Ecole des Hautes Etudes Commerciales D'Alger

EHEC

Dissertation submitted in partial fulfilment of the requirements for the Master's Degree in Businesses Sciences

Major: Supply Chain Management

THEME:

THE IMPACT OF CUSTOMER INTEGRATION ON AESTHETIC AND PERFORMANCE QUALITY IN THE NEW PRODUCT DEVELOPMENT PHASE

CASE STUDY: SARL WAFA

Submitted by:

Miss. Abir KADDECHE

Miss. Boutheyna ABABSA

Supervised by:

Dr. Keltoum BOUDJENANA

12th promotion

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Dedication

To my mother **SOFIA**, the strongest woman I know,

You are the unwavering source of my strength, my eternal guide through the complexities of life. Your sacrifices, patience, and endless care have shaped the person I am today. This work is as much yours as it is mine.

To my father **NOUREDDINE**, the man who believed in my potential and gave me the chance to pursue my dreams,

Your quiet strength and steady presence have taught me the value of perseverance. In every challenge, you've been my silent encouragement, showing me what it means to lead with dignity and passion. Thank you for always believing in me.

To my sisters, **NESRINE, IKRAM, and ROKIA,**

Like branches on the same tree, each of you growing in your own direction, yet forever connected to same roots.

NESRINE, a soul with a heart full of compassion, always giving without hesitation.

IKRAM, your strength and compassionate heart speak louder than words, inspiring those who know you.

ROKIA, your wisdom and graceful presence are a steady light to our life.

To my brothers, **ALA EDDINE and MOHAMED EL AMINE,**

ALA EDDINE, your ambition and determination are a daily reminder that dreams are meant to be pursued with courage.

MOHAMED EL AMINE, your playful mischief and wide-eyed curiosity breathe joy and wonder into every moment.

To my soulmate, **ABIR,**

You are the sibling I chose. In the tapestry of life, you are my thread of comfort, laughter, and loyalty. Through every high and low, your presence has been my steady anchor. No words can truly capture the gratitude I feel for you, but know that my journey, would have been incomplete without you by my side. Thank you for being my heart's true companion.

BOUTHEYNA

Dedication

I lovingly dedicate this thesis:

To my dear father, **ABDLAZIZ,**

My constant supporter throughout my academic journey or rather, my entire life.

Your hair turned grey for my sake. May God protect and bless you.

To my beloved mother, **ASSIA,**

The one who saw me with her heart before her eyes,

Who carried me in her womb before her arms.

Your prayers accompanied me wherever I went.

To my sister, **Amira,**

You are my only sister, my friend, my safe haven, my comfort, and my lifelong companion. I love you.

To my brothers, **Nourdine, Abdou, and Taki,**

Your presence has always been a source of strength and joy in my life.

To my friend, my beloved, and God's gift in my life, **Bouthyna,**

You stood by my side through every joyful and challenging moment. I am forever grateful.

To my dear friends, **Nihad, Ikram, Kawthar, Soumia, Meryem, and AYA,**

Thank you for walking this journey with me and for your sincere support.

And to everyone who supported me, whether from near or far even with just a smile,

I dedicate this success to you all. Your love, kindness, and encouragement made it possible.

Abir

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We also express our thanks to all the professors of our school EHEC, we express our deepest appreciation and respect for their dedication and the knowledge they have shared with us throughout our academic journey.

Finally, we offer a big thank you to everyone who supported us whether near or far throughout this path. Your encouragement meant the world to us.

Abstract

Due to the intensity of competition and the growing variety of product alternatives available to the consumer, it has become necessary for organizations to differentiate their products, whether through quality or price. To achieve this, many companies are integrating customers into the new product development phase to better understand their needs and preferences. They aim to build strong communication and collaboration with customers in the early phase to enhance the quality of their product.

According to JURAN quality is considered a key factor in a company's development, as it reflects organization's ability to meet customer expectations more effectively. In this context, customer integration plays a crucial role. By involving customers in the product development process, companies can gain deeper insights into the market requirements, which can lead to improvements in both the performance and aesthetic quality of the final product.

Through our study, we seek to understand the extent to which customer integration in the new product development stages affects the quality of the final product, particularly in terms of performance and design. WAFA Company was selected as the subject of this study as it is a long-standing partner known for its efforts to involve customers in order to deliver high-quality products.

Keywords: Customer integration, quality, performance quality, aesthetic quality, new product development

Résumé

Face à l'intensité de la concurrence et à la diversité croissante des produits proposés aux consommateurs, il est devenu nécessaire pour les entreprises de différencier leurs produits, que ce soit par la qualité ou le prix. Pour y parvenir, de nombreuses entreprises intègrent leurs clients dès la phase de développement afin de mieux comprendre leurs besoins et leurs préférences. Elles s'efforcent d'établir une communication et une collaboration étroites avec leurs clients dès les premières phases afin d'améliorer la qualité de leurs produits.

La qualité a toujours été un facteur clé du développement d'une entreprise ; elle reflète sa capacité à mieux répondre aux attentes de ses clients. Dans ce contexte, l'intégration des clients joue un rôle crucial. En impliquant les clients dans le processus de développement produit, les entreprises peuvent mieux comprendre leurs attentes, ce qui peut conduire à des améliorations des performances et de l'esthétique du produit final.

Cette recherche vise à comprendre dans quelle mesure l'intégration des clients dès les étapes de développement produit affecte la qualité du produit final, notamment en termes de performances et de design. La société WAFA a été sélectionnée pour cette étude, car elle est un partenaire de longue date reconnu pour ses efforts visant à impliquer ses clients afin de fournir des produits de haute qualité.

Mots clés : Intégration client, qualité, qualité de performance, qualité esthétique, développement de nouveaux produits.

ملخص

نظراً لشدة المنافسة وتزايد تنوع بدائل المنتجات المتاحة للمستهلك، أصبح من الضروري للمؤسسات تمييز منتجاتها، سواءً من حيث الجودة أو السعر. لتحقيق ذلك، دمجت العديد من الشركات عملاءها في مرحلة تطوير المنتجات الجديدة لفهم احتياجاتهم وتفضيلاتهم بشكل أفضل. تهدف هذه الشركات إلى بناء تواصل وتعاون قويين مع العملاء في المرحلة المبكرة لتحسين جودة منتجاتها.

لطالما كانت الجودة عاملاً أساسياً في تطور أي شركة، فهي تعكس قدرة المؤسسة على تلبية توقعات العملاء بفعالية أكبر، وفي هذا السياق، يلعب دمج العملاء دوراً حاسماً. فمن خلال إشراك العملاء في عملية تطوير المنتج، يمكن للشركات اكتساب رؤى أعمق حول توقعاتهم، مما قد يؤدي إلى تحسينات في كل من الأداء والجودة الجمالية للمنتج النهائي.

تسعى دراستنا إلى فهم مدى تأثير دمج العملاء في مراحل تطوير المنتج على جودة المنتج النهائي، لا سيما من حيث الأداء والتصميم. وقد تم اختيار شركة وفاء كموضوع لهذه الدراسة، كونها شريكاً عريقاً معروفاً بجهوده في إشراك العملاء لتقديم منتجات عالية الجودة.

الكلمات المفتاحية: تكامل العملاء، الجودة، جودة الأداء، الجودة الجمالية، تطوير منتجات جديدة.

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List of Abbreviations

ADV: Administrateur des ventes / Sales administrator

AFNOR: The French standardization association

AQ: Aesthetic Quality

B to B: business to business

CAD: Computer-Aided Design

CI: Customer Integration

E-commerce: Electronic Commerce

EDI: Electronic Data Interchange

ERP: Enterprise Resource Planning

ISO: International Organization for Standardization

ISO/TC: ISO Technical Committee

JIT: Just-In-Time

JUSE: The Japanese Union of Scientists and Engineers

KPI: Key Performance Indicator

LLC: Limited Liability Company

NGOs: Non-Governmental Organizations.

NPD: New Product Development

PLC: Product life cycle

PQ: Performance Quality

QMR: Quality management representative

R&D: Research and Development

SARL : Société à Responsabilité Limitée

SC : Supply Chain

SCI: Supply Chain Integration

TAV: tableau d'analyse des ventes. / The sales analysis table

TQM: Total Quality Management

Summary

General introduction

In a complex and challenging environment, where competition is not only national but also international, developing and offering new products and services that create value for existing customers and attract new ones has become essential for companies seeking to establish sustainable competitive advantages that will enable them to succeed.

To create innovative and challenging products and services, customer integration in the new product development phase has emerged as a solution, enabling businesses to collect valuable information directly from the end user, in order to increase the likelihood that market needs are met and the desired benefits are attained.

Today's customers are more informed and demanding more than ever, quality for theme has become a basic selection criterion and a key selling point for businesses. In this regard, companies are required to put in place the best quality management system (QMS) that will enable them to gain an edge in the marketplace.

It is in this context that we have chosen to address the following theme **«The Impact of Customer Integration on Aesthetic and Performance Quality in the New Product Development Phase.»**. This is a modern topic that is gaining increasing attention.

Our case study focuses on SARL WAFA FAIL, an Algerian company specialized in the production and manufacturing of household paper. The study specifically examines one of the company's new products, named "President Collection", which the company developed with the help of the input gathered through customer integration during its development phase.

This topic was chosen for the following reasons:

- our personal interest in quality and customer integration;
- the importance of quality for organizations, as it is considered a competitive advantage;
- the lack of awareness among Algerian institutions of the importance of customer integration in the new product development phase and its impact on aesthetic and performance quality;
- the lack of research and references on the subject under study.

The general purpose of this study is to answer the following research question: **« Does customer integration have an impact on aesthetic and performance quality in the new product development phase? »**

In order to reach a compelling answer, it was necessary to address these sub-questions:

Q1: Does customer integration affect aesthetic quality in the new product development phase?

Q2: Does customer integration affect performance quality in the new product development phase?

These sub-questions have led us to formulating initial research hypotheses. Based on literate reviews, we have conceived these two suppositions:

H1: Customer integration in the new product development phase has an impact on aesthetic quality.

H2: Customer integration in the new product development phase has an impact on performance quality.

Keeping in mind the nature of this study, it seemed appropriate to adopt both descriptive and analytical approach through:

A secondary research: To explore the existing studies on the subject;

A quantitative study: To collect the maximum amount of data through a survey distributed among representative employees of SARL WAFA FAIL.

This work is divided into two parts:

The theoretical framework: Marked by the first and the second chapters:

The first chapter aims to draw general attention to supply chain integration through the first section, then narrow the focus to customer integration and the new product development phase within the second section;

The second chapter provides a comprehensive review of product quality, presenting general concepts of quality in the first section, and theoretical foundations of the product and quality product in the second section.

The empirical framework: Marked by the third and the fourth chapters:

The third chapter explores the previous studies, host organization and research methodology, with a first section that reviews the most related previous studies, a second section that presents SARL WAFA FAILE, and a third section that details the chosen methodological approach;

The fourth chapter covers the results obtained from the collected data. The first section presents the analysis and discussion of the findings, while the second section provides a synthesis of the results.

Chapter one: Fundamentals of Supply Chain Integration

INTRODUCTION

Traditionally, the new product development phase has been an internal activity within the firm, but with the emergence of supply chain integration as a major factor, among others, it has expanded beyond organizational boundaries to encompass customers.

Supply chain integration involves aligning internal supply chain functions within the organization and linking them with external supply chain operations, including those of suppliers and customers. By adopting this integrative strategy, businesses no longer see customers only as byers or end-users but as partners and valuable source of insights.

This chapter is dedicated to exploring and discussing the literature review related to supply chain integration. It is structured into two sections: the first section will focus on providing a fundamental understanding of supply chain integration, outlining its different notions such as dimensions, benefits, and other relevant aspects. The second section will be dedicated to presenting various key concepts of customer integration and the new product development phase.

Section 01: Understanding supply chain integration

In today's global and interconnected business environment, the integration of supply chains is becoming increasingly important. Indeed, it is widely accepted that integrating a supply chain helps to improve its performance and, consequently, the performance of the companies participating in it.

This section will explore the concept of integration, the definition of supply chain integration, its elements, driving forces, benefits.

1. Defining integration

According to the oxford English dictionary, the word integration is defined as: "*The act or process of combining two or more things so that they work together*".[1]

This definition describes integration as the process of bringing together several elements so they can function interdependently.

The Larousse dictionary defined it as: "*Inserting something into something, incorporating it, making it part of a whole".*[2]

According to this definition, integration is the act of embedding an element into another.

On the other hand, Webster's Dictionary gave the following definition: "*the unified control of a number of successive or similar economic or especially industrial processes formerly carried on independently*".[3]

This definition offers a new perspective on integration in an economic and industrial field where processes were previously independent.

Based on these definitions, we can conclude that integration consists on unifying and combining different processes.

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[1] https://www.oxfordlearnersdictionaries.com, (consulted on 12/02/2025 à 17h20)
[2] https://www.larousse.fr/dictionnaires , (consulted on 12/02/2025 à 18h05)
[3] https://www.merriam-webster.com , (consulted on 12/02/2025 à 20h11)

2. Defining supply chain integration

In recent years, supply chain integration has received considerable attention from practitioners and academicians. One of the main reasons is that it greatly influences the competitive advantage of companies, but it is also a concept whose definition and operationalization are still up for debate, as stated by Toivo: "*There is no one definition of supply chain integration*".[1]

"*The supply chain integration process is defined as the cooperation and teamwork between supplier partners that create a network*".[2]

This definition brings attention to the importance of cooperation between supplier partners to achieve supply chain integration.

"*SCI as comprehensive collaboration between SC network members in strategic, tactical and operational decision-making*".[3]

This definition places importance on collaboration between a border range of supply chain partners to attain an integrated supply chain. It also underscores the idea that integration takes place at all decision-making levels.

"*SCI is strictly related to coordination mechanisms and in particular implies that business processes should be streamlined and interconnected, both inside and outside company boundaries*".[4]

According to this definition, SCI requires coordinating the internal as well as the external operations of the organization.

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[1] TOIVO, (E): *The Integration Within: What is internal integration in SCM,* Masters dissertation in Economic and Industrial Development, Linköping University, 2009, p.64.
[2] SYED, (H): *"Impact of Supply Chain Integration on Organizational Performance",* South Asian Journal of Operations and Logistics, N°02, 2023, pp.78-92.
[3] BERISA, (M): *the effect of internal supply chain integration on organizational performance: the case of bedele brewery,* Master's dissertation in Business and Economics, Jimma university, 2020, p.20.
[4] Ibid.,.20.

"*The degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organization processes. The goal is to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer at low cost and high speed*".[1]

This definition represents SCI as the collaborative management of the inside and outside businesses processes between all supply chain entities, to drive operational efficiency and create value.

"*Supply chain integration incorporates greater coordination and collaboration, touching upon the concepts of processes and cross-borders*".[2]

Following this definition, SCI extends beyond the internal operations to include the external operations.

Considering these multiple definitions, we can conclude that SCI consists of the cooperation, collaboration and coordination between all supply chain partners, both inside and outside company boundaries, to create a united and cohesive supply chain that facilitates the attainment of well-defined goals and ensures value creation for all stakeholders.

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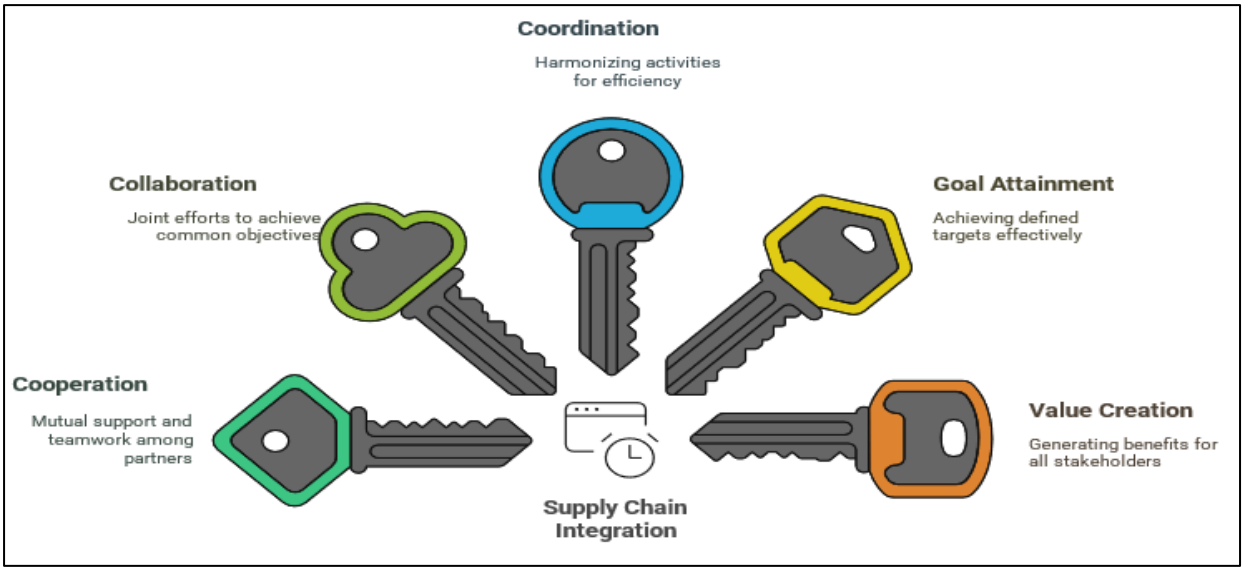
[1] GARCIA, (J), LUQUE (R) and LOPEZ (C): "*Supply chain integration scales validation and benchmark values",* Journal of Industrial Engineering and Management, N°02 2013, pp.423-440.
[2] TOIVO, (E) : Op.cit, p.63.

Figure N°01:Supply Chain Integration



Source: Author's own work based on BERISA, (M): The effect of internal supply chain integration on organizational performance.

The figure shows that supply chain integration is achieved through the combination of cooperation, collaboration and coordination to attain goals and create value.

2.1. Clarification of Terms

From the definitions above, we notice that cooperation, collaboration and coordination are frequently mentioned in the context of supply chain integration. Therefore, we will explain each term to clarify its distinct significance:

2.1.1. Cooperation

Cao and Zhang described cooperation as the following: "*In cooperative relationships, firms can share information, costs, risks, and rewards. However, each company remains completely independent from the others. It could change the way it works and learn from other companies*".[1]

[1] CAO, (M) and ZHANG (Q): *Supply Chain Collaboration: Roles of Interorganizational Systems, Trust, and Collaborative Culture*, Springer, London, 2013, p.1-221.

This definition suggests that cooperation is about exchanging key resources and responsibilities between businesses while maintaining independent, in order to gain insights from one another.

Toivo provided the following definition: *"Cooperation is where it all starts; it is the threshold level of interaction"*.[1]

According to this definition, cooperation is the starting point for integration.

Taking these definitions into account, we can conclude that cooperation in supply chain integration happens before collaboration and coordination. It is the minimum level of engagement between different supply chain partners, where they work together at a basic level of interaction without deeper commitment or shared strategic goals.

2.1.2. Collaboration

Cao and Zhang defined collaboration as: "*a partnership process in which two or more independent companies work closely to plan and execute supply chain operations toward common goals and mutual benefits*".[2]

According to this definition, collaboration accrues when independent companies plan and execute supply chain operations together to attain common objectives and advantages.

On the other hand, Toivo defined it as: "*Collaboration is when there is a high level of trust, commitment and information sharing among supply chain partners and a shared vision of the future*".[3]

This definition presents the idea that collaboration requires a strong interpersonal and organizational bond.

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[1] TOIVO, (E) : Op.cit, p.72.
[2] CAO, (M) and ZHANG (Q): Op.cit, p.1-221.
[3] TOIVO, (E) : Op.cit, p.72.

Based on these two definitions, we can conclude that collaboration is a high level of engagement between different supply chain partners, where they work together through a deeper form of interaction with a deeper commitment and a shared vision for long-term success.

2.1.3. Coordination

Cao and Zhang defined coordination as: "*the creation of unity of action through interdependence as an example of joint creation of decisions. Although they are involved in coordination, companies retain control of their own operations*".[1]

Following this definition, coordination takes place when businesses synchronize their operations through joint decision-making, while maintaining operational independence.

Toivo provided the following definition: "*Coordination is where specified workflows and information is shared to such a degree that it becomes possible to use JIT systems, EDI and other mechanisms of linkage between and among partners*".[2]

This definition suggests that coordination requires structured workflows and shared information through the use of modern technological tools.

From the definitions above, we can conclude that coordination in supply chain integration refers to the structured alignment of workflows, decisions, and information-sharing mechanisms between different supply chain partners, so they can complement each other while managing their own processes.

3. Supply chain integration dimensions

For a better understanding of the supply chain integration, it is important to identify its dimensions.

Supply chain integration dimensions used in the previous research have a wide variety, as noted by Berisa: "*It is clear from previous research that SCI suffers from a lack of clarity in its definitions, dimensions and variables*".[3]

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[1] CAO, (M) and ZHANG (Q): Op.cit, p.1-221.
[2] TOIVO, (E) : Op.cit, p.72.
[3] BERISA, (M): Op.cit, p.22.

The table below contains an overview of important previous studies on various dimensions of supply chain integration:

Table N° 01:Overview of previous studies on various dimensions of supply chain integration

Previous study	Supply chain integration dimensions
The study of: BERISA, (H), (2020). On understanding of external and internal integration in supply chains: Challenges and evaluation	Internal integration,
The study of HENDIJANI (R) and SAEIDI SAEI (R), (2020): Supply chain integration and firm performance: the moderating role of demand uncertainty	Internal integration, Product integration, processes integration
The study of: PELLATHY (D), BURNETTE (M) and MELINE (S), (2018). Supply chain integration strategy best practices: redefining the value derived from end-to-end, integrated supply chains	Strategic integration, operational integration, Information integration
The study of: TSANOS (C) and ZOGRAFOS (K), (2016). The effects of behavioral supply chain relationship antecedents on integration and performance	Information integration
The study of: HULTHÉN, (H), (2016).On understanding of external and internal integration in supply chains: Challenges and evaluation	Internal integration, external integration
The study of: DAMETEW (A), EBINGER (F) and ABEBE (B), (2016). Supply chain Integration for Improving Performance on Manufacturing Industries	Production and design integration, Knowledge integration, Technology integration, Resource integration.
The study of: BRUQUE (C) et alii., (2016). Supply chain integration through community cloud: Effects on operational performance	physical flow integration, information Integration
The study of: GARCIA (J), LUQUE (R) et LOPEZ (C), (2013). Supply chain integration scales validation and benchmark values.	Internal integration, supplier integration, customer integration

The study of: YANG (H) et alii, (2009).The Interaction of Internal and External Integration and Its Impact on Performance	Internal integration, supplier's integration and customer integration

Source: authors own work

From the table above, it is evident that internal integration, supplier integration and customer integration represent the key dimensions most commonly used in supply chain integration.

Supplier integration and customer integration are classified as external integration, as highlighted by Hongjiao, Linyan, Amrik, Amrik and Li: "*Supplier integration and customer integration are together referred to as external integration*".[1]

3.1. Internal integration

Teixeira, Koufteros and Peng defined Internal integration as: "*the result of a focus on the collaboration of activities within a company*".[2]

According to this definition, internal integration occurs when businesses concentrate on collaborating across their internal activities.

Vikas, Esinaulo, Jose, Archana, Luis and Gabriela presented the following definition: "*internal processes and functions strategically aligned and coordinated with the aim of achieving maximum performance of an organization*".[3]

Following this definition, internal integration is the strategic alignment and coordination of internal processes and functions to improve organizational performance.

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[1] HONGJIAO, (Y) and al: *"The Interaction of Internal and External Integration and Its Impact on Performance",* Australian and New Zealand Academy of Management Conference Proceedings, N°01, 2009, pp.01-25.

[2] TEIXEIRA, (R), KOUFTEROS (X) and PENG (D): "*Organizational structure, integration, and manufacturing performance: A conceptual model and propositions*", Journal of Operations & Supply Chain Management, N°5, 2012, pp.70-81.

[3] VIKAS, (K) and al: "*The impact of supply chain integration on performance*", Procedia manufacturing, N°11, 2017, pp.814-821.

Considering these two definitions, we can conclude that internal integration refers to intra-organizational cooperation, collaboration and coordination of all the processes within the company's boundaries, in order to enhance its overall efficiency.

3.2. External integration

Barbara, Baofeng and Xiande outlined external integration as: "*the degree to which a company understands the need of its clients and collaborates with clients and/or suppliers to develop inter-organizational strategies and shared practices and processes, so that it manages to satisfy its clients' needs*".[1]

This definition points out that external integration requires understanding clients' needs and collaborating with both clients and suppliers to achieve one of its major goals, which is satisfying clients' needs.

On the other hand, Rim described it as: "*the extent of association between manufacturers and external partners to shape inter-organizational practices, processes and strategies into synchronized and collaborative processes*".[2]

According to this definition, external integration involves establishing a solid association between businesses and their external partners to unify the different processes, practices and strategies.

These definitions point to the fact that external integration refers to inter-organizational cooperation, collaboration and coordination of all processes beyond the company's boundaries, in order to create value for both suppliers and customers.

---

[1] BARBARA, (F), BAOFENG (H) and ZHAO (X): "*The impact of supply chain integration on performance: A contingency and configuration approach*", Journal of Operations Management, N° 28, 2010, pp.58-71.

[2] RIM, (G) : *Intégration de la chaîne logistique et performance des entreprises,* thèse de doctorat en Sciences Économiques, Faculté des Sciences Economiques et de Gestion de Sfax, 2022, p.25.

3.2.1. Supplier integration

Vijayasarathy provided the following definition: "*Supplier integration is supply chain integration upstream. It involves a relationship between the firm and the upstream suppliers*".[1]

Following this definition, supplier integration refers to the partnership between businesses and their suppliers. It also outlines another name for supplier integration which is supply chain integration upstream.

Xiande, Baofeng, Willem and Jeff presented the following definition: "*Supplier integration refers to the process of interaction and collaboration between an organization and its suppliers to ensure an efficient flow of supply*".[2]

This definition suggests that supplier integration requires communication and collective effort between businesses and their suppliers, in order to optimize supply flow.

Taking into consideration these two definitions, we can conclude that supplier integration, also known as the upstream integration, refers to the inter-organizational cooperation, collaboration and coordination of all process, between the manufacturer and its suppliers, to optimize upstream flows.

3.2.2. Customer integration

Frohlich and Westbrook outlined the following definition: "*Customer integration is supply chain integration downstream, it is the outgoing set of products and services and the incoming set of data from customers to suppliers*".[3]

According to this definition, customer integration refers to the transactional and informational flow between businesses and their customer. It also introduces another name for customer integration, which is supply chain integration downstream.

