Associated with New Product Development Projects in Food and Beverage Manufacturing

Regarding firms' risks when producing new product development, the following 15 specific risks were identified:

1. Market risk

2. Technological/technical risk

3. Operational risk

4. Compliance/regulatory risk

5. Financial risk

6. Exchange rate risk

7. Supply chain risk

8. Inflation risk

9. Competitive risks

10. Credit risk

11. Political risk

12. Environmental/climatic risk

13. Performance risk

14. Security risk

15. Inventory control risk

The Risk Management Practices of the Food and Beverage Companies

Essentially, risk management practices include risk identification, risk assessment and analysis, risk mitigation, and risk monitoring and control. The following illustrates how various companies identify, evaluate, mitigate, monitor and control risks associated with new product development projects:

Project Risk Identification

Regarding the question of 'How does your firm identify new product development risks,' the data indicate that some of the companies use risk registers to monitor and record their project risks. Some team members also conduct periodic brainstorming sessions to identify new risks. Some companies also perform market surveys to ascertain new product risks. Thus, the companies employed both documented processes and collaborative brainstorming techniques to identify range of potential risks. In response to the question concerning the robustness of their risk identification strategies, participants grouped them as "very robust," "moderately robust," and "not robust." More than half of the respondents reported a moderate to very high degree of effectiveness in their risk identification strategies. Thus, 20% reported "very robust," 40% indicated "quite or moderately robust," and 40% expressed "not robust." Given that more than half of the respondents provided a positive response, it is reasonable to conclude that the risk identification practices in the sector are satisfactory. Nonetheless, the 40% indicating "not robust" raises concern, as this percentage is substantial.

Risk Assessment and Analysis

Regarding the question, "How has your company been evaluating and analysing the risks associated with new product development?" The results

72

indicated that the predominant techniques employed by the companies to evaluate and analyse risks associated with new product development are as follows:

1. Brainstorming sessions with risk management teams to assess and analyse new product risks in terms of likelihood and impact

2. Review of known risk registers or databases

3. Seeking expert opinions

4. Analysing sales turnover and financial reports

5. Market research and surveys

6. Using tools like Decision Trees and Failure Modes and Effects Analysis (FMEA).

As regards the question, "How effective are the risk assessment and analysis strategies or practices in your organisation?" the respondents evaluated the effectiveness of their companies' risk assessment and analysis strategies as "very effective," "quite effective," and "not effective." The majority of respondents reported that their strategies were "moderately effective" or "very robust." Thus, the majority of companies employed a synthesis of brainstorming, expert consultation, data analysis, and systematic risk assessment instruments to assess risks associated with new product development.

Risk Mitigation Strategies

Regarding the question, "What risk mitigation strategies does your company implement?" The responses indicated a range of mitigation strategies as follows:

Risk Avoidance: Many companies have sought to mitigate specific risks, including compliance and operational risks, by implementing proactive preventive strategies. Some respondents indicated, 'We try to be proactive, so we are normally able to avoid many of the risks, for instance, compliance and operational risks'.

Risk Mitigation: The majority of companies instituted internal controls, conducted training sessions for employees, and insured assets to diminish financial, operational, and other risks. Some respondents stated, 'We also mitigate financial and other risks by critically evaluating our internal controls'.

Risk Transfer: Approximately half of the respondents reported that their organisations are capable of transferring risks through the insurance of their facilities, equipment, and other assets. As some stated, "We do insure some of our facilities and equipment'.

Risk-sharing: Some respondents indicated that their companies mitigate certain financial risks through strategies such as franchising**.** Some respondents indicated, 'At times, we also consider franchising'.

Overall, the companies utilised a combination of the above-mentioned risk mitigation strategies, tailoring their approach to the specific risks they face, such as compliance, operational, financial and, supply chain risks. Thus, the goal was to avoid, reduce, transfer, or share risks to protect their businesses.

Risk monitoring and control

In response to the question regarding the measures implemented by the companies to ensure effective monitoring and control of risks in new product development projects, the data indicated that the majority of companies were

74

employing various strategies to answer this question. The array of monitoring and control measures encompassed the following:

1. Regular assessment and monitoring of internal controls to ensure sustainable and inclusive growth

2. Promotion of responsible practises like decent working conditions and ethical behaviour

3. Focusing on energy efficiency, renewable energy adoption, and low-carbon production to ensure responsible and innovative product development.

4. Development of risk and contingency plans, embracing technology and innovation, prioritising regulatory compliance, establishing product recall protocols and, conducting external audits.

5. Organisation of monthly, bi-monthly, or quarterly debriefings to update staff on risk issues and render of progress reports.

6. Conduct of quarterly safety training by HR(s).

7. Implementation of measures such as weekly "Tool Box" sessions to remind staff about professionalism whiles enforcing "No Drink" policies.

8. Daily updates from supervisors and weekly reports from department heads.

9. The finance heads cross-checking bank receipts daily.

10. Extensive use of risk registers to monitor documented risks, conduct of periodic market research, and hold regular risk management team meetings.

Overall, it was found that companies were taking a proactive, multi-faceted approach to ensure that new product development risks were effectively monitored and controlled throughout the process.

75

Risk Management Frameworks

To ascertain the companies awareness of the relevance and adoption of key international risk management practices and frameworks or standards, the researcher asked the following three questions: "As a company, how do you believe that a global risk management standard and framework (e.g., ISO 31000) will enhance the overall risk management initiatives of your new product development project?"; "Does your organisation possess a risk certification, such as an ISO certificate?"; and "If not, is there a specific reason?"

The responses to the initial question suggested that implementing an international risk management standard, such as ISO 31000, offers several advantages:

1. This will significantly improve the overall risk management initiatives of new product development projects by helping the organisations standardise their risk management processes and enhance compliance with global best practices.

2. This can improve the corporate image of the organisation and increase the acceptability of products in the international market.

3. This can make the organisation's products more recognised and appealing on the international stage.

4. This will enhance the overall effectiveness of the organisation's risk management efforts.

On the second question that elicited whether or not these companies have, for example, an ISO certificate, 55% of respondents replied affirmatively. Nevertheless, 45% admitted that their organisations lacked an

76

ISO certification. In response to the third question concerning the absence of the certificate, the primary challenges identified were the substantial cost and complexity associated with obtaining ISO 31000 certification, as well as the absence of a stringent requirement for its acquisition in Ghanaian business practices.

In summary, adopting ISO 31000 standards can yield substantial advantages regarding enhancement of corporate reputation, global product acceptability, regulatory compliance, and overall efficacy in risk management. Nevertheless, the substantial expense and intricacy associated with obtaining these certificates continue to pose significant obstacles, especially during this time when their acquisition is not yet obligatory for business operations in Ghana.

Discussions of the Qualitative Data

This section discusses the findings from the interviews considering the following research questions:

Research Question 1: What risks are associated with new product development projects in Ghana's food and beverage manufacturing industry?

