ENHANCED NEW PRODUCT DEVELOPMENT FRAMEWORK: A NOVEL APPROACH FOR DEVELOPING SUCCESSFUL PRODUCTS

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Dedication

This dissertation is dedicated to my esteemed parents, Rashid and Aqeela Sheikh, whose unyielding love and support have served as both my foundation and my guiding light throughout my academic pursuits. To my wife, Nilofar Hussain, whose boundless inspiration and steadfastness bolstered me through the most daunting phases of this work.

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ABSTRACT

ENHANCED NEW PRODUCT DEVELOPMENT FRAMEWORK: A NOVEL APPROACH FOR DEVELOPING SUCCESSFUL PRODUCTS

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The success rate of new product launches in the United States market is very low, with an estimated failure rate of around 95% out of nearly 30,000 debuts per year. This pattern of failure affects not only newly founded enterprises but also well-established market leaders. This research primarily aims to analyze the fundamental processes involved in attaining success in new product development, with a focus on identifying key components that significantly contribute to high success rates in newly introduced products. The goal is to create a New Product Development Framework that may increase the likelihood of successful product launches, thereby having a substantial impact on the field of new product development. The research employed industry surveys and interviews to understand the dynamics of product development frameworks and identify issues within them. Based on descriptive analysis of the survey results and content analysis of the interview transcripts, the “Enhanced New Product Development Framework” was conceptualized. This framework was subsequently tested in a 12-month case study, ultimately achieving $24K in recurring revenue with the newly developed product.

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CHAPTER I:

INTRODUCTION

1.1 Introduction

Scholars and consultants across various sectors and business schools widely endorse the concept of innovating new products. Building proficiency in new product development can significantly contribute to an organization's success. Product development poses a substantial and demanding task for any firm. New product development (NPD) entails a series of strategies and initiatives aimed at fostering expansion. This process encompasses making minor or major enhancements to existing products to meet market demands (Hosseini et al., 2018).

The "new product" notion has been thoroughly examined in the literature. Crawford provides a definition that characterizes it as a product requiring a revamped marketing approach and significant alterations, excluding minor adjustments that can be addressed through simple promotional efforts.

In order to ensure the success of New Product Development (NPD), it is crucial to establish seamless collaboration across manufacturing, engineering, research and development (R&D), marketing, finance, and purchasing departments. The marketing department should conduct an evaluation of the new product prior to assembling a cross-functional team to oversee its development

The NPD (New Product Development) process consists of eight distinct stages, each marked by its unique decision-making process. These stages include idea generation, idea screening and evaluation, concept development and testing, marketing strategy, business analysis, product development, test marketing, and commercialization. The final phase involves decision-making, product development, testing, and market launch.

1.1.1 New Product Development and Its Diverse Variants

New Product Development (NPD) encompasses the exhaustive process of introducing novel products or services to the market. A product is a concrete or abstract entity or service generated or formed through a procedure and intended for sale or provision to fulfill a particular client requirement or request. Products can be classified in multiple ways:

1) Tangible products, often known as goods, refer to physical commodities perceptible through sight, touch, and sensation. Some examples encompass automobiles, furnishings, garments, and comestibles.
2) Intangible products, often known as services, are goods that do not have a physical form but nonetheless deliver value. Some examples of industries are insurance, education, consulting services, and healthcare.
3) Digital products refer to software or electronic objects distributed and utilized through digital channels. Examples include e-books, software apps, and digital music or films.
4) Hybrid products refer to the amalgamation of physical items and services. For example, a tangible item like a smartphone may be accompanied by intangible benefits such as a warranty or a subscription service.

A product fulfills a specific function, meets a want or requirement, and follows a life cycle encompassing different phases, including introduction, growth, maturity, and decline. Companies typically design, produce, and market items in business settings to generate income and obtain a competitive advantage.

1.1.2 Product Life Cycle

The product life cycle, as defined by Levitt (1965), represents the sequential progression of a product through five distinct stages: development, introduction, growth, maturity, and decline. This concept was introduced by German economist Theodore Levitt in the Harvard Business Review in 1965, and it continues to hold relevance in contemporary business practices. The model illustrates the evolution of new products until they become outdated.

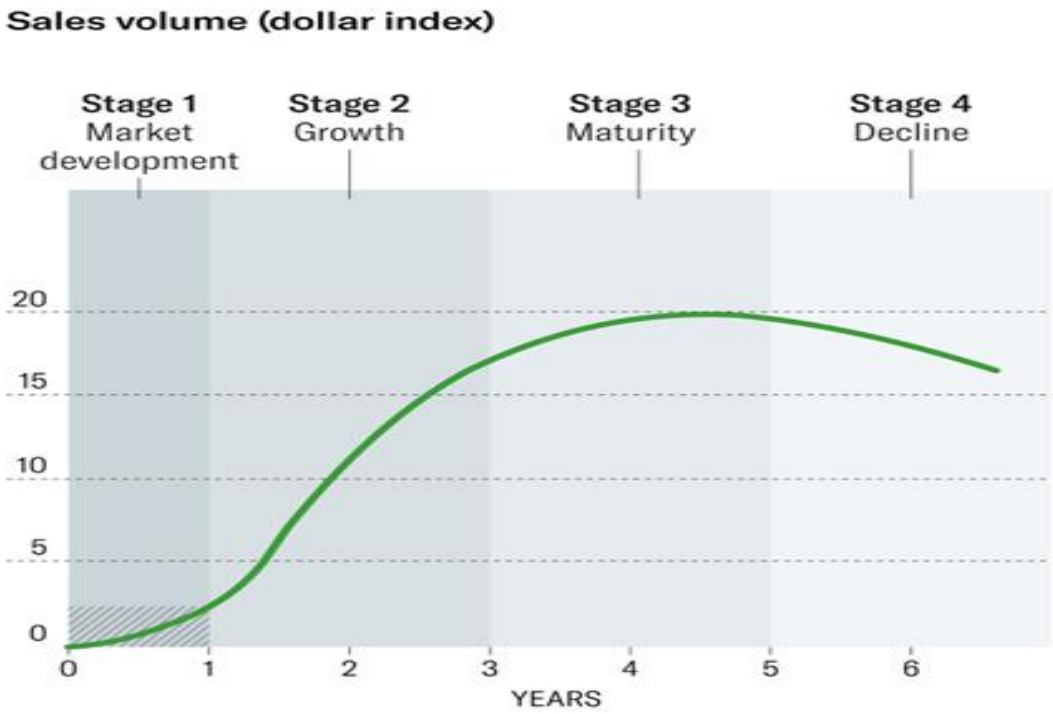

Figure 1.1: Product Life Cycle of the entire industry.

Successful products typically undergo identifiable stages as they traverse their life cycles. The following stages occur in a specific sequence:

Stage 1. Market development: This phase occurs when a new product is introduced to the market before a confirmed demand is established, often prior to full technical validation. During this phase, sales figures exhibit a declining trend with slow progress.

Stage 2. Market growth: Demand experiences rapid escalation, leading to an overall increase in market size. This phase is also known as the "Takeoff Stage."

Stage 3. Market maturity: Demand stabilizes and primarily increases due to replacement and new family formation.

Stage 4. Market decline: The product encounters a decrease in customer demand, resulting in a gradual decline in sales. However, this decline is not a dead end, but a call for innovation and the necessity for new products to meet market demands. It's a reassurance that the market is dynamic and open to new ideas.

1.1.3 The exigencies of New Product Development Strategy

Throughout the chronicles of history, the relentless march of technology has consistently made previous innovations obsolete, as seen in the shift from horse-drawn carts to automobiles and the transition from landline telephones to smartphones. Entities that fail to innovate and nurture new products run the risk of becoming obsolete in the ever-evolving market. This underscores the importance of new product development as a strategic imperative.

In contemporary dynamic markets, enterprises are not just compelled but also have the exciting opportunity to perpetually engender products that meet consumer requisites and generate commendable financial returns. While posing substantial challenges, this endeavor also presents opportunities for firms to reconfigure their business models, augment their proficiency and insight, penetrate new markets, and extend their endeavors.

Introducing new products is not just imperative but also promises to sustain competitiveness and realize their financial objectives.

To secure enduring success, organizations must accord primacy to developing and introducing new products. Novel offerings assume a pivotal role, not just in sustaining competitiveness but in driving the holistic robustness of a company's portfolio. Furthermore, new products often confer a resilient competitive advantage for numerous firms. It is manifest that the development of new products bears a pivotal role in attaining corporate prosperity, as they possess the capacity to engender revenues, augment market share, and enhance profitability, thereby yielding value for the stakeholders.

The failure rate of new product launches is remarkably high, with approximately 95% of the 30,000 new products introduced annually meeting an unfortunate end. This trend extends across all business sectors, impacting even industry giants such as Google, Coca-Cola, and Colgate, which have experienced their share of unsuccessful product ventures. Notably, Google's substantial investment in the Google Glass project drew attention but ultimately faded into obscurity (Christenson, 2013) and (Guthrie, 2021).

In 2020, the United States dedicated a staggering $717.0 billion to research and development (R&D). Projections for 2021, based on reported expectations from performers, indicate a total of $791.9 billion. Data from Anderson reveals that R&D expenditures in the United States amounted to $494.5 billion in 2015 and $406.6 billion in 2010.

Private enterprises in the United States devoted $538 billion to new product development, including research and development (R&D). In 2020, there was a 9.1% increase compared to 2019, as indicated in table 1. During the same year, internal funding by corporations totaled $466 billion, reflecting an 8.7% growth compared to the previous

year.(Unless specified otherwise, all monetary values and computations are presented in current dollar amounts.)

Table 1.1: U.S. R&D expenditures, 2010–21

Performing sector and source of funds	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020[a]	2021[b]
Current $millions												
All performers	406,600	426,215	433,716	454,271	475,969	494,499	521,700	553,768	604,372	666,153	716,955	791,873
Business	278,977	294,092	302,251	322,528	340,728	355,821	379,529	405,792	445,563	498,175	543,220	612,444
Federal government	50,798	53,524	52,144	51,086	52,687	52,847	51,187	52,553	58,356	62,802	64,237	65,207
Federal intramural[c]	31,970	34,950	34,017	33,406	34,783	34,199	31,762	32,231	36,793	39,870	40,371	40,036
FFRDCs	18,828	18,574	18,128	17,680	17,903	18,649	19,424	20,322	21,563	22,932	23,866	25,171
Nonfederal government	691	694	665	620	583	595	620	632	643	675	683	674
Higher education	58,084	60,088	60,895	61,548	62,351	64,635	67,792	71,114	74,878	78,146	80,842	84,035
Nonprofit organizations[d]	18,050	17,817	17,762	18,489	19,620	20,601	22,573	23,678	24,932	26,355	27,973	29,514
All funding sources	406,600	426,215	433,716	454,271	475,969	494,499	521,700	553,768	604,372	666,153	716,955	791,873
Business	248,126	266,427	275,728	297,188	318,410	333,243	360,291	386,539	426,488	482,227	520,363	587,717
Federal government	126,617	127,014	123,837	120,132	118,367	119,532	118,175	122,531	131,220	135,993	147,657	153,323
Nonfederal government	4,303	4,387	4,158	4,243	4,213	4,277	4,995	5,076	5,252	5,470	5,670	5,856
Higher education	12,262	13,103	14,300	15,378	16,210	17,292	18,746	19,984	21,227	22,294	23,191	24,055
Nonprofit organizations[d]	15,292	15,284	15,694	17,330	18,768	20,156	19,493	19,638	20,184	20,170	20,074	20,922

FFRDC = federally funded research and development center.

Note(s): Data are based on annual reports by performers. Expenditure levels for higher education, federal government, and nonfederal government performers are calendar year approximations based on fiscal year data.

Source(s): National Center for Science and Engineering Statistics, National Patterns of R&D Resources (annual series).

Numerous factors contribute to the failure of most new products to reach the market. This study aims to analyze the primary determinants responsible for the high failure rate in new product development.

The field of new product development is extensive, incorporating various processes, techniques, concepts, and practices from disciplines such as engineering, design, production, quality marketing, and business. In the initial stages of production, items were

frequently conceived by individual ingenuity or to address a clear market gap. Nevertheless, as markets reached a more advanced stage and rivalry intensified, the process of New Product Development (NPD) grew more organized and deliberate. Novel commodities play a substantial role in countries' gross domestic product (GDP) and are crucial in promoting economic expansion. Companies can enhance or acquire a competitive advantage in their respective sectors by consistently introducing innovative products. Introducing practical new items can increase market share, revenue, and profitability. Rapid technological advancements can render items obsolete at a fast rate, thereby necessitating ongoing innovation and the launch of new products. As societies progress, the needs and preferences of customers also change. Each novel product undergoes a life cycle and eventually becomes outdated, necessitating corporations to persistently create new products to meet market demands. As products and services mature, they become obsolete, prompting organizations to innovate and develop new offerings to offset the diminishing income from older items.

Developing new products is a crucial yet risky undertaking that organizations must pursue to remain competitive in the always-changing market environment. At present, in the United States, newly introduced products account for 49.50% of the company's total revenues (Cooper et al., 2001).

Business managers and industry experts contend that proficiently creating new products is pivotal in ensuring the long-term viability of organizations (Barclay et al., 2006). New product development (NPD) stands as a critical driver of competitive advantage, demanding the establishment of systems that deliver high-quality outputs, diverse options, frequent updates, rapid response times, and the ability to tailor products (Cooper, 1994; Crawford, 1991; Reinertsen & Smith, 1991). Internal systems for integrating and enhancing the NPD process have undergone restructuring to confront these

challenges. This restructuring encompasses the implementation of concurrent engineering, cross-functional collaboration, improved tools, and early engagement (Bessant & Francis, 1997; Thomas, 1993). With shorter product life cycles and heightened demand for product variety, NPD systems must handle a broader spectrum of new product opportunities and effectively manage the associated risks in bringing them from development to the market. Specific methods such as Cooper's 'stage-gate' strategy, which involves stringent screening, monitoring, and progression frameworks, have been prioritized (Cooper, 1994). While the concepts of cross-functional team collaboration (Lawrence, P. and Lorsch, J. (1967) Organization and Environment. Harvard University Press, Cambridge, MA) and NASA's 'phased review process' are not novel, they are currently being integrated into a new framework of 'best practices' in new product development (Bessant & Francis, 1997).

1.2 Research Problem

Kotler (2009) present a comprehensive analysis of the reasons for the high failure rate of new products despite the presence of established guidelines for successful new product development. One of the primary factors contributing to this phenomenon is the tendency to overestimate market size, leading to overproduction and subsequent financial losses. Another significant issue is inadequate product design, which may not resonate with potential customers. This could result from targeting the wrong market segment, such as attempting to introduce a luxury product in an economically disadvantaged area.

Concurrently, launching a new product during an inopportune economic climate, where consumer spending on non-essential items is limited, can significantly impede success. Additionally, incorrect pricing strategies can decrease profitability, whether set too high or too low. Insufficient marketing efforts can compromise a new product's visibility within the intended consumer base.

The landscape of products introduced to the market to address consumer demands rapidly evolves while consumer needs remain constant. New Product Development (NPD) necessitates collaborative efforts across various departments, including design, engineering, production, and marketing, and should not be confined to research and development departments alone (Kotler et al., 2012).

Approximately 30,000 novel goods are launched annually, with a staggering 95% ultimately ending in failure. No corporation, including prominent companies like Google, Coca-Cola, and Colgate, is exempt from this problematic statistic. Despite receiving significant investment, Google's ambitious Google Glass project rapidly declined in popularity and market presence (Christenson, 2013) and (Guthrie, 2021).