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[1] VIJAYASARATHY, (L): "*Supply integration: An investigation of its multi-dimensionality and relational antecedents*", International Journal of Production Economics, N°124, 2010, pp. 489-505.
2 XIANDE, (Z) and al: "*The impact of internal integration and relationship commitment on external integration*". Journal of Operations Management, N°29, 2011, pp.17-32.
[3] FROHLICH, (M) and WESTBROOK (R): "*Arcs of integration: an international study of supply chain strategies*", Journal of Operations Management, N°19, 2001, pp.185-200.

Swink, Narasimhan and Wang presented the following definition "*Customer integration leads to creating a relationship with customers and hence gaining a better and clearer understanding of customers' preferences*".[1]

This definition points out that customer integration is the partnership between businesses and their customers to obtain better insight to their requirements.

These two definitions indicate that customer integration, also known as downstream integration, refers to the inter-organizational cooperation, collaboration and coordination of all processes between the manufacturer and its customers to optimize downstream flows.

For the company to achieve external integration, it must first achieve internal integration, as reported by Berisa: "Intra-company integration is the starting point for broader integration across the SC".[2]

4. Areas and levels of integrations

To study the integrative function of supply chain management, it is important to answer two specific questions: what to integrate? And with whom to integrate?[3]

- To answer the question what to integrate? Fabbes-Costes identified four areas:[4]
  - integration of flows (physical, information, financial);
  - integration of processes and activities (operational, support, management);
  - integration of systems and technologies;
  - integration of actors (structures and organizations).

Mathe and Tixier suggest that integration of flows represents the priority layer since the success or failure of a supply chain is determined by its ability to allow supply to meet demand

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[1] SWINK, (M) NARASIMHAN (R) and WANG (C): "*Managing beyond the factory walls: effects of four types of strategic integration on manufacturing plant performance*", Journal of Operations Management, N°25, 2007, pp.148-164.
[2] BERISA, (M) : Op.cit, p.16.
[3] HULTHÉN, (H): *On understanding of external and internal integration in supply chains: Challenges and evaluation,* Doctoral Thesis in Industrial Management and Logistics, lund university, 2016, p.30.
[4] FABBES-COSTES, (N) : *La gestion des chaînes logistiques multi-acteurs : les dimensions organisationnelles d'une gestion lean et agile*, Presses Universitaires, Grenoble, 2007, p.19-43.

effectively and efficiently. From a logistics point of view, the other layers just represent conditions for the integration of flows.[1]

- To answer the question with whom to integrate? Which mean what is the nature and number of organizations or participants involved, five levels of supply chain integration have been proposed:[2]
  - intra-organizational integration: within each company;
  - limited inter-organizational integration: To direct partners (first tier customers and first tier suppliers);
  - extended inter-organizational integration: to all partners in a chain;
  - full supply chain integration: all chains in which an organization participates in;
  - societal integration: which includes the social and environmental aspects, and focuses on stakeholders external to the supply chain, like governments, NGOs, and local communities;

5. Benefits of supply chain integration

Supply chain integration, if applied effectively, is known to bring benefits to internal as well as external stakeholders.

The benefits of supply chain integration concluded from the study of:

- **Crandall, Crandall and Chen**:[3]
  - improve product quality;
  - increased competitive advantages;
  - increase resource utilization;
  - reduce unnecessary capital investment;
  - lower prices for the customer;
  - higher unit volume sales;
  - improved inventory management and warehousing.

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[1] MATHE, (H) and TIXIER (D) : *La logistique*, Presses Universitaires de France, paris, 1987, p.127.
[2] GHARIANI, (R) : Op.cit, p.17-18.
[3] CRANDALL, (R), CRANDALL (W) and CHEN (C): *Principles of Supply Chain Management*, CRC Press, Boca Raton, 2015, p.380.

- **Palomero and Chalmeta**:[1]
  - reduce overall costs;
  - identify new business opportunities;
  - improved overall performance;
  - improve On-time delivery;
- **National Research Council**:[2]
  - increased functional and procedural synergy between participants;
  - faster response to changing market demands;
  - lower cost manufacturing operations;
  - lower capital investment in excess manufacturing capacity;
  - shorter product realization cycles and lower product development costs;
  - increased profitability.

6. Forces Driving Integration

Several worldwide trends and forces are making supply chain integration an essential move and no longer an option.

The National Research Council presented the following drivers:[3]

- **increased cost competitiveness:** As costs competitiveness continues to increase, companies are seeking further cost reduction within their supply chains;
- **shorter product life cycles:** As product life cycles are becoming shorter over time, businesses must be more flexible to align faster with the new market expectations;
- **faster product development cycles:** Business must reduce the development cycle times of their products because the early introduction of a new product is often rewarded with a better competitive advantage, such as a larger market share;

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[1] PALOMERO, (S) and CHALMETA (R): "*A guide for supply chain integration in SMEs*", Production Planning & Control, N° 25, 2014, pp.372-400.
[1] Ibid., p.372-400.
[2] National Research Council: *Surviving Supply Chain Integration: Strategies for Small Manufacturers*, The National Academies Press, Washington, 2000, p.33.
[3] Ibid., p.28.

- **globalization and customization of product offerings:** Customers all over the world are becoming increasingly demanding for more variety of products and more customization, therefore businesses must adapt their offers to their customer's specific needs;
- **higher overall quality**: with the continuous increase in customer expectations and the tougher competition, businesses must offer products and services with a higher quality to meet or surpass the market quality standers.

Due to all this forces companies must integrate their supply chain to succeed in today's business environment, as mentioned by Crandall, Crandall and Chen: "*Business success involves recognition of the need to move to an integrated supply chain*".[1]

7. Supply chain integration success factures

For businesses to achieve a successful supply chain integration they must take on consideration the following critical factors:[2]

- organizational buy-in, including full commitment by management;
- a clear understanding and articulation of identifiable benefits for all parties;
- adaptability and openness to changes in work design and organizational structure, consistent with agreed-upon levels of process integration;
- effective use of appropriate technologies for communications, data exchange, and product development;
- compatibility with the strategic vision of the enterprise.

[1] CRANDALL, (R), CRANDALL (W) and CHEN (C): Op.cit, p.372.
[2] Agility Forum, *Remaking the Customer-Supplier Relationships: Business Process Integration and the Agile Enterprise*, 1997.

Section 02: Theoretical foundations of Customer Integration and New Product Development

In today's rapidly evolving industries, shaped by emerging trends and challenges, customer integration in the new product development phase has become increasingly important for businesses seeking to be innovative and flexible to meet new market requirements. Previous studies found that customers provide inputs to the different stages of the new product development phase by suggesting ideas, evaluating initial concepts, and testing prototypes, as stated by Edvardsson, Kristensson, Magnusson and Sundström: "*Customers are a potential goldmine of information"*.[1]

This section presents an overview of customer integration in the NPD phase, including its methods, influencing factors, and advantages. It also outlines the NPD process, key challenges, and success factors.

1. Customer integration

1.1. Defining customer integration

Over the years, a range of terminologies for CI has emerged, such as consumer involvement, client integration or customer partnership.[2] However the term used in our research is customer integration, because it stands out as the most frequently used in the literature revue.

CI is defined as the following:

"*Cooperation and interaction between a firm and its customers to ensure efficient flow of products or services to customers*".[3]

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[1] Karlstad University, *Customer integration in service development and innovation – Methods and a new framework*, 2010.

[2] SCHWEITZER, (F), VAN DEN HENDE (E) and HULTINK (E)**:** "*There's more than one perspective to take into account for successful customer integration into radical new product innovation: A framework and research agenda*", IEEE Transactions on Engineering Management, N°03,2020. pp.813-829.

[3] OTCHERE, (F), ANNAN (J) and ANIN (K)**:** "*Achieving Competitive Advantage through Supply Chain Integration in the Cocoa Industry: A Case Study of Olam Ghana Limited and Produce Buying Company Limited*", *International Journal of Business & Social Research*, N°02, 2013, pp 131–145.

According to this definition, CI is about building strong relationships and partnerships with customers to improve products or services movement.

"*Combining the company's internal resources with the external ones, which customers bring as inputs into organizational processes*".[1]

Following this definition, customers provide inputs that the organization uses alongside with its internal resources to boost process efficiency.

These two definitions suggest that customer integration is the ability of an organization to cooperate, collaborate, and coordinate its processes with its customers in order to meet their needs and enhance their satisfaction.

1.2. Customer integration methods[2]

There are 15 methods that can be used to apply customer integration in practice. Five of these are classified as active methods, which involve customers directly to the company's internal activities of the NPD phase, whereas the other ten are classified as passive methods, that position customers as informants who only react to what the company develops.

1.2.1. Active customer integration methods

We distinguish five active customer integration:

1.2.1.1. Lead user workshop

Customers from the targeted segment are invited into organized workshops within the company, where they are encouraged to generate ideas for a new product. The company then select those with the most innovative and advanced ideas-referred to as lead users- to work alongside the company staff on developing these ideas into final concepts.

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[1] JACOB, (F)**:** "*Preparing industrial suppliers for customer integration*", *Industrial Marketing Management*, N°01, 2006, pp.45–56.

[2] ZOGAJ, (S) BRETSCHNEIDER (U)**:** *Customer Integration in New Product Development: A Literature Review Concerning the Appropriateness of Different Customer Integration Methods to Attain Customer Knowledge*, *Conference Paper presented at the 20th European Conference on Information Systems (ECIS)*, Kassel University, research paper, 2012, p.6-7.

1.2.1.2. Focus group workshop

Customers from the targeted segments are invited to organized workshops within the company to discuss the initial product concepts with internal experts.

1.2.1.3. Idea competition

Companies conduct contests and encourage customers from the targeted segment to propose ideas for a new product within a predefined period of time. Propositions are evaluated by the company review committee, and the winners are rewarded.

1.2.1.4. Idea community

The company selects an internet platformer and encourages customers from the targeted segment to submit ideas for a new product and discuss theme with other customers who submitted similar or complementary propositions, in order to elaborate improved ideas that deserve to be reworded. This method allows businesses to create an ideal environment for insights.

1.2.1.5. Toolkit

The company provides customers from the targeted segment with an online platform or an application that contains a set of digital tools enabling users to shape their ideas for a new product. The most creative design will be rewarded.

1.2.2. Passive methods

For passive methods we have 10 methods:

1.2.2.1. Survey

A set of questions elaborated by the company and shared with customers from the targeted segment to gather their opinions, preferences, and experiences.

1.2.2.2. Complaint analysis

The company receives customers' complaints through different channels such as emails, social media or phone calls, then it analyses them and identifies the reasons behind customers dissatisfaction with the offered products and adapt corrective solutions. Complains are not seen as just problems but also as a source of insights for more improvements.

1.2.2.3. Boundary Spanner

The company frontlines workers gather information from customers during their direct contact with them, the acquired information is then analyzed by the company's experts to identify improvement opportunities.

1.2.2.4. Empathic Design

Customers are observed in their natural environments while using the product. This method allows businesses to discover customers implicit needs and obtain inputs for product development.

1.2.2.5. Product Clinic

It is the same as the empathic design method, the difference is that customers are observed in a laboratory instead of their natural environments.

1.2.2.6. Concept testing

Customers from the targeted segment are provided with a prototype and asked to use it, evaluate it, and give their feedback. This method helps businesses test the product before offering it for salle to avoid potential market failure.

1.2.2.7. Security Trading of Concepts

The company designs a digital platform or an application and places various ideas for a new product in it. Then it encourages customers from the targeted segment to sign up and start a trading game for the presented ideas. Each customer is given a virtual sum of money to buy and sell ideas freely. The idea with the highest buying rate is considered to be the one that will achieve success in the market. This method allows businesses to obtain real and honest judgment of the ideas.

1.2.2.8. Information Pump

The company develops playful means and encourages customers from the targeted segment to participate, in order to extract unconventional ideas from them. This method provides businesses with creative input and inspiration for product development.

1.2.2.9. Listening In

Customers from the targeted segment are invited to visualize a graphical illustration for several new product concepts and give their opinions. The company's experts then use that feedback to improve the product concepts and conduct a second visualization round. This procedure will be repeated several times until the best concept that matches customer desires is reached.

1.2.2.10. Quality Function Deployment

The company generates an idea for a new product and then interviews customers from the targeted segment about their needs regarding the predefined idea. The company's experts analyze these needs and translate them into useful technical product functions that will be applied during the NPD phase.

1.3. Factors influencing the selection of customer integration methods[1]

Füller and al., identified the following seven factors that influence businesses' decision when choosing the appropriate customer integration method for gather valuable input for the NPD phase.

1.3.1. Cost

Implementing a customer integration method requires financial investments, which can be high, medium or low depending on the chosen method. This factor is considered the most influential one, therefor businesses must manage CI costs to avoid the unnecessary expenses.

1.3.2. Duration

Refers to the time required to execute a customer integration method, and it varies depending on the selected method. Methods that can be executed within an hour or less are considered to be of a short duration, while methods that take up to a day are considered to be of a medium duration, and those that are conducted over several days or weeks are considered to be of a long duration. Businesses prefer short-duration methods such as focus group or toolkit

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[1] FÜLLER, (S) and al.: *A matrix for selecting appropriate customer integration methods, Recherche paper,* Technische Universität München, 2011, p.4-6.

since they allow for a faster input gathering and a faster alignment of products with customers' needs.

1.3.3. Required skills

Each customer integration method requires specific expertise and skills. The lack of internal competencies may affect the quality of the gathered customers knowledge and may force the company to assign external experts, which will increase the cost of execution.

1.3.4. Number of customers

Each customer integration method needs a specific number of participating customers, which range from a small group of one participant to a medium group of two to seven participants, and a large group of eight and above. This factor has a direct impact on the quality and the quantity of the collected customer input.

1.3.5. Infrastructure

Refers to the physical or digital resources needed for executing customer integration methods, and they vary depending on the selected method. Before conducting any CI method, companies must assess whether they have the necessary infrastructure, as it determines if the desired method can be implemented.

1.3.6. Phase in the innovation process

The different stages of the NPD phase align with specific customer integration methods. In the early stages, idea competitions and communities can be applied, as they allow collecting information on customers' needs and obtain insights for innovative ideas. In the intermediate stages, toolkits can be applied as it helps with developing the new product concept, and in final stages product testing can be applied to test prototypes.

1.3.7. Customer type

Customers differ in their knowledge and experience, allowing businesses to collect a variety of input. They are categorized into two types: lead users who provide innovative and reality-based ideas, and ordinary customers, who generate creative and unconventional ideas.

1.4. Customer integration advantages[1]

Effective customer integration enables businesses to gain various benefits, such as:

- the ability to differentiate their products from those of competitors;
- a deep understanding of customer needs;
- better meeting for customers' changing requirements;
- enhanced customers satisfaction;
- enhanced customers loyalty;
- increased revenue;
- increased market share;
- efficient addressing to market challenges.

2. New product development phase

New Product Development (NPD) is a crucial process that transforms ideas into marketable products. It involves several stages aimed at meeting customer needs and staying competitive in the market.

2.1. Defining new product development phase

"The process of bringing a new product in to the market is known as new product development. The new product introduced into the market does not have to be a fresh idea; it might be a development of an existing idea or the replacement of raw materials or commodities utilized in the existing product."[2]

According to this definition, NPD is a set of activities undertaken by companies to create a completely new product or to modify an existing one, then launch it on the market.

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[1] WASTI, (S) and JEFFREY (L): "*Collaborating with suppliers in product development: A U.S. and Japan comparative study*". *IEEE Transactions on Engineering Management*, N°2, 1999, pp.245–257.
[2] SHRIVARTHINI, (V) et KRISHNAVENI (V): « A Review: New Product Development, Categories, Importance and Process Involved in Product Development », *International Journal of Research Publication and Reviews*, N°10, 2022, pp 714-717.

2.2. Categories of New Product

There are several ways to classify 'new products.' One common approach categorizes them into four distinct types:[1]

2.2.1. New invention (Major innovations)

This is a completely new product, where businesses focus on developing a completely new product, to create a new experience for the consumer. This type is associated with risks such costumers' doubts and hesitation to spend their money on new product that may not benefit them.

2.2.2. Product improvements

This is an improvement made by companies to the existing product, such as improving product performance or changing the design. With this type, companies try to attract new consumers by differentiating their products from those of competitors.

2.2.3. Product additions

It is an imitation of a product which is already presented in the market by its original producer, but with additions, this product may have new and different benefits for consumers. This type of new product is typically adopted by small businesses that lack the resources to develop an entirely original product.

2.2.4. Repositioned products

Repositioning a product involves marketing an existing product differently to target a new audience. In other words, it is presented in a new way in the media.

2.3. Processes involved in New Product Development

Developing a new product requires the company to follow a structured process, from generating an idea to launching the product on the market. This process includes the following steps:

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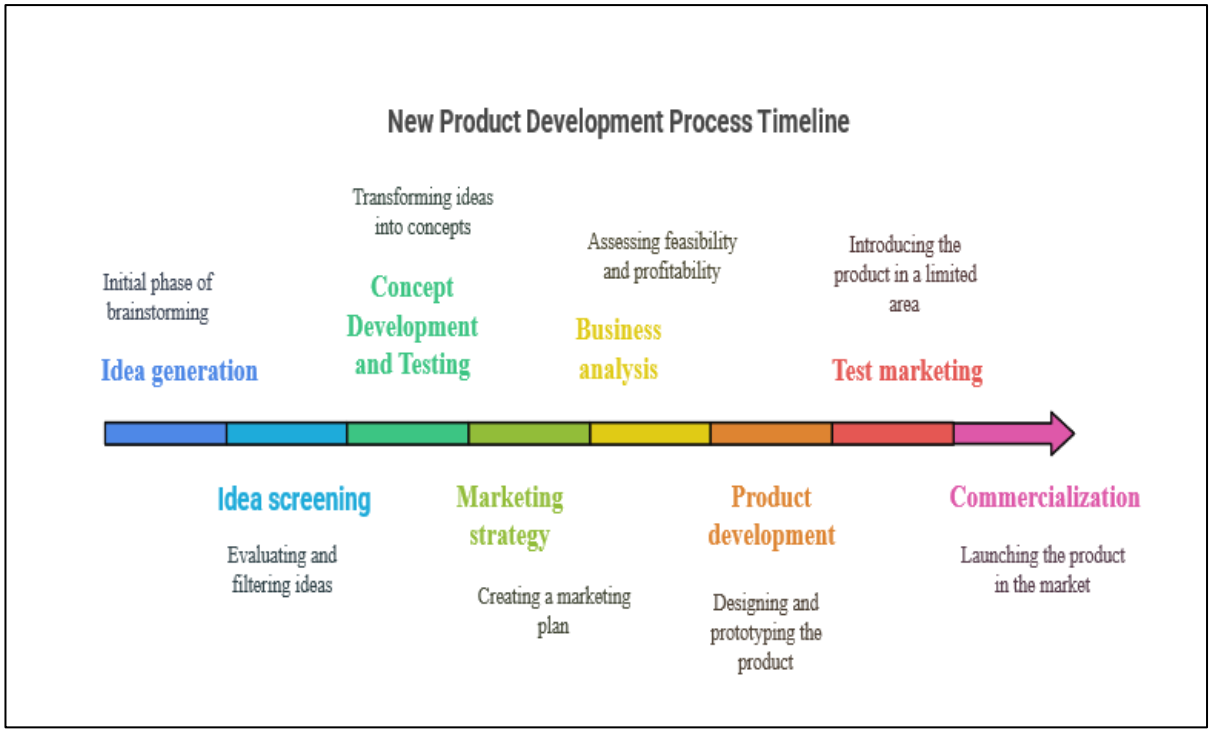
[1] Esen, (G): *Marketing*, IntechOpen edition, Londres, 2018, p 60.

Figure N°02: New product development process timeline



Source: Author's own work based on: KOTLER (P), and KELLER (K): Principles of Marketing

2.3.1. Idea generation [1]

This is the initial stage, and it includes coming up with many ideas for the new product. The ideas may have an internal source, (company employees) an external source, (consumers or competitors).

2.3.2. Idea screening [2]

In this stage, the ideas generated in the previous step are evaluated and filtered based on predefined criteria. These criteria can include market needs, alignment with the company's strategy, technical feasibility, and resource availability. The goal is to eliminate ideas that are not viable or do not align with the company's objectives, saving time and resources.

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[1] KOTLER, (P), and KELLER (K): *Principles of Marketing*, Pearson India Education Services, India, 2016, P.607.
[2] Ibid, p 611.

2.3.3. Concept Development and Testing [1]

In this stage the selected idea is turned into a more detailed product concepts, these concepts are then shared with a small group of target customers to gather their feedback and see how interested they are. Their level of interest and acceptance concept testing helps fine-tune ideas and makes sure the product matches what customers want and expect.

2.3.4. Marketing strategy [2]

At this stage, the marketing strategy is created for the selected concept. It consists of three parts. The first, is identifying the places where the new product will be distributed in, and what is the value of the profits that will come from theme? The second, is identify the price which the new product will be sold with, the third part is estimating how many units of the new product are likely be sold in the long term.

2.3.5. Business analysis [3]

At this stage, a thorough analysis is carried out to evaluate whether the concept is going to be profitable. Key factors like projected sales, costs, pricing, and market demand are examined. Financial models and business plans are developed to determine whether the new product can generate a sufficient return on investment.

2.3.6. Product development [4]

Once the concept is approved through business analysis, the product development phase begins. This stage involves designing, engineering and prototyping the product according to the predefined criteria. Collaboration between cross functional teams, including R&D, marketing and production is crucial to ensure that the product meets quality and design specifications.

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[1] Esen, (G): Op.cit, p62-63.
[2] KOTLER, (P), and KELLER (K): *Principles of Marketing*, Op.cit, p.614.
[3] Ibid, P.614.
[4] Ibid, P.615.

2.3.7. Test marketing[1]

Before a full-scale launch, some businesses opt for a test marketing phase. During this stage, the product is introduced thought media to a limited geographic area or to a specific number of target customers to assess its performance and gather real world feedback. Test marketing helps improving the advertising approach.

2.3.8. Commercialization[2]

Based on the information gained during the pilot marketing, pricing, distribution, and promotional strategies are developed.

Once all these steps are done, the product is officially ready for marketing and sale on a wider market.

2.4. Success factors for New Product Development phase

The success of NPD is based on many various variables. The most decisive variables that scholars have noted are: [3]

- **top management commitment:** Active top management participation at the early stage of the NPD phase is imperative to success, since they are responsible for providing strategic support, necessary resources, specify clear goals, and coordinating departmental activities;
- **involvement of cross functional team:** Front end success in the NPD phase is associated with involving members from different departments, as it supports full-fledged analysis, reduces uncertainty, and facilitates improved concept selection;
- **client interaction and market research:** Interacting with customers during the NPD phase and gaining knowledge regarding customers' requirements through market analysis is essential to avoid costly blunders, earn a first-mover advantage, and ultimately improve the company's chances of achieving a successful NPD process;

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[1] Esen (G): Op.cit, p63-64.
[2] Esen, (G): Op.cit, p64.
[3] FALAHAT (M), CHONG (S), and LIEW (C): *« Navigating New Product Development: Uncovering Factors and Overcoming Challenges for Success »*, *Heliyon*, N°10, 2024, PP.1-15.

- **project management capability:** Effective project management is critical in the front-end stages of the NPD phase, since project managers guide progress, define objectives, determine priorities, and control technical and organizational problems. Their leadership influences product definitions, and due to the heterogeneity of front-end activities, they must possess a broad array of skills to accommodate and lead effectively;
- **innovative ideas:** Successful NPD phase relies on innovative and creative ideas that challenges existing norms and provide customers with the needed value. The use of advanced digital tools and synchronization with future trends is vital for generating ideas that compete in the fast-evolving market of today.

2.5. Challenges of New Product Development phase

There are two types:[1]

2.5.1. Internal challenges

- **complexity of teams' project:** Developing a new product requires teamwork which can be complex due to an unstructured development phase;
- **communicating across functions:** Cross-functional communication offers a wide range of benefits for the NPD phase, but they also come with several challenges, particularly during peak periods when team members have too much work to do and start neglecting each other;
- **temporary team membership:** Project based teams, particularly in NPD phase, enable organizations to bring in the best experts for each task. However, because these experts are temporary, it may be challenging for them as well as the other team members to develop trust and collaborate effectively;
- **fluid team boundaries:** Teams in the NPD phase frequently consist of both temporary and core members, allowing for a flexible use of expertise. This structure can lead to coordination issues even though it promotes efficiency and resource optimization, teams must have well defined roles and excellent communication

[1] FALAHAT, (M), CHONG (S), and LIEW (C): *« Navigating New Product Development: Uncovering Factors and Overcoming Challenges for Success »*, *Heliyon*, N°10, 2024, PP.1-15.

within and between members in order to stay connected to the larger picture and enhance performance;

- **organizational structure:** Organizational structures must encourage teamwork, if NPD teams are to be efficient. Collaboration suffers when incentives are solely focused on departmental objectives or individual performance.

2.5.2. External challenges

- **price-income levels:** Businesses must take local income levels into account when launching new products in developing nations. High prices often tied to advanced product features can make products inaccessible to most costumers and push them to seek simpler and more affordable alternatives.
- **technological-developmental issues:** Successful new product development phase in developing nations may be hampered by a lack of a robust technological infrastructure and qualified researchers.
- **capital constraints:** High R&D expenses and a lack of funding in developing nations may delays achieving the promising new product innovations and prevent them from being shelved.

2.6. The importance of New Product Development [1]

- offering new innovative products;
- Improving existing products;
- providing additional value to the customer;
- in depth understanding for customers' needs;
- meeting customers' expectations;
- ensuring company continuity;
- allowing businesses to expend to new markets.

[1] SHRIVARTHINI, (V) and KRISHNAVENI (V) : Op.cit., P.717

CONCLUSION

This chapter provided an overview of supply chain integration, starting with its key concepts, outlining its dimensions. Three main dimensions: supplier, customer, and internal integration were identified as essential for improving efficiency, reducing costs, and enhancing overall supply chain performance.

The second section explored customer integration in detail, both active and passive methods of customer integration were presented, with keen interest in to the factors influencing the choice of the best method.

The last section discussed the new product development phase and explained each step involved in it, since every stage plays an important role before launching a new product. Companies face different challenges during this phase, whether they generated within the company or outside its boundaries. Therefore, we looked at these challenges in detail. Finally, we emphasized why this stage is important for both the company and the customer.

Given the strong link between customer integration in the new product development phase and product quality, the next chapter will address the core concepts of final product quality. It will present different definitions of quality, quality management principles, and how Total Quality Management (TQM) contributes to maintaining high standards of quality. It will examine the characteristics of the product life cycle, with special emphasis on how quality dimensions stimulate business performance.

Chapter two:
A Comprehensive Review of Product Quality

INTRODUCTION

Operating in an increasingly competitive environment, marked by complexity and uncertainty, has led businesses to focus on improving the quality of their products, based on the idea that offering a high-quality product is essential for ensuring sustainability, enhancing customer satisfaction, and achieving long-term success.