The data indicates that food and beverage manufacturing companies in Ghana encounter a minimum of 15 risks during the development of new products. The identified risks encompass organisational, financial, operational, technological, exchange rate, compliance/regulatory, supply chain, market, inflation, competitive, credit, security, inventory control, environmental, and performance risks. This discovery aligns with the findings of Parananond and Thawesaengskulthai (2014) and Juranic et al. (2016) who reported related

77

risks in new product development. Given that these risks impede the success of new product development initiatives, management must undertake all requisite measures to mitigate them.

Research Question 2: What are the risk management practices of the food and beverage manufacturing firms during new product development in Ghana?

Risk management practices of firms typically encompass risk identification, risk assessment and analysis, risk mitigation, and risk monitoring and control.

During the new product risk identification phase, the following issues were addressed: the methods of risk identification, the tools and techniques utilised, and the efficacy of the employed risk identification techniques. From the results, the companies identified risks in new products through techniques including risk registers, periodic brainstorming sessions, market surveys, and research. Thus, they integrated quantitative and qualitative methods by employing both documented procedures and collaborative brainstorming techniques to identify various potential risks. This approach is good for the sector, as none can be deemed adequate. Furthermore, with 40% of respondents asserting that their techniques lack robustness, regulators must enact measures to assist firms within the sector. Establishing risk management as a fundamental requirement for business operations and holding regular risk management training sessions to supplement the firm's offerings are two examples of such measures.

The researcher examined the following aspects of risk assessment and analysis: the methods employed by firms to evaluate and analyse risks

associated with new products and the efficacy of the assessment mechanisms utilised. The assessment revealed that companies employed various techniques: brainstorming sessions to evaluate risk probability and impact; reviewing risk registers or databases of identified risks; soliciting expert judgement and opinions; analysing sales turnover and financial reports; conducting market research and surveys; and utilising tools such as Decision Trees and Failure Modes and Effects Analysis (FMEA). The risk assessment and analysis tools used were therefore a mix of quantitative and qualitative techniques to figure out how likely new product risks were to happen and what would happen if they did. Table 9 delineates the risk matrix.

Table 9: Risk Matrix

Likelihood \ Impact	Insignificant	Minor	Moderate	Major	Catastrophic
Rare	Low	Low	Low	Medium	Medium
Unlikely	Low	Low	Medium	Medium	High
Possible	Low	Medium	Medium	High	High
Likely	Medium	Medium	High	High	Very High
Almost Certain	Medium	High	High	Very High	Very High

Source: Adopted from Hillson and Simon (2012)

Risk Likelihood:

Risk likelihood denotes the probability of a specific risk occurring. Common categories include the following:

Rare (Very Low Likelihood):

Probability: Less than 5%

79

Description: It is unlikely to happen. These events are highly improbable and may not have occurred before.

Unlikely (Low Likelihood):

Probability: 5% to 30%

Description: Infrequent but possible. These risks might have occurred in the past or have the potential to occur under specific circumstances.

Possible (Medium Likelihood):

Probability: 30% - 60%

Description: It could happen occasionally. These risks have a reasonable chance of occurring.

Likely (High Likelihood):

Probability: 60% - 90%

Description: Expected to happen. These risks frequently occur.

Almost Certain (Very High Likelihood):

Probability: More than 90%

Description: It is almost sure to happen. These risks are nearly inevitable.

Risk Impact: Risk impact assesses the potential consequences of a risk event. Impact is categorised into the following levels:

Insignificant (Very Low Impact):

Description: Minimal impact on operations, negligible financial loss, and no significant disruption.

Minor (Low Impact):

Description: Manageable impacts with small financial losses and minor operational disruptions.

80

Moderate (Medium Impact):

Description: Noticeable impact on operations, moderate financial loss, and disruption that requires management intervention.

Major (High Impact):

Description: Significant impact on operations, substantial financial losses, and major disruptions that require significant resources.

Catastrophic (Very High Impact):

Description: Severe impact on operations, critical financial losses, and potential for operational failure or significant long-term consequences.

Regarding the question of the effectiveness of the risk assessment and analysis techniques that were being employed, it became evident that for the majority (60) of the firms, their assessment and analysis techniques were worthwhile. Given that 40% of respondents voiced negative concerns regarding their companies' practices, immediate and serious attention is deemed necessary due to this significant percentage.

As regards the risk mitigation strategies adopted by the firms, the responses indicated the following range of strategies: risk avoidance, risk reduction, risk transfer, and risk sharing. According to the data, most firms combined some of the above strategies as and when necessary based on the risk's likelihood and impact, which is worthwhile. Thus, the ability to comply with regulations, streamlining internal controls, use insurance, and franchising are steps in the right direction. With respect to the effectiveness of the strategies, the 55% response rate in favour of the effectiveness of the mitigation strategies was also commendable. However, the 45% response rate

81

against the effectiveness of their techniques suggests that the industry as a whole would have to implement measures to help the firms.

Pertaining to risk monitoring and control practices of the firms, the results suggest that their risk monitoring and control measures were good. With measures like regular assessment and monitoring of internal controls to ensure sustainable and inclusive growth; promotion of responsible practises like decent working conditions and ethical behaviours such as focusing on energy efficiency, renewable energy adoption and, low-carbon production to ensure responsible and innovative product development were, worthwhile. Again, the development of contingency plans, conducting external audits, establishment of protocols, weekly debriefing, and quarterly safety training sessions etc. were all steps in the right direction. It is therefore not surprising that most respondents (70%) stated that their companies' monitoring and control measures were effective.

Although the researcher did not set compliance with the ISO standard as an objective, he decided to gauge the companies' understanding of how a proper adoption of such standard could be of benefit to them; whether or not they have such certificate; and the reason(s) for their lack of such certifications. As indicated by the data results, all companies proved to have an idea about such an international risk management standard. All of them could provide some benefits that a company could derive upon adopting such frameworks.

The benefits they mentioned, such as helping them improve their overall risk management initiatives for new product development projects; helping them standardise their risk management processes; enhancing their

82

compliance with global best practices; as well as helping them improve their corporate image; and making their products more acceptable internationally, were consistent with the works of Talbot (2022), and Wysokińśka-Senkus and Górna (2021), who posited that the ISO standard seeks to ensure operational continuity and gives reassurance in terms of economic resilience. Among the firms, 55% responded in affirmative to having an ISO certificate, while 45% of the firms who responded in the negative were not impressive. Because, the benefits that could be derived from adoption of such a standard are many, regulators as well as the associations in the sector need to encourage and also find ways of helping members be trained and acquire some of these certificates.

Quantitative Data Presentation

This section presents quantitative data based on objective three of this study, which aimed to determine the impact of risk management practices at each stage of the new product development process on the success of new product development projects within the industry. A sample of 400 participants was used for this aspect of the study. The questionnaire served as the research instrument and was distributed to the respondents via Google Forms. Ultimately, 300 participants from the total sample frame responded, resulting in a response rate of 75%. Table 10 summarises the demographic characteristics of the quantitative respondents.