In 2020, the United States spent $ 717.0 billion on research and development (R&D), as the National Science Foundation reported. The projected aggregate for 2021 is $791.9 billion, as per the forecasts stated by the performers. The entire expenditure on research and development (R&D) in the United States amounted to $494.5 billion in 2015, while in 2010, it was $ 406.6 billion (Anderson, 2023).

Notably, the attainment of successful new product development is contingent upon a myriad of factors, including the expertise of the research and development team, technical prowess, customer value, and endorsement from management (Zirger & Maidique, 1990). Nevertheless, various impediments to achieving successful new product development exist, including the influence of a dominant owner or manager, an emphasis on temporal and financial constraints, and a lack of appreciation for the importance of product design (Millward & Lewis, 2005). Overcoming these barriers necessitates adopting a systematic approach to product development (Roozenburg & Eekels, 1995) and implementing a rigorous decision-making process at every stage (Cooper, 2001). This process should involve the timely integration of specialized knowledge, meticulous allocation and

oversight of resources, and a supportive organizational milieu conducive to collaboration (Gupta & Wilemon, 1990). Moreover, the realization of successful new product development is contingent upon the capacity to select viable product concepts and effectively manage the entire process from ideation to launch (Cooper, 1994).

1.3 Purpose of Research

A tangible or intangible product must encompass functional and emotional qualities to meet customer needs and effectively provide value. It should also be tailored to meet specific customer requirements and include specialized components, such as customer support. The creation of a new product arises from an innovative and distinctive concept that has the potential to satisfy consumer needs. Throughout the new product development process, it's crucial to understand that changes will occur not only in the physical aspects of the product but in every other element. Different concepts can lead to the creation of various products, each of which can positively influence how clients perceive a company. When a new business begins producing a product that meets customer needs, it can potentially decrease the demand for existing competing products in the market. Companies must establish new product development (NPD) departments and their direct impact on production. By considering multiple concepts, these departments can understand the demands and requirements of consumers. These concepts can be categorized as follows: (i) product-service systems, (ii) the Kano model, (iii) conjoint analysis, (iv) the product value matrix, and (v) quality function deployment (Gurbuz, 2018).

Every firm, irrespective of its size, financial motivation, or industry, faces consistent demands to refresh, extend, or adjust its product or service offerings (Leenders et al., 2003). Over the past decade, there has been a rapid increase in the rate of market

and technology changes. A company's ability to innovate and create new goods is crucial for achieving competitive success in today's extremely volatile business environment (Cengiz et al., 2005). Emerging products are progressively recognized as crucial for achieving corporate success in the industry. In the 1970s, new products contributed to 20% of corporate earnings, but in the 1980s, they contributed to 33% of profits (Hirotaka, 1986). During the 1990s, the percentage increased to 50% (Slater, 1993). According to a recent study, the sales of new goods accounted for more than 42% of the company's total sales between 1985 and 1990. This increased from 33% in 1980 (Page, 1993). these enterprises anticipated quadrupling the goods they introduced. Nevertheless, the frequency of new product failures remains distressingly high. Recent research indicates that the success rates of new product launches are below 60%, precisely 54.3% for the UK, 59% for the US, 59.8% for Japan, and 49% for Spain (Edgett et al., 1992). In recent years, a significant number of studies have been conducted on the factors that contribute to the success of new products. However, these recent studies seem to have not substantially influenced management decision-making.

It is essential to acknowledge that the failure of most new products to reach the market can be attributed to several factors. This research aims to thoroughly dissect the root causes that contribute to the elevated failure rate in developing new products. The research will undertake a systematic inquiry, drawing from primary, secondary, and tertiary sources to comprehensively examine the topic. An essential component of this research entails identifying and obtaining relevant literature and conducting a comprehensive analysis of significant publications that provide insights into the key factors contributing to the failures of new products. The main objective of the study is to develop a "New Product Development System" that increases the likelihood of new products achieving success in the market. This system would offer a completely

integrated and comprehensive framework that empowers firms to create innovative products and attain market success. The research aims to achieve specific objectives, including:

1) Identification of Gaps and Loopholes in existing literature.
2) Formulation of comprehensive remedies for these identified deficiencies.
3) Establish an initial framework for developing a new product.
4) Evaluating the effectiveness of the Product Development Framework through a case study and
5) Developing a thorough framework for New Product Development to increase the probability of achieving market success.

Hence, it is crucial to have a comprehensive comprehension of the aspects that influence the success of a product. This understanding will enable enterprises to efficiently allocate resources to the product development process and enhance the market demand for their new items.

1.4 Significance of the Study

The contemporary corporate environment is characterized by rapid and unpredictable changes, necessitating a strategic alignment of business objectives with adept management of uncertainty and disorder. Cost leadership is a strategic approach aimed at achieving economies of scale and improving process efficiency with the goal of reducing costs, maximizing production rates, and optimizing resource utilization. This strategy often involves selling standardized items at competitive prices, which may lead to a focus on cost reduction and potential trade-offs in quality. However, this approach has limitations in terms of organizational expansion.

Product differentiation involves increasing profits by offering various products that meet customers' diverse demands and expectations. Companies must integrate market research, technology implementation, research and development (R&D), and innovation into their products and processes to excel in this area.

Companies view cost leadership as an internal factor that can be a strength or a weakness. However, reputable companies will not excessively prioritize efficiency at the expense of generating positive returns on investment, creating an environment less conducive to organizational growth.

Whilst, Product differentiation refers to the unique characteristics or features of a product that customers perceive. It is an external factor that can present an opportunity or a threat to a firm. Companies that seize this opportunity and turn it into a source of strength will benefit in the long term.

Efficient and successful new product development and entry into new markets are crucial competitive advantages. However, many newly developed products often fail or never progress to the launch phase. The dynamic corporate landscape has led to increased competition, rapid shifts in customer demands and expectations, accelerated technological obsolescence, and shortened product life cycles (Kumar & Phrommathed, 2006). The ability to consistently introduce successful new products to the market is a critical competitive advantage in the industry (Griffin & Page, 1996).

The primary objective of this research is to investigate the underlying reasons for the notable failure rates of newly developed products in the market. Extensive research conducted by Christensen, Guthrie, Cooper, and the Product Development and Management Association (PDMA) has revealed that a substantial percentage of products, ranging from 45% to 95%, do not successfully reach the market. This study is focused on comprehensively understanding the role of thorough market research in achieving Product-

Market Fit (PMF), which is identified as a significant factor contributing to product failures. According to CB Insight (2019), approximately 25% of product failures can be attributed to PMF, with around 20% stemming from insufficient market research and another 20% from products failing to meet customer quality and performance expectations. Additionally, 15% of failures are due to the inability to offer a unique value proposition, 10% to distribution challenges, and another 10% to neglecting customer feedback.

CB Insights and Statista have reported that a significant percentage of consumer goods, tech, and software products fail to achieve market success. In 2020, the tech market in the U.S. was valued at approximately $1.9 trillion, and the consumer goods market at about $2 trillion, collectively representing a substantial portion of the U.S. economy.

In the current dynamic market landscape, businesses must continuously innovate to ensure their products align with customer needs. This research aims to develop a new product development framework to address the primary product failure modes and augment the success rate of new products.

1.5 Research Questions

The primary objective of the research is to devise a "New Product Development framework" with the aim of bolstering the success rate of new products in the market. This framework is intended to offer a comprehensive approach for organizations seeking favorable outcomes in new product launches. The research will center on addressing fundamental inquiry:

1. How can we improve the chances of success for the new products?

CHAPTER II:

REVIEW OF LITERATURE

2.1 Introduction

According to the U.S. Bureau of Economic Analysis (2020), Statista (2020), and various scholarly articles, six primary causes have contributed to new product failures. These causes and their estimated percentages of failures are as follows:

- **Product Market Fit:**
    - The absence of fit between the product and its intended market accounts for approximately 25% of unsuccessful product launches (CB Insight, 2019).
- **Market Research:**
    - The direct impact of inaccurate or inadequate market research is estimated to underlie approximately 20% of product failures (CB Insight, 2019), underscoring the crucial role of comprehensive market analysis in product success.
- **Product Quality and Performance:**
    - Substandard product quality and performance and the failure to meet customer expectations in these areas contribute to approximately 20% of new product setbacks (CB Insight, 2019).
- **Value Proposition:**
    - The inability to offer a unique or differentiated value compared to market competitors and the absence of a unique value proposition is responsible for an estimated 15% of product failures (CB Insight, 2019).
- **Distribution Channels:**

- The unavailability or inefficiency of distribution channels has been identified as the reason for about 10% of product failures (Statista, 2020).

- **Customer Feedback:**
  - The significant role of customer feedback in product failures is evident, with neglecting or failing to incorporate consumer feedback associated with approximately 10% of unsuccessful products (Schreier & Fuchs, 2011). This highlights the importance of customer-centricity and the need for active listening to consumer needs.

Table 2.1: Major causes of new product failures rate (%)

Major Causes of Failed Products	% Failure
Product Market fit	25%
Market Research	20%
Product Quality and Performance	20%
Value Proposition	15%
Distribution Channels	10%
Customer Feedback	10%

According to findings from CB Insights and Llopis, the failure rates for technology and software products are estimated at approximately 90%, while the failure rate for new products in the Consumer-Packaged Goods (CPG) sector is around 85%. In the technology sector, key factors contributing to product failures include a lack of market fit, inadequate market research, absence of a unique value proposition, and a disregard for customer feedback. In the CPG sector, the challenges are equally significant, with key factors being high competition, evolving consumer preferences, and

distribution challenges. Understanding these factors is crucial for any business operating in these sectors.

When we consider the broader economic impact, the numbers are staggering. The technology market was valued at approximately $1.9 trillion, and the consumer goods market at around $2 trillion in 2020 according to Statista. Together, these two sectors form the backbone of the U.S. economy, contributing a whopping $3.9 trillion annually. This underscores the immense importance of these sectors and the need for a comprehensive understanding of their dynamics.

Table 2.2: New product failure rate (%) by industry and market size

Industry	% Failure	Market size in $ Billions USD
Technology and Software:	85 90%	$1900
Consumer Packaged Goods (CPG):	80-85%	$2000
Pharmaceuticals:	10-20%	-
Automotive:	30-40%	-
Restaurants/Food Service:	60%	-
Retail:	50%	-
Fashion/Apparel	80%	-

The focus of this research will center on the Consumer-Packaged Goods (CPG), Technology, and Software industries, which are acknowledged as bearing the highest rates of new product failure. This situation should not lead to despair but rather be seen as an opportunity for personal and professional development. This targeted investigative approach is designed to yield insightful findings and potential remedial strategies for the pervasive issue of product failure within these sectors, offering a beacon of hope for the future of these industries.

In the ever-evolving marketplace, enterprises are under pressure to consistently develop products that not only meet customer needs but also generate satisfactory profits. Despite the challenges, these demands offer enterprises the opportunity to refine their business models, enhance their competencies and knowledge base, explore new markets, and broaden their operational scope. To maintain competitiveness in a market that is constantly changing, enterprises need product development frameworks that align with market demands and effectively address market challenges. This literature review aims to identify the six key factors contributing to product failures, offering enterprises a roadmap to success: Product-market fit, Market Research, Product Quality and Performance, Value Proposition, Distribution Channels, and Customer Feedback.

2.2 Product Market Fit

2.2.1 Introduction

The concept of Product Market Fit (PMF) revolves around optimizing a product to meet the needs of the market. Paimonte (2016) conducted empirical research to explore various methods for achieving this optimization. The primary objective was to shed light on the methodologies that contribute to a startup's success in developing a product that effectively serves the market's demands. These findings hold great significance as they offer a comprehensive understanding of the strategies that can result in a successful product-market fit. They provide valuable insights to entrepreneurs, startup founders, business students, and researchers interested in product development and market fit, empowering them with the knowledge to make well-informed decisions. These findings hold great significance as they offer a comprehensive understanding of the strategies that can result in a successful product-market fit. They provide valuable insights to

entrepreneurs, startup founders, business students, and researchers interested in product development and market fit, empowering them with the knowledge to make well-informed decisions.

The primary objective of the research is to elucidate the fundamental factors that contribute to the effective development of a product that resonates with the requirements of the market. The thesis involves conducting research to establish the initial framework of product market fit and then delving further into the issue to identify correlations within scientific research that support, explain, and contribute to the initial framework's conclusions. Paimonte (2016) emphasizes several practical methodologies, including the Business Model Canvas (BMC), the Minimum Viable Product (MVP), Pivot, Innovation, Continuous Deployment, and the Build-Measure-Learn Startup Methodology. These methodologies are designed to be easily implementable and effective in achieving product-market fit. For example, the BMC is a tool that simplifies and optimizes the analysis of complex multivariable tasks, while the MVP is a strategy that allows for the testing of a product's viability with minimal resources.

Furthermore, Gruber (2014) defines product-market fit in his book as "something that both has its niche but also has a supportive economy around it that is willing to pay." He also emphasizes that while there may always be a user for a product, acquiring users does not necessarily indicate a product-market fit. Gruber (2014) suggests that to achieve product-market fit efficiently, one should adopt the "Lean Startup Methodologies LSM" insight of "customer development," which involves continuously seeking feedback from customers to develop the product according to their needs. This underscores the crucial role of customer input in the product development process, highlighting how understanding of the market can shape product success. In addition, "Lean Startup" by

Ries (2011) and the work of Osterwalder & Pigneur (2010) provide a framework to achieve product-market fit.

2.2.2 Achieving Product-Market Fit

Paimonte (2016) underscores the imperative of achieving Product-Market Fit, which demands not only identifying a niche but also ensuring the presence of a supportive economy willing to invest in the product. To effectively attain a product-market fit, it is imperative to adopt the insights of the lean startup methodology, particularly the emphasis on ongoing customer feedback and validation of market-driven hypotheses.

While Paimonte (2016) argues that optimizing the product development process through continuous customer feedback increases the chances of achieving an optimal product-market fit, it's important to note the limitations of the Lean Startup Methodology. The methodology's focus on early adopters may not fully represent the wider market, and its engineering-oriented approach may not provide comprehensive guidance in marketing and sales. This could potentially impact revenue generation in the initial stages. Additionally, the build-measure-learn approach could lead to significant resource depletion.

Finding product-market fit is crucial for the survival and success of software start-ups. Göthensten & Hellström (2017) delve into the strategies employed by software start-ups in their quest to achieve product-market fit, a particularly significant aspect given the high failure rate of such start-ups within two years of inception. The primary reason for these failures is often attributed to the inability to find product-market fit. Göthensten et al. (2016) emphasize the urgency for new product teams to establish product-market fit for their new products promptly.

As identified in the study, one of the major challenges newly developed products face is the premature launch of products without validating their product-market fit. It was found that product development teams invest extensive time and resources into the development of products without first ascertaining the customers' requirements. According to Leppanen (2015), the product team should first focus on finding the problem-solution fit before identifying the product-market fit, prior to the full-scale launch of the product.

Paimonte (2016) aims to contribute to the existing knowledge base regarding how software start-ups approach product-market fit with their innovations, and to comprehend the rationale behind their decisions. The ultimate objective is to provide practical insights that empower software start-ups to create or customize methodologies to achieve product-market fit.

The study was conducted as a qualitative and inductive multiple-case study with a comparative and cross-sectional nature. Empirical data was gathered from 19 software start-ups through semi-structured interviews. In the present research, a conceptual model was established in accordance with the underlying theoretical framework, serving as the basis for a matrix utilized to engage in thematic analysis of the empirical data.

Paul Paimonte's 2016 study on product-market fit identifies several key findings that are crucial for understanding the dynamics of achieving success in the market. Here are four key findings:

1. Customer Validation: Paimonte emphasizes the importance of thoroughly validating customer needs and preferences before launching a product. Understanding and aligning with customer expectations early on significantly increases the likelihood of achieving product-market fit.