Quality has been known for many years; it corresponds to the conformity of a product or a service to the implicit and explicit expectations of the customer.

This chapter aims to review and synthesize the previous studies that have contributed to the understanding of quality, it is divided into two sections: the first section will introduce various foundational aspects of quality, quality management, and total quality management, while the second section will outline core concepts related to the product and quality product.

Section 01: General Concepts of Quality

Quality is a discipline that gained considerable interest from businesses at the end of 1990, to better align with the customer evolving requirements and to stay sustainable in an increasingly competitive environment.

In this first section we will explore quality, quality management and Total Quality Managing, addressing various aspects under each main heading.

1. Quality

1.1. Defining quality

There are several definitions of quality given by dictionaries, various quality gurus, as well as various organizations.[1]

1.1.1. dictionaries definition for quality

According to the Oxford English Dictionary, quality is: *"a feature of somebody/something, especially one that makes them different from somebody/something else".*[2]

Following this definition, quality is a distinguished feature that sets someone or something apart from the rest.

Larousse dictionary provided the following definition: "*a way of being, good or bad of something, superior or excellent in something, preferring quality to quantity*".[3]
This definition presents the idea that quality can be positive or negative, and it can be chosen over quantity.

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[1] Kiran, (D): Total Quality Management: Key Concepts and Case Studies, Elsevier Inc, Oxford, 2017, p.2.
[2] https://www.oed.com (consulted on 11/03/2025 à 22:20)
[3] Larousse, encyclopedic dictionary, 2009 edition, p.661.

1.1.2. Experts' definition for quality

Kotler and Dubois defined quality as: "*the set of properties and characteristics of a product or service that gives it the ability to satisfy expressed or implicit needs*."[1]

According to this definition, quality is a set of attributes that allows a product or service to meet the stated or unstated requirements.

While Crosby provided the following definition**: "***Quality is conformance to requirements or specifications or standards*".[2]

Following this definition, quality is obtained when the predefined criteria are aligned with.

1.1.3. Organizations definition for quality

The International Organization for Standardization's (ISO) provided the following definition: *"The degree to which a set of inherent characteristics fulfils requirements".*[3]

This definition points out that quality depends on how well the product's intrinsic properties meets expectations.

The French standardization association (AFNOR), defined quality as: "*the ability of a product or service to satisfy the needs (expressed or potential) of users*".[4]

According to this definition, a quality product or a quality service is a product or a service that fulfills the consumer's explicit and implicit requirements.

Based on all the definitions above, we can conclude that quality is the set of essential characteristics of a product or a service that enable it to align with consumers expressed or implicit needs. By offering quality products or services, businesses will ensure consumer satisfaction and, consequently, gain a competitive advantage.

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[1] KOTLER, (P) et DUBOIS, (B) : *Marketing Management*, édition Union Public, Paris, 2000, P.90
[2]2 BRAUER, (J) et GERD (F) : *Management de la qualité de A à Z,* Masson, Paris, 1994, PP.17-22
[3] HATI, (S) and EZE (A): *Fundamentals of Quality*, Quality Improvement Institute of Nigeria, Nigeria**,** 2023, p.27.
[4] CLAUDE, (D) : *Marketin*g, Édition DUNOD, Paris, 2008, P.143.

1.2. Evolution of quality perception[1]

Quality has existed since early civilizations, it was synonymous with craftsmanship and artisanal work, where craftsmen and artisans focused on creating goods of high standard and took pride for doing so.

However, with the advent of the industrial revolution in the late 18th century, the perception of quality evolved as the following:

- **in the early 1900s**: Quality was perceived as the capability of a product to fulfill its intended purpose without wasting resources such as money, time and effort;
- **in the late 1910s**: Quality was understood as the product's capability to deliver the same efficient results every time;
- **during the 1950s**: Quality was seen as the product's capability to satisfy customer needs, resulting in customer loyalty and strengthening market position;
- **during the 1970s:** Quality was viewed as doing things right the first time to eliminate costly rework;
- **during the 1980s:** Quality was acknowledged as a continuous improvement process that could always be taken one step further toward greater efficiency;
- **in the early 2000s:** Quality was considered as the responsibility of the whole firm.

1.3. Objective and subjective nature of quality[2]

Understanding objective and subjective nature of quality is crucial for businesses seeking to offer high-quality products and services

The objective nature of quality means that quality can be easily measured and quantified, it can be expressed in number, figures and metrics, because it relies on factual data that results from scientific tests, performance measurements, standards meeting, etc. it enables businesses to evaluate how effectively their products and services meets the functional requirements.

The subjective nature of quality, on the other hand, means that quality can be difficult to measure and quantify, because it depends on personal perception, experience, preferences and

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[1] HATI, (S) and EZE (A): Op.cit**,** p.20-23.
[2] HATI, (S) and EZE (A): Op.cit**,** p.60-61.

emotions, it varies from one person to another. Subjective quality allows businesses to determine how well their products and services meets customer expectations.

Finding the right balance between these two is the key to true quality excellence.

1.4. Quality aspects[1]

Quality is categorized into three key aspects:

1.4.1. External quality:

Refers to the company's ability to meet market standards in terms of quality regarding its products and services, to ultimately ensure customer satisfaction and strengthen its position.

1.4.2. Internal quality:

Refers to the company's ability to execute its internal operations in compliance with quality management best practices to achieve operational efficiency.

1.4.3. Non-quality:

Refers to the difference between the intended quality and the quality actually obtained. it is expressed as a defect, nonconformity or anomaly, leading to a significant negative impact on the company overall performance.

Effectively managing these aspects will allow businesses to achieve long-term success.

1.5. Reasons for focusing on quality[2]

The following reasons reveal why businesses are increasingly prioritizing quality:

- quality has become a key purchasing factor for costumers;
- enhancing customer satisfaction, leading to loyalty and an increased customer portfolio;
- strengthening business reputation;
- obtaining a competitive edge;

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[1] JAMBERT, (C) : *l'assurance qualité : les normes ISO9000 en pratique,* édition d'organisation, Paris, 1997, P.8.

[2]DETRIE, (P) : *Conduire une démarche qualité*, Les Éditions d'Organisation, Paris, 2001, p. 54-62.

- boosting sales, profits and market share;
- optimizing resource management;
- minimizing additional costs resulted from non-quality;
- penetrating new markets;
- obtaining growth opportunities.

2. Quality management

2.1. Defining quality management

Quality is not a coincidental outcome but it is the result of effective management. Therefore, businesses must manage their quality, given its profound benefits and influence on long-term success.[1]

According to the literature review, quality was defined as:

"*The coordinated set of activities used to guide and control an organization in terms of quality*."[2]

Following this definition, quality management is a range of actions that direct the company's quality processes.

"*The process of setting quality policies and objectives, then devising strategies through quality planning, assurance, control, and improvement to realize these objectives*".[3]

This definition presents the idea that quality management starts by establishing quality goals, then planning, executing, controlling and continuously improving strategies to ensure that the predefined goals are met.

Considering these definitions, we can conclude that quality management is the set of structured activities that guide the company's quality efforts toward excellence. These activities

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[1] HATI, (S) and EZE (A): Op.cit**,** p.80.
[2] FORMAN, (B) : *Du manuel qualité au manuel management : l'outil stratégique*, AFNOR Editions, Denis Codex, 2013, p. 28.
[3] HATI, (S) and EZE (A): Op.cit, p.80.

must first be planned, then executed, controlled, and constantly improved, to attain the predefined quality objectives.

2.2. Quality management actors[1]

To ensure a successful execution for quality management activities, businesses must assign a qualified team that includes:

2.2.1. Quality management representative

This term refers to the person who represents the organization's commitment to quality. QMR is appointed by the top management to ensure that quality management processes are well implemented and continuously improved, he must possess the required expertise and must be given all the necessary authority and resources to accomplish his responsibilities.

2.2.2. Top management

The top management is responsible for making quality management decisions, identifying quality management objectives, planning their execution and measuring their achievement using appropriate indicators, it also delegates quality management responsibilities and provides the required guidance and resources.

2.2.3. quality team

Also called quality group, it is composed of the operational members responsible for implementing quality management procedures. These members are led by the quality management representative, and they must be trained and aware of the importance of their personal performance and how they contribute to attaining quality objectives.

2.2.4. Certification organization

Refers to an accredited organization that evaluates whether a company meets quality management standards. The auditor-certifier analyzes the organization's quality management

[1] VALLADE, (J) and Poupart (N) : *Démarche qualité et norme ISO 9001 : Une culture managériale appliquée à la recherche*, IRD Éditions, Paris, 2008, p.33.

documentation, detects the non-conformities and suggests corrective actions. It is important to build a positive relationship with the auditor-certifier because he possesses the expertise that will guide the organization to obtain certification.

2.3. Quality management principals[1]

The international experts of ISO/TC 176, who are responsible for developing and maintaining ISO's quality management standards, have developed and updated seven principles for businesses to use as guidance to ensure successful quality management.

The seven quality management principles are the following:

2.3.1. Customer focus

Meeting customer requirements and exceeding their expectations is considered to be a primary focus of quality management. Therefore, businesses must understand the current and future needs of their customers, by effectively integrating them, communicating with them, analyzing their desires, assessing their satisfaction levels and handling their complaints.

2.3.2. Leadership

Leaders at all levels are responsible for creating and maintaining an environment that allows all employees to be fully engaged in achieving the organization's quality management objectives. This can be accomplished by a clear communication of the organization's quality intentions across different hierarchical levels, establishing a culture of trust, providing employees with the required resources, training and authority, and recognizing their contributions.

2.3.3. Employees engagement

Employees at all levels must be fully involved in fulfilling the organization's quality management goals, this can be realized by encouraging them to collaborate, facilitating open discussions, empowering them to take initiatives, assessing their satisfaction and take appropriate actions to enhance it.

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[1] International Organization for Standardization (ISO), *Quality Management Principles*, 2015.

2.3.4. Process approach

Quality management is based on interrelated processes, that must be well executed to attain the desired quality outcome. Therefore, businesses have to identify processes objectives, assign responsibilities, determine the organization's resources and capabilities, ensure access to necessary information, and manage risks that can affect processes execution.

2.3.5. Continuous improvement

Successful quality management requires an ongoing focus on improvement. This focus is reflected through setting clear improvement goals, developing improvement projects and constantly reviewing and auditing them, training employees how to effectively apply improvement methodologies and acknowledge their contributions to improvement efforts.

2.3.6. Evidence-based decision making

For businesses to make accurate decisions on terms of quality management they must first have access to the right information and ensure that employees are competent to analyze it, then execute the suitable analyzing methods, and finally use the results obtained.

2.3.7. Relationship management

Efficient quality management requires businesses to well manage their relationships with all their interested parties such as suppliers, partners, investors, and customers. This can be done by identifying and prioritizing key interested parties, sharing information with theme, pooling their feedback, and engaging them in the development and improvement activities.

These principles are presented with no priority order, and Businesses can assign varying levels of importance to each principle depending on their needs and capabilities.

2.4. Quality management tools[1]

In 1977, the Japanese Union of Scientists and Engineers (JUSE) introduced seven quality management tools selected for their ease of application by people of different educational levels without any special training. These tools are the following:

Table N°02: Quality management tools

Tools	Explanation
Process map	It is a visual representation of an entire process, using a set of symbols such as the diamond that indicates that there is a decision to be made, the parallelogram that shows the inputs and outputs, the rectangle that indicates the work that is actually done, the oval rectangle which is used to mark the start and the end of the process, and the small circle that connects between the process sections when the map extends to more than one page. The process map turns a complex abstract process into a visual and simple one, allowing for a better understanding of the steps, activities and flows within the process.
Check sheet	It is used to identify how many times a particular defect has occurred during a specific period of time. The collected data can be further analyzed using other quality tools such as histograms or pareto charts. Setting up a check sheet requires the following steps: -determining the common defects that needs to be tracked; -creating a table with the common defects listed on the first left column, and the time periods across the top of the rest columns; -placing a check mark in the appropriate cell whenever a defect is encountered.
Histogram	A tool used to observe how the data in an interval scale is distributed. It facilitates the selection of appropriate statistical methods and guides decision-making. A histogram is a graphical representation of numerical data in a bar

[1] Foster, (T): *Managing Quality: Integrating the Supply Chain*, Pearson Education, londers, 2017, p.265-281.

	format, with no gaps between the bars. the horizontal line represents the different ranges of data values within the interval, and the vertical line represents the frequency of the value within each range.
Scatter diagram	Also called scatter plot, it is used to determine the relationship between two variables: X (independent) and Y (dependent). The diagram is based on the following Principles: -The horizontal Axis represents the independent variable (X); -The vertical Axis represents the dependent variable (Y); -Each point corresponds to a specific measurement of the dependent and independent variable; -The collection of several points forms a scatter plot.
Control chart	A control chart is a graphical representation used to examine the acceptability of a specific quality characteristic in a product over time. It is composed of a vertical line that represents the measured characteristic, and a horizontal line that represents the time. Inside the graph there are three other horizontal lines: The upper horizontal line represents the highest acceptable value of the measured quality characteristic; -The lower horizontal line represents the lowest acceptable value of the measured quality characteristic; -The central horizontal line represents the average value of the measured quality characteristic. Each point corresponds to a particular value of the measured quality characteristic at a particular time. Any point falls outside the upper or the lower horizontal line indicates a quality issue.
Cause-and-effect Diagram	Also called Ishikawa diagram or fishbone, it is a graphical representation used to identify all the potential causes of an observed effect or a problem and develop solutions to address it. The diagram takes the form of a fish's skeleton, with the problem placed at the head of the skeleton, the major causes situated at the ribs of the fish, and the sub-causes positioned at the smaller

	bones of the ribs. The major causes were classified into 5 families named the "5M": manpower, methods, mother-nature (environment), machinery, materials, then evolved into "7M" by adding: management and money. In order to reach the root causes, the question "why" is usually asked five times, and once determined, corrective actions must be taken.
Pareto chart	It is a type of bar chart used to identify the main causes that should be addressed as a priority. The pareto chart is based on the 80/20 rule, which suggests that 20% of the causes produce 80% of the effects, meaning that a few major causes create the most of the effects. The 80/20 rule is a general principle and the actual percentages may vary.

Source: Author's own work based on Foster, (T): Managing Quality: Integrating the Supply Chain, 2017, p.265-281.

2.5. The seven typical phases of progressive implementation of Quality Management[1]

The implementation of quality management requires the following phases:

1. developing a quality culture among key managers;
2. implementing a training program on quality management for all the organization employees;
3. identifying quality management objectives and updating the organizational structure to align with the predefined quality management goals;
4. assigning quality management representative;
5. assigning the quality team;
6. elaborating quality management documents;
7. implementing the quality management policy with continuous improvements along the way.

[1] AMZAL, (Y) et BOUKHERROUB (A) : *L'implication des ressources humaines dans le management de la qualité. Cas la filiale El Emir de Mascara du groupe Gilplait,* Mémoire de master en Sciences de Gestion, Université mouloud Mammeri de Tizi-Ouzou, 2020, p.25.

3. Total Quality Management

The concept of Total Quality Management is considered as one of the popular concepts used to manage the quality of products and services comprehensively, in order to meet the customer's requirements and satisfy his desires.

3.1. Definition

ISO definition: *"TQM is the management approach of an organization, centered on quality based on the participation of all its members and aiming at long-term success though customer satisfaction and benefits to all members of the organization and to society."*[1]

This definition focuses on engaging all employees in the quality approach to achieve long-term success by generating value for both customers and employees.

According to Dale et al. *"TQM it is the mutual co-operation of everyone in an organization and associated business processes to produce value-for-money products and services which meet and, hopefully, exceed the needs and expectations of customers."* [2]

This definition agrees with ISO definition in terms of involving all employees to achieve quality, then explaining the objectives represented in: Create value to make money and meet customer demands.

British Quality Association: *"TQM is a corporate business management philosophy which recognizes that customer needs and business goals are inseparable. It ensures maximum efficiency and effectiveness within a business."*[3]

This definition shows that TQM is a philosophy that does not separate customer needs from business objectives, and throw it the company achieves the highest level of efficiency and effectiveness.

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[1] KAHOUL, (H): *The Impact of Integrating Quality Management System on an Agri Food Industry's Brand Image*, Master's thesis in marketing The School of Higher Commercial Studies, Alger 2023, P.13.

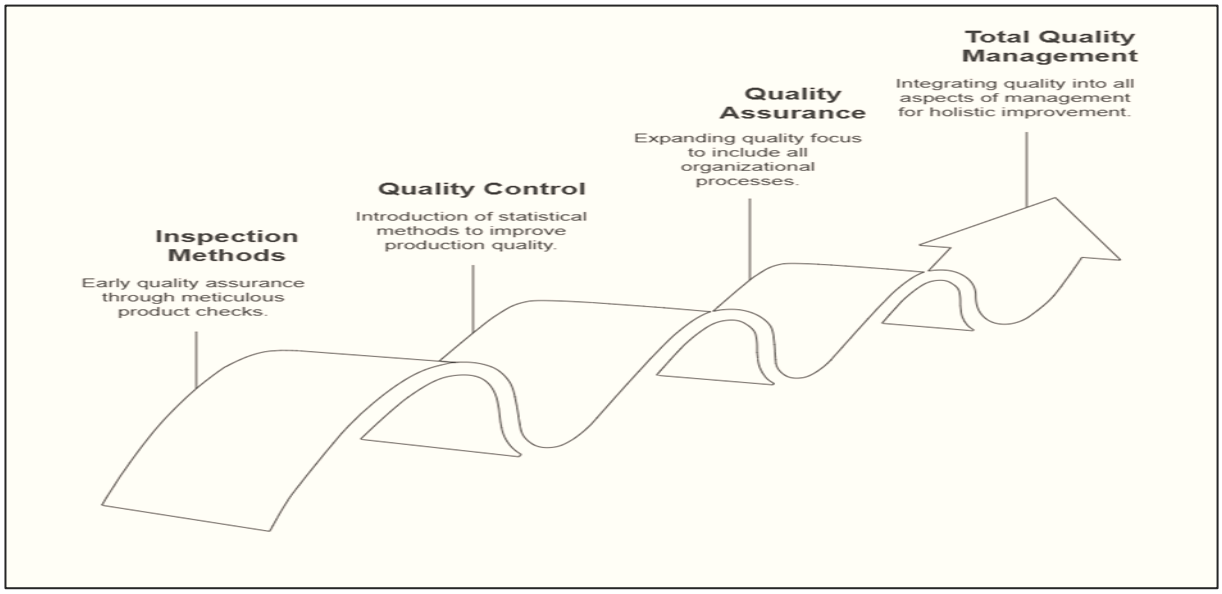
[2] DALE, (B), VAN DER WIELE (T) and VAN IWAARDEN (J): *Managing quality*, Blackwell Publishing, Royaume-Uni, 2007, P4.

[3] KAHOUL, (H): op.cit,P13.

3.2. The transition from quality to Total Quality Management

Total Quality Management (TQM) has evolved from simple inspection methods to a comprehensive approach focused on continuous improvement and customer satisfaction.

Figure N°03: Evolution of the concept of quality



Source: Author's own work based on DALE (B), VAN DER WIELE (T) and VAN IWAARDEN (J): Managing quality, 2007.

Following this figure, quality has evolved through the following four stages to ultimately become TQM:

1. Quality began with inspection methods, which focused on checking only the final product to detect and remove defective items before they reached the customer;
2. then it evolved into quality control, where verification was done during the production process to detect errors;
3. the next stage was quality assurance, which expanded the focus to all organizational processes, not just production.
4. Finally, Total Quality Management emerged, where the entire organization is involved in the quality efforts to achieve long-term success.

3.3. The importance of TQM

Among the reasons that made TQM important, we mention the following:[1]

- **enhancing product quality and meeting customer expectations:** TQM principles are considered as guidance that help businesses produce high quality products that meet customer expectation and increase their satisfaction;
- **creating a work environment that motivate employees:** Since TQM focuses on involving all the company employees in the quality approach, and encouraging them to take initiatives, providing them with the necessary authority and resource, and recognizing their efforts, it creates a motivational work environment that empowers employees to take on new responsibilities;
- **enhancing competitiveness:** An efficient implementation of TQM principals enables businesses to offer high quality products that consequently strengthen their competitive position;
- **reducing cost:** TQM practices help businesses optimize and improve their processes, leading to less mistakes and wastes, which ultimately results in lower operational costs.

[1] NWOKEOCHA, (I): *Total quality management in media outfits and organizational Performance*, in International Journal of Economic, Finance and Business Statistics (IJEFBS), N°01,2024, pp.31-42.

Section 02: Overview of Product Quality

Customers increased exigence for better quality obliged businesses to focus more on their products and adapt them to the market quality requirements in order to achieve overall success.

In this section, we will present fundamental concepts related to the product, such as its definition, types, and life cycle characteristics. Then we will explore product quality, its types and dimensions.

1. Product

1.1. Product definition

The American Marketing Association defined a product as: "*a bundle of attributes (features, functions, benefits, and uses) capable of exchange or use, usually a mix of tangible and intangible forms. A product may be an idea, a physical entity (goods), or a service, or any combination of the three."*[1]

This definition clarifies that a product is not just a physical feature, but also an intangible one. It can take many forms: idea, good or a service.

Kotler provided the following definition: "*Anything that can be offered to a market for attention, acquisition, use or consumption that might satisfy a -want or need."* [2]

According to this definition, the product is Offred in the market to address customers' demands.

Mayrhofer highlighted that: *"a product is considered to be a set of physical, symbolic and service attributes designed to satisfy the consumer."*[3]

This definition expresses the components of the product physical attributes like composition, form, size, and performance and symbolic attributes: image, name, and design.

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[1] https://www.ama.org/the-definition-of-marketing-what-is-marketing (Consulted on 11/03/2025 at 22 :35)

[2] KOTLER, (P), and KELLER (K): *Principles of Marketing*, Pearson India Education Services, India, 2016, P.605

[3] MAYRHOFER, (U): *Marketing*, Bréal edition, France, 2023, P.30.

According to these definitions, we can conclude that a product usually consists of both tangible and intangible traits designed to satisfy the consumer's demands. It can take the form of an idea, a commodity a service, or a mix of the three.

2. Product classifications

Products are classified into two types: consumer products and industrial products, and each type includes a further set of subclassifications, as follows:

2.1. Consumer Products

These are the products that the final consumer buys to satisfy his personal needs and needs. They are classified into four categories:[1]

- **2.1.1. convenience products:** It refers to the products that are purchased frequently and immediately, without the need to compare them to other ones;
- **2.1.2. shopping products:** These products are of higher price and less frequently purchased. Costumers buy theme after spending a lot of time gathering information about and comparing theme to similar offers;
- **2.1.3. specialty products:** Products that are characterized by unique features and associated with a distinctive brand. Costumers are willing to make efforts in order to obtain them, and their purchasing decision is driven by the desire to stand out and gain prestige;
- **2.1.4. unsought products:** These are products that costumers are unaware about their existing or are not interested in. This type requires extra marketing efforts in order to gain customers attention and persuade them to make a purchase.

2.2. Industrial Products

These products are purchased and used by industrial buyers for commercial purpose. The distinction between consumer goods and industrial goods is based on the buyer's nature and the purpose of the purchase.

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[1] KOTLER, (P), and KELLER (K): *Principles of Marketing*, op. cit, P.606-610.

These products are:[1]

2.2.1. Materials and parts

They include**:**

- **raw materials**: Fundamental components that are usually extracted from the nature and used in the production of products;
- **manufactured materials and parts:** Fundamental components that have undergone some manufacturing processing before being used in the production process. Unlike raw materials, they are not in their natural state.

2.2.2. Capital items

Long-term assets used to facilitate production. They include:

- **installations:** Expensive, fixed and long-lasting items that are essential for the functioning of all the company processes, such as power generators, the firm building…. etc.;
- **equipment:** Less expensive, movable and less permanent assets that are bought to facilitate production processes, such as production machines, material handling vehicles, …. etc.

2.2.3. Supplies and business services

Items and services that indirectly support production processes, such as maintenance tools and services, cleaning products and services…etc.

[1] KOTLER, (P), and KELLER (K): *Principles of Marketing*, op. cit, P.611.

3. Product life cycle

It is important to understand PLC curves in order to optimize resources and make informed business decisions.

Ulrik suggested that the product life cycle is based on three main assumptions:[1]

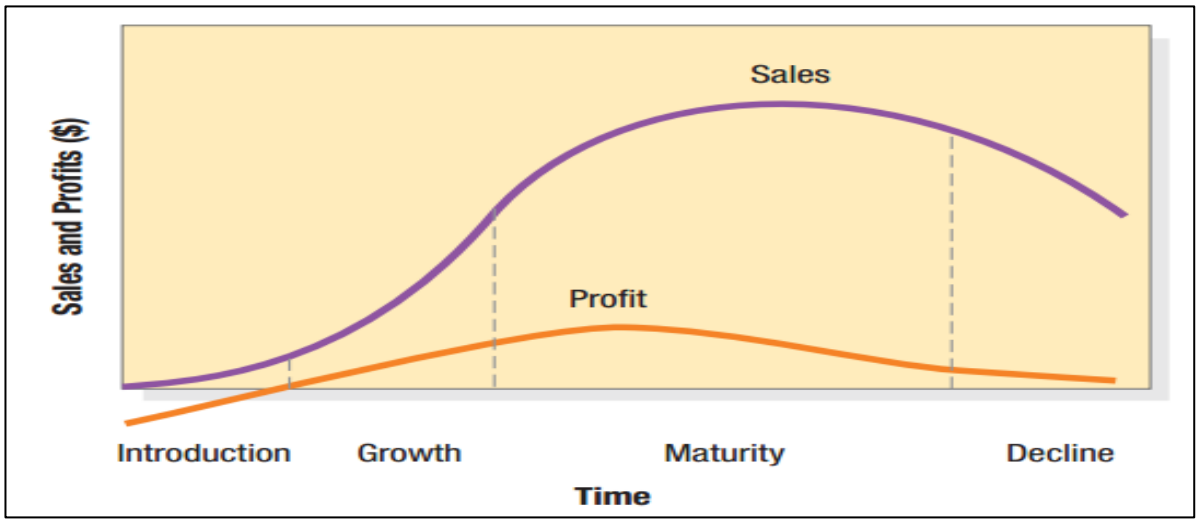
1. 1-every product has a limited lifespan;
2. 2- sales volume and profit level vary at each stage of the cycle;
3. 3- the appropriate marketing strategies differ at each stage.

3.1. Defining Product life cycle

Demeure provided the following definition "The *life cycle of a product can be defined as the analysis of the major stages in its life, from design to the final decision to remove it from the market."*[2]

Following this definition, the product lifecycle represents the journey of a product through various stages, from its introduction to the market to its eventual withdrawal.