Table 10: Demographic Characteristics of Respondents

	N=300	*(%)*
Gender		
Male	188	62.67
Female	122	40.67
Age		
21-30 years	96	32.00
31-40 years	101	33.67
41-50 years	81	27.00
Above 50years	22	7.33
Level of education		
Certificate	31	10.33
Diploma	105	35.00
Undergraduate	130	43.33
Masters	31	10.33
PhD	3	1.00

Source: Fieldwork (2023)

Of the 300 respondents surveyed, 62.67% (188 participants) were male, while 40.67% (122 participants) were female. The summarised results reveal that 32% (96 participants) were under 30 years of age, 33.67% (101 participants) were aged between 30 and 40 years, 27% (81 participants) were between 41 and 50 years, and the remaining 7.33% (22 participants) were over 50 years. The educational background of the respondents, as presented in Table 10, reveals that certificate holders comprised 10.33% (31 participants), diploma holders accounted for 35% (105 participants), undergraduates

represented 43.33% (130 participants), Master's degree holders constituted 10.33% (31 participants), and 1% (3 participants) of the respondents possessed a PhD. This shows that the respondent base is highly educated and therefore had sufficient understanding to provide a suitable response.

Descriptive Statistics and Normality Analysis

The employed descriptive statistical techniques were the mean and standard deviation. Table 11 summarises the calculated mean and standard deviation values for the questionnaire items. The mean and standard deviation for the questionnaire items ranged from mean = 3.03 to 4.63 and SD = 0.54 to 0.99 respectively. This indicates that respondents mostly agreed to the questions in the questionnaire.

Additionally, item normality was evaluated through skewness and kurtosis. Hair, Black, Babin, and Anderson (2010) assert that normality is deemed satisfied when skewness and kurtosis values lie within the interval of ± 2.00 (from -2.00 to 2.00). The obtained results (skewness = -0.91 to 0.90; kurtosis = -1.07 to 1.08) fall within this range, thus confirming the satisfaction of normality.

Table 11: Item Descriptive and Normality Diagnostics

	Items	M	SD	Skewness	Kurtosis	α
Risk management in Idea Generation						
RMIG	Managers hold brainstorm sessions to generate new product ideas or identify opportunities to enhance existing products.	3.36	1.32	-0.39	-0.93	
RMIG	During the product discovery phase, we analyse market trends, conduct thorough research, and delve into users' desires and requirements to identify specific problems and propose creative solutions.	3.41	1.37	-0.47	-0.97	0.93
RMIG	We employ frameworks like the SWOT analysis to assess strengths, weaknesses, opportunities, and threats (SWOTs) as part of our strategic evaluation process.	3.39	1.31	-0.36	-0.95	
RMIG	We utilise internal sources of ideas, including input from our marketing, customer support, sales team, and technical department, to generate and develop innovative concepts.	3.31	1.28	-0.32	-0.88	
RMIG	In addition to internal sources, we leverage external ideas, which encompass competitive analysis and significant feedback obtained from our target audience. These external sources contribute to our idea generation and refinement processes.					

Table 11: (Continued)

Risk Management in Market Analysis

RMCM	We collaborate closely with our product marketing and sales teams to ensure that our products' value is correctly positioned in the market. This partnership helps us align our product messaging and positioning with customer expectations and market demands.	3.39	1.34	-0.43	-0.94	
RMCM	We gather user feedback through various methods, including interviews, focus groups, surveys, and data analytics. These approaches enable us to gain valuable user insights to inform our product development and improvement efforts.	3.38	1.30	-0.40	-0.90	0.88
RMCM	We conduct user tests to observe how individuals use our product, which allows us to identify gaps and areas for improvement in the user experience. This hands-on approach helps us refine our products based on real-world usage and feedback.	3.29	1.29	-0.35	-0.87	
RMCM	Our approach is to generate many ideas while maintaining a strong focus on delivering value to our customers. This ensures that our innovation efforts are customer-centric and driven by their needs and preferences.	3.35	1.31	-0.32	-0.94	

87

Table 11: (Continued)

Risk Management in Concept Development and Testing					
RMCD	We emphasize the importance of creating a comprehensive description or blueprint of our idea or product concept. This detailed documentation serves as a roadmap for the development and implementation of our innovative concepts.	3.38	1.29	-0.32	-0.94	
RMCD	We ensure that the blueprint development is oriented towards the product's market, encompassing the features and advantages of our solution that could appeal to our customers, as well as the proposed pricing strategy for the product.	3.41	1.31	-0.42	-0.92	0.87
RMCD	Our product concept, along with its blueprint, consistently estimates the expenses associated with the design, development, and launch of the product.	3.32	1.29	-0.31	-0.90	
RMCD	We continuously create alternative product concepts to assess their attractiveness to customers and ultimately select the one that offers the highest value to them.	3.37	1.33	-0.40	-0.94	

Table 11: (Continued)

RMCD	After developing our concepts, we subject each concept to testing with a select group of consumers, validating the product ideas with users before committing significant time and resources to their development.	3.39	1.34	-0.42	-0.95	
RMCD	Before making a commitment to develop a new product, we share the concept with potential buyers in order to gather insights and gauge the viability of the product idea within the target market.					

Risk Management in Marketing Strategy and Business Analysis

RMMS	We describe an initial marketing strategy for introducing the product to the market and assess the value of the proposed solution from a business perspective.	3.40	1.35	-0.36	-1.01	
RMMS	Following the development of the marketing strategy, the product management team evaluates the business viability of the product concept.	3.39	1.29	-0.42	-0.87	0.83
RMMS	We scrutinise sales forecasts, anticipated expenses, and profit projections to determine whether they align with the company's objectives before advancing the product to the development stage.	3.52	1.06	0.55	-0.63	

Table 11: (Continued)

Risk Management in Product Development						
RMPD	Our product development process is contingent on our company's chosen development approach, which may include agile product development, the waterfall method, or another suitable alternative.	3.65	0.93	0.47	-0.36	*0.92*
RMPD	We generate prototypes and subject them to user testing to observe user interactions and gather feedback.	3.46	0.94	0.56	-0.27	
RMPD	In our testing process, we prioritise usability testing for primary features. This is performed for two key reasons: first, to identify the optimal flow, and second, to iterate the flow to ensure it is intuitive and comprehensible for users.	3.34	0.92	0.77	0.19	
Risk Management in Test Marketing						
RMTM	We consistently maintain communication with our customers and actively collect research data to gain insights into what resonates with our target audience and what does not.	3.52	1.06	0.55	-0.63	
RMTM	We conduct test marketing by launching the completed product within a selected market segment, allowing us to assess its performance based on a predetermined marketing strategy.	2.96	0.75	0.94	1.3	*0.72*

90

Table 11: (Continued)

RMTM	We perform alpha testing to identify and rectify any bugs or issues before the product is released publicly.	3.87	0.97	0.41	-0.71	
RMTM	We also engage in beta testing, providing actual users with the opportunity to use the product and provide valuable feedback on their experiences. This feedback aids in further refinement and improvement before the product's full-scale launch.	3.30	0.91	-0.42	-0.73	
Risk management during product launches						
RMPL	We establish our key results as soon as possible, comprehensively plan how to track them, and then strategize how to leverage the insights gained to implement changes or adaptations.	3.38	1.32	-0.38	-0.97	0.81
RMPL	We ensure that our product, marketing, sales, and customer support teams are well-prepared and coordinated to ensure a successful product launch and diligently monitor its performance.	3.38	0.88	0.87	0.29	

NB: M is the Mean (average response); SD refers to Standard Deviation; α refers to the Alpha Values.
Source: Fieldwork (2023)

Correlations and Reliability Analysis of the Constructs

The result captured in the Table 12 below summarised the correlation matrix constructs and the reliability values of each construct. From the results, a significant correlation existed among three constructs, while the remaining constructs showed no significant correlation. The reliability of the constructs was determined using a commonly used technique (Cronbach alpha). The alpha (α) takes values ranged from zero (0.00) to (1.00). A reliability value of at least 0.70 is statistically adequate to measure the internal consistency of respondents' responses (Hair et al., 2010). The results obtained had Cronbach alpha (α) values ranged from (α=0.831 to 0.937), implying a high level of internal consistency because all the constructs have values above the recommended value of 0.70.