2. Iterative Development: The study underscores the effectiveness of iterative development processes. It suggests that companies that iterate and refine their products based on continuous feedback from early adopters and customers are more likely to achieve product-market fit than those relying on one-time, static product launches.
3. Early Adoption Metrics: Paimonte's research highlights the significance of monitoring and interpreting early adoption metrics. Metrics such as conversion rates, retention rates, and customer feedback play a critical role in gauging whether a product resonates with its target market.
4. Market Timing: The study identifies market timing as pivotal in achieving product-market fit. It suggests that launching a product at the right time when there is a clear demand or gap in the market can significantly enhance its chances of success.

These findings underscore the complex interplay between product development, market understanding, and timing in achieving product-market fit, offering valuable insights for entrepreneurs and businesses aiming to navigate the competitive landscape effectively

The following approaches for finding product-market fit were identified: The ‘Scientific’, ‘Testing,’ and ‘Market Research’ approaches.

The study’s conclusion aligns with previous research, indicating that software start-ups often opt for lightweight methodologies. This finding has practical implications, suggesting that software start-ups could benefit from adopting such methodologies in their product development processes.

There is a preference among software start-ups to conduct activities having direct and visible impact on the offering and the venture. Supporting activities to prepare and evaluate tests were viewed as onerous and counterproductive.

Specific methodologies for collecting customer feedback may only sometimes be suitable. The research offers evidence that these methodologies may prove ineffective when applied to professionals as opposed to consumers.

2.2.3 Lean Product Development

In his book "Lean Startup", Ries (2011) delineates the Lean Startup methodology, which comprises three main sections: Vision, Steering, and Acceleration. The Vision section emphasizes the significance of validated learning in contrast to traditional product development processes and introduces the concept of hypotheses testing to achieve strategic objectives.

The Steering section, the heart of the Lean Startup methodology, is a testament to its customer-centric nature. It revolves around the Build-Measure-Learn processes, with a spotlight on the Lean Product Development (LPD) process. The process begins with creating a Minimum Viable Product (MVP), collecting customer data, analyzing the outcomes, gaining insights from the data, and implementing any required enhancements. This approach is structured to guarantee that the product aligns with the customers' needs and preferences. The primary aim is to reduce the time invested in the initial stages of product development and achieve Product-Market fit, a milestone that can only be reached through the active engagement of customers. The process begins with creating a Minimum Viable Product (MVP), collecting customer data, analyzing the outcomes, gaining insights from the data, and implementing any required enhancements.

In his 2011 work, Eric Ries explores the concept of product development acceleration, emphasizing the significance of testing a Minimum Viable Product (MVP) in the early stages of product development. Subsequently, he advocates for employing the Build-Measure-Learn (BML) feedback loop, a systematic process for iterative improvement. The BML feedback loop involves building a product, measuring its performance, and learning from this data to make informed decisions about the next steps in product development. Ries also introduces the innovative accounting process, a methodical approach designed to assess the progress and validate learning experiences in product development.

In essence, the Lean Startup methodology revolves around creating a Minimum Viable Product (MVP) and the subsequent testing of the MVP and other underlying hypotheses through the systematic collection of customer feedback data. The insights gleaned from the customer perspective guide iterative refinements to the MVP. This customer-centric approach provides a solid foundation for decision-making, rooted in validated customer feedback, thereby accelerating product development and substantiating product-market fit.

2.2.3.1 The Lean Start-up Methodology (LSM) for Product Development

Dennehy (2016) emphasizes the significant failure rate of newly developed products and startups in software and IT. The lack of a structured process for testing products and business models (Mullins et al., 2009; 2002; 2012) contributes to most new products failing to reach the market. This lack of structured approaches sometimes leads to misallocating resources and finances to untested products. Blank & Dorf (2006) address this issue, noting that companies are transitioning from traditional product development processes to a more robust, agile, customer-driven product development

process. However, Agile product development processes do not offer guidance on which products to build, presenting challenges for new startups (Bosch, et al., 2012; 2013).

In response to these product development challenges, many new startups have embraced the Lean Startup Methodology (LSM) focusing on delivering customer value and reducing waste during new product development (Harb & Blank, 2013; 2015). LSM is heavily influenced by the Customer Development Model proposed by Blank (2005), placing the customer at the forefront and offering a process for testing business model assumptions about markets, customers, channels, and pricing. Startups using LSM translate their vision into testable business model hypotheses, which are validated through rapid cycles of hypothesis-driven, customer-centric experiments using a series of 'minimum viable products' (MVPs). If test results are negative, companies may need to 'pivot' by changing elements of their proposed business model and testing new assumptions (Eisenmann, et al., 2012; 2015).

LSM equips product development teams with enhanced knowledge and creativity from customers and other stakeholders, empowering them to deliver high-quality products and generate value. The approach offers numerous advantages, such as validating business hypotheses, assessing product-market fit, promoting learnings, minimizing resource wastage, and mitigating risks (Blank, et al., 2012; 2013). Nevertheless, the effectiveness of LSM has primarily been supported by real-world evidence rather than extensive scholarly research.

Dennehy et al. (2016) further suggest that, much like other innovative methodologies, the evolution of LSM has been primarily industry-driven, with academia contributing relatively minimally to the research and development of its fundamental concepts (Blank, et al., 2008;2009;2011). Consequently, the adoption of LSM focuses more on practical implementation with less emphasis on understanding the value it brings

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2.2.3.2 Product Market Framework for LPD

The pioneering work by Dennehy, et al. (2016) introduced two innovative frameworks that address a crucial gap in Lean Startup Methodology (LSM) research. These frameworks focus on the challenge startup companies face in efficiently progressing their Minimum Viable Products (MVPs) to a Product-Market Fit (PMF). The first framework, the Viability, Feasibility, Usability, and Desirability (VFUD) Framework - From MVP to PMF, systematically links product viability, feasibility, and usability/desirability with lean product development. The VFUD Evaluation Framework's second framework provides a structured approach to transform prototypes into products that align with their target market. This process involves a series of steps, including user testing, iteration, and refinement, to ensure that the final product meets the needs and desires of the target market. These frameworks offer a systematic and objective method for both startup and established companies to design and evaluate their MVPs.

Furthermore, Dennehy, et al. (2016) not only presented the VFUD Evaluation Framework artifact but also provided a comprehensive set of generic evaluation questions for MVPs. Their work goes beyond theoretical discussions, delving into the practical implications of the lean concept and its relevance to research and development practices

and academia. These frameworks are not just theoretical constructs, but practical tools that can be readily applied in your own research and product development practices.

2.2.3.3 VFUD Framework for Product Development

According to Dennehy et al. (2016), in today's rapidly changing markets, businesses must continuously create products that meet customer demands to thrive. While fulfilling these demands can be challenging, they present opportunities for businesses to adapt their business models, enhance their skills and knowledge, enter new markets, and expand their operations. To remain competitive in the face of rapid change, businesses require product development frameworks that help them create products tailored to the market. Many product development teams often overlook the critical factor of product-market fit, despite its significant impact on the success or failure of a product in the market.Dennehy et al. (2016) have outlined two critical points: first, they have developed a conceptual framework linking product viability, feasibility, and usability/desirability to lean product development; and second, they have proposed an evaluation framework to help businesses design products that align with their markets.

Dennehy et al. (2016) and Blank (2016) initially discuss the limitations of a Product-Driven Process, which may be effective in a well-established market but often disregards the crucial aspect of customer needs and expectations. This approach frequently leads to uncertainty as companies overlook gathering insights into their customers or understanding why their customers would purchase their product or service. Understanding customer needs is not just a strategy, but a key to success in product development.

Subsequently, Johnson et al. (2000; 2002; 2012) examine the traditional Waterfall Process, a sequential design process in which progress is seen as flowing

steadily downwards (like a waterfall) through the phases of conception, initiation, analysis, design, construction, testing, production/implementation, and maintenance (Evdokimova, A., & Ovsiienko, K,.2015).This model adjusts the product-driven model to address market expectations. However, this model presents its own challenges, such as the difficulty of managing a large set of requirements due to its sequential nature. The Agile Process is then introduced as an incremental process that encourages iterative learning between an organization and its customers. Despite its benefits, the Agile Process also has its drawbacks, including difficulties in scaling and the need for commitment from customers (Bahli et al., 2016).

The Lean Start-up Methodology (LSM), derived from the agile family of methodologies, is not just a proposed approach but a proven and suitable one for dealing with high levels of uncertainty, particularly in environments such as software product development (Kodukula, 2016). Core principles of LSM involve the reduction of waste, maximizing learning, deferring decisions, rapid delivery, and gaining a comprehensive understanding of the overall situation (Cohen et al., 2004). Ries (2011) advocates for a swift launch of a 'Minimum Viable Product' (MVP) to secure a wealth of validated learning from the market with minimal effort and cost. This methodology instills confidence and reassurance in businesses, knowing that they are on the right path to success.

Dennehy et al. (2016) have introduced a framework developed from their academic and practitioner research to guide adopting a lean start-up approach, assisting in the iterative progression from an MVP to acquiring Product Market Fit (PMF). This framework emphasizes three overlapping criteria in human-centered design that a new product concept must meet to attain market success: viability, feasibility, and usability/desirability. The ultimate aim is to position the resulting solutions at the

intersection of these three criteria, known as the ‘sweet spot,’ where optimum innovation occurs. This is achieved by understanding the needs of the end customer and creating products or services that fulfill their needs and desires while also generating significant value for the company.

2.2.3.4 The VFUD Evaluation Framework

Dennehy, et al. (2016) presents the VFUD Evaluation Framework, an innovative tool crafted by our research group. This cutting-edge framework is designed to guide product development from the basic Minimum Viable Product (MVP) to the accomplishment of a Product Marketing Fit (PMF). The journey starts with ideas that ignite the creation of a new product, forming the foundation for the initial MVP. The business then embarks on the empathy phase, engaging with current or potential customers through methods like focus groups and field observations of users interacting with the MVP in its intended environment.

The feedback collected during this stage is analyzed to determine if PMF has been achieved. If the result is negative, the MVP is adjusted based on the input, and the evaluation process is repeated until PMF is achieved. To oversee this process, Dorf and Blank (2012) recommend using a Product Positioning Statement Template, which captures essential product characteristics such as its name, version, target audience, category, key benefits, and distinguishing features from similar products in the market.

Furthermore, researchers have developed a set of practical evaluation queries to assist professionals in assessing an MVP's viability, feasibility, and usability/desirability. These questions examine three perspectives: the viability lens (business), the feasibility lens (technology & architecture), and the usability & desirability lens (human values). While these questions are not exhaustive, they provide a solid foundation for businesses

to ask relevant evaluation questions, ensuring the evaluation process stays on track. This suite of evaluation questions allows businesses to objectively assess their MVPs, ensuring that designers and design teams are not biased in their perception of their MVPs, which may be technologically viable but could lack the viability and/or usability/desirability to succeed.

Dennehy et al. (2016) further probe into the implications of the Lean Startup Methodology (LSM) for research and development (R&D) practitioners and academic researchers. Despite LSM's escalating popularity, there exists a need for more frameworks to guide businesses in accomplishing Product Marketing Fit (PMF). The authors' collaborations with industry magnify the necessity of developing such frameworks to shepherd businesses in LSM and designing and evaluating Minimum Viable Products (MVPs) to ensure PMF.

Nonetheless, Dennehy et al. (2016) highlight several bottlenecks in the comprehension of LSM among practitioners and academics, including ambiguous key lean concepts like MVP and PMF, a missing cumulative tradition where new theories supplement existing research, and limited LSM applicability in diverse scenarios.

To counter these challenges, Dennehy et al. (2016) crafted two frameworks using a design research strategy: the VFUD Framework—From MVP to PMF and the VFUD Evaluation Framework. These frameworks equip startups and well-established companies to design and evaluate their MVPs objectively, launching new products via a recurrent 'designing and evaluating' process. The authors noted that these frameworks aid businesses in product development and fortify their conceptual models of introducing new products.

However, Dennehy, et al. (2016) underline that a comprehensive, long-term analysis is crucial to discuss the lasting effects of these transformations. They also urge

the wider research community to make substantial contributions towards the theoretical advancement of the lean concept and to explore its applicability to new domains (Conboy, et al., 1976; 2004). This call for collective effort underscores the shared responsibility in shaping the future of product development and the Lean Startup Methodology.

2.3 Market Research (MR)

2.3.1 Introduction

Christensen (1997), in his book The Innovator's Dilemma, presents a different perspective. He argues that leading companies such as Digital, IBM, Apple, and Xerox lost their market dominance not because of market research but due to an overemphasis on customer feedback. This approach led to incremental enhancements rather than breakthrough innovations. Ovens (1998) supports this view, arguing that purchase intention surveys are not reliable predictors of new product sales. While market research can provide valuable insights, it's essential to acknowledge its limitations. Traditional new product development processes, including market research, segmentation, competitive analysis, and forecasting, are criticized for producing commonplace products and stifling innovation. For instance, James Dyson's bagless vacuum cleaner faced initial skepticism despite its eventual success. Morone's (1993) study suggests that successful product innovations blend discontinuous product innovations with incremental improvements. This contradicts the belief that Japanese firms succeeded in the 1980s by copying and improving US and European technology. Instead, the most successful Japanese firms have been leaders in research and development, suggesting the role of technology-push approach to

product innovations, enabling a company to strategically target and dominate premium market segments while establishing its technology as the industry standard.

2.3.2 Application of Market Research in New Product Development

Brown (1995) developed a model of factors affecting product development success, highlighting the role of various agents and the distinction between process performance and product effectiveness. However, the potential hindrance of customers in the product development process is not discussed. Despite high-profile failures like RCA's Video-disc, Procter & Gamble's Pringles, and General Motors' rotary engine, the market research industry argues that extensive market research can prevent such losses. It's crucial to note that a significant number of new products fail because they don't satisfy consumer needs and wants, with a staggering 80%-95% of new products failing to establish a market presence after two years (Barrett, 1996). This stark reality underscores the significant role of market research in understanding consumer needs and wants, and thus, in preventing product failures. Through comprehensive market research, organizations can cultivate a profound comprehension of their target demographic, including their preferences and requirements. This process mitigates the potential for product failure while enhancing the likelihood of achieving success.

Hamilton (1982) espouses a market-driven outlook, emphasizing the substantial role of comprehensive market research. This standpoint is widely recognized and has been predominant in the realm of management ideology. An example of a market-driven strategy is conducting thorough market research to pinpoint consumer needs and preferences. This would involve the development of products curated to these specific demands. Additionally, Hamilton(1982) contends that market research guarantees consumer-centric company strategies, ultimately leading to the development of more successful products.

However, the involvement of market research in new product development is a contentious subject, with ongoing debates on whether technology-driven influences or market-pull factors spur product innovations.

The intricacy of the discourse on market research's role in product innovation is particularly pronounced in the context of discontinuous product innovations, where no pre-existing market is present. In such instances, market research may yield inconclusive outcomes (Brown, 1991), as consumers often find it difficult to articulate their needs. Hamel (1994) proposes that customers may lack foresight, prompting scientists and technologists to question the relevance of their innovative technologies when they are dismissed based on market research findings. In the case of discontinuous product innovations, market research is viewed with skepticism (von Hippel, 1999), suggesting that the application of such methods may impede significant innovations, implying that less market research may be needed for major product innovations.

Trott (2001) puts forth two clear propositions: P1, which suggests that a low information symmetry between buyer and consumer, meaning that the buyer has more information than the consumer, could limit the effectiveness of any conducted market research, and P2, which points out that a high installed base effect, referring to the tendency of consumers to stick with familiar products, could hinder the success of market research initiatives.