Figure N°04:Product life cycle curve



Source: Philip Kotler: *Marketing Management*, 2011, P 310

[1] MAYRHOFER, (U): Op.cit,P.103.
[2] CLAUDE, (D) *:* Op.cit, p.107.

3.2. Product Life Cycle phase

The product life cycle is divided into four phases: [1]

3.2.1. introduction phase: Corresponds to the gradual entry of a product into the market. This phase is characterized by high level of marketing efforts to raise awareness of the product and encourage purchase, low level of sales and no profits. Products at this stage have to be carefully monitored to ensure that their growth;

3.2.2. growth phase: This stage is characterized by product acceptance in the market, significant increase in sales and profits, less marketing efforts, and protentional modifications on the marketing mix strategy. The major goal of this phase is to gain customer preferences and increase sales;

3.2.3. maturity phase: Also known as "the golden phase", it is the most profitable stage where sales and profits reach their highest level. However, through time, sales start to decline as the market becomes saturated with the product. when this happens, businesses are obliged to develop the product in order to differentiate it and increase sales again;

3.2.4. decline phase: At this stage, sales and profits decline quickly as the product becomes less wanted due to the appearance of better alternatives. Depending on the product profits, businesses have to decide whether to continue its production or end it.

3.3. Benefits of the product life cycle

An in depth understanding of the PLC allows businesses to gain several advantages, among them are the following:[2]

- Adopt an appropriate marketing mix strategy based on the needs of each phase;
- manage the balance of a product line by ensuring that new products will replace declining ones;

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[1] IVASCU, (L), DRAGHICI (A) and NIEMANN (J): «A Debate on the Product Lifecycle Implications and Product Market Behavior», Scientific Bulletin of the Politehnica University of Timisoara, Romania, N°2,2018, PP.29-35.

[2] NATHALIE, (L) : Toute la fonction Marketing : Savoirs, Savoir-faire et Savoir-être, édition DUNOD, Paris, 2005, P.51.

- anticipate competitive actions and strategies.

4. Product characteristics

Reality proves that a consumer's preference for a product is based on its quality, design, packaging, image, or brand reputation, these are called product characteristics.

Product characteristics can be tangible, intangible or a mix of both.

4.1. The physical characteristics of a product

4.1.1. Packaging

4.1.1.1. Definition

Kotler presented the following definition: ***"****Packaging includes all the activities of designing and producing the container for a product".*[1]

According to this definition, packaging is the external covering used for practical as well as marketing purposes, such as protecting the product, facilitating its transportation and storage, and presenting it for sale.

4.1.1.2. The levels of packaging

Packaging can be classified into up to three levels:[2]

- **primary packaging:** Directly in contact with the product and accompanies it throughout the consumption process. It influences the consumer's perception of the product during the use;
- **secondary packaging:** Provides protection for the primary packaging and promotional support for the product. It plays an essential role in attracting customers attention and provoke them to purchase it, and unlike the first level, this one is discarded when the product is used;

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[1] KOTLER (P), and KELLER (K): *Marketing Management*, Prentice Hall, États-Unis, 2012, P.346.
[2] KOTLER, (P), KELLER (K) et MANCEAU (D) : Marketing management, 13 édition PEARSON, Paris, 2009, P.395.

- **tertiary packaging:** This level is used to facilitate storage and transportation processes, and it contains information that are directed to the distributors.

4.1.1.3. Packaging functions

Packaging functions can be divided into two types:

- **technical functions:** Refers to the physical role of the packaging which is facilitating the product transportation and storage processes, protecting the product from damage, and ensuring its safe use and consumption;[1]
- **communication functions:** Refers to the communication role of the packaging which is providing essential information about the product for the receiver and influencing its perception of it.[2]

4.1.2. Labeling

Kotler provided the following definition: *"the label can be a simple attached tag or an elaborately designed graphic that is part of the package. It might carry a great deal of information, or only the brand name."*[3]

Taking in consideration this definition, the label is a tag attached to the product and/ or its packaging, it displays essential information about the product such as safety warnings, usage instructions, components, brand name…. etc.

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[1] LINDON, (D) and LENDREVIE (J) : *Mercator : Tout le marketing à l'heure de la data et du digital*, Dalloz, Paris, 2021, p.347.
[2] Ibid. ,p.350.
[3] KOTLER, (P), and KELLER (K): *Marketing Management,* op.cit, p.348.

4.2. The intangible characteristics of a product

4.2.1. Product assortment

4.2.1.1. Definition of product assortment

Also called a "product mix" refers to the variety and range of products they share the same main functions, address the same market, or are sold through the same distribution channels.[1]

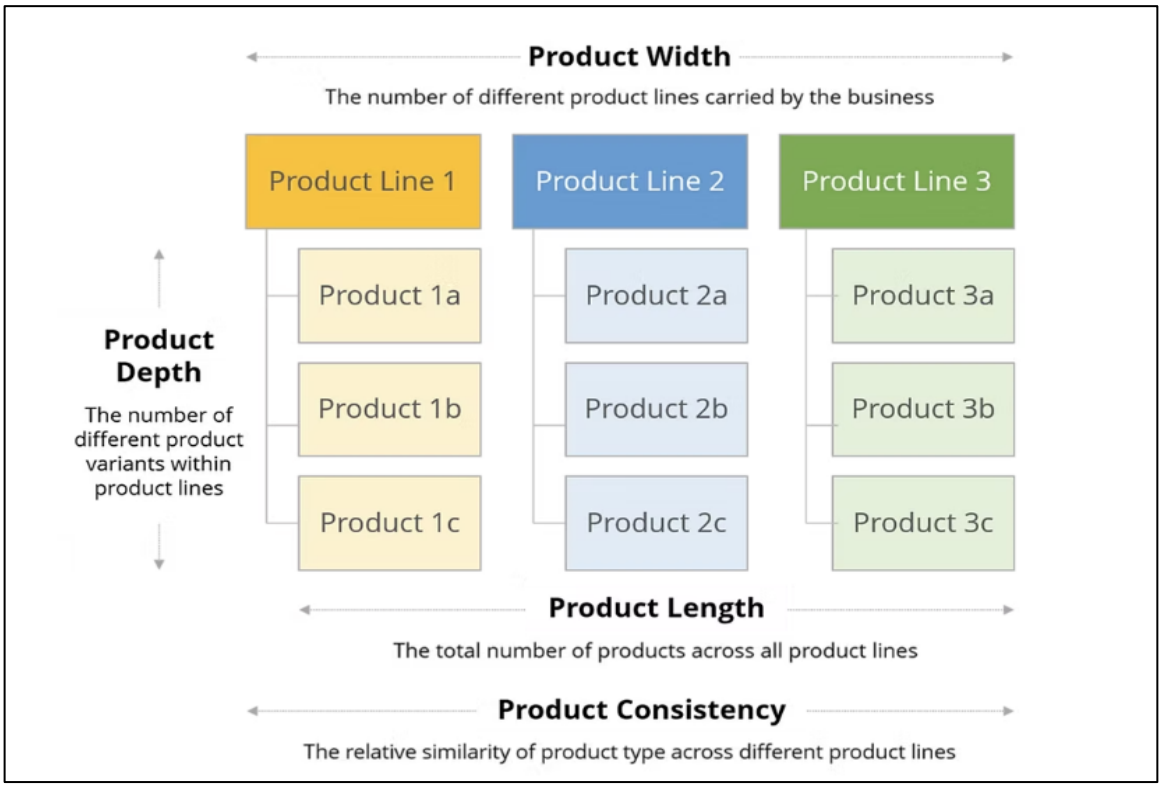
Each product assortment features 4 dimensions, which are:[2]

- **the length of a product mix:** Refers to the total number of all the different products that a company can market;
- **the depth of a product mix:** Refers to the total number of products within a single product line;
- **the width of a product mix:** Refers to different product lines the company owns;
- **the consistency of the product mix:** Refers to the homogeneity between the different product line.

The figure below illustrates the four dimensions of the product mix:

[1] LINDON, (D) and LENDREVIE (J), op.cit, p.367.
[2] KOTLER, (P), and KELLER (K): *Marketing Management,* op.cit, P.336-337.

Figure N°05:Product mix (product assortment) dimensions



Source: https://www.peakframeworks.com/post/product-mix (consulted on 23/03/2025 on 23:58).

4.2.2. The Brand

4.2.2.1. Brand definition

"A brand is a recognized name associated with a product which projects an image to the consumer such that he or she rates the product associated with the brand higher than other comparable products"[1]

This definition indicates that the brand is a distinctive name, design or a symbol that accompanies the product, allows businesses to distinguish their products from those of competitors and create a good and long-lasting impression in costumers mind.

[1] TOLLINGTON, (T): *Brand assets*, edition John Wiley & sons ltd, New York, 2002, p.95.

4.2.2.2. Brand components [1]

A strong brand that stays in the consumer's mind must include the following basic components:

- **name:** The word or phrase that identifies the brand;
- **logo:** The visual symbol or design represents the brand;
- **slogan:** A short and catchy phrase that represents the message of the brand;
- **color code:** The combination of colors chosen for the brand;
- **jingle:** a short musical tune or song used in brand advertising.

5. Quality product

5.1. Definition [2]

Quality product can be defined from different points of view based on who is evaluating it.

5.1.1. Quality Product for customer

Product of quality, from the customer's perspective, is a product that satisfies their needs, solves a specific problem, and works efficiently.

5.1.2. Quality Product for company

A product of quality from the company's perspective is a product that aligns with the specifications that were defined based on customer expectations.

5.2. Product quality types

The KANO model distinguishes three types of product quality:[3]

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[1] ABDELOUAHAD, (F): *The impact of social media presence on the brand image. Case study: Sarl tammy*, Master's thesis in marketing The School of Higher Commercial Studies, Alger 2023, P.9.
[2] https://www.indeed.com/career-advice/career-development/product-quality Consulted on 08/04/2025 at 00 :01.

[3] DURET, (D) et PILLET (M): Qualité en production : de l'ISO 9000 à six sigma, organisation edition, Paris, 1998, p.29.

5.2.1. implicit quality

Refers to the unspoken expectation's customers have for the quality of a product. In another words, it is the basic quality that customers expect its existence in a product;

5.2.2. proposed quality

Refers to the quality level promised by the company to its customers. It includes features and attributes that the company actively promotes in its product;

5.2.3. innovative quality

Refers to the unexpected quality that costumers did not anticipate its existence but very satisfied with. It enables businesses to differentiate their products from those of competitors and gain a competitive edge.

5.3. Product quality dimensions

According to Garvin, a product is considered to be of quality if the following eight dimensions are available in it: [1]

- **performance:** Refers to how well a product or service does what it is supposed to do. It is about the main functions that fulfil the customer's primary needs;
- **features:** provide a complement to the basic operation of the product. These are characteristics that are considered secondary to the main operating characteristics;
- **reliability**: Refers to the correct functioning of a product over a given period of time and under normal conditions of use. The most common measures of reliability are the mean time to first failure and the failure rate (number of failures per unit of time);
- **conformance:** Refers to the degree of agreement between the produced product and its preestablished specifications that were determined based on customers' expectations;
- **durability:** Refers to the lifespan of a product. It is also the sum of the use derived from a product before it deteriorates or breaks down, and its replacement is preferable

[1] MABOUDI, (F), SHEIKH (R): *Evaluation and Selection of Products Based on the Quality Dimensions by Word of Mouth (Case Study: Brands of the Mobile Phone), Preprints*, N°202305.0131, 2023, pp.1-14.

to continual repairs. Durability is closely linked to reliability. A reliable product is likely to have a longer lifespan than one that has numerous failures;

- **Serviceability:** Refers to the product ability to be quickly and easily maintained when its damaged, and to be used again with no difficulties. It is directly linked to the quality of after-sales service (SAV), and it is generally measured by the average time taken by the after-sales service to carry out a repair;
- **aesthetics:** aesthetics represents what the customer can perceive through their "five senses": the look, sound, taste, smell, and feel of the product;
- **perceived quality:** Also known as a priori quality, it refers to the initial opinion that customers have about the quality of the product before using it. This perception is developed by the product's advertising, brand image, or other customers' experiences.

CONCLUSION

In summary, quality has gained a significant focus over time, becoming one of the key factors that allows businesses to have a competitive advantage. It can be at the same time objective and subjective, and its various dimensions present a whole picture of how quality is perceived and controlled within an organization. A well quality management is essential if a business wants to reach the desired quality objectives. Therefore, we have seen the definition of quality management, its history, and most significantly, the key principles upon which it is based.

Quality management is sought through a systemized approach with key phases like customer need identification and continuous improvement, supported by some tools employed to measure, analyze, and enhance quality at all levels. From simple quality control to overall quality management, the evolution of quality has great advantages to customers, companies, and employees.

Product quality took center stage in the following section. We started by defining product types and exploring the product life cycle and why it is relevant. It was established that products consist of physical and intangible factors, both collectively being part of the overall customer experience. Finally, we mentioned product quality from both the customer's and the company's perspective, explaining what the word stands for in a particular instance and explaining different types such as implicit, suggested, and creative quality.

Chapter three: Research methodology

INTRODUCTION

In this chapter, and within the first section, we will review the most prominent previous studies that addressed the topic of customer integration during the innovation and development phase, in addition to the impact of this integration on product quality. These studies addressed the same variables used in our study, highlighting their importance as a theoretical basis.

In the second section we will take an overview of the host organization, SARL WAFA FAILE, highlighting its history, location, missions, objectives and other key aspects that will help us understand the company's relevance to our study. The last section will address the methodological approach adopted for the research, as well as the methodological tools used for data collection and analysis.

Section 01: Literature Review

The success of developing a new product relies more and more on the collaboration between companies and customers. Customer integration in the product development phase is seen as an important lever for improving product quality, particularly in terms of performance and aesthetics. This review aims to explore the links between customer integration in the new product development phase of the products developed.

1. The study of: LABIDI Fatima, 2020

LABIDI Fatima: The role of supply chain management in enhancing product quality.

This study examined the impact of supply chain integration on the product quality. It included SCI three dimensions: customer integration, supplier integration and internal integration, as for the product quality it included all its eight dimensions. The study measured the level of date quality at Taiba Dates Company in Ouargla, and investigated the nature of the relationship between SCI and the product quality eight dimensions. Based on the statistical analysis of the data collected through a quantitative approach, it resulted that :There is a positive relationship between SCI and all the product quality dimensions, thus, there is a positive relationship between customer integration and both aesthetic and performance quality.

2. The study of: Simone Vogel and al.2020

Simone Vogel and al.: Making customer integration in company processes persistent: Comparison of literature and industrial perspective.

This research focused on the ability of businesses in involve customers in their operations and make them a sustainable long-term partner. Through the observation and face to face interviews, the researchers have found that practical implementation of customer integration remains a challenge for companies, especially those who lack effective mechanisms for systematic and continuous customer integration. They also noted that companies, who actually apply customer integration, lack a comprehensive and systematic approach to making customer integration sustainable within their organization.

3. The study of: Thorsten Teichert and Iwan Von Wartburg 2017

Thorsten Teichert and Iwan Von Wartburg: Online Customer Integration in New Product Development.

The research paper discussed how can online customer integration in the NPD phase help the company progress towered better quality. This study concluded that understanding customer needs is crucial for a successful new product development process, which means taking in consideration the feed-back and expectations of customers can lead to developing a product that aligns perfectly with customers' needs in terms of quality. It also highlighted that effectively implementing online customer integration can provide a competitive advantage for firms.

4. The study of: Arawati Agus 2015

Arawati Agus: Supply Chain Management: The Influence of SCM on Production Performance and Product Quality.

This study investigated the impact of multiple practices of SCM on the production performance and product quality in manufacturing companies. The study consisted of 250 companies that were specifically selected to suit the study's objectives. It reached many results, the most prominent of which are: the adoption of new technologies and innovation stands out as the most influential factor in enhancing both production performance and product quality., although it highlighted that customers input is an essential part of achieving this performance and quality, which enhances that customer integration leads to a satisfactory result for the company.

5. The study of: Kathrin Füller and al., 2014

Kathrin Füller and al.: A matrix for selecting appropriate customer integration methods.

The study aimed to examine the effect of internal integration, customer integration and supplier integration effects on conformance quality and design quality in the manufacturing sector. It also discussed the decision factors that should be taken into consideration when choosing appropriate customer integration methods for innovation processes. This study concluded that there are seven key decision factors that companies should consider when selecting customer integration methods: costs, duration, required skills, number of required customers, infrastructure, phase in the innovation process, and customer type. These seven

decision factors can be used in a multi-dimensional decision matrix to help practitioners select the most appropriate customer integration methods for their needs.

6. The study of: Zahra Lotfi and al. 2013

Zahra Lotfi and al.: The Relationship between Supply Chain Integration and Product Quality.

The work of Zahra Lotfi et al. goes deeper into how different dimensions of supply chain integration, internal, supplier, and most importantly customer integration affects product quality. They clearly indicated that customer integration has a positive impact on both design quality and conformance quality. The study also highlighted that involving customers not only improves the product design but also its technical performance.

7. The study of: Zogaj Shkodran and Ulrich Bretschneider, 2012

Zogaj Shkodran and Ulrich Bretschneider: customer integration in new product development: a literature review concerning the appropriateness of different customer integration methods to attain customer knowledge.

This study examined various customer integration methods in the new product development phase. It intended to Identify the different customer integration methods used in NPD phase, and determines the right one that matches the required type of customer knowledge (need information, solution information, sticky information, leading edge information). The study reached a set of conclusions, the most important of which are: Ther are two types of customer integration method passive and active. Methods with active customer integration, are the most effective at capturing the full range of customer knowledge, including needs, solutions, sticky information, and leading-edge information. Passive customer integration methods are less effective at capturing advanced types of customer knowledge like solution information and sticky information. The company can choose the method that suits it according to its needs and capacities.

8. The study of: Arawati Agus,2011

Arawati Agus: The Structural Influence of Supply Chain Management on Product Quality and Business Performance.

This study aimed to determine whether SCM has significant influence on product quality. Using both quantitative and qualitative approaches across multiple companies, the study emphasized the importance of technologies and lean production in enhancing both aesthetic and performance aspects of products. One of its most important findings is that product quality acts as a bridge between SCM and overall business performance. The study suggested that aligning the product quality with customers need and expectations will directly lead to an enhanced product quality and better business performance.

9. The study of: S.R. Hosseini Baharanchi, 2009

S.R. Hosseini Baharanchi: Investigating the role of supply chain integration practices in predicting product quality and innovation performance.

This study explored the relationship between supply chain integration and product innovation and quality. The result showed that supply chain upstream integration has a higher impact on product quality, compared to internal integration and supply chain downstream integration. The study also confirmed that organizations, which actively collaborating with their customers had seen improvements in both innovation and quality.

10. The study of: Ashwin W. Joshi and Sanjay Sharma, 2004

Ashwin W. Joshi and Sanjay Sharma: Customer Knowledge Development: Antecedents and Impact on New Product Performance.

This study investigated how firms develop customer knowledge and assess its impact on new product success. The analysis of the data collected from 831 business units, through surveys, indicated that all antecedents have significant effects on customer knowledge development, which in turn has a strong positive impact on new product performance. The study also highlighted the importance of integrating customer insights into innovation processes.

11. The study of: Pierre Krawtchenko, 2004

Pierre Krawtchenko: Contribution to the study of client integration in the management of innovative projects.

This study aimed to understand how to integrate customer knowledge into the innovation process. It also analyzed how customer knowledge contributes to improving innovation outcomes in order to identify practices that increase customer acceptance of innovation in the market. Through a survey sent to 609 companies, results clarified there is no universal best practice for integrating clients into innovation practices must be tailored to the company type and innovation goals. It also pointed out that a successful customer integration helps reducing the risks of innovation failure.

The previously discussed studies provided us with an initial picture and a comprehensive overview of our research topic. They significantly assisted in developing the questionnaire and facilitated the selection of the appropriate tool for analyzing the data and testing the validity of the hypotheses that we proposed. (see appendix N°01)

Section 02: The company presentation -WAFA FAILE-

In this section we will take an overview about WAFA FAILE its internal organization, its values, its objectives.

1. General presentation of the WAFA company

WAFA is an Algerian company specialized in the transformation of paper for household use, hygiene, and personal care. Established in Algeria as a leading brand and backed by years of experience, WAFA is known for its exceptional execution in the paper converting industry, and is an active player in this field through the range of products it offers.

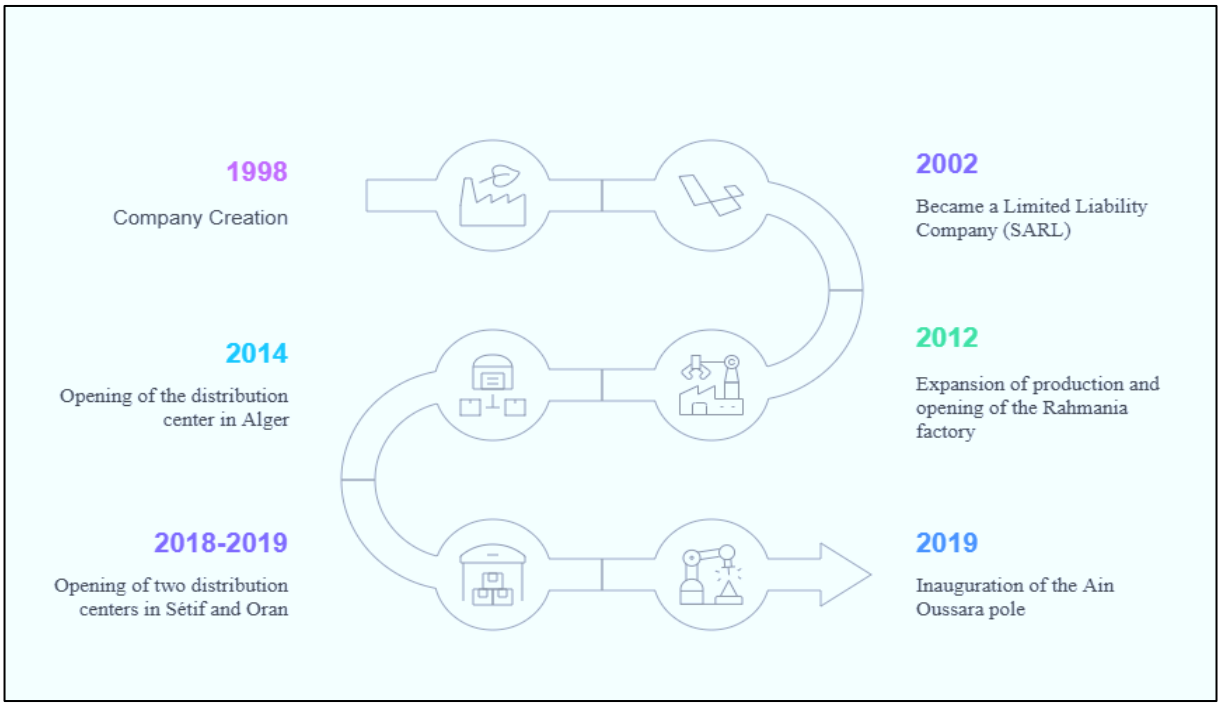
WAFA works to satisfy the consumer needs by supplying the market with quality products and competitive prices. The company continually improves these products to meet international standards. Over the past 24 years, WAFA kept offering exceptionally high-quality products that exceed expectations, and building lasting relationships with its customers. [1]

1.1. The brand history

In 1998, Wafa was founded by the late ZEBDA Ben Azouz, the father as a single member limited liability company (EURL). The organization grew out of ZEBDA passion for converting paper for home use, with a constant concern for the well-being of the individual and respect for the environment. In 2002 the company took a new turn to become SARL WAFA FAILE located on a 3000 m² site in Cheraga. Its development continued in 2012 by moving to the Rahmania site, within the Sidi Abdallah pharmaceutical center in Algiers, which then occupied an area of 5000 m². Over the years, Wafa has gradually consolidated its position in the local and international market, notably thanks to the opening in 2019 of an industrial complex in Ain Wassara, Djelfa, covering an area of 67,000 m².[2]

[1] Internal company document: the WAFA product catalog
[2] Internal company document

Figure N°06:The big changes in WAFA's history



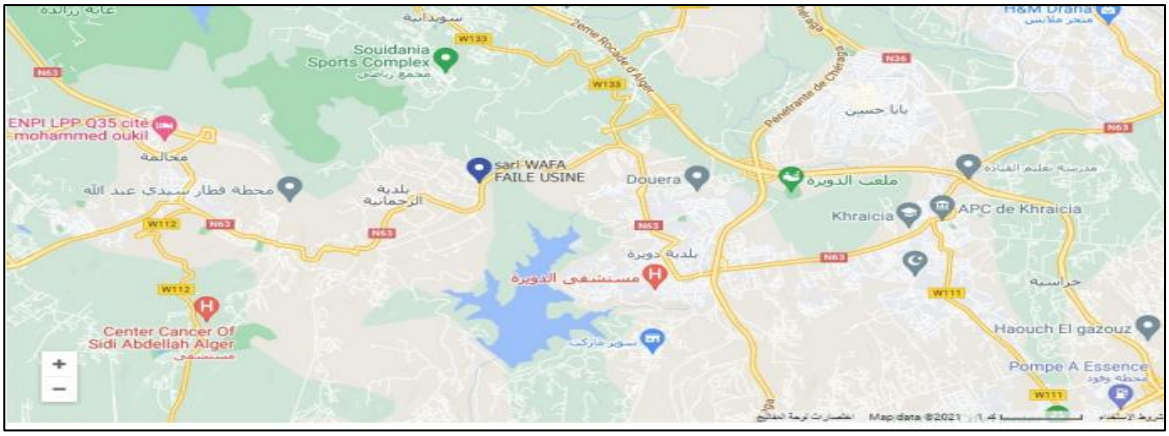
Source: Authors own work based on Internal company document

The figure shows the big changes in WAFA's history from 1988 until 2019 where three distribution centers were opened one in 2014 and two in 2018 and 2019.

1.2. Geographic location

SARL WAFA FAILE is located in the province of Algiers, district of Zeralda, commune of Rahmaniya, in the El Boustane Industrial Zone N36, a pharmaceutical center near the N63 national road.