Table 12: Correlation Analysis and Test of Reliability

		1	2	3	4	5	6	7
1	Risk Management and Idea Generation	1.000						
2	Risk management and market analysis	-0.081	1.000					
		(0.191)						
3	Risk Management and Concept Development	-0.587	0.242	1.000				
		(0.000)	(0.000)					
4	Risk Management and Marketing Strategy	-0.296	0.391	0.412	1.000			
		(0.000)	(0.000)	(0.000)				
5	Risk Management and Product Development	-0.063	0.010	0.131	0.087	1.000		
		(0.311)	(0.771)	(0.054)	(0.228)			
6	Risk management and testing marketing	-0.289	0.381	0.402	0.077	0.087	1.00	
		(0.000)	(0.000)	(0.000)	(0.238)	(0.238)		
7	Risk Management and Product Launch	-0.245.	3.562	0.863	-0.303	0.430	0.757	1.00
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

NB: Values outside and inside brackets represent correlation and significant values, respectively.

Source: Fieldwork (2023)

Item Standardised Loadings and Validity Analysis

The validity of the item loadings was significant in confirmatory factor analysis (CFA). The performance of each item was assessed using standardised regression loadings. Standardised regression weight or loadings must be 0.50 and ideally be quite above 0.70 to be considered adequate to demonstrate high convergence on a common point (Hair et al. 2010). As indicated in the results, all study items had loadings ranging from 0.545 to 0.978, implying a high convergent validity. In addition, the independence of the constructs was examined by comparing the average variance extracted with the squared correlation (i.e. discriminant validity).

Discriminant validity is achieved when the AVE of two constructs exceeds the square of the correlation between the two constructs. The results in Table 13 demonstrate the average and squared roots of AVE. As indicated in the results, no correlations (Table 12) were equal to or greater than the square root of the AVE, indicating discriminant validity. Each AVE value was found to be greater than the correlation square. Discriminant validity is thus supported; multi-collinearity is therefore absent (Byrne, 2001).

94

Table 13:Validity Analysis

Constructs	Items	Standardised Loadings	AVE	Sqrt (AVE)
Risk Management and Idea Generation				
	RMID	0.863		
	RMID	0.877	0.753	0.868
	RMID	0.934		
	RMID	0.867		
Risk management and market analysis				
	RMCM	0.679		
	RMCM	0.860	0.723	0.850
	RMCM	0.883		
	RMCM	0.927		
Risk Management and Concept Development				
	RMCD	0.565	0.657	0.811
	RMCD	0.940		
	RMCD	0.913		
	RMCD	0.545		
	RMCD	0.940		

95

Table 13: (Continued)

Risk Management and Marketing Strategy

RMMS	0.776		
RMMS	0.751	0.658	0.811
RMMS	0.740		
RMMS	0.859		

Risk Management and Product Development

RMPD	0.831	0.736	0.858
RMPD	0.842		
RMPD	0.926		
RMPD	0.853		
RMPD	0.864		

Risk Management and Test Marketing

RMTM	0.576		
RMTM	0.942		
RMTM	0.932	0.659	0.821
RMTM	0.546		

Risk Management and Product Launch

RMPL	0.587	0.688	0.832
RMPL	0.978		
RMPL	0.567		

AVE represents average variance extracted
Source: Fieldwork (2023)

Structural Equation Model

Confirmatory analysis was done using the Structural Equation Modelling to examine the hypothesised conceptual framework by performing a simultaneous test. As shown in Table 14, the following were the model fit indices and their values: Chi-square/df = 2.252, CFI = 0.972, GFI = 0.957, AGFI = 0.878, NFI = 0.955 and RMSEA = 0.036. Overall, these values provided evidence of good model fit. All of the model-fit indices exceeded the respective common acceptance levels as seen in Table 14 which demonstrated that the model exhibited a good fit with the collected data.

Table 14: Summary of model fit indices

Fit Indices	Accepted Value	Model Value
Absolute Fit Measures		
X^2 (Chi-square)		556.158
DF (Degree of Freedom)		247.000
Chi-square/df(X^2/df)	<3	2.252
GFI (Goodness of Fit Index)	>0.95	0.957
RMSEA (Root mean square error of approximation)	<0.08	0.036
IFM (Incremental Fit Measures)		
NFI (Normed Fit Index)	>0.95	0.955
CFI (Comparative Fit Index)	>0.95	0.972
IFI (Incremental Fit Index)	>0.95	0.984
RFI (Relative Fit Index)	>0.95	0.944
TLI (Tucker-Lewis Index)	>0.95	0.986

Fit indices > 0.95 are considered acceptable.

Source: Fieldwork (2023)

Hypotheses Testing Results

As regards the objective three which was to establish the relationship between management practices and the success of a new product development project, the following details the results of the hypothesis testing. The results in Table 15 are a summary of the hypotheses testing results. Seven hypotheses were tested in this study. The hypothesis test was performed at the 5% significance level. The estimated result for Hypothesis 1, which looked at Risk Management practice at Idea Generation and Success of NPD, was given as (β=0.474; SE=0.456; Sig<0.05), hence the hypothesis was significant and supporting.

The Hypothesis 2 held that Risk Management practices at the Idea Screening Level impact the Success of New Product Development projects. The result of this hypothesis implies a statistically significant influence of Risk Management practices at the idea screening level on the success of NPD. The effect was positive, as the estimated impact was given as (β=0. 0.782; SE=1.247; Sig<0.05). Therefore, the hypothesis is supported.

The Hypothesis 3 held that Risk Management practises at the Concept Development Level impact the Success of New Product Development projects. The result of this hypothesis implies a statistically significant influence of Risk Management practises at the Concept Development Level on the Success of NPD. The impact was estimated to be (β=0.681; SE=0.435; Sig<0.05). The impact showed a positive relationship.

The Hypothesis 4 held that Risk Management practises at the marketing strategy level impact NPD success. The result implied a significant influence of risk management practises at the marketing strategy level have a

98

significant influence on NPD success. The influence was estimated to be approximately (β=0.538; SE=0.334; Sig>0.05). Hence, the hypothesis showed a positive relationship.

The Hypothesis 5 held that Risk Management practices at the product development level impact NPD success. For this hypothesis, the result showed that risk management practices at the product development level have a statistically significant positive influence on the success of NPD at (β=0.664; SE=0.679; Sig<0.05). Thus, the hypothesis is supported by the data.