2.3.3 Four Conditions Which Impact The Market Research

Market research often fails to anticipate potential challenges with new products due to low buyer information and a significant installed base effect. The installed base effect refers to the existing infrastructure or systems that a new product must integrate with or replace, which can be substantial and hindered by the buyer's limited understanding of the technology.

Trott (2001) discusses four different conditions under which market research is conducted and its implications for product development.

1. Learning from lead users: Conventional market research methods gather information from the target market's core. However, the 'lead user' process, introduced by Von Hippel and Thomke (1999), focuses on users who are ahead of the mainstream market in terms of their needs and innovations. These lead users are often early adopters or innovators who have already created solutions to their unique needs. The development teams' task is to identify and adapt these ideas to the company's requirements, anticipating that these needs will eventually become mainstream.
2. Market research may impede the development of innovative new products: In situations with low information symmetry, initial market research may yield unfavorable results due to the buyers' lack of information and knowledge. The challenge here lies in educating and persuading buyers about the benefits of the innovative new product. This aspect of traditional market research presents an intriguing challenge for academic researchers to explore and understand. For example, when electric cars were first introduced, consumers were skeptical about their performance and range, leading to initial market research results that did not accurately reflect the market potential. The challenge here is to educate and convince buyers of the benefits of the innovative new product, such as the environmental benefits and cost savings in the long run.
3. Market research needs to be more helpful: In conditions where industrial buyers operate within a high technology base, market research is arduous and arguably unproductive. In such cases, the role of third-party intermediaries, such as IT analysts, becomes significant. These intermediaries have the

expertise and knowledge to understand and interpret complex technological information, bridging the gap between the technology and the buyers.Evidently, they can provide valuable insights and recommendations that can effectively steer product development during these challenging scenarios (Vestey, 2000).

4. Market research is unable to warn of potential difficulties with the new product: In situations with low levels of buyer information and a high-installed base effect, market research offers little insight. The changes involved may be substantial, and the buyer's low understanding of the technology may prevent them from comprehending the potential benefits.

2.4 Product Quality and Performance (PQP)

2.4.1 Introduction

In his seminal work from 2002, Rose deep dives into the definitions of quality and performance for new products and the various dimensions of product quality. This understanding of quality and its evaluation is not just important but crucial.

There are five major approaches to comprehending and measuring quality:

Table 2.3: Quality definitions

Definition	Description
Transcendent	Physical and performance meet design specifications
Product-Based	Performance, feature, durability
User-based	Aesthetics, perceived quality
Manufacturing-based	Conformance, reliability
Value-based	Conformance at acceptable price

In addition to these definitions, Garvin (1987) identifies eight dimensions of product quality:

Table 2.4: Quality dimensions

Dimension	Description
Performance	Primary function of the product
Features	Secondary function of the product
Reliability	Probability of failure-free performance over the specified time
Conformance	Physical and performance meet design specifications
Durability	Useful product life
Serviceability	Easy to service and maintain
Aesthetics	The product looks, feel, sound, taste, smells and personal preference
Perceived	Unstated requirements, Brand name image

These dimensions can be used to differentiate the five traditional approaches to quality definition: the product-based approach emphasizes performance, features, and durability; the user-based approach centers on aesthetics and perceived quality; and the manufacturing-based approach focuses on conformance and reliability. Madu (1995) suggests that price, product features, and product reliability are key drivers of customer satisfaction.

2.4.2 Relationship Between Quality, Performance, and Customer Satisfaction

Rose (2002) explores the relationship between product quality and performance, highlighting certain quality dimensions as more vital than others. It also discusses how quality and performance impact customer satisfaction. The absence of essential

measurements to monitor customer satisfaction, employee morale, and management leadership is attributed to inadequate measurement and poor quality (Juran, 1993). However, before quality can be measured, it must be defined, and it is noted that there is no single global definition of quality (Bettman, 1993).

Rose (2002) investigated how firms define quality and which product quality dimensions are vital to their competitive strategy. The study aimed to establish connections between the five quality definitions and the eight quality dimensions. In addition to exploring these relationships, the author examined how firms define quality and which product dimensions they consider crucial for competing based on quality.

Rose (2002) presents the following relationships between five quality definitions and the eight quality dimensions.

Table 2.5: Quality definitions' rankings

Rank	Quality Definition	Mean(n=150)	Standard Deviation
1	Transcendent,	4.13	0.82
2	Product-Based,	3.85	0.90
3	User-based,	3.77	0.82
4	Manufacturing-based	3.54	0.99
5	Value-based.	3.01	1.01

Table 2.6: Quality dimensions' rankings

Rank	Dimension	Mean(n=150)	Standard Deviation
1	Performance	4.58	0.64
2	Features	4.47	0.67
3	Reliability	4.40	0.75

4	Conformance	4.30	0.98
5	Durability	3.93	1.07
6.5	Serviceability	3.58	1.03
6.5	Aesthetics	3.58	1.06
8	Perceived	3.29	1.27

The survey results indicated that "performance" emerged as the most critical quality dimension for companies seeking a competitive edge. Additionally, "conformance," "perceived quality," and "reliability" all received ratings above 4 on a 5-point scale, signifying their importance. Consequently, four out of the eight quality dimensions were identified as essential for firms' competitive strategies

2.4.3 Garvin's framework

A strategic tool outlining eight product quality dimensions, offers valuable insights for organizations as they shape their competitive strategies. This framework not only establishes a clear connection between Garvin's quality dimensions and the five definitions of quality but also empowers firms to strategically align their products with customer expectations. The user-based definition focuses on aesthetics and perceived quality, while the manufacturing-based definition emphasizes performance and features.

According to Garvin (1987), firms are not required to pursue all eight dimensions simultaneously. Instead, they are reassured that they can strategically target a specific quality niche. By condensing the eight product quality dimensions into a more manageable set of meaningful factors, such as 'hassle-free use', 'fit for intended use', and alignment with customers' tastes and preferences, firms may find it simpler to carve out their unique niche.

2.5 Value Proposition (VP)

2.5.1 Introduction

Wormald (2015) examines the concept of a 'value proposition' (VP) statement. The term 'Value Proposition' (VP) is commonly used in business, particularly in new product development. Wormald (2015) conducts a literature review to comprehend the value proposition across different businesses. He then meticulously examines the evolution of the 'Value Proposition' from its initial stages in business innovation methodology to its current role in business modeling utilized by entrepreneurs and product development teams, as well as its concept in the new product development arena, providing a comprehensive and enlightening understanding of its significance.

The research probes into the value proposition utilized by design teams, focusing on industrial design organizations and websites across various countries. Companies pursue marketing success through diverse strategies, including the development of innovative products and new business processes such as new products, manufacturing processes, customer relations, delivery channels, and financial management. Osterwalder and Pigneur's book "Business Model Generation" (2010) emphasizes the value proposition (VP) as a central element in the model of new business opportunities, defining it as the reason customers opt for one company over another by solving their problems or satisfying their needs.

2.5.2 Developing and Articulating a Value Proposition

Wormald (2015) notes that the value proposition, often overlooked by product design teams and companies, is in fact integrated into the product development phase in several large corporations. He views the value proposition as a method of communication

that aids in developing and articulating the value offered, functioning not only for design teams but also for sales and marketing. This collaborative approach facilitates the alignment between product development and marketing teams throughout the development process, emphasizing the importance of crafting and utilizing a value proposition for organizations aiming to introduce innovation into their products and services. Moreover, Keeley (2013) characterizes innovation as the introduction of a new Minimum Viable Product (MVP) and aligns the value proposition with an offering of value. Anderson (1999) defines the value proposition as a marketing statement that elucidates why a customer should invest in a particular product or service.

Key Elements of a Value Proposition (Moore, 2002)

1. Target Users: Identification of the primary audience who will benefit from the product.
2. Unmet Needs: Addressing the specific needs or gaps that the product will fulfill.
3. Proposed Products: Outlining how the product addresses these needs.
4. Key Benefits to Users: Highlighting the main advantages the users will experience.
5. Differentiation from Competition: Specifying what sets the product apart from other available options.

Hardy (2006) further highlights the significance of using the value proposition (VP) to analyze businesses internally and externally. According to Hardy (2006), the value proposition (VP) enables enterprises to adopt a customer-centric viewpoint, focusing on the benefits received by the customers from the business, its products, and services. His

book also suggests how developing a value proposition (VP) can enhance the company's performance.

The practical significance lies in the potential of Value Proposition (VP) as a valuable tool for product development teams. Additionally, the VP can establish connections between:

• Research knowledge and product realization

- Strategic objectives and product development
- Creativity and Innovation
- Analysis and Synthesis of market requirements

In the transition from ‘pre-product’ to ‘post product’ within a New Product Development (NPD) process, Wormald (2015) suggests that strategic business objectives can be achieved by developing innovative products using Value Proposition. Value Proposition facilitates a connection between businesses and design teams, encompassing ideation and product development, to help organizations deliver innovations to their customers. The concept of “Sustainable Value Proposition Design” is introduced in the article, discussing sustainable innovative business models and customer-driven innovation that can create customer-focused value propositions (Baldassarre, 2017). This approach holds the potential to not only meet customer needs but also contribute to a more sustainable future, a prospect that should inspire optimism in our audience.

Furthermore, in the context of customer value propositions (CVPs), Baldassarre (2017) argues that CVPs are a very focused and iterative, aligning with the needs of the target market. This alignment is not a mere coincidence but a deliberate strategy to ensure the effectiveness of value propositions. It is emphasized that value propositions provide benefits rather than just product features (Fisk, 2009), a reassurance that should instill confidence in our audience about the value of this approach.

Baldassarre (2017) also discusses the unsustainable nature of existing modes of living and business practices due to population growth, a growing middle class, and resource usage. Emphasis is placed on the sustainable development of innovative products, understanding customer and market needs, remaining flexible for requirement modifications, and solving real business problems.

Baldassarre (2017) argues that the existing modes of living and business practices are not sustainable due to population growth, a growing middle class, and other resource usage. They emphasize the need for sustainable development of innovative products, with an understanding of customer and market needs, while staying flexible for requirement modifications and solving real business problems.

2.6 Distribution Channels (DC)

2.6.1 Introduction

According to Neves et al. (2001), distribution channels are not just a means of distribution but essential for establishing sustainable competitive advantages. These marketing channels are characterized by their long-term nature, requiring a consistent structure that strongly emphasizes people and relationships. The 4 Ps of marketing (product, place/distribution channels, price, and promotions/communications) underscore the collaborative nature of distribution channels in creating a competitive edge. It is the enduring competitive advantages that distribution channels provide, due to their long-term orientation and emphasis on human connections, that truly make them indispensable. Kotler and Keller (2012) elaborate further on this by presenting a series of steps derived from the review of four existing models in the literature.

2.6.2 Model for Distribution Channel Planning (Neves et al., 2001)

Neves et al. (2001) have proposed a set of sequential steps, derived from examining four existing supply chain models in literature that have practical implications for companies. These steps, including contributions from supply chains, were further refined through the analysis of models by Stern & El-Ansary (1996). The variations among the models were elucidated, with Stern et al.'s model emerging as the most comprehensive, focusing on the consumer. Neves et al. (2001) underscore the integration of the company's strategic planning with its distribution channels in Rosenbloom's model, whereas Berman's model offers detailed lists for each step. These models provide a framework companies can use to customize their distribution channels, enhancing their competitive advantages.

The process begins with a comprehensive assessment of the entire supply chain. This is followed by an overview of the distribution channels within the industry and the particular company. An in-depth environmental analysis is then conducted to comprehend the external factors affecting these channels. Power analysis within the channels is essential for understanding each channel member's influence over others.

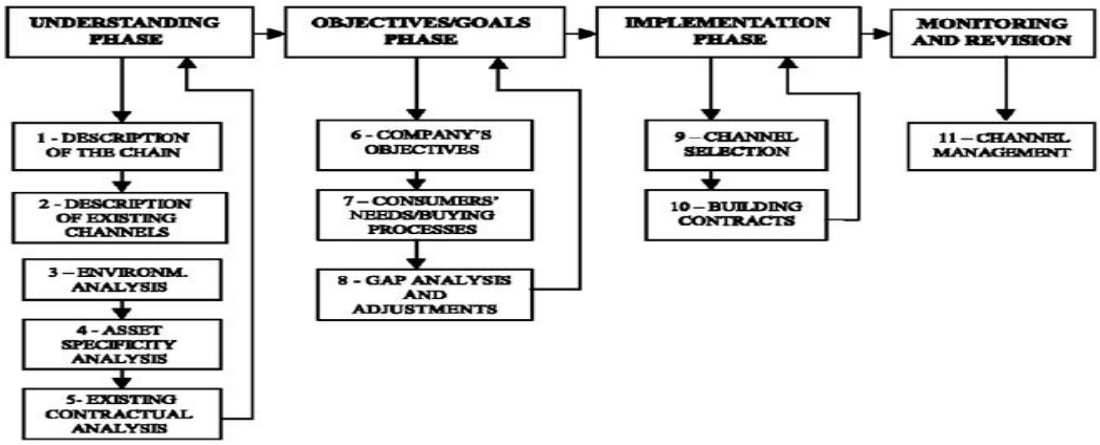

Figure 2.1: A model for the distribution channels planning process

As outlined by the author, the sequence of steps commences with an initial understanding phase. This sequence applies whether it's a new distribution system or a regular revision of current channels. The author has delineated four distinct phases of the planning process for developing distribution channels, each serving a specific purpose.

2.6.2.1 Phase 1: Understanding phase

The initial phase, known as the understanding phase, is of utmost importance as it lays the groundwork for the entire distribution channel planning process. This phase encompasses a total of five distinct steps, each crucial in its own right.

Step 1: Description of the entire supply chain

The distribution channels planning process is a strategic approach designed to comprehensively understand all the entities involved in a supply chain, from raw material suppliers to end consumers. Its purpose is to enable the analysis of competing chains for a specific product. This is particularly beneficial for diversified companies that require comprehensive descriptions of all their operational chains, including negotiating entities such as suppliers and retailers. A thorough understanding of the entire chain is essential in the food sector, where traceability is increasingly important. This knowledge also plays a significant role in enriching the environmental analysis phase.

Step 2: Description of distribution channels

The following step entails providing a comprehensive overview of all entities operating within a specific industry's distribution network. The objective is to gain a deeper insight into the functions and roles of these entities. The analysis encompasses consumption data, industry metrics, key companies, and other pertinent information. While an industry-wide distribution network analysis is initially conducted, it is imperative to subsequently focus on an individual company's channels, which may differ

from the broader industry. Sales and financial data play a critical role in assessing the importance of these channels for a company's revenue and profitability. Building on prior research, (Neves et al., 2001) recommend examining four distinct flows: products and services, communication, information, and payments/financial. Each flow is further segmented into specific functions, involving the relevant stakeholders and potential alternative solutions. This meticulous approach ensures a comprehensive comprehension of the distribution channels, laying the groundwork for subsequent environmental analysis.

Step 3: Environmental analysis and impacts on the channel

The following section explores the importance of understanding fluctuations and ambiguities in the business milieu and their effects on distribution channels. Environmental uncertainties can drive firms to adopt governance structures that minimize transaction costs, as proposed by Williamson (1985). However, a degree of flexibility in governance can prove advantageous, even if it results in heightened transaction costs. The use of the "step" analysis tool is recommended to evaluate potential factors impacting industry and company channels, encompassing socio-cultural, economic, technological, and political influences. It is advised to use tables to elaborate on the drivers, consequences, and impacts of each environmental aspect. For instance, one could examine how the integration of the Internet by farmers affects sales and communication. The document also highlights the significance of power analysis in channels, which pertains to the ability of one channel member to influence another. This analysis is crucial in strategic decision-making and guides decisions regarding channel strategy (Neves, et al., 2001).