Figure N°07:Geographic location of SARL WAFA FAILE



Source: developed by Authors using Google Maps

1.3. Technical sheet

The following table presents a technical sheet containing various information about the company WAFA FAILE:

Table N°03:Technical Sheet of WAFA FAILE

Name	SARL WAFA FAILE
Legal Status	Limited Liability Company (LLC)
Head office	132, zone industrielle Amara Box: 18, Chréaga, Alger, Algeria
Sector of activity	Production & conversion of paper, sanitary products & household tissues.
Logo	
Number of employees	Around 1200 employees
Phone Number	Mob: +213 (0) 555.04.00.06 Tel/ Fax: +213 (0) 20.299.647

Source: developed by Authors based on the WAFA product catalog

1.4. Visions, objectives and guarantees[1]

1.4.1. Visions

- utilizing human resources to attend customers efficiently;
- teamwork in building the company and developing products in an essence of cooperation and openness;
- encouraging team spirit through initiatives such as training and team building;
- relying on advanced digital equipment to ensure quality production and innovation;
- leading the industry by maintaining strong performance and continuity of excellence;

[1] Internal company document

- fostering a sense of belonging through enthusiasm and group participation;

1.4.2. Objectives

WAFA's main objective are:

- positioning itself as a leading paper supplier in Algeria;
- diversifying its offerings to meet all customer expectations;
- contributing to national economic development;
- establishing a culture of paperless household in Algeria;
- covering the Algerian market with its products and targeting neighboring countries to develop their export activities.

1.4.3. Guarantees

Among Wafa guarantees, we mention the following:

- the continuity of exporting high-quality Wafa solutions;
- the continuity of supplying Algeria with high-quality Wafa solutions;
- the availability of its products at any time;
- on time delivery;
- offering hygiene products that are safe for the user as well as the environment;
- providing the ideal work environment;
- strict adherence to business ethics.

1.5. WAFA products

WAFA offers high-quality products at competitive prices, and customize its offers to meet the needs of diverse customers, whether end consumers or business-to-business (B2B) clients such as restaurants and hotels. The table below presents the most prominent products of the company: [1]

[1] Internal company document: the WAFA product catalog.

Table N°04:WAFA Product

Product Family	Description
PAPER TOWEL	WAFA Paper towels are made from high-quality pure cellulose wadding. The multi-ply roll ensures effective absorption capacity. (see appendix N°02)
TOILET PAPER	Wafa Toilet paper guarantees softness and strength through its three variants: Eco, Extra and Extra Scented. (see appendix N°03)
TABLE NAPKINS	Wafa Table napkin available in several designs and sizes, pleasant to the touch and decorative. (see appendix N°04 and N°05)
TISSUES	WAFA offers two models of tissue boxes: Medium model «70 tissues», mosaic design, large model «140 tissues». This product is made from 100% pure white cellulose wadding, these two-ply tissues are very soft and highly absorbent. Additionally, it also offers a pocket tissue, perfect for daily use: extra soft and very durable. (see appendix N°06)
WIPES	To ensure optimal hygiene and respect for the sensitivity of children's skin, WAFA offers two types of wipes: Unscented wipes of 80, and scented wipes of 72. (see appendix N°07)
ALUMINIUM FOIL	WAFA aluminum foil is available in rolls from 5 meters to 180 meters, with a width of 30 cm. It protects food during cooking, while preserving its aromas. (see appendix N°8)
BAKING PAPER	WAFA Baking Paper Ideal for baking food in the oven. It allows for easy baking while facilitating removal from the mold thanks to its non-stick surface. This paper can be used in both conventional ovens and microwaves. (see appendix N°09)

CLING FILM	WAFA plastic wrap is transparent and easy to use, preventing the mixing of odors and protecting food. It is stretchable and durable; it adapts to all shapes of plate and container. (see appendix N°10)
ALUMINIUM FOOD TRAYS	WAFA trays with compartments and lids are mostly used for special occasions. They range from 420 cl to 1320 cl. (see appendix N°11)
PARAPHARME	WAFA offers a special range dedicated to doctors and healthcare professionals, including examination sheets and high-quality double-ply cellulose wadding rolls. WAFA examination sheets are extremely absorbent, durable, soft, and flexible. They are packaged in sets of 12 rolls, with each roll containing 70 sheets, 65 cm wide, and pre-cut every 45 cm. (see appendix N°12)
ENTREPRISE	WAFA offers a personalized range of napkins available in various sizes, and a personalized tissue boxes for businesses. (see appendix N°13)

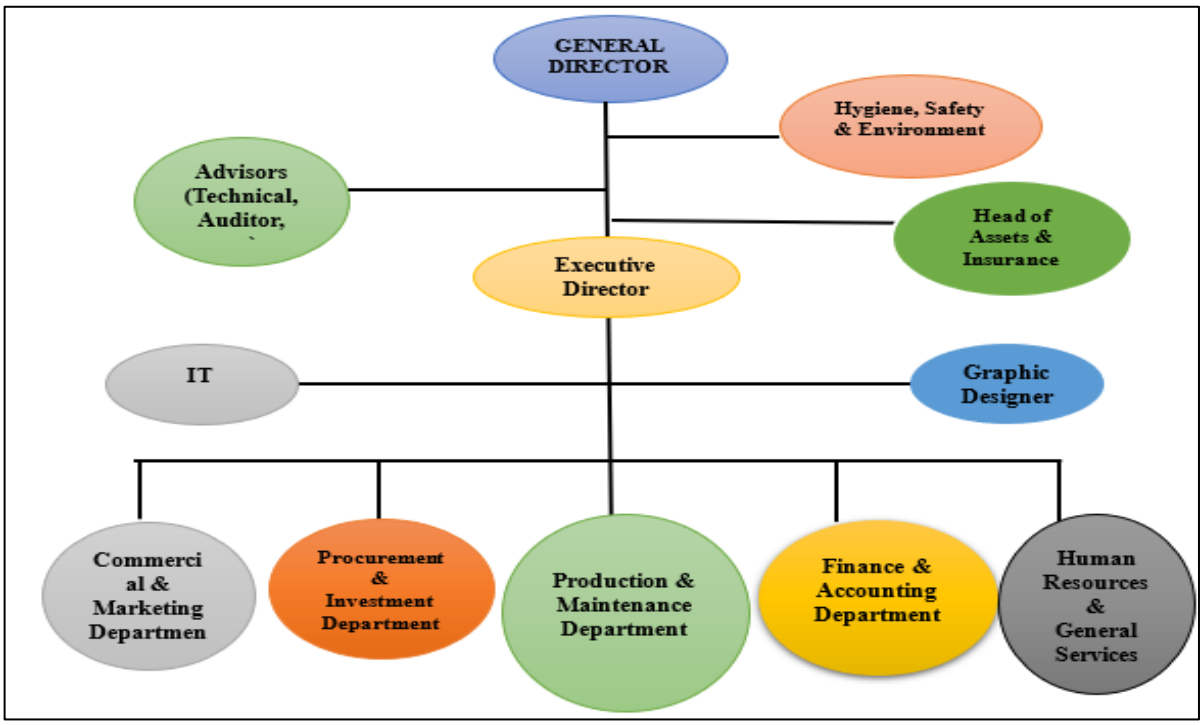
Source: developed by Authors based on the WAFA product catalog

Wafa always strives to offer innovative new products that meet the market needs of the market. In this context, it has developed a new product in the category of table napkins named “President Collection”, which is a pre-folded table napkin easy to use. This product has been selected as the focus of our applied study. (see appendix N°05)

1.6. The organizational structure of WAFA [1]

The figure below represents the general organization chart of WAFA FAILE:

Figure N°08:WAFA FAILE organizational chart



Source: Internal company document.

1.6.1. General Management

Responsible for ensuring coordination between the different departments and leading them towards achieving the company's strategic objectives.

1.6.2. Human Resources Department

It is responsible for provides the company with the competent and necessary employees, to ensure the continuity of the institution's activity. It also manages the employees' affaires, shape their skills in response to company requirements, and administrates their development process.

[1] Internal company document

1.6.3. Purchasing and Supply Department

It provides the primary resources necessary for the production process, and it is divided into two subdivisions:

- **Purchasing:** It is responsible for: selecting suppliers, negotiating price with them and ensuring the quality of the purchasing raw materials.
- **Supply management:** It is responsible for: tracking orders until delivery, managing inventory, planning the needs for raw materials and/or finished products and coordinating with other departments to ensure smooth operations.

1.6.4. The Finance and Accounting Department:

Finance department provides the financial resources necessary for the continuity of the activity of the various departments, while the accounting department records the accounting of all the institution's operations.

1.6.5. Production & Maintenance Department

It oversees all the production stages through its following subdivisions:

- **production:** This subdivision is under the supervision of production managers who oversee the production process at all stages, and distribute tasks among workers on the production lines,
- **quality control:** It ensures that the products resulting from the production process comply with the quality standards set by the Company's top management, by monitoring all production lines and examining the products in the company’s laboratories;
- **maintenance service:** It is responsible for the reparation of all the production tools and machines.

1.6.6. Sales & Marketing Department

This department plays a key role in developing and implementing the company's sales strategy. It is responsible for sales management, coordinating distribution teams, monitoring sales performance, and promoting products on the market. This department is the one where our practical internship took place. It includes:

1.6.6.1. Sales Department

WAFA leverages technology to optimize sales. It uses ERP software to track sales, inventory, and to analyze sales data to evaluate each distributor's performance (KPI tracking). It also uses Retail Execution to improve business efficiency.

This department includes regional managers, direct distribution supervisors, wholesale channel supervisors, and distributor supervisors, who in turn supervise sales representatives, order pickers, and sales assistants, all under the supervision of the national sales manager.

- **Distribution models used:** WAFA used two distribution models which are:

  - **direct distribution:** The company has three centers located in Algiers, Oran, and Sétif. Each center is headed by a center manager, an administrative manager, and a regional sales manager. The sales administrator (ADV) is responsible for managing tours and preparing the sales analysis table (TAV). At the regional level, distribution areas are entrusted to area managers, whose main mission is to implement the sales strategy, ensure the smooth running of distribution in the field, and guarantee the efficient transmission of information.

  - **indirect distribution**: It includes all the distributors who are WAFA partners. They are located in different states and they act as exclusive representatives of WAFA in their respective regions, under an exclusive contract.

  - **key accounts:** WAFA also has Key Accounts "Grands Comptes", which are managed separately by a specialized team from the Sales Department, because they require specific contracts, specific negotiations and personalized monitoring. There are two categories:

    - **Large and Medium-Sized Retailers:** These are contract customers who represent the brand's image and its ranking. This primarily includes supermarkets and hypermarkets.

- **B to B:** It encompasses commercial activities between WAFA and other companies, such as the hotel industry, Djezzy, Algiers Airport, and certain ministries. They provide a showcase for WAFA products in the business market.

1.6.6.2. Brand management

This department manages all external relations and events for the WAFA brand. This includes media interactions, communications agency, and the organization of events in large venues, and trade shows. The main objective of WAFA's participation in trade shows is to strengthen its brand image and ensure a sustainable commercial, media, and market presence.

Regarding the communications agency, WAFA recently had changed its service provider. The new agency now manages the Facebook and Instagram pages, the YouTube channel, and the advertising spots.

This team, dedicated to external relations and communications, plays a key role in developing WAFA's brand awareness and image in the market.

Section 03: Methodological Framework

In this section, we are going to present the methodology used to collect the data needed to answer our research question.

1. Methodological approach

1.1. Defining the methodological approach

Aktouf defined it as: "*The study of the proper use of methods and techniques. It's not enough to know what they are; you also need to know how to use them properly, how to adapt them, as rigorously as possible, to the precise object of the research or study, on the one hand, and to the objectives pursued, on the other*".[1]

According to this definition, a methodological approach is a set of methods and techniques chosen for a given research project. They must be the most appropriate for the study, and must lead to the predefined objectives.

To better test our hypotheses and answer our research question, we have chosen to adopt a quantitative approach. This choice is justified by the nature of our study that focuses on understanding the impact of costumer integration on aesthetic and performance quality in the NPD phase.

1.2. Quantitative approach

According to Ndinga:

"*The quantitative approach consists of creating quantitative data that can be analyzed in different fields of knowledge".*[2]

Following this definition, the quantitative approach is used to collect the required information in a form of measurable data. The numbers are then analyzed using statistical tools, and the results can be presented in graphs or tables.

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[1] AKTOUF, (O) : *Méthodologie des sciences sociales et approche qualitative des organisations*, Les Presses de l'Université du Québec, Montréal, 1987, p.27.
[2] NDINGA, (M) : *Initiation à la recherche en sciences économiques*, Editions L'Harmattan, paris, 2018, p. 31.

The quantitative approach uses a variety of tools to collect the information that will later be analyzed in order to confirm or refute previously formulated hypotheses and make informed decisions. These instruments include questionnaires, experiments, secondary databases…etc.

For our quantitative study, we decided to use the questionnaire, which we created online via Google Forms.

Analysis of the questionnaire responses enables us to provide in-depth answers to our main problematic: **"Does customer integration have an impact on aesthetic and performance quality in the new product development phase?",** and to our sub-questions:

Q1: Does customer integration affect aesthetic quality in the new product development phase?

Q2: Does customer integration affect performance quality in the new product development phase?

To answer these questions which are examined in the context of a new product developed by WAFA Company, named "President Collection", two hypotheses were formulated and argued as follows:

H1: Customer integration in the new product development phase has an impact on aesthetic quality.

Aesthetic quality, which includes visual appeal and styling, is often shaped by customers. Bloch demonstrated that information technology tools, such as CAD systems, allow customers to personalize product design such as color and form, providing businesses with aesthetic insights.[1]

Later, researchers began to emphasize that aesthetics go beyond mere appearance. In the context of new product development NPD, Creusen and Schoormans noted that aesthetic quality helps creating emotional connection with users, making it an essential component of user experience[2]. Veryzer and Borja de Mozota similarly argued that involving customers in

[1] BLOCH, (P) and al.: «Seeking the Ideal Form: Product Design and Consumer Response», in Journal of Marketing, N°59, 1995, pp.16-29.
[2] CREUSEN (M) and SCHOORMANS (J): «The Different Roles of Product Appearance in Consumer Choice», in Journal of Product Innovation Management, No°1, 2005, pp. 63–81.

design stage guides designers toward more visually appealing product form, that meets the desired aesthetic quality results. [1]

Research by Mugge et al. underlines the idea that user's feedback can improve a product's attractiveness and increase its perceived value[2]. Zahra Lotfi et al., examined how customer integration impacts aesthetic quality, and concluded that such involvement leads to designs that better align with market expectations and boost customer satisfaction[3]. Simone Vogel et al., highlighted the importance of transferring customer knowledge into internal organizational processes input; to develop products that not only function well but also look and feel right to users. Along the same lines, Kathrin Füller et al., emphasized that selecting the appropriate customer integration methods, particularly in the early stages of innovation, allows companies to incorporate user insights into design elements, such as color, texture, size…. etc., and achieve a pleasing aesthetic appeal.

However, the involvement of customers in aesthetic quality decisions is not always beneficial. According to Dell'Era and Verganti, over-reliance on customer opinion can limit businesses creativity, especially in industries where aesthetic innovation is crucial such as fashion and technology, because designers may feel constrained by customer preferences, leading to less original or bold visual outcomes.

It is in this sense that we will test the relationship between customer integration and aesthetic quality in the new product development phase.

Figure N°09:Hypotheses one

Source: Author's own work

[1] VERYZER, (R) and BORJA DE MOZOTA (B): «The Impact of User-Oriented Design on New Product Development: An Examination of Fundamental Relationships», in Journal of Product Innovation Management, N°2, 2005, pp. 128–143.

[2] MUGGE, (R.), DAHL (D), and SCHOORMANS (J): «What You See, Is What You Get? Guidelines for Influencing Consumers' Perceptions of Consumer Durables through Product Appearance», in Journal of Product Innovation Management, N° 3, 2019, pp. 309–329.

[3] LOTFI, (Z) and al.: «Information Sharing in Supply Chain Management», in Procedia Technology, N°11, 2013, pp. 298–304.

H2: Customer integration in the new product development phase has an impact on performance quality.

Performance quality refers to how well a product functions and fulfils its intended purpose. In the context of new product development, it is commonly assessed through attributes such as reliability, durability, efficiency, and usability. [1]

Griffin and Hauser highlighted that, companies that integrate customers into the development process often achieve better product performance through the gathered input. A few years later, Kaulio found that involving customers during prototype testing can lead to significant improvements in usability and product effectiveness[2]. Building on this, Kristensson et al. emphasized that customers are able to provide practical feedback, which helps developers identify functional requirements early in the development phase[3]. In 2012, Zogaj Shkodran et al. demonstrated that using active methods such as lead-user and workshops enables firms to gather valuable insights from customers that directly contributes to enhancing the final product's performance quality. [4]

Later, Teichert et al. confirmed that involving customers online during the NPD process can boost performance quality by incorporating real-time feedback to align the product fundamental properties with user preferences[5]. Ashwin W. Joshi et al. argued that customer knowledge has a significant positive impact on new product performance, and companies that engage customers early in the NPD phase are more likely to deliver high performing products.[6] Lotfi et al., pointed out that customer integration alongside internal and supplier integration, lead to improved performance quality.

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[1] GARVIN, (D): «Competing on the Eight Dimensions of Quality», in Harvard Business Review, N°6, 1987, pp. 101–109.

[2] GRIFFIN, (A) and HAUSER (J.R.): «The Voice of the Customer», in Marketing Science, N°1, 1993, pp. 1–27.

[3] KRISTENSSON, (P), MATTHING (J), and JOHANSSON (N): «Key Strategies for the Successful Involvement of Customers in the Co-Creation of New Technology-Based Services», in International Journal of Service Industry Management, N°4, 2008, pp. 474–491.

[4] ZOGAJ, (S) and BRETSCHNEIDER (U): «Customer Integration in New Product Development: A Literature Review Concerning the Appropriateness of Different Customer Integration Methods to Attain Customer Knowledge», in ECIS 2012 Proceedings, 2012, p. 208.

[5] TEICHERT, (T.) and al.: «How to Implement Informational and Emotional Appeals in Print Advertisements», in Journal of Advertising Research, N°4, 2017, pp. 396–406.

[6] JOSHI, (A) and SHARMA (S): «Customer Knowledge Development: Antecedents and Impact on New Product Performance», in Journal of Marketing, N°4, October 2004, pp. 47–59.

However, Griffin & Hauser, found that there are risks, such as intense focus on customer feedback that might push companies to make changes that satisfy individual needs but reduce overall product efficiency[1]. Furthermore, Ulwick found that customers often lack the technical expertise required to propose improvements that take performance limitations into account, particularly when it comes to complex products.

It is in this sense that we will test the relationship between customer integration and performance quality in the new product development phase.

Figure N°10:Hypotheses two

Source: Author's own work

1.3. The questionnaire

Kotler, Keller and Manceau defined it as: "*the most common information gathering instrument. It often incorporates not only the questions to be asked, but also the response ranges. It is an extremely flexible instrument, thanks to the variety of questions that can be asked*".[2]

Taking this definition in consideration, we can conclude that a questionnaire is a tool used to collect information from respondents. It contains a set of questions on a particular subject, and it is prepared, constructed and administered according to specific rules.

A questionnaire can include different types of questions: [3]

- **open questions:** The person being questioned is completely free to answer the question in the way he/she sees fit;

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[1] GRIFFIN, (A.) and HAUSER (J.R.): «The Voice of the Customer», in Marketing Science, N°1, 1993, pp. 1–27.

[2] KOTLER, (P), KELLER (K) et MANCEAU (D) : Marketing management, op.cit, p.123.

[3] OUACHRINE, (H) and CHABANI (S) : Guide de méthodologie de la recherche en science sociales, Taleb impression, 2éme édition, Alger, 2013, p.18.

- **closed questions:** The respondent has a limited choice of possible answers, which are pre-established. There are three types of closed questions:
  - **dichotomous closed questions:** The respondent is offered two possible answers, and he/she can choose only one;
  - **multiple-choice questions with a single answer**: The person being questioned is offered several possible answers, and he/she can choose only one;
  - **multiple-choice questions with a multiple answer**: The person being questioned is offered several possible answers, and he/she can choose several answers.
- **The attitude scales**: They aim to measure the respondent's opinions or intentions and to evaluate their intensity. The most commonly used are the following:
  - **likert scale**: Allows the respondent to expresses his/her degree of agreement by choosing one of the five options, which are on general: Strongly disagree, disagree, neutral, agree, totally agree;
  - **the semantic differential**: Also called Osgood's scale, it allows the respondent to situate his/her opinion between two poles of opposite adjectives, separated by a certain number of levels;
  - **purchase intention scale**: It is used to measure the respondent purchase intention, its usually formulation consists of offering, the person being questioned, the following five options: Definitely not, probably not, maybe, probably, definitely.
- **Ranking and rating scales**: They are used to evaluate the respondent's preferences and opinions. There are two types:
  - **the preference scale**: It allows the respondent to rank his/her preferences among different possibilities;
  - **scoring scales**: It allows the respondent to give a score to each of the proposed choices. The score depends on the length of the scale.

For our study, we decided to use the Likert scale to obtain more precise responses. This type enabled us to collect detailed quantitative data on respondents' opinions, offering a deeper understanding for the subject under study.

1.4. The Sampling:

Aktouf defined it as: "*selecting, according to pre-established criteria, a certain number of individuals from a defined group, in order to carry out measurements or observations on them that will allow the results to be generalized to the entire original group*"[1]

Following this definition, the sampling involves selecting a small group of individuals from the target population to question them about the subject under study. These individuals must be representative of the targeted population, in order to generalize the obtained results on it.

There are different sampling methods that can be used to conduct a questionnaire, and they are devised into two categories: random methods also called probabilistic, and non-random methods also named non-probabilistic.[2]

- **Probabilistic methods**: They give each individual from the target population a chance to be selected as member of the sample that will be questioned. Among these methods are the following:
  - **simple sampling**: A random technique where all individuals from the target population have an equal chance of being selected as a member of the sample that will be questioned;
  - **systematic sampling**: The sample members are selected based on a numbered list, where each number represents an individual from the target population. The first number that represents the first member of the sample is chosen at random, and the following numbers that represent the rest of the sample members are determined by adding a constant interval, called the "sampling step";
  - **stratified sampling:** The target population is divided into homogenous subgroups (strata) based on specific characteristics that they share. Once divided, only few individuals from each stratum are selected randomly. The selected individuals are then gathered to form the sample that will be questioned;

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[1] AKTOUF, (O) **:** *Méthodologie des sciences sociales et approche qualitative des organisations*, Les Presses de l'Université du Québec, Montréal, 1987, p.73.
[2] LOUISE, (P) : *Méthodes quantitatives pour les sciences humaines*, Loze-Dion édition, Québec, 2009, p.18.

- **cluster sampling**: The target population is divided into subgroups (clusters) based on specific criteria. Then, few whole clusters are selected randomly, and all the individuals in the selected clusters are included in the sample that will be questioned.

- **Non-Probabilistic methods:** They don't give each individual from the target population an equal chance to be selected as member of the sample that will be questioned. These methods include:
  - **purposive sampling**: Also called judgmental or selective sampling. The individuals who will form the sample to be questioned are selected from the target population based on specific criteria relevant to the research topic. This method aims to select the individuals who are considered to have the most insights to the subject under study;
  - **blind sampling**: Individuals who will form the sample to be questioned are selected from the target population based on their accessibility, and not on specific criteria. This method doesn't ensure the representativeness of the population;
  - **voluntary sampling**: Individuals from the target population volunteer to be members of the sample that will be questioned. A volunteers' call is made via various public platforms, and often with rewards to attract participants.

For our study, we opted for the purposive sampling, because we aim to collect information from specific number of WAFA employees who have direct involvement in our research, and who can provide us with detailed information. Using this method, we focused on a small but highly relevant group of 15 employees, ensuring that we gather useful data instead of unrelated one.

1.5. The Questionnaire structure:

Generally, a questionnaire is structured into three main parts: the introduction, the core questions and a closing part.

Based on this approach, our questionnaire consists of 24 questions and it is divided as follows:

- **The introduction:** In which we introduced ourselves to the respondents, and presented our research topic.

- **The questionnaire body:** Consists of 20 questions which are related to the study variables, and it is divided into three sections:
    - Customer integration
    - Aesthetic quality
    - Performance quality
- **Conclusion:** Consists of 4 socio-demographic questions (gender, current position, years of experience, age) that enabled us to profile the participants.

We used simple and clear wording so it can be easily understood by our sample. The questions are written in English and French and a note of "Thank you for your time "was added at the end of the questionnaire.

1.6. Construction of items

Our questionnaire consists mainly of items measuring our three variables: Customer integration, Aesthetic quality, and Performance quality.

The items were extracted from the literature review and modified to suit the purpose of our study. The table below represents the 20 items included in our questionnaire body.

Table N°05:List of corrected and adapted questionnaire items

Items	**Athor**	**items corrected and adapted**	**Items in French**
Customer integration			
We frequently are in close contact with our customers.	**Juan A and al., 2013**	WAFA is frequently in close contact with its customers.	WAFA est souvent en contact étroit avec ses consommateurs.
Our customers are actively involved in our NPD phase.		WAFA customers provide input throughout all the New Product Development stages (from idea to testing).	Les consommateurs de WAFA apportent leur contribution à toutes les étapes du développement d'un nouveau produit (de l'idée à l'essai).

Customers help with the design and the prototypes tests	**Kjell E Gruner and Christian Homburg 2000**	Wafa Customers help with the design and the prototypes tests	Les consommateurs de Wafa aident à la conception et aux tests des prototypes
You involved customers as co-creators, not just as data sources.		Wafa involve its customers as co-creators, not just as data sources.	Wafa implique ses consommateurs en tant que co-créateurs, et pas seulement en tant que sources de données.
We always strive to improve communication methods with customers.	**Labidi Fatima 2019**	WAFA always strives to improve communication with customers through focus Groupe	WAFA s'efforce toujours d'améliorer la communication avec ses consommateurs en mettant l'accent sur focus Groupe
		WAFA always strives to improve communication with customers through individual interviews	WAFA s'efforce toujours d'améliorer la communication avec ses consommateurs par le biais d'entretiens individuels.
		WAFA always strives to improve communication with customers through field observation.	WAFA s'efforce toujours d'améliorer la communication avec ses consommateurs par le biais d'observations sur le terrain.
		WAFA always strives to improve communication	La WAFA s'efforce toujours d'améliorer

		with customers through complaint analysis	la communication avec ses consommateurs en analysant les plaintes.
We continuously interact with our customers to improve performance and aesthetic quality.		WAFA interacted with its customers to improve performance and aesthetic quality of its new product “President Collection”	WAFA a interagi avec ses consommateurs pour améliorer les performances et la qualité esthétique de son nouveau produit « Président Collection »
Aesthetic quality			
The product stands out in the market due to its visual appeal.	**Erdinç Koç and Al.,2018**	WAFA new product “President Collection” will stand out in the market due to its visual appeal.	Le nouveau produit de WAFA, « Président Collection », se distinguera sur le marché par son attrait visuel.
The design aligns with our brand image and customer expectations.		WAFA new product “President Collection” aligned with customer expectations during the test stage.	Le nouveau produit de WAFA, « Président Collection », s'est aligné sur les attentes des clients pendant la phase de test.
Aesthetic aspects were validated during customer		“President Collection” aesthetic aspects were validated through customers testing.	Les aspects esthétiques de la « Président collection » ont été validés par

testing or design reviews.			des tests auprès des consommateurs.
Your products are differentiated from competitors because of their innovative design.	**S.R. Hosseini Baharanchi, 2009**	"President Collection" is differentiated from competitors because of its innovative design.	La « Président Collection » se distingue de ses concurrents par son design innovant.
Customers give positive feedback on the product's design or appearance	**Antonio K, 2010**	WAFA customers gave positive feedback on "President Collection" design or appearance after the test stage.	Les consommateurs de WAFA ont réagi positivement à la conception ou à l'apparence de la « Président Collection » après la phase de test.
The company produces various forms of the products to suits customers' needs	**ABDESSEL -AMYENE M, 2023**	"President Collection" form suited customers' needs during the test stage.	La forme « Président Collection » a répondu aux besoins des consommateurs pendant la phase de test.
Performance quality			
The product meets or exceeds technical performance standards.	**S.R. Hosseini Baharanchi, 2009**	"President Collection" meets or exceeds the intrinsic characteristics defined during the development phase.	La « Président Collection » satisfait ou dépasse les caractéristiques intrinsèques définies

			au cours de la phase de développement.
We track customer satisfaction scores related to product functionality.		Wafa tracks customer satisfaction scores related to product functionality during the testing stage.	Wafa suit les scores de satisfaction des consommateurs liés à la fonctionnalité du produit au cours de la phase de test.
We receive low rates of product returns or complaints.		Wafa receives low rates of returns or complaints during the testing stage.	WAFA reçoit peu de retours ou de plaintes au cours de la phase de test.
Internal quality control tests confirm the product performs as intended.		WAFA tests are effective to confirm that the product performs as intended.	Les tests réalisés par WAFA sont efficaces pour confirmer que le produit fonctionne comme prévu.
Customers are very satisfied with the product performance	**Saeed Najafi-Tavani and al., 2022**	WAFA customers were satisfied with "President Collection" performance after the test stage	Les consommateurs de WAFA ont été satisfaits de la performance du « Président Collection » après la phase de test.