The Hypothesis 6 held that Risk Management practises at the Test Marketing Level impact the Success of NPD. For this hypothesis, the result showed that risk management practices at the test marketing level influence the success of NPD. The impact was estimated to be positively related (β=0.578; SE=0.344; Sig<0.05). Hence, the hypothesis is supported and is significant.

The Hypothesis 7 held that Risk Management practices at the Product Launch Level impact the Success of NPD. For this hypothesis, the result showed that risk management practices at the product launch level have a significant statistical influence on the Success of NPD. The impact was estimated to be positively related (β=0.778; SE=0.189; Sig<0.05). Hence, the hypothesis was supported.

In summary, all seven developed hypotheses showed a positive influence and were supported by the data, indicating strong correlations between risk management practices and the firm's success in NPD. Therefore, Table 15 below presents a summary of the hypotheses' results as well as the Standardised Path Coefficients of the relationships between risk management

99

practices and success of new product development projects at various levels. Figure 5 shows the research model developed by the researcher and the hypothesis results.

Table 15: Summary of Hypotheses

				Estimate (β)	S.E.	C.R.	P-value	Remarks
H1	Risk Management at the Idea Generation Level	--->	Success of New Product Development	0.474	0.456	3.668	0.000	Supported
H2	Risk Management at The Idea Screening Level	--->	Success of New Product Development	0.782	1.247	3.633	0.000	Supported
H3	Risk Management at the Concept Development Level	--->	Success of New Product Development	0.681	0.435	3.757	0.000	Supported
H4	Risk Management at the Marketing Strategy and Business Analysis Level	--->	Success of New Product Development	0.538	0.334	1.757	0.082	Supported
H5	Risk Management at the Product Development Level	->	Success of New Product Development	0.664	0.679	3.792	0.000	Supported
H6	Risk Management at Test Marketing Level	--->	Success of New Product Development	0.578	0.344	1.897	0.081	Supported
H7	Risk Management at the Product Launch Level	--->	Success of New Product Development	0.778	0.189	4.992	0.470	Supported

β is Standardised Regression Weight

Source: Fieldwork (2023)
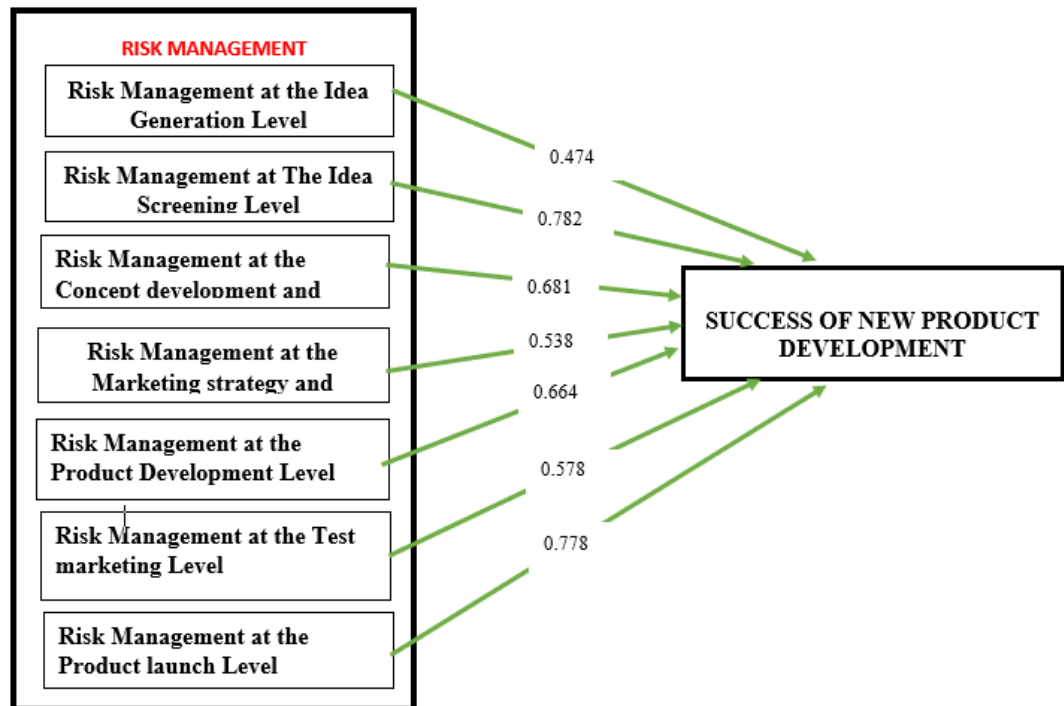
Figure 5: Research Model with the hypothesis results

Source: Author's Construct (2023)

Quantitative Data Discussion

The third objective of this study sought to assess the influence of risk management practices at each phase of the new product development process on the success of new product development projects within the industry. The following sub-headings outline the findings:

The Impact of Risk Management at the Idea Generation Stage on the Success of New Product Development

The researcher hypothesised that risk management practices in the idea generation phase affect the success of new product development efforts. Thus, risk management strategies during the idea generation stage influence the success of new product development efforts. From the data, risk management is found to be crucial for ensuring the success of new product development projects. The anticipated result was 47.4%. This corresponds with Owens's

102

(2009) claim that to alleviate risks in product development, a company must analyse market trends, conduct research, and meticulously examine users' needs and preferences to pinpoint problems and propose innovative solutions. Kabala and Seshamani (2016) asserted that they must also evaluate frameworks such as SWOT analysis to establish a firm's Strengths, Weaknesses, Opportunities, and Threats.

The Impact of Risk Management at the Idea Screening Stage on the Success of New Product Development

The researcher hypothesised that risk management practices in the idea screening phase affect the success of new product development efforts. The study's data supports this hypothesis, suggesting an estimated impact of about 78.2%. This aligns with Kotler and Keller (2016) assertion that idea screening in the new product development process significantly mitigates risk by facilitating the selection of ideas to pursue or reject, based on various factors, including anticipated consumer benefits, required product enhancements, technical feasibility, and marketing potential.

The Impact of Risk Management at the Concept Development and Testing Stage on the Success of New Product Development

The researcher hypothesised that risk management practices during the concept development and testing phases affect the success of new product development projects. This claim was firmly substantiated, as the support rate was approximately 68.1%. This aligns with the assertion by Kazimierska and Grębosz-Krawczyk (2017) that a product concept, essentially a comprehensive outline or description of the idea, must invariably be documented to mitigate risk. This encompasses details regarding the product's target demographic, its

attributes and advantages that may incentivise consumer purchases, the proposed pricing, and the expenses associated with its design, development, and launch.

The Impact of Risk Management at the Marketing Strategy and Business Analysis Stage on New Product Development Success

The researcher posited that risk management practices at the levels of marketing strategy and business analysis affect the success of new product development projects. The data findings support this proposition, suggesting its influence is roughly 53.8%. This corresponds with Owens (2009), who stated that to reduce risk, a company must develop a marketing strategy and conduct a business analysis to guide the positioning, pricing, and promotion of a new product. Following the development of the marketing and business analysis strategy, product management can evaluate the commercial feasibility of the product concept.