Neves (2001) proposed creating a separate table for each of the four environmental factors (political/legal, economic/natural, socio-cultural, and technological) with four column headings as follows:

(1) Drivers;

(2) Implications;

(3) Probability; and

(4) Impact.

Step 4: Asset specificity analysis

Asset specificity analysis is crucial for companies to establish contracts and partnerships. It provides valuable insights into organizing and coordinating transactions within the channel. Anderson (1992) has highlighted the strategic implications of asset specificity in channel integration. When firms face asset specificity, uncertainty, and high transaction frequency, they often seek governance structures to minimize transaction costs. Key specificities include physical assets, time, information and knowledge technology, human resources, location, and marketing/transaction specifics such as unique brands or communication developed for a particular transaction. It is advisable to create a table for each specificity, outlining the owner of the asset, the specificity, and potential costs or alternative uses.

The article delves into the analysis of Asset specificity, covering a range of investments, including physical, technological, human, and marketing. This comprehensive approach ensures that readers gain a thorough understanding of the topic.

(1) Time

(2) Human

(3) Physical

(4) Location

(5) Information technology

(6) Marketing (brands/communications)

A table with the following three-column headings can help

(1) Transaction costs

(2) Impact

(3) How to reduce it

A table incorporating the four designated column headings is recommended to analyze monitoring activities and evaluate performance attributes comprehensively.

(1) List of activities

(2) Ability to monitor (high/medium/low)

(3) Observability of activity (high/medium/low)

(4) Cost of monitoring (high/medium/low)

2.6.2.2 Phase 2: Existing contractual analysis

This involves a thorough review of the company's current contracts with suppliers, distributors, and other partners, and benchmarking of distribution practices, which entails comparing the company's distribution methods and strategies with those of industry leaders to identify areas for improvement.

Understanding the governance of relationships in the distribution channels of the company's industry is not just important; it is empowering. It enlightens the deployment of coordination methods, typical contractual practices, and purchasing procedures, providing the knowledge to make informed decisions. This understanding informs whether the proposed coordination methods for the next steps are feasible and whether they will incur substantial negotiation and learning costs. Additionally, it is important to evaluate and learn from the best practices of the leading competitors in the industry.

Step 5: Existing contractual analysis and benchmarking of distribution practices:

This step involves a thorough review of our existing distribution contracts and a comparison with industry benchmarks.

It is indispensable to comprehend the governance of relationships within a company's industry's product distribution channels and to analyze and evaluate the best practices of key competitors thoroughly.. This includes coordination modalities, standard contractual practices, and procurement procedures. This profound understanding is pivotal in determining whether the proposed coordination modalities for upcoming stages are overly complex and involve significant negotiation and learning costs.

2.6.2.3 Phase 3: Objectives of the Company

Step 6: The objectives of the company

The step emphasizes aligning distribution channel objectives with a company's strategic marketing plan. Objectives should be consistent with price, product, and communication strategies.

Defining objectives is not just about considering a range of metrics; it's about strategically choosing the right ones that pertain to different channels. These metrics, such as sales volume, profit margins, market share, customer satisfaction, and inventory turnover, among others, are tools for success. It's also essential to factor in behavior-based measures such as service department efficiency, warranty claims processing, and salesforce skills. This strategic process will involve creating multiple tables, forecasts, and tools for goal-setting, giving the power to steer your business in the right direction.

Step 7: The consumer’s objectives, needs and buying process

It is essential to recognize the importance of conducting marketing research to gain insight into the preferred distribution system from the consumer's point of view. Considering the high costs associated with such research, it is crucial to customize the approach to align with each company's specific objectives. Stern and El-Ansary (1996) highlight the creation of customer-centric distribution systems and recommend various methods for measuring consumer satisfaction. A qualitative phase is suggested for identifying relevant attributes based on customer experiences, which then informs the design of a quantitative questionnaire. Functions and lists can be helpful in understanding consumer needs. Furthermore, understanding clients' buying process is crucial, as Neves et al. (2001) emphasized.

Step 8: Gap analysis and quick adjustments

The company evaluates its perspective on the preferred distribution channel and consumer preferences in this phase. Harmonizing the company's goals with market constraints and internal limitations is crucial. Stern & El-Ansary (1996) emphasize the idea of "quick adjustments," indicating that the insights obtained from previous stages can be promptly implemented in existing channels if they provide clear advantages.

2.6.24 Phase 4: Implementation phase

Step 9: Selection of channels and negotiation

After setting objectives, a company can select its channel structure and members, assuming it has the necessary flexibility. This decision is affected by agent availability, relationship dynamics, and other factors that have been previously examined. When it comes to negotiations, several techniques are available, and successful negotiation frameworks are outlined in Lynch's "Business Alliance Guide" (1993).

Step 10: Building contracts and relationships

In this stage, the primary emphasis is on formulating contracts or agreements with channel partners. These contracts may take various forms, including written, oral, or other modalities as previously coordinated. They should encompass considerations of potential opportunism, enforcement mechanisms, adaptability to changes, exit barriers, incentives, and monitoring (Boyle, et al., 1992). Investigating the target market's legal framework is imperative to ensure distribution strategies' viability. Seeking counsel from legal professionals is advisable. The contracts should encompass anticipation of potential conflicts and delineation of methods for conflict resolution. Bremen (1996) delineates diverse sources of conflict and recommends resolution techniques such as sensitivity training and joint goal setting. Conventional contract models are available in marketing channel literature for franchises. As for strategic alliances or joint ventures, Lynch (1993) offers guidance.

2.6.2.5 Phase 5: Monitoring and revisions

Step 11: Channels management

In the final phase of the process, effective channel management takes center stage. The existing literature provides a wealth of techniques and skills for successful channel management. Establishing strong partnerships and trust is of utmost importance. It is recommended to apply theories of relationship marketing, commitment, and trust in channel management (Morgan, 1994). Additionally, paying attention to physical processes, logistics, and member motivation is crucial, as indicated by Rosenbloom (1999) who suggests various motivation techniques. The development of trust in transactions is well-documented, with Doney (1997) providing valuable insights. Anderson and Weitz (1992) outline factors that contribute to enhanced trust in a manufacturer, such as reputation, goal alignment, and balanced power dynamics.

However, it is essential to consider the potential drawbacks of strong commitments, such as reduced incentives for excellence. Gattorna (1996) highlights the importance of continually monitoring consumer satisfaction, with research frequency being determined by the time required for implementation. Doney's (1997) insights offer new perspectives on the existing literature, and their applicability to private sector organizations looking to design their channel strategy is evident.

- The role of distribution is to guarantee the timely delivery of products to the right place and in the right quantity.

- Despite being analyzed early in the 20th century, distribution continues to be a prominent subject in marketing literature.

- Channel theory has two orientations: economic (focusing on the efficiency of the channel) and behavioral (concentrating on power, cooperation, satisfaction, and conflict within channels).

The determination of the distribution structure is contingent upon various factors.

- The product class, categorized as convenience, shopping, and specialty goods, plays a pivotal role in shaping the distribution structure.

- Additionally, product attributes such as replacement rate, gross margin, adjustability, timing of consumption, and search time hold sway over distribution determinations.

- Scholars have drawn a correlation between distribution structure and product characteristics, consumer behavior, and market components.

- A comprehensive framework is outlined, encapsulating multifarious facets that may influence a firm's preference for a distribution channel. Various authors have linked distribution structure with product characteristics, consumer habits, and market factors.

- Scholars have drawn a correlation between distribution structure and product characteristics, consumer behavior, and market components.

- A comprehensive framework is outlined, encapsulating multifarious facets that may influence a firm's preference for a distribution channel

- The study underscores the exigency for further inquiry into distribution intensity.

- The elucidated framework lays the groundwork for prospective empirical studies aimed at comprehending channel design and the determinants of distribution channel choices.

2.7 Customer Feedback (CFB)

2.7.1 Introduction

Customer feedback is crucial in the product development process as it provides insights into customer needs, preferences, and pain points. Effective use of customer feedback can significantly enhance the likelihood of new product success by ensuring relevance and satisfaction.

Theoretical Perspectives:

- Veryzer (2003):
    - Emphasizes the importance of aligning new solutions with genuine consumer needs and preferences.
    - Innovation often requires a shift in consumer behavior, which can be guided effectively through continuous feedback.
- Mozota (2005):

- Advocates for the adoption of user-oriented design (UOD) to enhance new product development.
- UOD not only provides a deeper understanding of design challenges but also helps in expanding the potential of the product.

2.7.2 Integrating Customer Feedback into Product Development

To design products that meet customer expectations, integrating systematic and continuous feedback mechanisms into the product development process is essential. This approach aligns products more closely with market needs and reduces the risk of product failure.

Steps for Effective Customer Feedback Integration:

1. Gathering Feedback:
    - Use various methods such as surveys, interviews, focus groups, and usability testing to collect comprehensive customer insights.
2. Synthesizing Feedback:
    - Utilize tools like affinity diagrams to categorize and organize feedback.
    - Use the Analytical Hierarchy Process (AHP) to prioritize feedback based on importance and impact.
3. Incorporating Feedback into Design:
    - Translate prioritized feedback into actionable design objectives and requirements.
    - Use Quality Function Deployment (QFD) to ensure that feedback reflects accurately in the product design.
4. Continuous Monitoring:

- Establish mechanisms for ongoing collection and analysis of customer feedback even after the product launch.
- Adapt and improve the product based on new feedback to maintain market relevance and customer satisfaction.

2.7.3 Challenges and Strategies

Several challenges exist in effectively integrating customer feedback:

- Volume and Variety of Feedback:
  - Managing and synthesizing a large volume of feedback from diverse sources can be overwhelming.
- Prioritization:
  - Determining which feedback to prioritize requires a systematic approach to ensure the most critical issues are addressed.
- Feedback Overload:
  - Balancing the need to incorporate feedback without overwhelming the product development process.

Strategies to Overcome Challenges:

- Structured Feedback Tools: Use structured tools like the Kano Model to differentiate between essential and non-essential features.
- Iterative Development Cycles: Implement iterative development cycles to gradually incorporate feedback and make continuous improvements.
- Cross-functional Teams: Engage cross-functional teams for gathering, synthesizing, and implementing feedback for a holistic approach to product development.

2.8 Conclusion & Gaps in Literature

The literature review scans the primary reasons why a significant number of newly developed products fail to succeed in the market. According to (Christensen, 2013), (Guthrie, 2021), (Cooper, 2001), and the Product Development and Management Association (PDMA), 45% to 95% of products, depending on the product and industry types, never make it to the market. Therefore, the literature review aims to uncover the major causes behind these high failure rates. It focuses on understanding the role of comprehensive market research in achieving a perfect alignment between the product and its target market, commonly referred to as Product-Market Fit (PMF).

Product-market fit (PMF) is a leading factor contributing to approximately 25% of product failures (CB Insight, 2019). A significant cause of product failure is the lack of thorough market research. CB Insight (2019) estimates that about 20% of product failures stem from inadequate or inaccurate market research. CB Insight (2019) also suggests that roughly 20% of new products fail due to not meeting customer expectations regarding quality and performance. An additional finding by CB Insight (2019) is that about 15% of failures can be attributed to a lack of differentiation from competitors. Moreover, insufficient distribution networks can significantly impact a product's success. According to Kottler & Keller (2012), approximately 10% of product failures are due to distribution issues. Lastly, disregarding customer feedback can lead to around 10% of product failures (Schreier & Fuchs, 2011).

The high failure rate of products is a significant issue, and understanding its causes is crucial. Six primary causes have been identified, each playing a significant role in product failure:

1. Product-Market Fit (25% of failures): Products that do not meet market needs.

2. Inadequate Market Research (20%): Failures resulting from insufficient or inaccurate market data.
3. Product Quality or Performance (20%): Products failing to meet customer quality and performance expectations. Quality is assessed through five approaches and eight dimensions to guide product development.
4. Value Proposition (15%): The inability to offer a unique or differentiated value compared to market competitors. Lack of a unique Value Proposition is responsible for an estimated 15% of product failures (CB Insight, 2019).
5. Distribution Channels (10%): Failures arising from distribution challenges.
6. Neglecting Customer Feedback (10%): This is a critical factor, as it involves ignoring valuable customer input and feedback, which can significantly impact product success.

As per (CB Insights, 2019) and (Statista, 2020), a staggering 80%-85% of consumer goods and 85%-90% of tech and software products fail to achieve market success. In 2020, the tech market in the U.S. was worth around $1.9 trillion, and the consumer goods market was about $2 trillion (Statista, 2020). These two industries, constituting a significant portion of the U.S. economy at $3.9 trillion a year, are in dire need of a new approach to product development.

In the dynamic market landscape, businesses must continuously innovate, ensuring their products align with customer needs. This demands a shift in business models, skills enhancement, and market penetration. This research, with its focus on addressing the six primary product failure modes, aims to develop a new product

development framework that holds the potential to dramatically increase the success rate of new products in the market.

Piamonte (2016) highlights the challenges faced by new startups and products, citing a 95% failure rate in achieving market success. He advocates using the Business Model Canvas and Lean Startup Methodology to attain product/market fit. Göthensten & Hellström (2017) observe that many software startups prematurely launch their products and propose four strategies for ensuring market fit, noting a trend towards more straightforward approaches. Ries (2011), in "Lean Startup," advocates a systematic approach to product development, focusing on learning from real-world feedback. Another source underscores the significance of the Lean Startup Methodology and its reliance on customer feedback despite being primarily supported by real-world success stories. The VFUD Framework is also noted for helping startups refine products for better market fit. These papers collectively stress the critical nature of aligning products with market needs and the methodologies and frameworks involved in achieving product-market fit.

Christensen (2003) posits that larger corporations such as IBM and Apple relinquished their top positions due to an excessive focus on customer preferences, neglecting innovation and novel concepts. This excessive customer-centricity, which refers to a business strategy that prioritizes the needs and wants of the customer above all else, can have potential drawbacks. Ovans concurs, stating that gauging customer interest alone does not always indicate a product's market success. Several renowned products, like Dyson's vacuum, initially faced skepticism but later achieved success. Trott (2001) delves into the emergence of unique innovations by Japanese firms in the 1980s, highlighting their leadership in pioneering new creations rather than imitating others. In contrast, Eisenhardt's model (1995) outlines factors contributing to successful product

development while overlooking the potential drawbacks of excessive customer-centricity. Despite extensive market research, major corporations have experienced product failures, as many new products fail to align with consumer needs. Market research is widely believed to enhance the likelihood of product success. However, market research efficacy diminishes when introducing entirely original and unconventional products, lacking an existing market for reference. Some experts posit that traditional market research might be less effective in such scenarios.

The literature reviews offer valuable insights into product market fit but neglect to explore product problem fit. Additionally, they must delve into the technical aspects and mechanics of achieving product market fit. While most research explain product market fit, they often lack information on how to achieve it.

Market research can sometimes hinder the development of new ideas. If potential buyers lack knowledge about a new product, they may not recognize its value. However, effectively communicating the product's benefits is the key to overcoming this challenge. In certain industries, such as the tech sector, where existing technology is prevalent, traditional market research methods may not provide meaningful insights. This is particularly true when potential buyers are unfamiliar with a new technology and when there is already a significant amount of existing technology in the market. But by effectively communicating the unique benefits of a new product, market research can still play a crucial role in product development.

One major challenge is the lack of market data for new technologies and innovations. There is often insufficient information available to conduct thorough market research. Paul Trott (2001) does not address assessing market receptiveness to new innovative products. This highlights a significant challenge in market research, particularly when it comes to assessing the potential success of new and innovative products. It's

important to acknowledge these challenges to understand the limitations of traditional market research better.