Source: Author's own work.

1.7. The questionnaire test

Before officially administrating the questionnaire, we tested it first with few members of the sample, in order to:

- ensure that the questions are understood by the respondents;
- check the clarity and the simplicity of the used terms;
- ensure that the questions are relevant to the research topic;
- check the harmony logical order of the questions;
- identify issues with the design of the questionnaire.

The questionnaire testing was conducted by measuring Cronbach's alpha for each construct using IBM SPSS 27 statistical software. Table N°04 shows that the indicator is acceptable across all measurement scales, confirming their reliability. Therefore, the survey will be used as it is.

Table N°06:Reliability test (Cronbach's alpha) of the variables

Variables	Item's number	Cronbach's alpha
Customer integration	9	0,892
Performance quality	6	0,901
Aesthetic quality	5	0,854

Source: Author's own work using SPSS 27 software.

CONCLUSION

This chapter laid the essential groundwork for our research by presenting a comprehensive overview of previous studies, the host organization, and the methodological framework employed. First, the literature review highlighted the critical role of customer integration in the new product development (NPD) process, especially regarding its influence on both aesthetic and performance quality. These previous studies served as a solid theoretical foundation, guiding the development of our hypotheses and the design of our data collection instrument.

Second, we presented SARL WAFA FAILE, the host organization, whose strategy aligns with the objectives of our research. The detailed overview of its structure, operations, and product offerings confirmed its relevance as a practical context for examining customer integration during NPD.

Finally, we outlined the methodology adopted to conduct the research. A quantitative approach was chosen to gather measurable data, using a structured questionnaire based on established literature. We also explained the rationale for the sampling technique, the structure and testing of the questionnaire, and the reliability of the measurement scales.

The insights and methodological tools detailed in this chapter pave the way for the next chapter, where we will analyze the data collected and interpret the results in relation to our research questions and hypotheses.

Chapter four: Investigating the Relationship Between Customer Integration and Product Quality in the NPD Phase at SARL WAFA FAIL.

INTRODUCTION

This chapter presents the results of the empirical study conducted to examine the impact of customer integration on aesthetic and performance quality during the new product development (NPD) phase. Using SARL WAFA's "President Collection" as a case study, the data collected through a structured questionnaire were analyzed with SPSS version 27. The chapter begins with descriptive statistics to profile the respondents and understand general trends, followed by correlation and regression analyses to test the research hypotheses and determine the strength and direction of relationships between variables. This data-driven approach provides insights into how customer integration affects product quality and supports decision-making for product development strategies.

Section 01: Presentation and discussion of results

The ultimate goal of this research is to examine the impact of customer integration on aesthetic and performance quality of SARL WAFA new product "President Collection" during its development phase.

In this chapter, we will present the data analysis preformed using SPSS version 27, a software package that provides a variety of statistical tools necessary to determine the dependability of the data for testing the hypotheses and answering the research question. The data gathered through the survey will be analyzed using:

1. **Descriptive statistics:** Conducted to describe the demographic structure of the sample and to assess the distribution and consistency of responses;
2. **Pearson correlation analysis:** Preformed to examine the strength and direction of the relationship between the independent variable and each of the dependent variables;
3. **Linear regression analysis:** Used to test the hypothesis

Before starting the analysis, it is important to clarify that the items used in SPSS were coded. Therefore, each item will be displayed along with its corresponding code in table N°07:

Table N°07:Codes used for items on SPSS 27

Item	Code
WAFA is frequently in close contact with its customers.	CI_1
WAFA customers provide input throughout all the New Product Development stages (from idea to testing).	CI_2
Wafa Customers help with the design and the prototypes tests	CI_3
Wafa involves its customers as co-creators, not just as data sources.	CI_4
WAFA always strives to improve communication with customers through focus Groupe	CI_5
WAFA always strives to improve communication with customers through individual interviews	CI_6
WAFA always strives to improve communication with customers through field observation.	CI_7
WAFA always strives to improve communication with customers through complaint analysis	CI_8

WAFA interacted with its customers to improve performance and aesthetic quality of its new product "President Collection"	CI_9
WAFA new product "President Collection" will stand out in the market due to its visual appeal.	AQ_1
WAFA new product "President Collection" aligned with customers' expectations during the test stage.	AQ_2
"President Collection" aesthetic aspects were validated through customers testing.	AQ_3
"President Collection" is differentiated from competitors because of its innovative design.	AQ_4
WAFA customers gave positive feedback on "President Collection" design or appearance after test stage	AQ_5
"President Collection" form suited customers' needs during the test stage.	AQ_6
"President Collection" meets or exceeds the intrinsic characteristics defined during the development phase.	PQ_1
Wafa tracks customer satisfaction scores related to product functionality during the testing stage.	PQ_2
Wafa receives low rates of returns or complaints during the testing stage.	PQ_3
WAFA tests are effective to confirm that the product performs as intended.	PQ_4
WAFA customers were satisfied with "President Collection" performance after the test stage.	PQ_5

Source: Author's own work.

1. Descriptive statistics

1.1. Respondents' socio-demographic Description

A frequency test was used to provide an overview of the participants characteristics in terms of gender, current position, years of experience and age.

Table N°08:Gender of Respondents

Gendre	**Frequency**	**Percent**
Female	6	40
Male	9	60
Total	**15**	**100**

Source: Author's own work using SPSS 27 software.

Table N°08 shows that most of the respondents are males, representing 60% of the sample, while females represent the remaining 40%.

Table N°09:Job position of Respondents

Position	Frequency	Percent
Commercial	3	19.8
Community manager	1	6.7
Logistics coordinator	1	6.7
Logistics manager	1	6.7
Manager quality	1	6.7
Marketing manager	2	13.3
Product development engineer	1	6.7
R/D specialist	1	6.7
Sales analyses	1	6.7
Sales manager	2	13.3
Trade marketing	1	6.7
Total	**15**	**100**

Source: Author's own work using SPSS 27 software.

Table N°09 illustrates that participants from different job position, which are related to the study, had answered the survey. The most common ones are commercial (19,8%), marketing manager (13.3%), and sales marketing (13.3%). Each of the remaining positions represents 6.7% of the sample.

Table N°10:Work experience of Respondents

Experience	Frequency	Percent
less than 1 year	4	26,7
1 to 3 years	6	40
4 to 6 years	3	20
More than 6 years	2	13.3
Total	**15**	**100**

Source: Author's own work using SPSS 27 software.

Table N°10 indicates that the majority of respondents (40%) have between 1 and 3 years of experience within SARL WAFA, while a small proportion of respondents (13,3%) have more than 6 years of work experience within the company.

Table N°11:Age of Respondents

Age	Frequency	Percent
Between 20-25	3	20
Between 26-30	5	33.3
Between 31-45	7	46.7
Total	**15**	**100**

Source: Author's own work using SPSS 27 software.

Table N°11 reveals that 20% of the participants are between 20 and 25 years old, 33.3% are between 26 and 30, and 46.7% are between 31 and 45 years old.

1.2. Study variables analysis

To describe the independent variable and the dependent variables, a measure of central tendency (mean), dispersion (standard deviation), Rank, t-value was conducted. This analysis provided insights to the responses' patterns.

1.2.1. Independent Variable Analysis

To examine whether customer integration in the NPD phase is applied at SARL WAFA, we used: the mean, standard deviation, ranking and t-value of the Independent Variable (CI).

Table N°12: Mean, Standard Deviation, and t-value of the Customer Integration.

Variable	Mean	Std.Deviation	t-value
Customer integration	3.97	0.529	7.109

Source: Author's own work using SPSS 27 software.

The table N°12 indicates that the mean value of customer integration is 3.97 with standard deviations of 0.529. This indicates that respondents agree that the company applies customer integration during the development phase.

Also, there is an agreement among the employees about the importance of customer integration in the development phase, since ($t = 7.109 > 2.14$).

Table N°13:Mean, Standard Deviation, t-value and ranking of Customer Integration Items.

Items	Mean	Std.Deviation	t-value	Rank
CI_1	4.40	0.632	8.573	2
CI_2	3.53	0.743	2.779	8
CI_3	3.67	1.175	2.197	7
CI_4	3.93	0.594	6.089	6
CI_5	4.27	0.844	5.551	4
CI_6	3.20	1.014	0.764	9
CI_7	4.47	0.915	6.205	1
CI_8	4.33	0.724	7.135	3
CI_9	3.93	1.033	3.5	5
Customer integration	3.97	0.529	7.109	

Source: Author's own work using SPSS 27 software.

Table N°13 shows that the mean values for customer integration items range from 3.20 to 4.47, reflecting respondents' agreement on the effective implementation of customer integration within the company. The corresponding standard deviations range from 0.6 to 1.1, reflecting a moderate degree of variability in responses.

Additionally, respondents agree that customer integration is important in the NPD phase, since ($t > 2.145$).

1.2.2. Dependent Variables Analysis

To examine whether the achieved aesthetic and performance quality of "President Collection", defined during the development phase through customer integration input, are pleasing, we used: the mean, standard deviation, ranking and t-value of the Dependent Variables (AQ and PQ).

Table N°14:Mean, Standard Deviation, t-value and ranking of Dependent Variables

Variable	Mean	Std.Deviation	t-value	Rank
Aesthetic Quality	3.97	0.588	6.365	1
Performance Quality	3.91	0.575	6.107	2
Quality	3.94	0.543	6.680	

Source: Author's own work using SPSS 27 software.

Table N°14 shows that the mean of "President Collection" aesthetic quality is 3.97, and the mean of "President Collection" performance quality is 3.91. These values indicate that respondents agree that "President Collection" is aesthetically and performantly pleasing.

Additionally, the SD of "President Collection" aesthetic quality is 0.588, and the SD of "President Collection" performance quality is 0.575, indicating that the answers participants gave are not very different from each other.

Additionally, participants agree that these two quality dimensions of "President Collection" are important for the company, since ($t > 2.145$).

Following the statistical findings, aesthetic quality is ranked the first before performance quality, which suggests that the participants valued the look of "President Collection" more than its technical performance.

Table N°15:Mean, Standard Deviation, t-value and ranking of Aesthetic Quality

Items	Mean	Std.Deviation	t-value	Rank
AQ_1	4.27	0.594	8.264	2
AQ_2	3.80	0.775	4.000	5
AQ_3	3.60	1.056	2.201	6
AQ_4	4.70	0.799	5.172	1
AQ_5	4.00	0.926	4.183	4
AQ_6	4.07	0.961	4.298	3
Aesthetic Quality	3.97	0.588	6.365	

Source: Author's own work using SPSS 27 software.

Table N°15 illustrates that the mean values for aesthetic quality are between 3.60 and 4.70. this suggests that participants agree that "President Collection" is aesthetically satisfying. The

corresponding standard deviations are between 1 and 0.5, indicating that respondents generally have the same opinion on these items.

Additionally, participants agree that the company pays great attention to aesthetic quality, since (t > 2.145).

Table N°16:Mean, Standard Deviation, t-value and ranking of Performance Quality

Items	**Mean**	**Std.Deviation**	**t-value**	**Rank**
PQ_1	4.00	0.655	5.916	3
PQ_2	3.67	0.976	2.646	4
PQ_3	3.53	0.743	2.779	5
PQ_4	4.13	0.834	5.264	2
PQ_5	4.20	0.676	6.874	1
Performance Quality	3.94	0.545	6.680	

Source: Author's own work using SPSS 27 software.

Table N°16 presents the responses provided by the participants regarding "President Collection" performance quality. The mean values range between 4.13 and 3.53, reflecting respondents' agreement that "President Collection" is performantly satisfying. The standard deviations are between 0.834 and 0.545, reflecting moderate variated responses.

Additionally, respondents agree that performance quality is important for the company, since (t>2.145).

2. Pearson Correlation Analysis

To determine whether there is a relationship between the Independent Variable and Dependent Variables, we used Pearson Correlation.

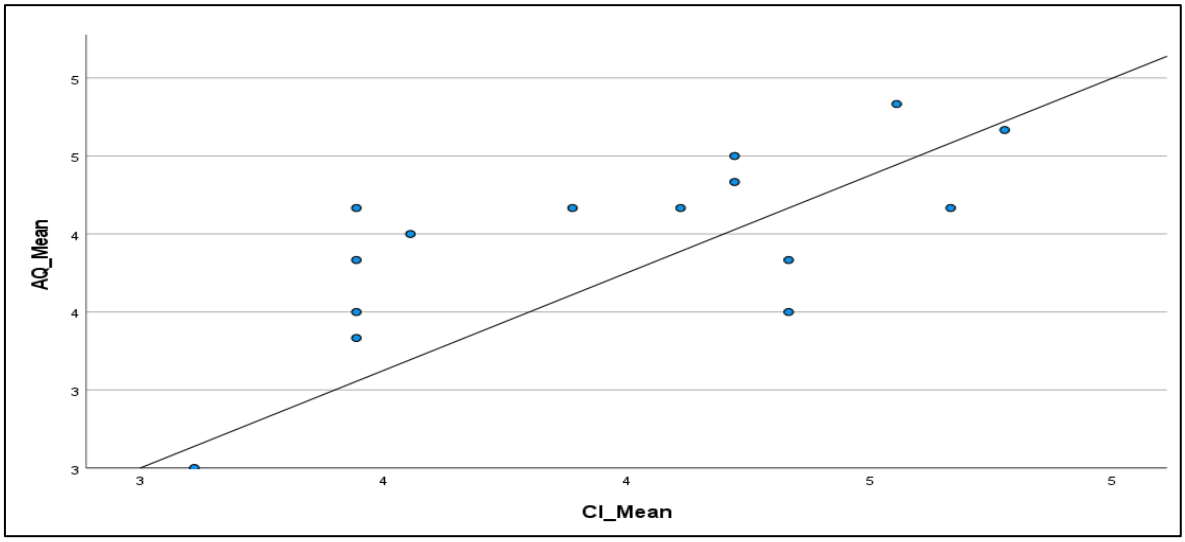
To be able to apply Pearson's Correlation analysis, the following conditions must be verified: the independent and the Dependent Variables are scale Variables, linearity, normality, no strong outliners.

2.1. Verifying that the Independent and the Dependent variables are scale variables.

The items measuring our variables (customer integration, aesthetic quality, performance quality) are based on a Likert-type scale, where respondents rate their level of agreement with statements regarding the impact of customer integration in the new product development process on aesthetic and performance quality of "President Collection". Although Likert scales are technically ordinal, they are widely treated as scale variables in social sciences when multiple items are aggregated. The scale has equal intervals between values, allowing for the calculation of means and other parametric statistics, satisfying the requirement for Pearson correlation analysis.

2.2. Verifying linearity

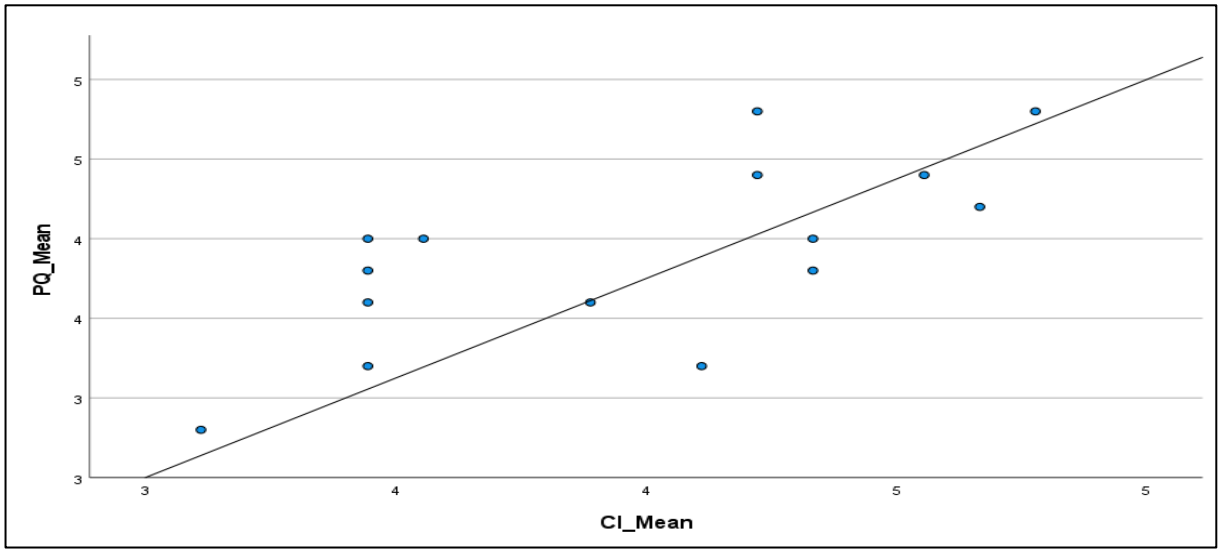
Figure N°11:Scatter Plot of aesthetic quality by Customer integration



Source: SPSS 27 output**.**

Figure N°11 shows that the data points aligned along an upward linear path. This indicates a linear relationship between customer integration in the NPD phase and aesthetic quality of "President Collection", satisfying the linearity condition required for Pearson correlation.

Figure N°12:Scatter Plot of performance quality by Customer integration



Source: SPSS 27 output**.**

Figure N°12 illustrates that the data points aligned along an upward linear path. This indicates a linear relationship between customer integration in the NPD phase and performance quality of "President Collection", satisfying the linearity condition required for Pearson correlation.

2.3. Testing normality

To determine whether the data follows a normal distribution, we used Shapiro-Wilk and Kolmogorov-Smirnov tests.

Table N°17:Testes of Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Customer integration	,184	15	,185	,923	15	,212
Aesthetic quality	,166	15	,200*	,937	15	,342
Performance quality	,102	15	,200*	,967	15	,816

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction.

Source: SPSS 27 output**.**

Table N°17 shows that the p-values is greater than 0.05 for all three variables and in both testes (Shapiro-Wilk and Kolmogorov-Smirnov), which means that the condition of normality is met.

2.4. Verifying no strong outliers

Table N°18:Z-scores for the Independent and Dependent variables

Z-scores	Z_CI	Z_AQ	Z_PQ
1	1.52727	1.18998	1.55353
2	0.68657	-0.79332	-0.18550
3	-0.99483	-1.07665	-1.22891
4	0.68657	-0.22666	0.16231
5	-0.99483	-0.79332	0.16231
6	0.47640	0.90665	0.85792
7	-1.62535	-2.49329	-1.92452
8	-.78465	0.05667	0.16231
9	-0.99483	0.33999	-0.53330
10	-0.99483	-0.22666	-0.18550
11	-.015413	0.33999	-0.53330
12	0.26622	0.33999	-1.22891
13	1.10692	1.47331	0.85792
14	1.31709	0.33999	0.51011
15	0.47640	0.62332	1.55353

Source: Author's own work using SPSS 27 software.

Table N°18 illustrates that the Z-scores of customer integration in the NPD phase, aesthetic quality and performance quality of "President Collection" ranges between 1.55353 and -2.49329. This indicates that all the variables reveal no strong outliers, satisfying the requirement for Pearson correlation analysis.

Given that all the conditions are satisfied, Pearson Correlation can be applied.

Table N°19:Bivariate Pearson's Correlation (r) Among Independent Variables, Dependent variables, and between Independent and Dependent Variables.

		Customer integration	Aesthetic quality	Performance quality
Customer integration	Pearson Correlation	1	,694**	,690**
	Sig. (2-tailed)		,004	,004
	N	15	15	15
Aesthetic quality	Pearson Correlation	,694**	1	,743**
	Sig. (2-tailed)	,004		,001
	N	15	15	15
Performance quality	Pearson Correlation	,690**	,743**	1
	Sig. (2-tailed)	,004	,001	
	N	15	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS 27 output**.**

The table N°19 shows a significant positive correlation between customer integration in the new product development phase and the aesthetic quality of "President Collection" since ($r=0.694$ and $p < 0.01$), indicating that greater customer integration in the NPD phase is strongly associated with the pleasing aesthetic quality achieved in "president collection".

The analysis also reveals a significant positive correlation between customer integration in the NPD phase and performance quality of "President Collection", since ($r=0.690$, $p < 0.01$), suggesting that a greater customer integration in the NPD phase is strongly associated with improve performance quality of "President Collection".

In addition, the results indicate a significant positive relationship between the dependent variables, as evidenced by Pearson correlation coefficient $r = 0.743$, with a significance level of $p<0.01$. In other words, aesthetic and performance quality of "President Collection" are strongly associated with each other.

3. Linear Regression Analysis

To answer the research question: what is the impact of customer integration on aesthetic and performance quality in the new product development phase? Two hypotheses were formulated:

H1: customer integration in the new product development phase has an impact on aesthetic quality.

H2: customer integration in the new product development phase has an impact on performance quality.

To test these hypotheses, linear regression is used.

3.1. Testing hypothesis 01

A first linear regression analysis is conducted to examine the effect of customer integration on the aesthetic quality of "President Collection", in the NPD phase. In other words, to examine weather changes in customer integration during the NPD phase are strongly associated with changes in the aesthetic quality of "President Collection". Therefor the following hypotheses are proposed:

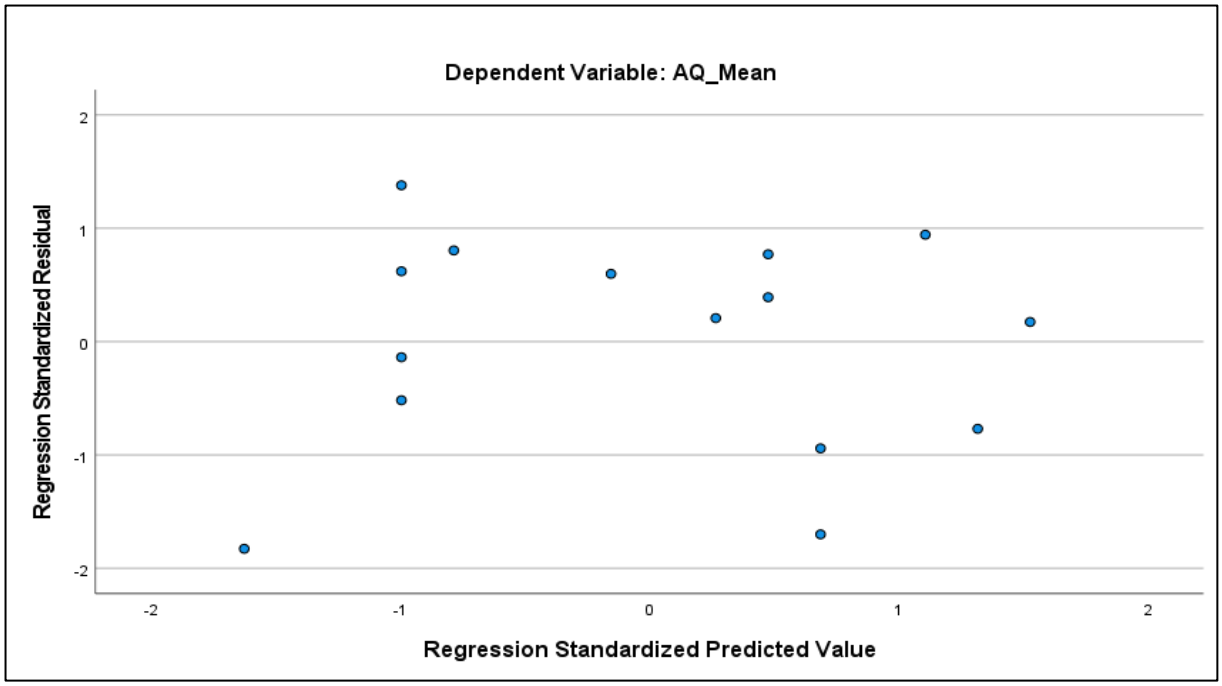
$H0_1$: customer integration in the new product development phase has no impact on aesthetic quality.

$H1_1$: customer integration in the new product development phase has an impact on aesthetic quality.

To be able to use the linear regression, the following assumptions should be fulfilled: linearity, Normality of Residuals, Homoscedasticity, Independence of Errors.