The Impact of Risk Management at the Product Development Stage on the Success of New Product Development

The researcher asserted that risk management practices during product development affect the success of new product development initiatives. The finding substantiates the hypothesis that risk management practices during the product development phase influence the success of new product development initiatives. The projected degree of influence is roughly 66.4%. This is shared by Owen (2009) as well as Kotler and Keller (2016), who explained that at the product development stage, firms must adopt a suitable product development approach and come up with prototypes to determine how users may interact with them and collect feedback. This helps validate design decisions and

identify flaws or usability issues before handing the designs to a development team.

The Impact of Risk Management at the Test Marketing Stage on the Success of New Product Development

It was hypothesised that risk management practices during test marketing would affect the success of new product development initiatives. The results corroborated the hypothesis, with an impact level established at 57.8%. This corresponds with the views of Huang and Wang (2017), who contended that to reduce risk in new product development, a company must interact with customers and gather research data to identify what is effective and attractive to the target audience, as well as what is not.

The Impact of Risk Management at the Product Launch Stage on the Success of New Product Development

The researcher finally hypothesised that risk management practices during the product launch phase affect the success of new product development efforts. The data findings supported this assertion, indicating that the estimated impact was roughly 77.8%. This corresponds with Juranić et al. (2016), who asserted that for a company to successfully launch a product with reduced risk, it must swiftly define its primary outcomes, understand how to track them, and subsequently ascertain how to utilise the insights for adjustments or modifications. The assertion also corresponds with the views of Dewi et al. (2015) and Yin and Zhang (2021), who contend that for companies to successfully launch new products, it is essential to have established product, marketing, sales, and customer support teams to guarantee effective execution and performance assessment of the new product.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the summary, conclusions and recommendations of the study. The study aimed to assess the risk management practices in Ghana's food and beverage manufacturing sector during new product development and to evaluate how these practices influence the success of projects at different stages of the development process. The study employed both qualitative and quantitative methodologies, utilising an interview guide and a questionnaire as research instruments.

The study employed a purposive sampling technique, selecting 20 key, experienced respondents with a focus on risk management from 20 food and beverage manufacturing firms in the Greater Accra and Central regions to gather qualitative data. Consequently, one participant was chosen from each of the 20 participating companies. For the quantitative component of the study, the researcher also employed a purposive sampling technique, selecting four hundred (400) participants from ten (10) food and beverage companies (food only, beverage only, both food and beverage) in the Greater Accra region of Ghana.

Summary of the Qualitative findings

CMC Invest (2023) asserts that risk management includes finding uncertainties, analysing them, and figuring out what to do about them. The goal is to improve the outcomes of good events and lessen the effects of bad ones. Risk management is a coordinated endeavour to guide and regulate an organisation against risks during business operations. It is expected to mitigate

106

potential losses and transform risks into opportunities for generating corporate profits. Lin et al. (2012) asserted that risk management involves a systematic approach to identifying and mitigating the adverse impacts of uncertainties by aligning strategy, organisational processes, personnel, technology, and knowledge.

This study assesses risk management in new product development projects in the food and beverage manufacturing industry in Ghana. Two specific qualitative objectives and one quantitative objective drove the study. The two qualitative objectives that drove the study were: 'To determine the risks associated with new product development projects in Ghana's food and beverage manufacturing industry'; and 'To examine the risk management practises of firms in the food and beverage industry during the production of new products'.

According to the study's first objective, Ghana's food and beverage manufacturing companies encountered 15 main risks when developing new products. The identified risks encompass organisational, technological, market, performance, financial, supply chain, inventory control, environmental, inflation, exchange rate, security, compliance, competitive, credit, and political risks. These results align with the observations of Parananond and Thawesaengskulthai (2014) and Juranic et al. (2016) who documented analogous risks in new product development. Given that risks may yield adverse outcomes, management must remain watchful and undertake all requisite measures to mitigate them during the development of new products.

107

The findings pertaining to the second objective of this study reveal that industry risk management practices encompass risk identification, assessment, mitigation, monitoring, and control. This aligns with the recommendations of certain risk management organisations, including the Project Management Institute (PMI, 2017). Nonetheless, the findings clearly indicate that a substantial number of firms in the industry must enhance the effectiveness of their risk management initiatives. A considerable number of companies in the sector lack proficiency in certain international risk management practices, including ISO. Also, a considerable number of firms in the industry lack international risk management certifications, such as ISO certificates.

The findings demonstrated that the adoption and adherence to certain globally recognised risk management standards and frameworks, such as ISO 31000, yield numerous advantages. According to Patrick-Oh (2023), these benefits include assisting organisations in increasing the likelihood of achieving objectives, improving the identification of opportunities and threats, and effectively allocating and utilising risk management resources.

Risks within the industry were identified and evaluated utilising both qualitative and quantitative methodologies. Commonly employed qualitative tools encompass expert judgement, brainstorming, and team meetings. Commonly utilised quantitative tools include Decision Trees and Failure Mode and Effects Analysis (FMEA). The FMEA is a forward-looking risk assessment instrument that necessitates a thorough evaluation of high-risk processes to pinpoint enhancements that mitigate the likelihood of unintended negative outcomes. The findings indicate that companies in the industry can alleviate risks through a combination of strategies, including risk transfer and

108

risk sharing. Risk monitoring and control in new product development projects were conducted through project risk response audits, regular project reviews, ongoing assessment of internal controls, periodic safety training programs, progress reports, and debriefings.

Summary of the Quantitative findings

In accordance with objective three (3) of this study, the following summary is presented: Risk management practices during the idea generation stage positively impact the success of new product development projects. The projected outcome was approximately 47.4%; b) Risk management strategies at the idea screening stage positively affect the success of new product development initiatives. The estimated impact was approximately 78.2%; c) Risk management practices at the concept development stage positively affect the success of new product development projects. The estimate was approximately 68.1%; d) Risk management practices at the marketing and business analysis levels positively impact the success of new product development projects. The influence was approximated at 53.8%; e) Risk management practices at the product development stage positively affect the success of new product development projects. The estimate was approximately 66.4%; f) Risk management practices at the test marketing stage positively impact the success of new product development initiatives. The estimated impact was 57.8%; g) Risk management practices at the product launch stage positively affect the success of new product development projects. The impact was approximated at 77.8%. The findings align with Zwikael and Ahn (2011), who stated that proactive risk management is essential for addressing uncertainties and ensuring project success, and with Peljhan and Marc (2021),

who emphasised that integrating risk management throughout the NPD process aligns project objectives with market demands, thereby enhancing the likelihood of successful product launches.

Conclusions

This section provides a logical conclusion to the research based on the study findings. Using data obtained from interviews and questionnaires, the study reached the following conclusions:

One, adopting and implementing effective risk management practices brings benefits such as helping to identify, assess, mitigate, monitor, and control risks in the food and beverage manufacturing industry during the development of new products.

Two, there is a great number of risks associated with new product development projects in the food and beverage manufacturing industry. Fifteen (15) main risks associated with Ghana's food and beverage industry during new product development in the industry are political risk, organisational risk, technological/technical risk, supply chain risk, financial risk, compliance/regulatory risk, competitive risk, market risk, performance risk, security risk, inventory control risk, environmental/climatic risk, inflation, and exchange rate risk.