In his 2015 work, Wormald discusses the phenomenon of consumers perceiving a product as a compelling concept. This perception entails a deep sense of connection to the product, akin to fulfilling a long-held desire. Such resonance also extends to the product aligning seamlessly with its brand. Wormald's research scrutinizes the Value Proposition (VP) concept as a proclamation of the value a product pledges to deliver. Emphasizing the importance of comprehending authentic customer needs and the product's positioning in the market, Wormald contends that design teams should diligently consider its VP in addition to concentrating on aesthetics and functionality. This understanding of VP has practical implications, equipping businesses with the knowledge to develop products that resonate with their target audience.

Moreover, Baldassarre et al. (2017) and their collaborators propose a practical strategy for developing sustainable products. Their approach involves continual solicitation of feedback from customers and stakeholders to ensure that the product aligns with their requirements, while simultaneously upholding eco-friendly standards. This strategy, as outlined in their research, not only contributes to environmental conservation but also ensures the product's performance is exemplary, thereby meeting both customer and business needs.

The current research literature lacks guidance on effectively integrating quality and performance into product design. Despite the comprehensive framework offered by the five quality definitions and the eight dimensions of quality, there remains a paucity of guidance on seamlessly incorporating quality and performance into the product development process.

Neves (2001) explores the intricacies of distribution channels, highlighting their focus on people and relationships as an avenue for businesses to gain a competitive edge. These channels are deemed pivotal within the framework of the 4 Ps of marketing. The study systematically dissects the process of crafting effective distribution channels, drawing insights from four well-established models. The delineated steps encompass a broad spectrum, ranging from comprehending the entire supply chain to channel management. Emphasizing the alignment of distribution objectives with a company's strategy is paramount, along with the imperative to grasp consumer preferences and the competitive landscape. Furthermore, the study delves into the critical factors underpinning the distribution structure, inclusive of product type and consumer behaviors. Fundamentally, the article serves as a comprehensive blueprint for businesses to adeptly devise and oversee their distribution channels, thereby gaining a competitive edge in the market.

While extant literature has extensively addressed delivery channel structure and its formulation, there remains a dearth of discussions regarding the efficacy and testing of delivery channels. This gap in our understanding is crucial, as it hampers businesses' ability to adapt their delivery channels to rapidly evolving market conditions. Therefore, there is an urgent need for further research in this area to equip businesses with the knowledge and tools to test and adapt their delivery channels effectively.

Veryer (2003) underscores the significance of user-oriented design (UOD) in enhancing the New Product Development (NPD) process. UOD facilitates a comprehensive understanding of design challenges and offers a clearer vision for a product's potential. For instance, UOD research areas could include user testing, user interface design, user experience design, and user feedback analysis. Furthermore, it

delineates these four pivotal areas for UOD research, thereby paving the way for prospective studies and tools to fortify NPD.

The genesis of a new product entails a convergence of technical and commercial inputs. On one hand, technical professionals such as R&D and engineering teams exist, while creative entities such as NPD teams ascertain the product's market relevance. Industrial design, as delineated by the Industrial Designers Society of America (IDSA) and the International Council of Societies of Industrial Design (ICSID), functions as an intermediary between the technical specifications and the final product's aesthetics, ensuring its adherence to both manufacturers' and users' requisites. Firms like IDEO deeply embed this approach within their NPD processes, leveraging industrial design to balance form and function in their products.

Despite the comprehensive deconstruction of the NPD process by experts, real-world scenarios often exhibit a higher degree of fluidity, with interdisciplinary collaboration prevailing. Nevertheless, the assimilation of design in NPD manifests differences across firms. Disparities in NPD methodologies, exemplified by Cooper's Stage-Gate™ and that proposed by Ulrich and Eppinger, underscore divergent vantage points. The former, being marketing-centric, emphasizes market research, consumer preferences, and competitive analysis, while the latter, being engineering-focused, prioritizes technical feasibility, product performance, and cost-effectiveness. Understanding these differences is crucial for aligning NPD strategies with the desired product outcomes.

In today’s rapidly evolving market, continual innovation is indispensable for businesses to thrive in an increasingly competitive landscape. The development of new products must prioritize user orientation, transcending conventional market research, particularly for pioneering innovations. Terminology such as "Human-Centered Design,"

"Customer-Centric Design," and "User-Centered Design" (UCD) is frequently employed within the realm of user-centered designs, with UCD's inception credited to Norman and Draper. Its fundamental tenet revolves around aligning products with user needs to deliver a comprehensive user experience. This underscores the fact that successful innovations often necessitate a shift in consumer behavior, highlighting the imperative of harmonizing novel offerings with consumer needs and preferences.

In summary, this chapter underscores the critical factors contributing to the high failure rates of new product developments, illuminating gaps that persist in the existing literature. While considerable emphasis has been placed on understanding product-market fit and the significance of comprehensive market research, this chapter highlights the necessity of integrating technical aspects and user-oriented design principles for a more holistic approach to new product development (NPD). Despite the wealth of knowledge outlining key reasons for product failures, there remains an inherent challenge in effectively communicating the value proposition of pioneering innovations and tailoring market research to uncharted technological advancements. Furthermore, the need for robust distribution channels and continuous adaptation to evolving market conditions is evident. Moving forward, this research aims to bridge these gaps by proposing a nuanced framework that synergizes customer-centric insights with technological feasibility, thereby enhancing the success rates of new products in the competitive market landscape.

CHAPTER 3:
RESEARCH METHODOLOGY

3.1 Introduction

The preceding chapter provided an extensive literature review to identify the critical factors influencing the success and failure of new product development (NPD). This chapter will delineate the research methodology adopted to investigate these factors empirically.

The research methodology serves as a blueprint for collecting, analyzing, and interpreting data relevant to the study's objectives. This chapter encompasses the following elements: the overall research design and strategy, detailed descriptions of the data collection methods, the sampling techniques applied, and the data analysis procedures.

The main objectives of this chapter are:

1. To explain the choice of research design and its appropriateness for addressing the research problem.
2. To detail the methods of data collection and the rationale behind selecting these methods.
3. To describe the sampling techniques used to ensure data representativeness and reliability.
4. To outline the analytical frameworks and procedures for data analysis,

The following sections will systematically address these components, beginning with a discussion on the research design.

3.2 Research Design

The research design is the foundational framework guiding this study. In exploring the success and failure of new product development, a mixed-method approach was chosen, integrating both quantitative and qualitative data. This hybrid approach allows for a comprehensive examination of the research problem, providing both breadth and depth through statistical analysis and rich, contextual insights.

3.2.1 Mixed-Method Approach

A mixed-method approach was selected for several reasons:

- Complex Nature of NPD: The multifaceted aspects of NPD, such as market research, product quality, and value proposition, necessitate both quantitative data for generalizability and qualitative insights for deeper understanding.
- Complementarity: Quantitative data can identify patterns and correlations, while qualitative data can explain the underlying reasons and mechanisms behind these patterns.
- Validation: Combining multiple data sources and types enhances the study's validity and reliability by cross-verifying findings through triangulation.

3.2.2 Quantitative Research

The quantitative component involves a structured survey administered to a sample of firms engaged in new product development. The survey aims to gather standardized data on key variables identified in the literature review, including Product Market Fit

(PMF), market research practices, product quality, value proposition, distribution channels, and customer feedback mechanisms.

- Survey Design: The survey questionnaire was designed based on existing validated scales and constructs from the literature on NPD. It included a mix of closed-ended and Likert scale questions to capture both objective data and subjective perceptions.
- Sampling Frame: The sampling frame consisted of medium to large firms across various industries with active NPD projects.
- Sampling Technique: A stratified random sampling technique was employed to ensure representation across different industry sectors. The strata were defined based on industry type and firm size.
- Sample Size: A sample size of 300 firms was targeted to achieve a balance between statistical power and feasibility.

3.2.3 Qualitative Research

The qualitative component involves semi-structured interviews with key stakeholders involved in NPD, including project managers, product designers, and marketing professionals. The objective was to capture in-depth insights and experiences related to the critical factors identified in the literature review.

- Interview Guide: An interview guide was developed, grounded in the key themes from the literature, such as PMF, market research methodologies, product quality measures, and customer feedback integration.

- Participant Selection: Purposive sampling was used to select participants who could provide rich, relevant information. Participants were chosen based on their roles and experiences in NPD projects.
- Sample Size: A total of 60 interviews were conducted, with participants from diverse industries to capture a broad spectrum of experiences.

3.3 Data Collection Methods

The research employed a multi-stage data collection process, integrating surveys and interviews to ensure comprehensive coverage of the research objectives.

3.3.1 Survey Administration

The surveys were administered online using a structured format designed to capture quantitative data efficiently. Steps included:

- Pre-testing: The survey was pre-tested with a small group of firms to refine questions and ensure clarity.
- Distribution: Surveys were distributed electronically to the identified sample, with follow-up reminders to boost response rates.
- Data Collection Period: The survey remained open for a period of eight weeks to allow ample time for responses.

3.3.2 Interview Process

The interviews were conducted following a semi-structured format to provide consistency while allowing flexibility to probe deeper into specific issues. Steps included:

- Scheduling: Interviews were scheduled at the convenience of participants, typically lasting between 45 to 60 minutes.

- Recording: With participants' consent, interviews were audio-recorded for accurate transcription and analysis.
- Transcription: Interviews were transcribed verbatim to ensure that all nuances of the discussions were captured for analysis.

3.4 Data Analysis Techniques

The data analysis methods were chosen to align with the study's mixed-method approach, ensuring that both quantitative and qualitative data were analyzed rigorously and systematically.

3.4.1 Quantitative Data Analysis

Descriptive Statistics: Initial analysis involved descriptive statistics to summarize the data and identify patterns.

Software Tools: Minitab was employed for analysis of data, ensuring robust and precise computation of results.

3.4.2 Qualitative Data Analysis

Content Analysis: Qualitative data were analyzed using content analysis to identify common themes, patterns, and insights.

Software Tools: NVivo was utilized to manage and analyze qualitative data, aiding in the identification of emerging patterns and relationships.

3.5 Rationale for Methodological Choices

Each methodological choice in this study was informed by the nature of the research questions and hypotheses, as well as the need for robust, credible findings. The

mixed-method approach ensures comprehensive data triangulation, enhancing the validity of the study.

Alignment with Research Objectives: The chosen methodologies align with the objective of understanding multifaceted factors influencing NPD, providing balanced, well-rounded insights.

Enhancing Validity and Reliability: Methodological triangulation through multiple data sources and types reinforces the reliability and validity of the findings.

3.6 Ethical Considerations

Ethical considerations are paramount in conducting research, especially when dealing with human participants and sensitive business data. This section outlines the ethical protocols adhered to in this study to ensure the rights and well-being of participants, as well as the integrity of the research.

3.6.1 Informed Consent

Participant Information: All participants were provided with a detailed participant information sheet explaining the purpose of the study, the nature of their involvement, and their rights.

Voluntary Participation: Participation in both the survey and the interviews was entirely voluntary. Participants had the right to withdraw at any point without any consequences.

Consent Forms: Written informed consent was obtained from all interview participants, and implied consent was assumed for survey respondents upon completion of the survey.

3.6.2 Confidentiality and Anonymity

Data Protection: Personal and company identifiers were removed to anonymize the data, ensuring participants' confidentiality.

Data Storage: All data were securely stored in encrypted files accessible only to the SSBM faculty.

3.6.3 Ethical Approval

Institution’s Board: The research proposal, including the methodology and ethical considerations, received approval from the Swiss School of Business and Management (SSBM). This ensured compliance with ethical standards and guidelines.

Compliance with Regulations: The research adhered to relevant regulations and ethical guidelines, including those of the GDPR.

3.7 Limitations of the Study

While the research methodology was designed to provide comprehensive and robust findings, it is essential to acknowledge the limitations of the study that may affect the generalizability and interpretability of the results.

3.7.1 Sampling Bias

Representation: Despite efforts to ensure a representative sample, there may be inherent biases due to the self-selection of participants and the stratified random sampling technique. Firms that chose to participate might have different characteristics from those that did not, potentially influencing the results.

Industry Diversity: The diversity of industries included in the sample, while providing breadth, may also introduce variability that complicates the interpretation of findings across different sectors.

3.7.2 Response Bias

Survey Responses: Respondents' answers might be influenced by social desirability bias, leading them to report what they perceive as favorable rather than their actual practices and experiences.

Interview Responses: Interview participants might be influenced by recall bias or may emphasize certain aspects of their experiences over others, affecting the richness and accuracy of the qualitative data.

3.7.3 Methodological Constraints

Mixed-Method Integration: While the mixed-method approach provides comprehensive insights, integrating findings from quantitative and qualitative data can be challenging and may lead to potential inconsistencies.

Data Collection Timing: The data collection period spanned eight weeks, during which market conditions or organizational changes could have influenced participants' responses.

3.7.4 Scope of the Study

Focus Areas: The study focuses on specific factors influencing NPD (such as PMF, market research, etc.), which, while important, may not capture all potential determinants of NPD success and failure.

Geographical Limitation: The study's geographical focus might limit the applicability of findings to different cultural and economic contexts.

3.8 Summary

In this chapter, the research methodology for investigating the factors influencing the success and failure of new product development has been meticulously outlined. A mixed-method approach was adopted, integrating quantitative and qualitative data to provide a comprehensive understanding of the research problem. The chapter detailed the research design, data collection methods, sampling techniques, data analysis procedures, ethical considerations, and limitations of the study.

By employing a combination of structured surveys and semi-structured interviews, the research methodology ensures robust, reliable data that can offer valuable insights into the critical factors identified in the literature review. Adherence to ethical guidelines safeguards participant rights and data integrity, while recognition of the study's limitations provides context for interpreting the findings.

The next chapter will present the results of the data analysis, highlighting the key findings and their implications for the success and failure of new product development.

CHAPTER IV:

RESULTS

4.1 Descriptive Analysis of Survey Results

This section provides a concise analysis of the survey data, highlighting key findings from 300 respondents. We begin by detailing participation metrics and respondent demographics, including their roles and industry sectors. We then explore the adoption and satisfaction levels of various New Product Development (NPD) frameworks, alongside their effectiveness in critical areas. The analysis also addresses specific challenges faced with these frameworks and identifies methodologies considered for overcoming these challenges. Finally, we summarize feedback and suggestions from respondents and note their willingness to participate in follow-up interviews, offering insights into the strengths and limitations of current NPD practices.

4.1.1 Survey Participation:

- Total responses: 300
- Incomplete responses: 36
- Valid responses: 264

4.1.2 General Information

Roles of Respondents:

- Product Manager: 132
- Innovation Lead: 48
- Market Research Analyst: 24

- R&D Manager: 36
- Others: 24

Industry Representation:

- Technology: 96
- Consumer Goods: 72
- Healthcare: 48
- Automotive: 24
- Others: 24

4.1.3 Current New Product Development Frameworks

Framework Usage:

- Lean Startup: 96
- Design Thinking: 72
- Stage-Gate: 60
- Agile: 18
- Six Sigma: 12
- Custom Framework: 36
- Other: 6

Satisfaction Levels with Current NPD Framework:

- Very Satisfied: 36 (13.6%)
- Satisfied: 60 (22.7%)
- Neutral: 72 (27.3%)

- Dissatisfied: 72 (27.3%)
- Very Dissatisfied: 24 (9.1%)

Effectiveness of Current NPD Frameworks in Specific Areas (Percentage of "Very Effective" + "Effective" Ratings):

Table 4.1: Survey Results on effectiveness of current NPD Frameworks

Area	Lean Startup	Design Thinking	Stage-Gate
Product Market Fit	35%	37%	38%
Market Research	32%	34%	35%
Product Quality and Performance	29%	31%	33%
Value Proposition	28%	30%	32%
Distribution Channels	24%	26%	27%
Customer Feedback Integration	31%	33%	34%

4.1.4 Specific Challenges and Issues

Agreement with Challenges Facing NPD (Percentage of "Strongly Agree" + "Agree" Ratings):

Table 4.2: Survey Results on agreement with challenges facing NPD

Challenge	Lean Startup	Design Thinking	Stage-Gate
Absence of Product Market Fit	62%	60%	58%
Inadequate Market Research	65%	63%	60%
Substandard Product Quality and Performance	67%	66%	65%
Lack of Unique/Differentiated Value Proposition	68%	66%	64%
Inefficient Distribution Channels	72%	71%	68%

Challenge	Lean Startup	Design Thinking	Stage-Gate
Difficulty Incorporating Customer Feedback	64%	62%	60%

4.1.5 Methodologies and Framework Improvements

Key Factors for an Ideal NPD Framework:

- Thorough Market Research: 78%
- Customer Feedback Loop: 75%
- Unique Value Proposition 70%
- Strong Product-Market Fit Analysis: 69%
- Efficient Distribution Strategy: 72%
- High-Quality Standards: 65%

4.1.6 Feedback and Suggestions

Open-ended Suggestions Summary:

- Need for more iterative and flexible frameworks.
- Increased emphasis on real-time market analytics and customer insights.
- Better integration of distribution strategy into NPD.
- Higher focus on unique value propositions and differentiation.
- Enhanced methods for maintaining product quality and meeting customer expectations.