3.1.1. Testing linearity

Figure N°13: Scatterplot of standardized residual vs standardized predicted value

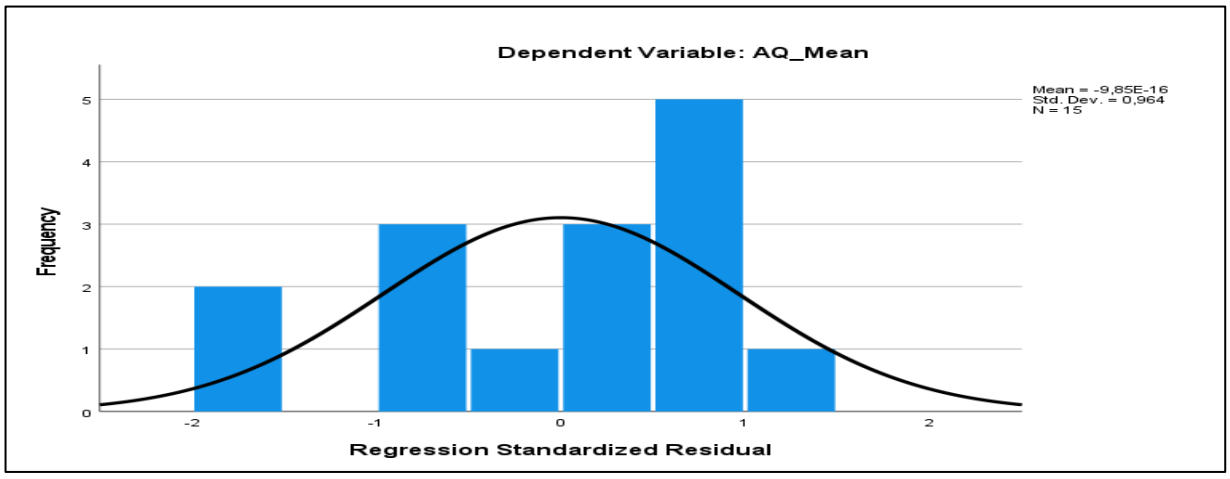


Source: SPSS 27 output**.**

Figure N°13 shows a random spread of points with no clear pattern, indicating that the assumption of linearity is met. In other words, the relationship between customer integration in the NPD phase and the aesthetic quality of "President Collection" is linear.

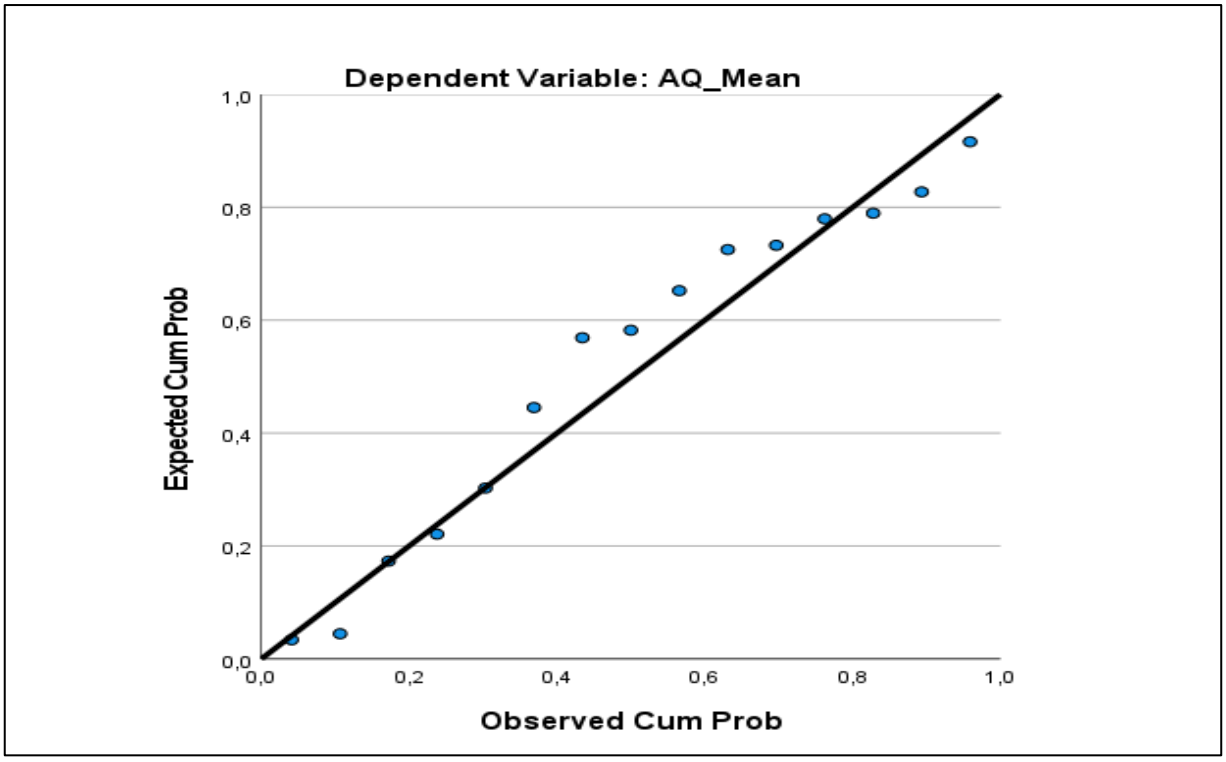
3.1.2. Testing normality of Residual

Figure N°14:Histogram of standardized residuals



Source: SPSS 27 output**.**

Figure N°15:Normal p-p plot of standardized residuals

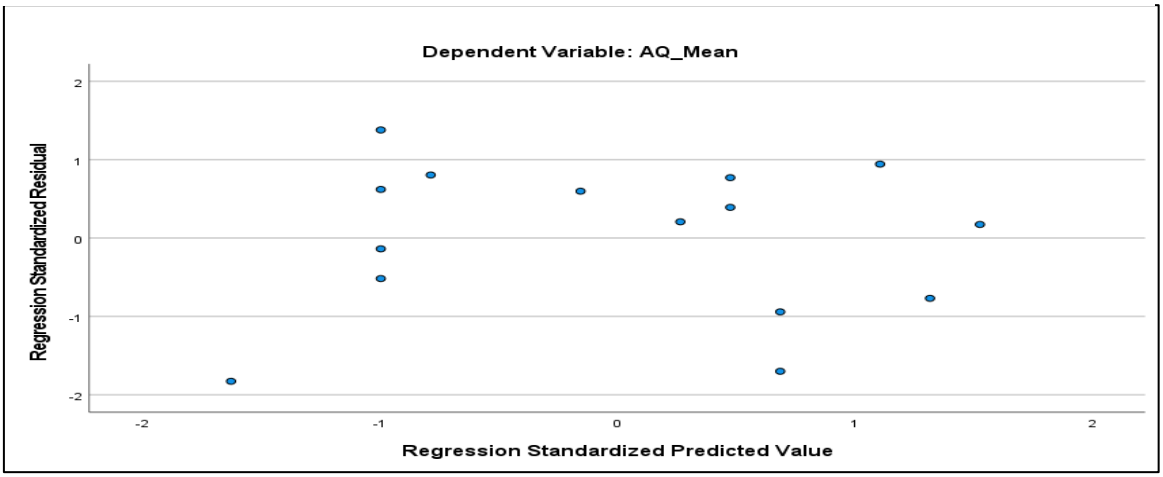


Source: SPSS 27 output**.**

Figure N°14 presents a bell-shaped histogram, while **figure N°15** shows that the points closely follow the diagonal line. These two figures indicate that the assumption of normality of residuals is satisfied. In other words, the residuals are normally distributed, ensuring the reliability of the significance tests.

3.1.3. Testing homoscedasticity

Figure N°16:Scatterplot of standardized residual vs standardized predicted



Source: SPSS 27 output**.**

Figure N°16 reveals a random spread of dots with no specific pattern, which validates the assumption of homoscedasticity. In other words, the residuals have constant variance across all levels of the predicted values.

3.1.4. Testing independence of Errors

Table N°20:Modal summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,694[a]	,482	,442	,439	2,010

a. Predictors: (Constant), CI_Mean

b. Dependent Variable: AQ_Mean

Source: SPSS 27 output**.**

Table N°20 indicates that the Durbin-Watson statistic is 2.010, this value falls within the acceptable range (between 1.5 and 2.5), conforming that the assumption of independence of Errors is met. In other words, the residuals are not correlated with each other.

Since all the assumptions are met, linear regression results are considered valid and trustworthy, and their interpretation can proceed.

3.1.5. Interpreting the model summary table

Table N°21:Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,694[a]	,482	,442	,439	2,010

a. Predictors: (Constant), CI_Mean

b. Dependent Variable: AQ_Mean

Source: SPSS 27 output**.**

Table N°21 reveals that the regression model fits well since ($R^2 = 0.482$), and indicates that customer integration in the NPD phase explains 48.2% of the variance in “President Collection” aesthetic quality.

3.1.6. Interpreting ANOVA Table

Table N°22: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,334	1	2,334	12,090	,004[b]
	Residual	2,510	13	,193		
	Total	4,844	14			

a. Dependent Variable: AQ_Mean

b. Predictors: (Constant), CI_Mean

Source: SPSS 27 output**.**

Table N°22 illustrates that the regression model is statistically significant since (F=12.090; p = 0.004 < 0.05). This indicates that integrating customers in the NPD phase significantintrly predicts “President Collection” aesthetic quality.

3.1.7. Interpreting the coefficients Table

Table N°23: Coefficients

		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	,900	,889		1,012	,330	-1,021	2,821		
	CI_Mean	,772	,222	,694	3,477	,004	,292	1,252	1,000	1,000

a. Dependent Variable: AQ_Mean

Source: SPSS 27 output**.**

Table N°23 shows that integrating customers in the NPD phase has a significant positive impact on “President Collection” aesthetic quality since (B = 0.772; β = 0.694; p=0,004 < 0,05).

Based on all these interpretations of the first linear regression results, the null hypothesis ($H0_1$) is rejected, and the alternative hypothesis ($H1_1$) is accepted. This implies that customer

integration has a significant impact on "President Collection" aesthetic quality, in the NPD phase.

3.2. Testing hypothesis 02

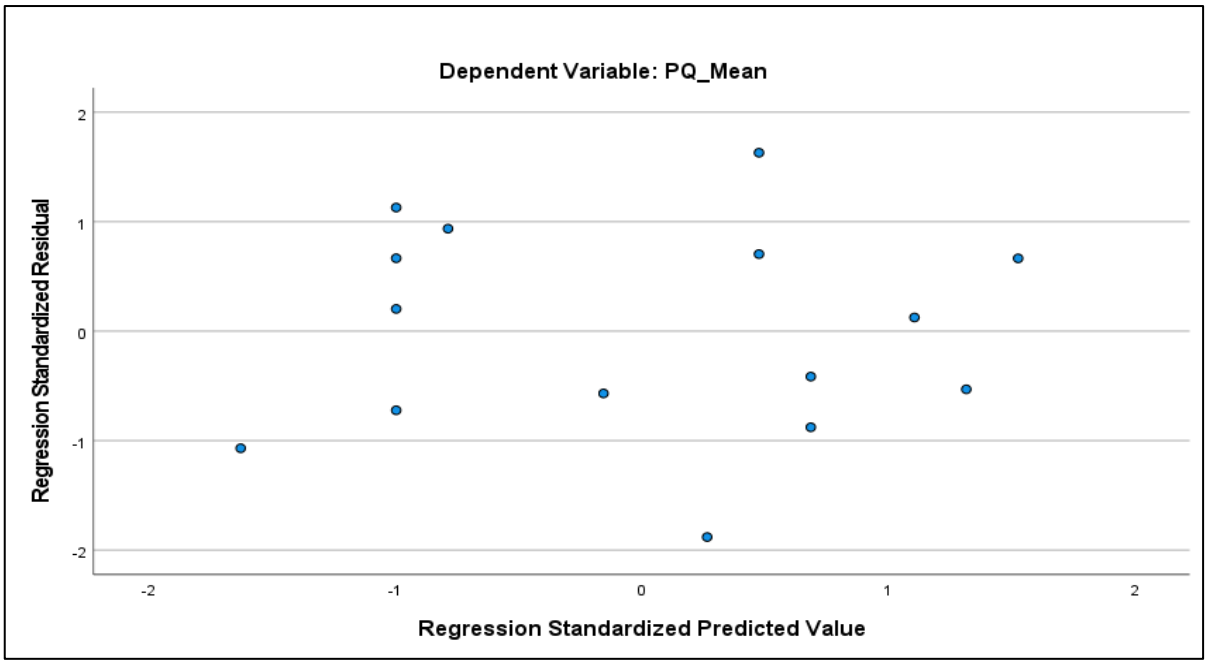
A second linear regression analysis is conducted to examine the effect of customer integration on the performance quality of "President Collection", in the new product development phase. In other words, to examine weather changes in customer integration during the NPD phase are strongly associated with changes in the performance quality of "President Collection". Therefor the following hypotheses are proposed:

$H0_2$: customer integration in the new product development phase has no impact on performance quality.
$H1_2$: customer integration in the new product development phase has an impact on performance quality.

To be able to use the linear regression, the following assumptions must first be fulfilled: linearity, Normality of Residuals, Homoscedasticity, Independence of Errors.

3.2.1. Testing linearity

Figure N°17:Scatterplot of standardized residual vs standardized predicted

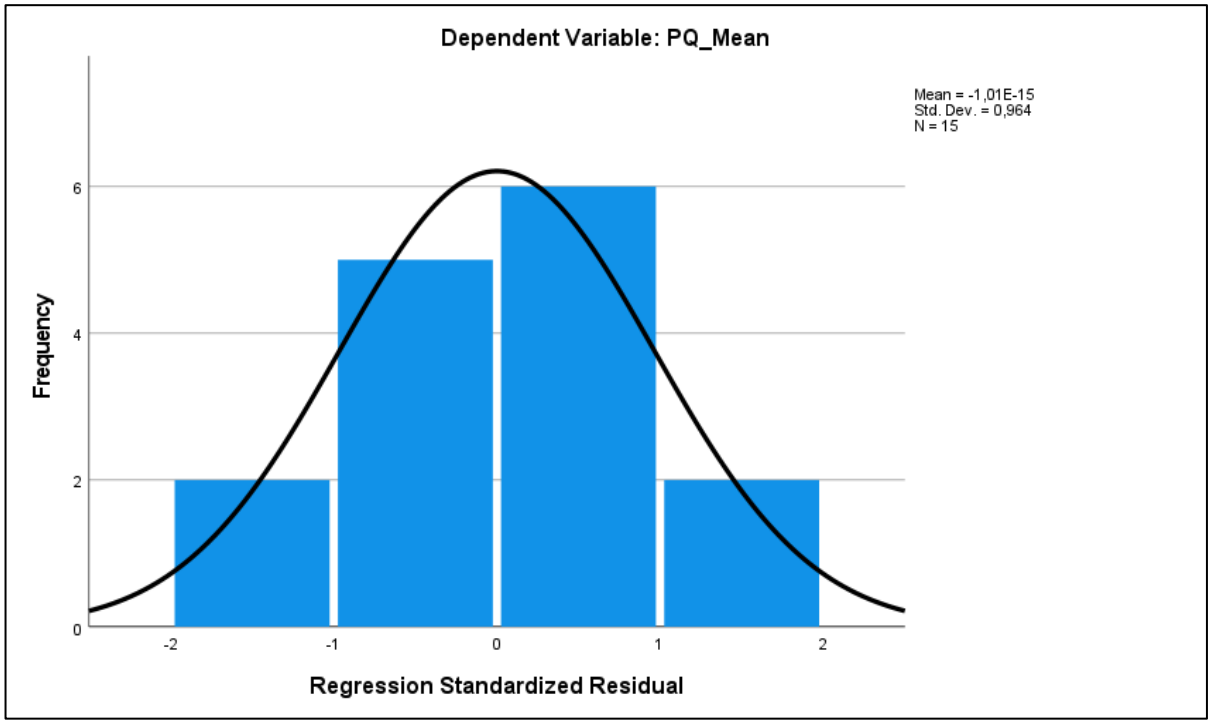


Source: SPSS 27 output.

Figure N°17 shows a random spread of points with no clear pattern, indicating that the assumption of linearity is met. In other words, the relationship between customer integration in the NPD phase and the performance quality of "President Collection" performance is linear.

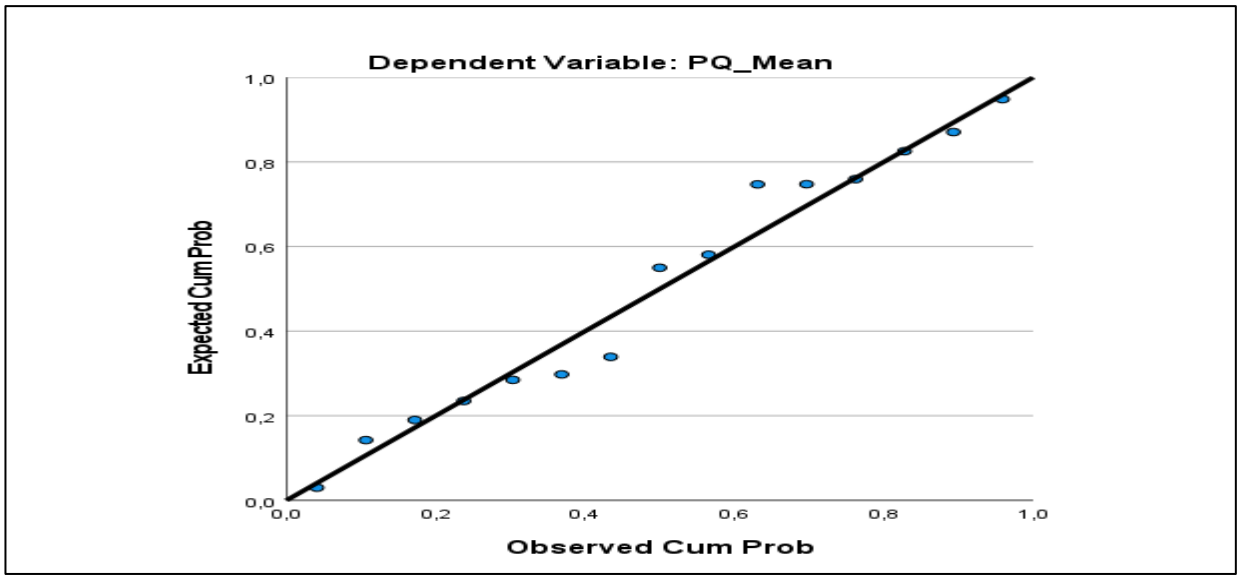
3.2.2. Testing normality of Residual

Figure N°18:Histogram of standardized residuals



Source: SPSS 27 output.

Figure N°19: Normal p_p plot of standardized residuals

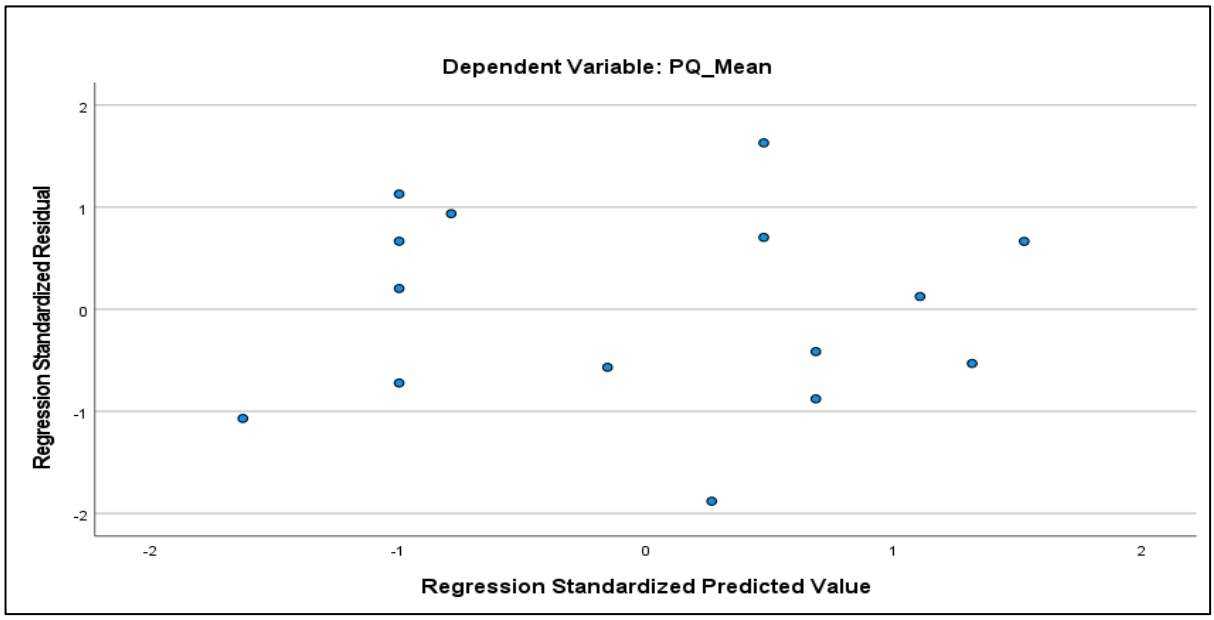


Source: SPSS 27 output.

Figure N°18 presents a bell-shaped histogram, while **figure N°19** shows that the points closely follow the diagonal line. These two figures indicate that the assumption of normality of residuals is satisfied. In other words, the residuals are normally distributed, ensuring the reliability of the significance tests.

3.2.3. Testing homoscedasticity

Figure N°20:Scatterplot of standardized residual vs standardized predicted



Source: SPSS 27 output.

Figure N°20 reveals a random spread of dots with no specific pattern, which validates the assumption of homoscedasticity. In other words, the residuals have constant variance across all levels of the predicted values.

3.2.4. Testing independence of Errors

Table N°24: Modal summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,690[a]	,476	,436	,432	1,950

a. Predictors: (Constant), CI_Mean

b. Dependent Variable: PQ_Mean

Source: SPSS 27 output.

Table N°24 indicates that the Durbin-Watson statistic is 1,950, this value falls within the acceptable range (between 1.5 and 2.5), conforming that the assumption of independence of Errors is met. In other words, the residuals are not correlated with each other.

Since all the assumptions are met, linear regression results are considered valid and trustworthy, and their interpretation can proceed.

3.2.5. Interpreting the model summary table

Table 25: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,690[a]	,476	,436	,432	1,950

a. Predictors: (Constant), CI_Mean

b. Dependent Variable: PQ_Mean

Source: SPSS output**.**

Table N°25 reveals that the regression model fits well since ($R^2 = 0.476$), and indicates that customer integration in the new product development phase explains 47.6% of the variance in "President Collection" performance quality.

3.2.6. Interpreting ANOVA Table

Table N°26: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,204	1	2,204	11,809	,004[b]
	Residual	2,426	13	,187		
	Total	4,629	14			

Dependent Variable: PQ_Mean

Predictors: (Constant), CI_Mean

Source: SPSS 27 output**.**

Table N°26 illustrates that the regression model is statistically significant since ($F=11.809$; $p = 0.004 < 0.05$). This indicates that integrating customers in the NPD phase significantly predicts "President Collection" performance quality.

3.2.7. Interpreting the coefficients Table

Table 27: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	,927	,874		1,061	,308	-,961	2,816		
	CI_Mean	,750	,218	,690	3,436	,004	,279	1,222	1,000	1,000

a. Dependent Variable: PQ_Mean

Source: SPSS 27 output**.**

Table N°27 shows that integrating customers in the NPD phase has a significant positive impact on "President Collection" performance quality since ($B = 0.750$; $\beta = 0.690$; $p = 0.004 < 0.05$).

Based on all these interpretations of the second linear regression results, the null hypothesis ($H0_1$) is rejected, and the alternative hypothesis ($H1_1$) is accepted. This implies that customer integration has a significant impact on "President Collection" performance quality, in the new product development phase.

Section 02: Results synthesis

To examine whether the visual appeal and functional effectiveness of SARL WAFA'S new product, "President Collection", were influenced by customer integration during its development phase, a questionnaire of 24 Likert scale item was structured and distributed to 15 relevant employees. The collected data were then analyzed using SPSS (version 27) through descriptive statistics, Pearson correlation and linear regression.

The descriptive statistics revealed that SARL WAFA recognize the importance of integrating customers in the new product development phase and its impact on aesthetic and performance quality of the produced products. The findings also indicated that during the development process of "President Collection" the company paid great attention to these two quality dimensions especially, aesthetic quality;

Pearson correlation confirmed the existence of a significant positive relationship between customer integration in the new product development phase and "President Collection" aesthetic and performance quality. Additionally, it illustrated that there is a significant positive relationship between aesthetic and performance quality.

The linear regression validated that customer integration in the NPD phase signifyingly predicts "President Collection" aesthetic and performance quality.

These results enabled us to reject the null hypotheses and accept the alternative ones.

The practical experience gained during the internship at SARL WAFA provided relevant insights that support the research findings on customer integration in the new product development phase and its impact on the aesthetic and performance quality.

Initially, the company did not distinguish between products of varying quality levels, as all were packaged identically especially paper towel and toilet paper, this created confusion among customers, who were unable to differentiate between high and medium-quality products, leading to complaints and negative perceptions regarding quality and pricing. To address this, the company adopted focus groups and complaints analysis as major methods to integrate the targeted customers. These two methods enabled the it to gather valuable input that helped it develop an effective differentiation strategy, represented in categorizing products into two lines:

- "Extra": of high quality and slightly higher price,
- "Eco" of medium quality and more affordable price.

With this strategy the company was able to remove its costumers' confusion and further improve the quality of its products in terms of design as well as performance.

CONCLUSION

The analysis in this chapter confirms that customer integration plays a significant role in enhancing both the aesthetic and performance quality of new products. The descriptive statistics revealed a strong internal consensus on the relevance of customer involvement during the development phase of SARL WAFA's “President Collection.” The correlation and regression analyses validated the two hypotheses, showing a strong, positive, and statistically significant relationship between customer integration and both quality dimensions. These findings highlight the value of incorporating customer feedback early and continuously throughout the NPD process to ensure products meet market expectations. The results also align with practical insights gained during the internship, where methods like focus groups and complaint analysis were successfully implemented to improve product quality and differentiation.

General conclusion

Customer integration is one of the most important activities that organizations must focus on, especially in the new product development phase. In light of an unstable environment, open markets, increased competition, media development, and the growth of individual awareness, it has become imperative for organizations to understand and meet the aspirations of their customers in order to maximize the value provided to them.

This involvement goes beyond customer satisfaction, it influences various aspects of organizational performance, especially product quality. Involving customers in the development process allows firms to improve aesthetic quality by aligning with customers preferences, and enhance performance quality by addressing their functional needs.

Our study aims to explore the impact of customer integration on aesthetic and performance quality during the new product development phase of SARL WAFA "President Collection". The main objective is to answer our research question: **Does customer integration have an impact on aesthetic and performance quality in the new product development phase?**

Having observed the practices adapted by SARL WAFA, we found that the organization have the knowledge about the importance of making customers as a part of the company to gain valuable input from them that will guide it to offer innovative products that meets the required needs. Involving customers is crucial not only in idea generation but also in all the development stages. In the case of SARL WAFA, this suggests that closer collaboration with customers contributes to the creation of products that are both visually appealing and functionally effective. This integration can take place through several methods that are chosen according to the company's goals and budget, as well as the products it offers.

Throughout our study, we came to the following conclusions:

«Customer integration in the new product development phase has an impact on aesthetic quality», this hypothesis was **confirmed.** Following our analysis results, we found that customer integration at SARL WAFA during the NPD phase had a strong relationship with "President Collection" aesthetic quality, since the correlation coefficient $r = 0.694$. Furthermore, regression analyses showed that customer integration predicts "President Collection" aesthetic quality, since ($B = 0.772$; $\beta = 0.694$; $p = 0.004 < 0.05$). Additionally focus group was the main method used by the company to collect customers preferences regarding the visual appeal.