Three, when Ghana's food and beverage manufacturing businesses are able to adopt some of the best international risk management standards and practices, they have the chance of protecting and improving their firms' reputations in the international market. They will also improve their internal processes and reduce costs. Thus, they will be able to guard against product development issues like poor product design, a high percentage of new

110

product rejections by consumers, high product delivery discrepancies, low quality (against agreed service level agreements—SLAs), and poor customer service.

Four, effective risk management at the new product development stages has a very significant and positive impact on the success of new product development projects. Thus, effective risk management practices at the stages of the new product development process will help in the following directions: (1) Ensure development of a technical support system for new products; (2) Ensure timeliness of the new product; (3) Improve product quality and adherence to regulatory compliance; (4) Conduct due diligence and supplier audits to monitor supplier compliance with overall corporate standards; (5) Incorporate sustainability into their contract and payment terms; (6) Implement sustainability concepts to reduce waste and carbon footprint; and (7) Help reduce financial losses.

Recommendations

In light of the study's findings and identified gaps, the researcher recommends that the following as part of strategic measures to enhance risk management initiatives in new product development and to improve the overall performance of food and beverage manufacturing firms in Ghana:

First, assessment of resources: Without adequate resources, new product development and risk management would not be feasible. Therefore, there is a need to assess the availability of the required resources before embarking on new product development projects. Effective risk management initiatives require resources such as finance, human resources (experts in risk management), infrastructure (risk management policy), information (internal

and external information,) and technologies. For successful risk management practices, resources such as finance, information, and human resources are required. These resources must be planned, mobilised, optimised and controlled by the management of various food and beverage manufacturing firms.

Second, an effective risk management team must be present in all food and beverage manufacturing companies. The findings indicate that, not all firms have an effective or proper risk management team to handle risks. It is also essential that the composition of such risk management teams must be carefully considered. The organisations' risk management team members must be drawn from all the various departments of the organisation. This will make the risk management team cross-functional. The presence of a risk management team should never be considered an optional but a mandatory requirement. To ensure compliance with this recommendation, therefore, it is suggested that the regulatory bodies in Ghana should ensure that punitive actions are attached to their non-compliances.

Third, considering the extent of investment (both time and finances), manufacturing companies in the food and beverage sector must also beef-up their risk assessment and mitigation strategies. Thus, not only must there be an establishment of risk management teams; their practices must also be seriously checked. This is because the study's findings revealed some lapses in there. This will properly help the firms mitigate the risks associated with the entire new product development process. Thus, the time and financial commitment involved in the development of new products are such that, new product

112

initiatives would have to do more than just break-even and make marginal gains. Those ventures must be profitable.

Fourth, food and beverage manufacturing firms must also adopt and follow the dictates of the New Product Development Model when dealing with risk management in new product development. Based on the findings, the model is beneficial for the success of new product developments. Thus, the research findings' have established a significant correlation between the risk management practices at the stages of the NPD process and the success of new product development projects in Ghana.

Fifth, firms in the industry can be encouraged to be adopting some of these best international risk management standards and practices. Per the findings, adopting some of these standards can be very beneficial for the firms in Ghana. The regulators as well as the associations within the industry can also consider ways of making it less costly or burdensome for the food and beverage manufacturing firms in Ghana as they try to adopt and implement some of these standards and practices.

Suggestions for Further Research

Despite the study's relevance to knowledge, practice, and policy, it has some limitations or suggests some areas that could be addressed in future research to advance the body of knowledge. These include the following:

First, the scope of this current research is narrow, limiting generalization as the study focused primarily on the food and beverage new product development initiatives within the Greater Accra and the Central regions. Future studies therefore can look at other regions of Ghana, if not the

entire country as risk is known to be sensitive to environmental and geopolitical factors.

Second, the study's model asserts that risk management practices are positively and significantly correlated with the success of new product development projects at different stages of the process. To contribute to the body of existing literature, future studies can consider researching into other issues such as how moderating and mediating variables like top management commitment to risk management as well as resource capabilities influence new product development success.

114

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117

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APPENDICES

APPENDIX I - INTERVIEW GUIDE

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

SCHOOL OF BUSINESS

DEPARTMENT OF MARKETING AND SUPPLY CHAIN

MANAGEMENT

Dear Sir/Madam,

I am a postgraduate student at the aforementioned institution, conducting a research on "Managing Risk in New Product Development Projects within the Food and Beverage Manufacturing Sector in Ghana." Your company is one of Ghana's most esteemed and resourceful food and beverage manufacturing enterprises, and I seek to acquire knowledge regarding the management of risks in new product development projects within your organisation. Consequently, you have been selected due to your experience as a project manager, operational manager, general manager, head of risk, quality control manager etc. addressing the company's risk management concerns to partake in the interview. The research is solely for academic purposes; therefore, all information disclosed will remain confidential. Thank you for agreeing to participate in this interview.

SECTION A. Demographic Characteristics of Respondents

1. Kindly indicate your gender: (a) Male [ ]   (b) Female [ ]

2. Age: ....

3. Work Experience in years …………………………………

4. What is your highest level of education?

    i. Diploma   [ ]

    ii. Bachelor's Degree [ ]

    iii. Master's Degree   [ ]

    v. Ph.D.   [ ]

5. What is your position in this organization?

    i. Project Manager   [ ]

    ii. General Manager   [ ]

    iii. Operational Manager [ ]

    iv. Head of Risk   [ ]

    v. Quality Assurance/ Control Officer [ ]

Section B. General Background Information about the Company

6. For how long has your company been in existence?

i. 1 – 5 years   [ ]

ii. 6 – 10 years   [ ]

iii.11 years and above [ ]

7. Which category will you classify your company in the industry?

i. Food manufacturing company   [ ]

ii. Beverage manufacturing company [ ]

iii. Both   [ ]

8. Which of the following groupings does your company belong?

i.   Small scale company   [ ]

ii.   Medium scale company [ ]

iii.   Large scale company   [ ]

136

9. Has your organization developed any new product in the last Ten (10)

years?

a). Yes [ ]   b). No [ ]

10. If yes, how well is the product doing on the market?

…………………………………………………………………………………

11. Does your company have a risk management team?

a). Yes [ ]   b). No [ ]

12. If yes to question 11, how long have you been a number of the risk

    management team for your organisation?

 i. 5 years or below   [ ]

ii. 6 – 10 years   [ ]

iii. Above 10 years   [ ]

SECTION C. Project Risk Identification

13. How does your firm identify new product development risks?

…………………………………………………………………………………

14. In your own opinion, how robust is your company to risk identifications?

i. Very robust   [ ]

ii. Moderately robust [ ]

iii. Not robust   [ ]

15. What are some of the risks that your company faced while producing the

new product?

....

SECTION D. Risk Assessment and Analysis

16. How has your company been assessing and analysing her new product

development risks? ……………………………………………………….

137

17. How effective is the Risk Assessment and Analysis strategy in your company?

i. Very effective   [ ]

ii. Moderately effective   [ ]

iii. Not effective   [ ]

SECTION E. Risk Mitigation Strategies

18. What are some of the risk mitigation strategies your company adopts?

....