Follow-up Interview Willingness:

- Yes: 162 (61.4%)

- No: 102 (38.6%)

4.1.7 Insight Summary

The survey results indicate that Lean Startup, Design Thinking, and Stage-Gate are the most commonly used New Product Development frameworks across various industries. However, these frameworks show significant limitations in addressing crucial areas such as product-market fit, market research, product quality, value proposition, and distribution channels. The overall satisfaction with these frameworks is moderate, with a considerable percentage of respondents expressing dissatisfaction or neutrality.

4.2 Content Analysis Of Interview Transcripts

To thoroughly analyze and present the various methodologies used in the Lean Startup, Design Thinking, and Stage-Gate processes, we have systematically categorized the prevailing industry problems and their respective possible solutions. This compilation is crucial for both academic inquiry and practical application, as it underscores the necessity for further research and refinement in these methodologies.

4.2.1 Lean Startup

The Lean Startup methodology emphasizes the need for a streamlined and iterative approach to product development. However, several gaps exist in effectively identifying market problems, capturing customer requirements, defining a Minimum Viable Product (MVP), and optimizing feedback mechanisms. The following table outlines these issues and the current methods employed to address them.

Table 4.3: Problems With Lean Startup Identified Based On Content Analysis Of Interview Transcripts

Problems	Solutions
Framework do not address problem definition or market pain points effectively.	Incorporate a detailed Problem Description methodology in the Project Charter.
There are gaps in methodologies for effectively capturing and prioritizing customer requirements	VoM gathering & Synthesis: Affinity diagram & Prioritization Matrix: Analytical Hierarchy Process (AHP)
There is an ambiguity or variability in defining what constitutes a Minimum Viable Product.	Functional Analysis: Functional Model.
There is an ambiguity or variability in defining what constitutes a Minimum Viable Product. While the MVP is designed to test key hypotheses, there may be challenges in effectively identifying and validating these hypotheses	Concept selection: Pugh matrix
There may be gaps in methodologies for collecting data on customer usage, engagement, and satisfaction.	Gathering Customer feedback
There is a gap in understanding how to optimize feedback mechanisms to enhance learning and iteration cycles.	Synthesizing and Prioritizing customer feedback: AHP, & Design scorecard
While data collection is essential, there are challenges in interpreting the collected data accurately to derive actionable insights.	Synthesizing and Prioritizing customer feedback: AHP, & Design scorecard
There are gaps in how organizations synthesize and disseminate the insights gained from analyzing MVP data and customer feedback	Synthesizing and Prioritizing customer feedback: AHP, & Design scorecard
Organizations may lack clear criteria or frameworks for determining when to iterate, pivot or persevere based on feedback and insights.	Stage Gate Decision making Process

4.2.2 Design Thinking

Design Thinking focuses on empathizing with end-users and iterating solutions based on feedback. Nevertheless, it faces issues such as limited stakeholder perspectives, effectiveness in generating well-defined problem statements, and incorporating diverse feedback sources. The following table presents these issues and proposed solutions.

Table 4.4: Problems With Design Thinking Identified Based on Content Analysis of Interview Transcripts

Problems	Solutions
Existing research primarily focuses on empathizing with target users or customers, but there is limited exploration of how to incorporate perspectives from a broader range of stakeholders, including marginalized or underrepresented groups.	Problem description methodology: Project Charter
Various techniques, such as problem framing workshops or brainstorming sessions, are used during the Define phase to articulate design challenges. However, there is a lack of empirical research evaluating the effectiveness of these techniques in generating well-defined problem statements that guide successful design outcomes.	Problem description methodology: Project Charter
While ideation typically involves generating a wide range of ideas, there is limited research on the effectiveness of different divergent thinking techniques in stimulating creativity.	Concept generation
While iteration is fundamental to the Design Thinking approach, there is limited research on how to effectively iterate through multiple rounds of prototyping.	Gathering, synthesizing and prioritizing customer feedback. Design scorecard
While user feedback is central to the testing phase, there is limited research on how to effectively integrate diverse feedback sources, such as direct observation, surveys, interviews, and usability testing.	Gathering, synthesizing and prioritizing customer feedback. Design scorecard
Design Thinking often involves balancing creative exploration with practical constraints, such as time, budget, and resource limitations. However, there is limited research on how to effectively manage this balance during the iterative process.	Analytical Hierarchy Process(AHP) to tradeoff and prioritization

4.2.3 Stage-Gate

The Stage-Gate process aims to manage product development systematically through various stages or 'gates.' However, it encounters challenges in risk management, gate criteria consistency, and innovative techniques for idea generation. Below is a table that details these problems and proposed solutions.

Table 4.5: Problems With Stage-Gate Identified Based On Content Analysis Of Interview Transcripts

Problems	Solutions
Further research is needed to identify and manage risks associated with new product initiatives at the initiation stage	Risk Assessment and Risk mitigation

The criteria used to evaluate projects at each gate in the Stage-Gate process may vary across organizations and industries. There is a need for research to identify best practices for defining gate criteria that effectively assess project feasibility, risk, and alignment with strategic objectives.	D-Gate decision making process
There is a need for research into innovative techniques and methodologies for idea generation that go beyond traditional brainstorming sessions	Concept Generation
There is a need for research into innovative techniques and methodologies for concept development that foster creativity and differentiation.	Prototyping using Design Scorecard
While customer feedback is essential for validating product performance and usability, there is limited research on how to systematically incorporate customer input into the testing process within the Stage-Gate framework.	Gathering, synthesizing and prioritizing customer feedback. Kano Model
There is a gap in understanding the most effective market entry strategies within the Stage-Gate framework.	Marker research & market segmentation

CHAPTER V:

ENHANCED NEW PRODUCT DEVELOPMENT (ENPD) FRAMEWORK

5.1 Introduction

Several frameworks have been suggested for the process of developing new products, each with its own unique emphasis and methodology. Bhuiyan & Thomson, (2010) emphasizes the significance of functional interaction and overlapping in the processes of new product development (NPD), especially in situations characterized by uncertainty. In their work, de Waal & Knott., (2010) introduces a thorough and detailed framework for NPD activity. This framework has many stages and incorporates various perspectives, including NPD practices, practitioners, and praxis. Dhargalkar et al. (2016) present a comprehensive framework for new product development (NPD) and upgrading, which includes 45 qualities that reflect customer wants and desires. Kahn et al. (2006) present a framework of best practices for new product development (NPD), encouraging more discussion and debate. In addition, Tsinopoulos & McCarthy (2002) provide intricate systems frameworks for new product development (NPD). Considering the trade-offs involved, Tsinopoulos examines the relationship between cost, lead time, dependability, and creativity. Simultaneously, McCarthy introduces a sophisticated framework for complex adaptive systems that takes into account the impact of decision-making agents on the adaptability of the NPD process and the output of innovation.

In new product development (NPD), a notable absence exists of a widely accepted, comprehensive organizing framework. As a result, researchers often devise their own classification systems, which are typically limited in their scope and challenging to harmonize with each other. For instance, Nijssen & Lieshout, (1995) categorized tools into four distinct groups, grounded in what they identified as the

underlying NPD problems. However, their system fails to account for the role of market research tools, which are crucial in understanding consumer needs. In contrast, Adams-Bigelow, (2004) proposed a completely different set of four categories, further reflecting the disparate nature of such classifications. His system, while comprehensive, overlooks the importance of project management tools, which are essential for successful NPD.

Unfortunately, while insightful, these categorizations lack the breadth and depth required to serve as a robust taxonomy for integrating research findings. They tend to exclude tools designed for other purposes and fail to encompass vital NPD activities such as project management, product strategy, and information management. Some may argue that NPD's contextual and situational nature makes it impossible to develop a single authoritative framework. However, we believe that while the specific tools and activities may vary, there are underlying principles and processes that can be universally applied, forming the basis of a comprehensive framework.

Despite the variability in NPD processes, we propose that each unique enacted process could draw upon, or be characterized by, the same authoritative integrating framework based on a generic NPD process. This aligns with the belief that a well-defined and comprehensive organizing framework is indispensable and holds immense potential for harmonizing the diverse elements of NPD research. This, in turn, could contribute to a more cohesive and structured body of knowledge in the field, inspiring new avenues of research and understanding.

The analysis focused primarily on three commonly employed frameworks for new product development: The Lean Startup Methodology by Eric Ries, Design Thinking by Tim Brown, and Stage-Gate by Robert G. Cooper. The research found deficiencies in existing product development frameworks, prompting the creation of a new and innovative framework to solve these shortcomings. The ensuing investigation examined

these three frameworks in detail, identifying the inadequacies connected with each framework. As a result, the Enhanced Nw Product Development (ENPD) Framework was created specifically to solve these research deficiencies.

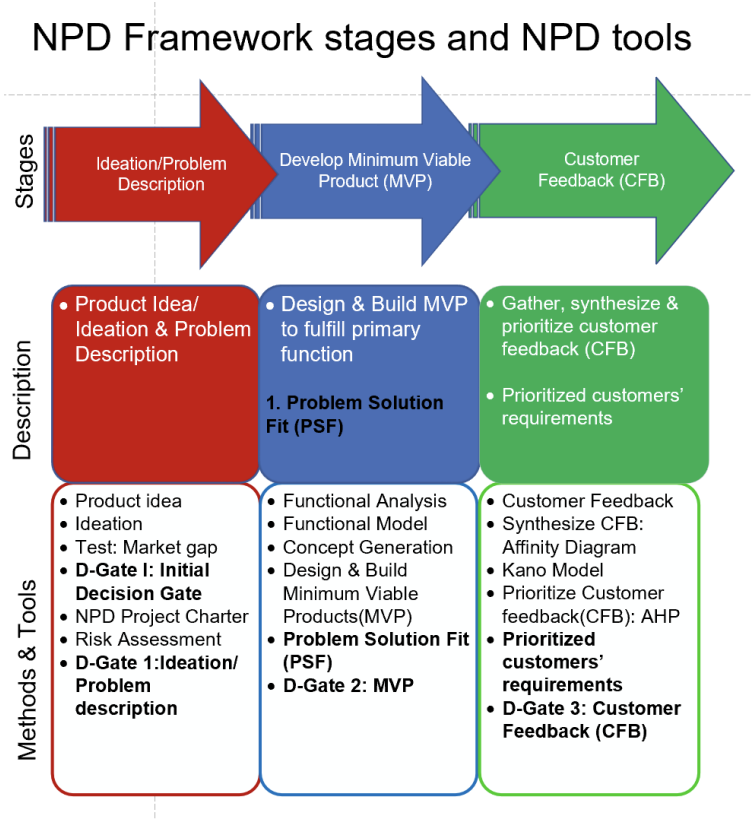

Figure 5.1: Simplified View Of Enhanced New Product Development (ENPD) Framework - Methodology, Steps and Tools

Figure 5.2 expands the framework and provide an exhaustive diagram. The Framework encompasses 14 crucial steps, including decision-making logic, integral to the successful launch of a product. These steps have been meticulously formulated to address the primary causes of product failures identified in the existing literature and the problems identified in the results chapter of this study. This framework represents a significant leap forward in product development strategies, promising exciting new possibilities for business.

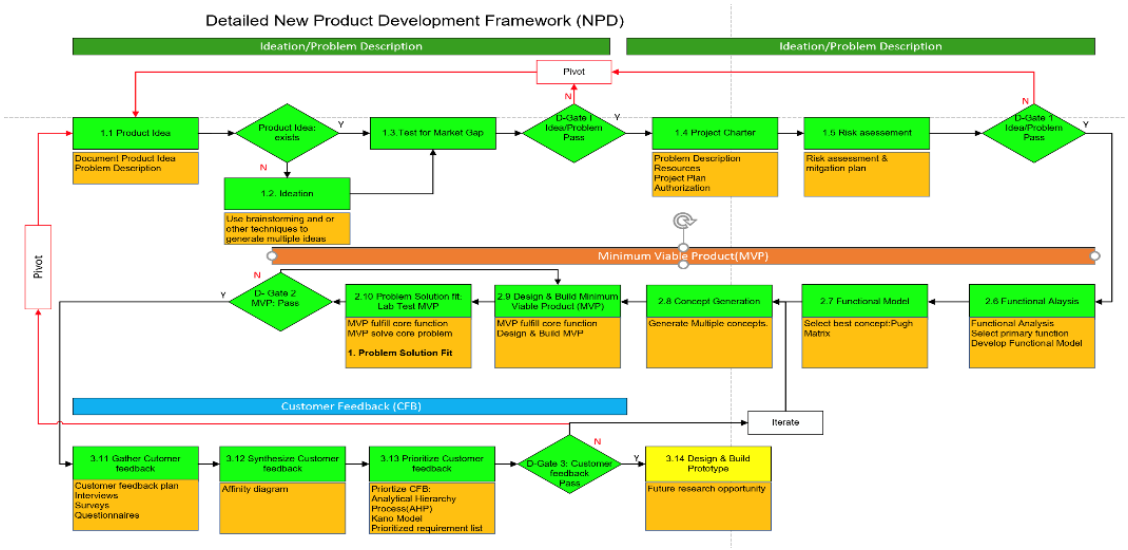

Figure 5.2: Detailed View Of Enhanced New Product Development (ENPD) Framework - Methodology, Steps and Tools

5.2 Ideation/Problem Description

In the realm of new product development, 'Product Ideation' and 'Problem Description' are not just concepts; they are the bedrock of innovation. These frameworks are guiding principles that profoundly influence and delineate the development process. Interrelated within the product development trajectory, the problem statement defines the specific need or challenge the product intends to address, while the product idea embodies the proposed solution to the identified problem. Together, they establish the cornerstone for developing a relevant and appealing product to the targeted market segment.

A product idea represents the foundational concept for a new product or an enhancement to an existing product. It usually embodies a creative or innovative solution aimed at addressing a specific market need or demand. The genesis of a product idea may stem from diverse origins such as market research, customer input, technological progress, or a distinct revelation from a team member. Most importantly, a product idea

is more than just a concept or vision. It is the spark that ignites the entire product development process. It outlines the potential characteristics of the product and its ability to address a specific market need or challenge. In many cases, a product idea is the very beginning of the journey towards developing a new product or innovation.

In the arena of product development, creating specific product concepts and ideas often presents a challenge for both organizations and individuals. This is where the power of collaboration comes into play. Product development teams work hand in hand with stakeholders and engage in a process of brainstorming and idea generation. This collaborative effort leads to a diverse range of concepts, from which the most promising idea is selected for further development into tangible products and services.