«Customer integration in the new product development phase has an impact on performance quality. » also this hypothesis was **confirmed.** following our analysis results, we found that customer integration at SARL WAFA during the NPD phase had a strong relationship with "President Collection" performance quality, since the correlation coefficient r = 0.690. Regression analyses further showed that customer integration predicts "President Collection" aesthetic quality, since (B = 0.927; β = 0.690; p = 0.004 < 0.05). The company relied on field observation as a main method to collect customers' expectations regarding the intrinsic characteristics.

These two hypotheses allowed us to answer the sub-questions and thus reach an answer to our main problematic.

While the existing studies examined the impact of customer integration on aesthetic quality alone or on performance quality alone, our research examined the impact of customer integration on both quality dimensions and specifically in the new product development phase, thereby contributing to the growing body of literature on a study that remines underexplored. Additionally, since customer integration is applicated by few Algerian companies, our research provides empirical evidence for local firms about the importance of integrating customers in the NPD phase, encouraging them to adopt this approach to further enhance the quality of their products.

Based on the literate review, the results obtained from the conducted analyses, and the major practices observed within SARL WAFA when integrating customers in the NPD process to improve the aesthetic and performance quality of its products, we propose the following suggestions to the company:

- balance between the attention given to aesthetic and performance quality to ensure continued customer satisfaction about the visual as well as the functional features of the offered products;
- employ various customer integration methods such as (idea competition, Toolkit, Security Trading of Concepts, Quality Function Deployment…etc.) to better capture customer's requirements;
- implement a training program to further enhance the interpretation skills of MRK, R&D and quality employees;
- encourage knowledge sharing between employees who have an in-depth understanding for customer integration practices and those who don't.

Every research has its limitations, and this study is limited by the fact that:

- the focus is on one company;
- the sample size of the study may affect generalizability;
- only few workers of SARL WAFA have an in-depth understanding of the topic of our research;
- the study examined a single product line within the company;
- the research explored only two quality dimensions;
- limited access to internal company data and staff availability affected the breadth of the sample.

In this regard, we therefore suggest new lines of research such as:

- investigating the impact of customer integration in the NPD on other product quality dimensions;
- investigating the impact of supplier integration in the NPD on product quality;
- investigating the impact of internal integration on product quality.

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Appendices

Appendix N°01: Literature review

Name and year	goals	problem	Hypotheses	methodology	Method	Variables	Results
-LABIDI Fatima 2023	-Identifying the quality levels in the company under study. -Highlighting the reality of supply chain management in the company under study. Understandig the nature of the relationship between supply chain management and product quality in the company under study.	-How does supply chain management contribute to enhancing product quality?	**-H1:** The products of the company under study are characterized by high levels of quality. **-H2:** Supply chain management is highly prevalent in the company under study. **-H3:** There is a positive correlation between supply chain management and product quality in the company under study. **-H4:** There are statistically significant differences in the responses of the study sample regarding the dimensions of product quality attributed to personal variables (gender, age, educational level, experience, position, department) in the company under study.	Quantitative methodology based on a survey.	Survey through a questionnaire with employees	**-For quality:** -Conformity Aesthetic appearance -Durability Serviceability -Perceived quality **-For SCM:** **-**customers Integration -suppliers Integration -Internal integration	-This study Proving that: -supply chain management is highly prevalent in the company. -There is a positive relationship between supply chain management and product quality in the company under study. -All dimensions of the independent variable influence the dependent variable, product quality. -As supply chain management increases, the level of product quality improves through the availability of strategic partnerships with suppliers, customer relationship management, and

							integration with intermediaries and distributors.
-Arawati Agus 2015	-The goal was to understand and determine measures of SCM that can enhance production performance and product quality.	-What is the impact of supply chain management (SCM) on production performance and product quality, and what is the mediating role of production performance in the relationship between SCM and product quality?	**-H1:** SCM is positively related to production performance. **-H2:** SCM is positively related to product quality. **-H3**: Product quality performance is positively related to product quality. **-H4:** Production performance mediates the linkage between SCM and product quality.	-Quantitative survey method, data from 250 manufacturing companies.	-Survey through a questionnaire with 250 companies' managers.	**-supply chain management:** -Strategic Supplier Partnership -Lean Production -Quality Information -Exchange Between Supply Chain Partners -New Technology and Innovation **-production Performance:** -Production Effectiveness -Production Efficiency **-product quality:** -Product Conformance -Product Performance -Product Reliability	-The result also provides evidence that the production performance construct partially mediates the linkage between SCM and product quality. - Among the SCM practices, 'new technology and innovation' emerges as the most important factor that enhances production performance and product quality, and it is followed by 'strategic supplier partnership', 'quality information exchange' and 'lean production. - SCM has a positive and significant effect on production performance and product quality.

							- A good implementation of SCM can produce positive outcomes such as excellent product quality, low operating costs, on-time deliveries, and reduce wastage and inventory**.** - lean production system makes worker production responsibility central to the continuous improvement of productivity and quality
-Zahra Lotfi Shahnorbanun Sahran -Muriati Mukhtar -Ali Taei Zadeh 2013	- The purpose of the study was to find out the related internal integration, customer integration and supplier integration effects on conformance quality and design quality on the manufacturing sector.	- What is the relationship between supply chain integration (internal integration, customer integration, and supplier integration) and product quality (design quality and conformance quality)?	**-H1**: Customer integration has a positive relationship with design quality. **-H2**: Internal integration has a positive relationship with design quality. **-H3**: Supplier integration has a positive relationship with design quality. **-H4**: Customer integration has a positive relationship with conformance quality. **-H5**: Internal integration has a positive relationship with conformance quality.	-secondary researches.	- The research model was brought out by the literature review in the field of supply chain management.	**-Supply chain integration:** - customer integration -internal integration -supplier integration. **-product quality:** -conformance quality -design quality.	- Each dimension of supply chain integration affects each dimension of product quality.

			-H6: Supplier integration has a positive relationship with conformance quality.				
-S.R. Hosseini Baharanchi 2009	-investigates the role of supply chain integration practices in predicting product quality and innovation performance.	-What are the relationships between different types of supply chain integration (internal, upstream, and downstream) and product quality and innovation performance?	**-H1:** The higher the supply chain integration (internal, supply and customer integration) is, the higher the product quality performance will be. **-H2:** The higher the integration of the supply chain (internal, supply, and customer integration) is, the higher the product innovation performance.	-Quantitative survey method, data from 111 manufacturing companies.	-Survey through a questionnaire with 111 companies Managers.	**-Supply chain integration:** -internal integration, supply -integration customer integration. **-product:** -product quality -product innovation performance.	-The results imply that supply chain upstream integration has a higher impact on product quality, compared to internal and supply chain downstream integrations. -Therefore, this result provides a confirmation of previous studies; that firms operating in highly collaborative practices with suppliers and customers are likely to have an excellent performance in product quality and innovation. -The findings of the current study support this view. Firms targeting high product quality performance have a greater need for supply integration than customer integration.

-Arawati Agus, 2011	-Empirically determine whether SCM has significant influence on product quality	-What are the critical variables of SCM that would be able to enhance product quality and business performance in manufacturing companies in Malaysia?	**-H1:** Supply chain management has a positive structural effect on product quality. **-H2:** Supply chain management has a positive structural effect on business performance. **-H3:** Product quality has a positive structural effect on business performance. **-H4:** Product quality mediates the linkage between supply chain management and business performance.	-qualitative study -quantitative study	-Face to face interviews -survey	-Supply chain management -Product quality -Business performance	- The result indicates that manufacturing companies should emphasize greater attention to the technology and lean production aspects of SCM and a greater degree of Management support for SCM implementations. - These SCM initiatives together with cooperation between supply chain partners and customization process under postponement program would result in better quality and customized offerings which ultimately improve products sales of the manufacturing companies. -SCM enhances product quality and has a positive effect on business performance.

-Simone Vogel, Matthias Kreimeyer, Ronny Richter, Stefan Spinler. 2020	- Understand the current state of customer integration (CI) in practice and identify any problems. - Determine the key factors that influence the implementation of CI. - Design a new model for CI that can effectively transfer customer knowledge across the organization and make it persistent.	- how a customer integration model can be designed to transfer customer knowledge across divisions and along the entire product life cycle into a knowledge representation in the organization and ensure its Persistance ?	**-H1:** The lack of a comprehensive, modular CI process model is a key barrier to effective CI implementation in practice. **-H2:** Organizational-level factors (e.g., multidisciplinary collaboration, knowledge representation) are understudied in CI literature but critical for persistence. **H3:** A CI model anchored in existing processes and capable of translating customer knowledge across divisions will improve industrial applicability.	- Qualitative study.	-Face to face interviews and Observation.	**-Independent Variables:** -Organizational structure -CI methods (e.g., Design Thinking, surveys, advisory boards). -Knowledge representation. **-Dependent Variables:** -CI effectiveness -Process persistence -Industrial applicability	- Despite extensive research, practical implementation of customer integration remains a challenge for companies, who lack effective mechanisms for systematic and continuous customer integration. - Practitioners lack a comprehensive, structured approach to make customer integration persistent within organizations.
Thorsten Teichert, Iwan Von Wartburg 2017	-creating a classification system that organizes the various ways customers can be involved online in a company's processes.	-What are the different forms of online customer integration that firms can use to engage customers in new product development (NPD) processes, and how can these different forms be	**-H1:** Online customer integration can enhance NPD by enabling deeper and more continuous customer involvement beyond traditional methods. **-H2:** Different forms of online integration (e.g., forums, portals) are suited to different stages of NPD	- Qualitative study.	**-Literature Review:** Synthesis of existing research on NPD, customer integration, and knowledge management. **-Conceptal Analysis:** Devel	**-Independent Variables:** -Types of online customer integration **-Dependent Variables:** -Knowledge generation	-Understanding customer needs is crucial for successful new product development. -Effectively implementing online customer integration can provide a

	-explaining how Different types of customer interaction can produce different types of knowledge. -explaining how knowledge about online customer integration can provide a competitive advantage.	mapped to different modes of knowledge generation?	and types of knowledge exchange. **-H3:** Firms that effectively manage multiple forms of online customer integration can develop a competitive advantage through superior knowledge generation and innovation capabilities.		opment of a typology and mapping of online integration forms to knowledge generation modes. **-Case Illustrations:** U se of real-world examples to validate the proposed typology.		competitive advantage for firms.
-Kathrin Füller, Tobias Engel, Maximilian Benz, Suparna Goswami, Helmut Krcmar 2014	- The purpose of the study was to find out the related internal integration, customer integration and supplier integration effects on conformance quality and design quality on the manufacturing sector.	- What decision factors should be considered when selecting appropriate customer integration methods for innovation processes?	-**H1:** A multi-dimensional decision matrix incorporating organizational constraints will improve the selection of customer integration methods compared to existing frameworks. **-H2:** Different customer integration methods are optimal for different innovation phases and organizational contexts. **-H3:** IT-based tools can automate and enhance the	-a systematic and thorough review of the existing literature on customer integration into innovation processes.	-Identifying relevant databases Conducting a keyword search on "customer integration method" and "decision criteria" - Screening the initial 1625 search results to identify 43 potentially relevant articles	**-Independent Variables:** -Customer integration methods. **-Dependent Variables:** -Suitability of method for innovation phase, quality/quantity of customer input.	- there are seven key decision factors that companies should consider when selecting customer integration methods: costs, duration, required skills, number of required customers, infrastructure, phase in the innovation process, and customer type. -these seven decision factors can be used in a multi-dimensional decision matrix to help

			selection process for practitioners.		Conducting a second, more detailed screening to identify 22 relevant articles for developing a decision matrix for selecting customer integration methods.		practitioners select the most appropriate customer integration methods for their needs.
-Zogaj Shkodran, Ulrich Bretschneider 2012	-Identify the different customer integration methods used in new product development (NPD) literature. -evaluate each method and determine the right one that matches the required type of customer knowledge (need information, solution information, sticky information, leading edge information).	-What kind of customer integration methods can be identified within the NPD literature? -how suitable are the particular methods for internalizing customer knowledge?	-No hypotheses	- Qualitative study.	-A systematic literature reviews. -The researchers conducted a three-stage literature search across multiple databases using relevant keywords, and then applied inclusion criteria to only select peer-reviewed journal articles that explicitly addressed customer integration	**-Independent Variables:** -Types of customer integration **-Dependent Variables:** -Need information -Solution information -Sticky information -Leading edge information	-Methods with active customer integration, especially the lead user method, are the most effective at capturing the full range of customer knowledge, including needs, solutions, sticky information, and leading-edge information. - Passive customer integration methods are less effective at capturing advanced types of customer knowledge like solution information and sticky information.

					methods in the innovation process. -They then analysed the selected papers and books to identify the customer integration methods.		
-Ashwin W. Joshi, Sanjay Sharma 2004	-Explore how firms develop customer knowledge. - Assess its impact on new product success.	-How does customer knowledge development influence new product performance?	**-H1:** The greater the extent of **customer involvement,** the greater the extent of **customer knowledge development**. **-H2:** The greater the extent of **market orientation,** the greater the extent of **customer knowledge.** **-H3:** The greater the extent of **IT infrastructue sophisticatin**, the greater the extent of **customer knowledge development** **-H4:** The greater the extent of **cross-functional integration**, the greater the extent of **customer knowledge development** **-H5**: The greater the extent of customer knowledge development, the greater the new product performance.	quantitative study	- surveys; data collected from 831 business units	-customer knowledge Development new product performance.	- All antecedents have significant effects on customer knowledge development. - Customer knowledge development has a strong positive impact on new product performance. - The study validates the framework and encourages integrating customer insight into innovation processes.

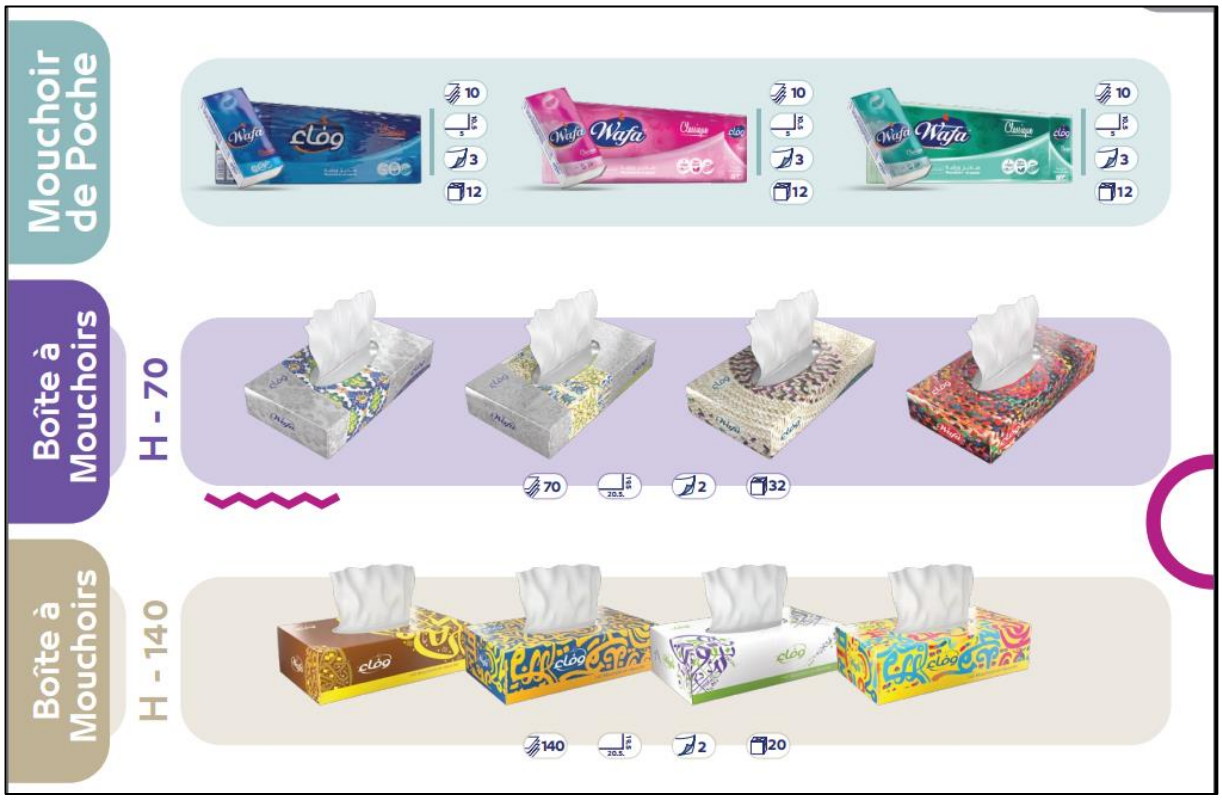
Appendix N°02: Paper Towel Family

Appendix N°03 : Toilet Paper Family.

Appendix N°04: Table Napkins Family

Appendix N°05: Table Napkins Family

Appendix N°06: Tissues family



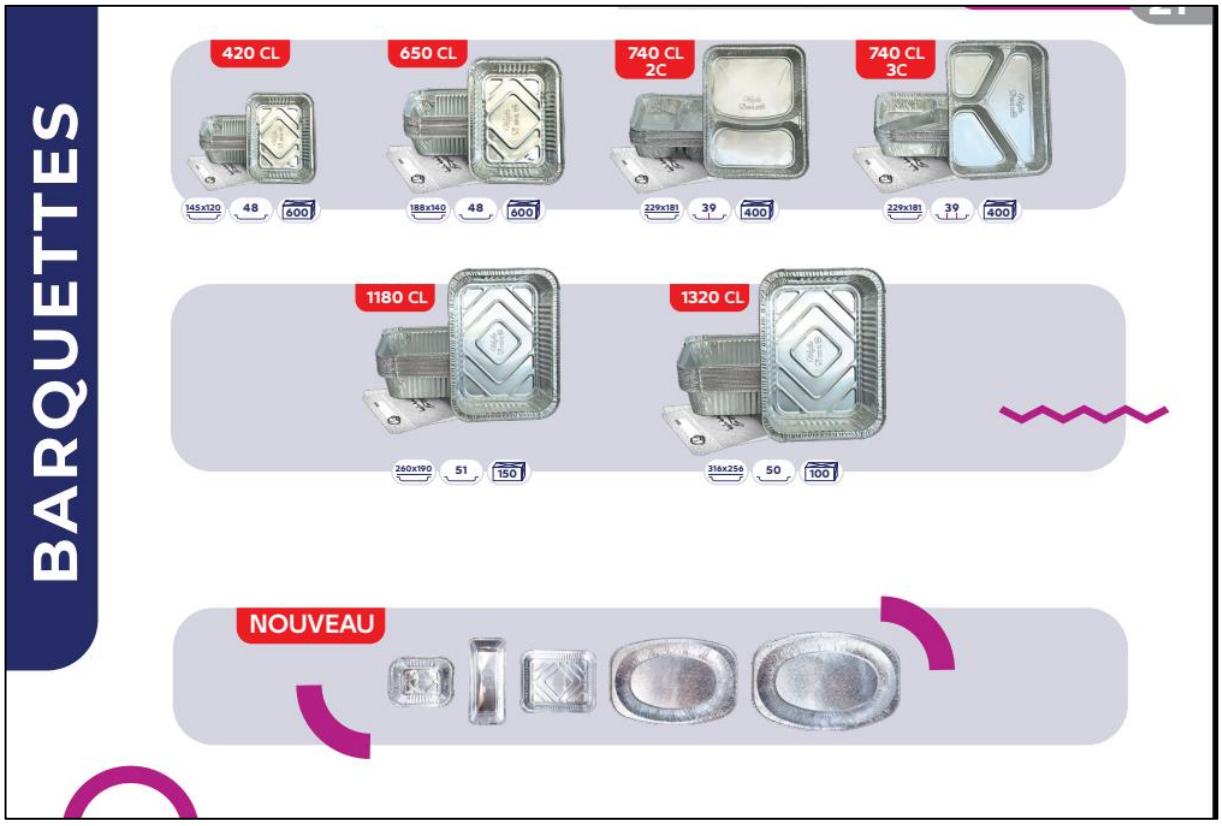
Appendix N°07: Wipes family

Appendix N°08: Aluminum Foil family

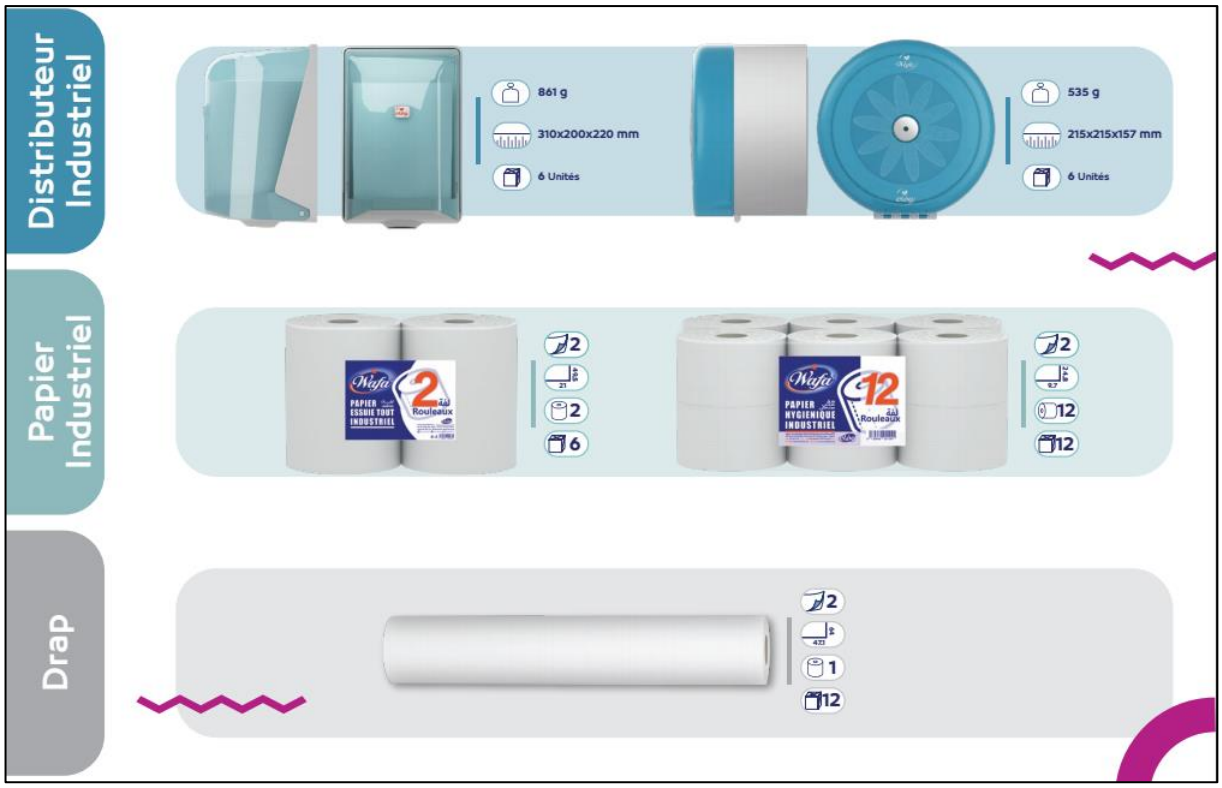
Appendix N°09: Baking Paper family

Appendix N°10: Cling Film family

Appendix N°11: Aluminum Food Trays family



Appendix N°12: Parapharme family



Appendix N°13: Entreprise family

Appendix N°14: Survey

The impact of customer integration on aesthetic and performance quality in the new product development phase. (L'impact de l'intégration du client sur la qualité esthétique et la performance dans la phase de développement d'un nouveau produit).

This questionnaire is part of a research project that will be used to prepare a master's thesis in business science at The School of Higher Commercial Studies (EHEC) Koléa.

We would like you to take part in this research by answering the following questions. Your answers will only be used within the framework of this research, being anonymous and confidential. Thank you in advance for participating in this research.

(Ce questionnaire fait partie d'un projet de recherche qui servira à préparer un mémoire de master en sciences commerciales à l'Ecole des Hautes Etudes Commerciales (EHEC) de Koléa.
Nous vous proposons de participer à cette recherche en répondant aux questions suivantes. Vos réponses ne seront utilisées que dans le cadre de cette recherche, de manière anonyme et confidentielle.
Nous vous remercions par avance de votre participation à cette recherche).

Please check the circle corresponding to your level of agreement or disagreement with the following statements. (Veuillez cocher le cercle correspondant à votre degré d'accord ou de désaccord face aux propositions suivantes) :

1- Strongly disagree (Pas du tout d'accord). 2- Disagree (Pas d'accord)

3- Neutral (neutre). 4- Agree (D'accord). 5- Totally agree (Tout à fait d'accord).

Items	1	2	3	4	5
Q1- WAFA is frequently in close contact with its customers.					
Q2- WAFA customers provide input throughout all the New Product Development stages (from idea to testing).					
Q3- Wafa Customers help with the design and the prototypes tests.					
Q4- Wafa involves its customers as co-creators, not just as data sources.					
Q5- WAFA always strives to improve communication with customers through focus Groupe.					

Q6- WAFA always strives to improve communication with customers through individual interviews.					
Q7- WAFA always strives to improve communication with customers through field observation.					
Q8- WAFA always strives to improve communication with customers through complaints analysis.					
Q9- WAFA interacted with its customers to improve performance and aesthetic quality of its new product “President Collection”.					
Q10- WAFA new product “President Collection” will stand out in the market due to its visual appeal.					
Q11- WAFA new product “President Collection” aligned with customer expectations during the test stage.					
Q12- “President Collection” aesthetic aspects were validated through customer testing.					
Q13- “President Collection” is differentiated from competitors because of its innovative design.					
Q14- WAFA customers gave positive feedback on “President Collection” design or appearance after the test stage.					
Q15- “President Collection” form suited customers' needs during the test stage.					
Q16- “President Collection” meets or exceeds the intrinsic characteristics defined during the development phase.					
Q17- Wafa tracks customer satisfaction scores related to product functionality during the testing stage.					
Q18-Wafa receives low rates of returns or complaints during the testing stage					
Q19- WAFA tests are effective to confirm that the product performs as intended.					
Q20- WAFA customers were satisfied with “President Collection” performance after the test stage.					

Demographic information:

-Gender:

- Male
- Female

-What is your current position?

- Product development engineer.
- R/D specialist
- Marketing manager.
- sales manager.
- Logistics managers.
- Other:

-Your age

- 20-25
- 26-30
- 31-45
- 46-50
- Plus 50

-Years of experience:

- Less than 1 yea
- 1–3 years.
- 4–6 years.
- More than 6.

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