SECTION F. Risk Monitoring and Controlling

19. What measures are being adopted by your company to ensure risks in new product development projects are monitored and controlled effectively in your company?

..…………………………………………………………………………

SECTION E. Risk Management Framework

20. As a member in your company, how do you think adopting a global risk management standards and frameworks (e.g., ISO 31000) help improve the overall risk management initiatives of the new product development project in your company?

21. Does your organization have a risk certificate such as an ISO certificate etc.?

a). Yes [ ]   b). No [ ]

22. If No, what is/are the reason(s)?

....

....

138

APPENDIX II – QUESTIONNAIRE

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

SCHOOL OF BUSINESS

DEPARTMENT OF MARKETING AND SUPPLY CHAIN

MANAGEMENT

Section 1 - Preamble

Charles Ephrim, a final-year Master of Commerce student at the University of Cape Coast, created this survey. I am currently conducting research on the theme *'Managing Risk in New Product Development Projects in the Food and Beverage Manufacturing Industry in Ghana.'* Your input is invaluable to helping me gather relevant data to better understand and analyse the research problem. I kindly request you to take a few minutes of your time to complete this questionnaire for me. Your participation is greatly appreciated. Thank you very much.

Ethical Assurance: This data gathering exercise is being carried out ethically, and therefore any information provided here will be used for academic purposes only. Your responses will remain confidential and will not be shared with any third party.

Section 2 - (Questions for Objective Three): What impacts or effects do Risk Management Practices at the various stages of the New Product Development Process have on the Success of New Product Development Projects?

A- Background Information of Respondents

Instructions: Please tick as appropriate

1. Age: below 30years ☐   30 - 40years ☐   41-50 years ☐ above 50 years ☐

2. Gender: Male   ☐   Female ☐

3. What is your highest level of education?

   Certificate ☐   Diploma ☐   Undergraduate ☐   Masters ☐   PHD ☐

4. What is your position within your organization?

   ☐ Top Level   ☐ Middle Level ☐ Operational Level ☐ Other Staff

B – Study Constructs

Please indicate your level of agreement with the following statements by ticking appropriately. Please take note: SD-Strongly disagree [1], D-Disagree [2], N-Neutral [3], A-Agree [4], SA-Strongly agree [5]

1	Risks management practices in Idea Generation					
A	Managers engage in brainstorming sessions to generate new product ideas or identify opportunities for enhancing existing products.	1	2	3	4	5
B	During the product discovery phase, we analyze market trends, conduct thorough research, and delve into users' desires and requirements to pinpoint specific problems and propose creative solutions.	1	2	3	4	5
C	We employ frameworks like the SWOT analysis to assess our strengths; weaknesses; opportunities; and threats (SWOT) as part of our strategic evaluation process.	1	2	3	4	5

D	We utilize internal sources of ideas, including inputs from our marketing, customer support, sales team, and technical department, to generate and develop innovative concepts.	1	2	3	4	5
E	In addition to internal sources, we also leverage external ideas, which encompass competitive analysis and significantly, feedbacks obtained from our target audiences. These external sources contribute to our idea generation and refinement processes.	1	2	3	4	5

2	**Risks Management Practices in Conducting Market Analysis**					
A	We collaborate closely with our product marketing and sales teams to ensure that our product's value is positioned correctly in the market. This partnership helps us align our product's messaging and positioning with customer expectations and market demands.	1	2	3	4	5
B	We gather user feedback through a variety of methods, including interviews, focus groups, surveys, and data analytics. These approaches enable us to gain valuable insights from our users to inform our product development and improvement efforts.	1	2	3	4	5
C	We conduct user tests to observe how individuals are using our product, allowing us to	1	2	3	4	5

141

	identify any gaps and areas for improvement in the user experience. This hands-on approach helps us refine our product based on real-world usage and feedback.					
D	Our approach is to generate a multitude of ideas while maintaining a strong focus on delivering value to our customers. This ensures that our innovation efforts are customer-centric and driven by their needs and preferences.	1	2	3	4	5

3	**Risks Management Practices in Concept Development and Testing**					
A	We emphasize the importance of creating a comprehensive description or blueprint of our idea or product concept. This detailed documentation serves as a roadmap for the development and implementation of our innovative concepts.	1	2	3	4	5
B	We ensure that the blueprint development is oriented towards the product's market, encompassing the features and advantages of our solution that could be appealing to our customers, as well as the proposed pricing strategy for the product.	1	2	3	4	5
C	Our product concept, along with its blueprint,	1	2	3	4	5

142

	consistently incorporates an estimation of the expenses associated with the design, development, and launch of the product.					
D	We continuously create alternative product concepts to assess their attractiveness to customers and ultimately select the one that offers the highest value to them	1	2	3	4	5
E	After formulating our concepts, we subject each of them to testing with a select group of consumers, validating product ideas with users before committing significant time and resources to their development.	1	2	3	4	5
F	Prior to making a commitment to develop a new product, we share the concept with potential buyers to gather insights and gauge the viability of the product idea within the target market.	1	2	3	4	5

4	**Risks Management Practices in Marketing Strategy and Business Analysis**					
A	We formulate an initial marketing strategy to introduce the product to the market and assess the value of our solution from a business standpoint.	1	2	3	4	5
B	Following the development of the marketing strategy, the product management team evaluates the business viability of the product concept.	1	2	3	4	5

143

C	We scrutinize sales forecasts, anticipated expenses, and profit projections to determine whether they align with the company's objectives before advancing the product to the development stage.	1	2	3	4	5
5	**Risks Management Practices in Product Development**					
A	Our product development process is contingent on our company's chosen approach for development, which may include agile product development, the waterfall method, or another suitable alternative.	1	2	3	4	5
B	We generate prototypes and subject them to user testing to observe user interactions and gather feedback.	1	2	3	4	5
C	In our testing process, we prioritize usability testing on the primary features. This is done for two key reasons: firstly, to identify the optimal flow, and secondly, to iterate on the flow to ensure it is intuitive and comprehensible for our users.	1	2	3	4	5

6	**Risks Management Practices in Test Marketing**					
A	We consistently maintain communication with our customers, actively collecting research data to gain insights into what resonates with our target audience and what doesn't.	1	2	3	4	5

144

B	We conduct test marketing by launching the completed product within a selected market segment, allowing us to assess its performance based on the predetermined marketing strategy.	1	2	3	4	5
C	We carry out alpha testing to identify and rectify any bugs or issues before the product's public release.	1	2	3	4	5
D	We also engage in beta testing, providing actual users with the opportunity to use the product and provide valuable feedback on their experiences with it. This feedback aids in further refinement and improvement before the product's full-scale launch.	1	2	3	4	5

7	**Risks Management Practices in Product launch**					
A	We establish our key results as soon as possible, comprehensively plan how to track them, and then strategize how to leverage the insights gained to implement changes or adaptations.	1	2	3	4	5
B	We make certain that our product, marketing, sales, and customer support teams are well-prepared and coordinated to ensure a successful product launch and diligently monitor its performance thereafter.	1	2	3	4	5

146