Product idea

Idea Generation: The journey of creating a new product typically begins with idea generation. This involves brainstorming, identifying market opportunities, and understanding consumer needs. It's crucial to envision improvements for existing products, keeping the end user in mind. The product design is driven by a user-centric approach to specifically cater to the needs and preferences of the target market.

Concept Development: Upon formulation of a product idea, it is of utmost importance to further develop it into a defined concept. This process entails portraying the fundamental details, features, and functionalities of the product. The concept should elucidate the unique selling points (USPs) that render the product innovative or novel. The product idea serves as a catalyst for the development of an original product, undergoing a methodical validation, refinement, testing, and launch process to effectively bring the innovative concept to the market. The success of the product hinges on

proficient execution, comprehensive market research, and adaptation based on user feedback.

When presenting a product idea, it's essential to provide a clear and detailed explanation, and to address how this idea solves a specific market problem. The process of generating new product or service ideas is a creative and repetitive one. It's important to understand that generating innovative ideas is not a one-time event but a continuous and systematic process. It involves constant experimentation, iteration, and refinement based on feedback and market dynamics. Here's a structured approach to generating innovative ideas:

Identify Problems or Needs: Consider the issues individuals encounter in their everyday lives or areas where needs are unmet. These could range from matters of convenience to health, entertainment, communication, or productivity.

Market Research

Conducting exhaustive market research empowers you to analyze prevailing market trends, consumer inclinations, and market voids. Scrutinize existing products or services to identify areas for enhancement or untapped opportunities. Research is the key to unlocking the potential of new products.

Brainstorming Sessions: Collect a varied group of individuals, such as coworkers, friends, or professionals from different disciplines, and conduct brainstorming sessions. Foster a culture of free idea-sharing without judgment. Employ strategies such as mind mapping or the SCAMPER method (Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, Reverse) to stimulate creativity.

Customer Feedback: Engage with your target audience to gain insights into their pain points and product/service preferences. Employ methodologies such as surveys, interviews, and focus groups to gather valuable data for guiding idea generation.

Observation and Inspiration**:** In the academic context, it is important to be mindful of one's environment and to observe human interactions with various products and services actively. Inspiration can often stem from everyday experiences, natural phenomena, artistic expressions, and advancements in technology.

Competitor Analysis**:** It is important to conduct a thorough analysis of your competitors' offerings and market positioning. By doing so, you can identify opportunities to differentiate your own products or services and introduce unique innovations. This kind of competitive analysis is crucial for staying ahead in the market and meeting the changing demands of customers.

Technology Trends: Staying abreast of emerging technologies and their potential applications in developing innovative solutions is essential. Technologies such as artificial intelligence, block chain, augmented reality, and the Internet of Things (IoT) present opportunities to generate new product or service concepts.

Cross-Industry Inspiration: Consider seeking inspiration from diverse industries. Innovation often stems from the application of concepts or solutions across different sectors.

Collaboration and Partnerships**:** Engage in collaborative efforts with other businesses, startups, or organizations to make use of their expertise, resources, or customer base. Forming partnerships can expedite the advancement and acceptance of new concepts and innovations.

Upon identification of potential product or service ideas, it is essential to meticulously assess and prioritize them based on criteria such as viability, feasibility,

usability, and desirability. This pivotal process can be effectively executed by leveraging the Idea Prioritization Matrix. Subsequently, it is imperative to employ the D-Gate I: Initial Decision-Making Gate process to evaluate the market landscape, verify the presence of existing solutions within the target market, and substantiate the identified market gap.

Table 5.1: Idea Prioritization Matrix

Idea Priortization Matrix

		Rating of Importance to Business & Customer	8	9	7	8	8	6	5	10	3	8	9	10	9	10	8		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
		Business Requrements	Minimum Capital Required	Easy to start	High Margin	Quick Return on Investment	Immediate Revenue	Meeting revenue Goals	High EBITDA	Scaleable business	Business Quaderant B/I	Innovation	Viable	Feasible	Usabable	Desiable	Hard to duplicate	Total	
	List Category	List Ideas																	
1		Idea 1	9	9	9	9	9	5	5	5	1	5	5	5	5	1	5	698	2
2		Idea 2	5	5	9	5	5	9	1	9	9	9	5	1	5	5	5	666	3
3		Idea 3	5	5	9	5	5	9	9	9	9	9	9	9	8	9	9	921	1
4		Idea 4	1	9	5	5	5	5	9	5	9	5	5	1	5	1	1	514	
5		Idea 5	1	9	5	5	5	5	9	5	9	9	1	1	1	1	1	474	
6																		0	
7																		0	
8																		0	
9																		0	
10																		0	
11																		0	
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14																		0	
15																		0	
16																		0	
17																		0	
18																		0	
19																		0	
20																		0	
																		0	
Total			168	333	259	232	232	198	165	330	111	296	225	170	216	170	168		

The aim of the ideation phase is to engender a multitude of product concepts. Subsequently, these ideas are to be ranked in accordance with the overarching business strategy, as well as specific business and market imperatives. Using a prioritization matrix objectively underscores the ideas that exhibit the greatest congruence with the

strategic objectives, business directives, and market demands. For instance, the matrix could consider factors such as market potential, resource requirements, and alignment with the company's core competencies.

D-Gate I: Initial Decision-Making Gate

The significance of D-Gate I cannot be overstated. It is here that we confirm the absence of similar products, services, or businesses and determine whether a proposed product idea offers a unique value proposition. In the event that there is an existing solution to the market problem, any proposed solution must demonstrate a clear, unequivocal superiority over the current one. In that case, it is recommended to pivot and explore alternative ideas that effectively address the market issue. A well-informed decision is crucial before allocating valuable resources to the development of a product that may not achieve product-market fit.

D-Gate Team: Product Owner, Product Development Leader, and Critical Team Members.

The decision gate team plays a crucial role in meticulously addressing all critical requirements and rendering a decision to either advance to the subsequent phase or implement a strategic pivot. Your thorough understanding and documentation of the underlying problem is key, as it defers the development of potential solutions until the concept generation phase. Your expertise and diligence are trusted in this process.

For the progression to the next stage of New Product Development (NPD), it is crucial to ensure that all the requirements of D-Gate I are fully met and satisfied. These requirements may include but are not limited to, a clear understanding of the market problem, a unique value proposition, and a well-defined target market. Meeting these

criteria will ensure that the proposed product idea has a high potential for success in the market.

D-Gate I Requirements: In order to advance to the next phase of New Product Development (NPD), it is essential that all requirements of D-Gate I are properly met and fulfilled.

Table 5.2: D-Gate I: Initial Decision Gate

		1st Idea: Calculate future income requirement and required investments		
		D-Gate I: Initial Decision Gate		Decision
1	Market Need	Product/Service/ Business Idea fill the market gape	Yes	Pass
2	Solution	There is a smilar solution exist in the market	Yes	Pivot
3	Alternate Idea	If answer to #2 is No then, Can you create a new market or modify the Product Idea	Yes	Pass
4	Product Idea	Product Idea is clearly defined.	Yes	Pass
5	Market Problem	Market Problem clearlt stated as customers view the problem	Yes	Pass
		2st Idea: Deverlop a product to generate stock reports for investments		
		D-Gate I: Initial Decision Gate		Decision
1	Market Need	Product/Service/ Business Idea fill the market gape	Yes	Pass
2	Solution	There is smilar solution exist in the market	No	Pass
3	Alternate Idea	If answer to #2 is No then, Can you create a new market or modify the Product Idea	Yes	Pass
4	Product Idea	Product Idea is clearly defined.	Yes	Pass
5	Market Problem	Market Problem clearlt stated as customers view the problem	Yes	Pass

NPD Project Charter

A Project Charter is a formal document describing a new product development project's fundamental details, objectives, and scope. This document provides a solid foundation to steer the project team and stakeholders through the collaborative product development process. Notably, it is a dynamic and evolving document. The New Product Development Charter (NPDC) holds significant importance for several reasons:

The clarity of Purpose section in the NPD Project Charter is a powerful tool. It succinctly articulates the project's purpose and aims, fostering a shared understanding among all team members and stakeholders. This alignment is key to driving the project forward and achieving its objectives.

Scope Definition: The project scope is essential for defining the boundaries and parameters of the project, explicitly specifying what is within and outside its scope. This crucial step is instrumental in preventing scope creep and maintaining the project's focus and objectives.

Roles and Responsibilities: The Roles and Responsibilities section in the NPD Project Charter is a crucial component. It clearly outlines the specific roles and responsibilities of team members, stakeholders, and project sponsors. This clarity is instrumental in the task assignment process, ensuring that each individual understands their role and contributes effectively to the project. Moreover, it promotes clear accountability, as everyone knows what is expected of them.

Resource Allocation: The document details the project's resource needs, such as budgetary requirements, staffing, equipment, and materials.

Risk Assessment: It encompasses a proactive evaluation of potential project risks and obstacles, facilitating early mitigation strategy development and instilling confidence in the project's ability to handle challenges.

Communication: It functions as a method of communication, guaranteeing that all involved parties share a consistent comprehension of the project's objectives and anticipations.

The ENPD project charter consists of the following sections:

1. Project details
2. Problem Statement
3. Product Scope
4. Project Plan
5. Next Innovation & Exit Strategy

6. Project Team members & Resources
7. Approvals

Table 5.3: ENPD Project Charter

New Product Development (NPD) Project Charter

1. Project details		**Project details**
Project Name:		
Project description		
NPD Project Leader: Name		
Product owner:Name		
Stake Holders		
NPD Coach: Name		
Project start date		
Product Launch date		
Check when completed		**Inputs & comments**
Market Research & Analysis		
Budget		
Risk Assessment		
Business Case		
Financial Analysis		
2. Problem Statement		**Problem Statement**
Provides Problem statement or opportunity that New Solution will address: Use 5 W and 2 H: 1. What is a problem? 2. Why it is a problem? 3. Where is a Problem: Location, Market? 5. Who has identified the problem? 6. How problem is discovered? 7. How large is the problem?(Impact: $, People, Region)		
What is known?		
What is unknown?		
3. Project Scope		
Defines project boundries: In scope		
Defines what is outside scope of the project		
4. Project Plan		**Project Plan (Projected Completion Dates)**
Ideation/Problem description		
Develop Minimum Viable Product(MVP)		
Customer Feedback (VoM)		
Design, build & Test Prototype		
Design, build & Test Beta Model		
Market Ready Product		
5. Next Innovation & Exit strategy		
Next Innovation (Next Gen products).		
Product Exit Strategy		
6. Product Development Team & Resources		
NDP team members, Resources		Name - Name - Name - Name - Name - Name -
7. Approvals:		Signaturs & date
NDP Team Leader		
Product Owner:		

Project details

- Project Name: A clear and concise title that describes the project.
- Project Description: A concise project summary detailing its purpose and objectives.
- NPD Project Leader Name: Identify the name of the Project Team leader who is accountable for the project from start to finish.
- Product Owner: The proprietor assumes complete Profit and Loss (P&L) accountability for the successful introduction of a product. This encompasses allocating resources, financial backing, product development, and marketing endeavors.
- Stakeholder: In the process of New Product Development (NPD), the active involvement of stakeholders is not just important, but crucial. Their collaboration, endorsement, and feedback are key drivers of success. Stakeholders, with their vested interests, play a significant and influential role in the development, prosperity, or denouement of the new product.
- Stakeholders: A list of key stakeholders and their roles in the project.
- Budget: A Product development budget must be meticulously developed and approved by the Product Owner. The Product Owner ensures the team has adequate funding to launch the product. This process is thorough and ensures the financial stability of the project. Check the box and fill in the budget field.
- NPD Coach: The guidance of a product development coach can significantly improve the efficiency and outcomes of a product development team, leading to enhanced collaboration and a streamlined development process. Identify the name of the Product development team coach.

Problem Statement: A problem statement comprises a clear and succinct depiction of an issue necessitating attention. Typically, it encompasses an elucidation of the individuals impacted by the problem, the specific challenges they confront, and the ramifications of these challenges. An appropriately delineated problem statement assumes paramount significance, serving as a compass for product development and ensuring that the team remains steadfast in addressing genuine and pertinent concerns for the designated users.

The matter must be clearly articulated using the following framework:

1. What is the problem?
2. Why is it a problem?
3. Who is impacted by this problem?
4. Where does this problem exist (Market segment/customers)?
5. Who has identified the problem?
6. How problem is discovered?
7. How significant is the problem?

A well-defined problem statement should be crafted and integrated into the Product Development Charter for comprehensive guidance.

Project Scope: It is a comprehensive and detailed description of all project tasks, including objectives, deliverables, activities, timelines, and constraints. It defines the project boundaries by outlining inclusions and exclusions. This is a critical component of project management and greatly impacts successful project execution. Identifying project

boundaries is essential to determine what falls within the project scope and what does not.

Project Plan: The project team is tasked with formulating a high-level project plan to establish projected completion timelines for all stages within the New Product Development process. Subsequently, the New Product Development team will utilize this high-level project plan as a guiding framework to articulate a comprehensive and intricate project plan. Next Innovation & Exit Strategy

Next Innovation & Exit strategy: As mentioned earlier, the Project Charter is a fluid document meant to be used and updated during product development. When a product reaches maturity, organizations need to think about developing new, innovative products to stay competitive, foster growth, meet customer expectations, and succeed in a rapidly changing and demanding business environment.

The decision must be made whether to discontinue the product and begin developing a new one or to enhance the current product to offer greater value to customers. Keeping this section of the Project Charter regularly updated throughout the product development process is crucial

Product Development Team & Resources: Identify Product Development Team Members, their roles, and responsibilities

Approvals: Project Charter must be approved by the Team Leader and Product Owner

Risk Assessment

In new product development, risk assessment is a systematic process that identifies, analyzes, and evaluates potential risks and uncertainties. This step is crucial as

it helps organizations anticipate and address challenges, make informed decisions, and increase the likelihood of achieving project objectives. It's not just important but imperative to conduct a comprehensive risk assessment and develop a mitigation plan for high-risk elements. Once the risk assessment is complete, it's essential to mark the risk assessment box, as it signifies the completion of a critical task.

Table 5.4: Project Risk Analysis Worksheet

Project Risk Analysis Worksheet

Project Name:				Date Last Updated:					
Product Name:		Project Leader:							

Risk Assessment							Risk Mitigation			Updated Risk Ranking				
No.	Risk Description	Impact Type (Most Critical)	Impact Ranking	Likelihood of Occurrence	Detection	Risk Priority Ranking(RPR)	Actively Address Risk?	Description of Planned Risk Response	Target Date	Responsible Person	Impact Ranking	Likelihood of Occurrence	Detection	Risk Priority Ranking(RPR)	Comments & status
1			2 = Low	Low	2 = Low	8					2 = Low	2 = Low	2 = Low	8	
2															
3															
4															
5															
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D-Gate 1: Product Idea/Problem Description

The Stage-Gate® process, a robust framework in new product development (NPD) and innovation management, was pioneered by the esteemed innovation management expert (Cooper, 2019). This process involves breaking down the product development journey into distinct stages, each with specific objectives and activities. Decision points or gates are strategically placed between these stages to assess progress and determine whether to proceed or halt the project. The Decision-Gate process, another structured framework for product development, manages and evaluates product

development at various stages before advancing to the next phase. Its goal is to enhance new product development efforts' effectiveness and success rate. The D-Gate process is composed of several stages, each with specific objectives and activities, and gates or decision points to evaluate product development progress and ensure that the necessary steps and processes are completed. Furthermore, Decision Stage Gates ensures the viability, usability, and feasibility before allowing further progress.

Decision-Gate Process provides the following benefits:

Risk Management: The Decision-Gate process proactively identifies and mitigates potential risks and issues in the early stages. This approach significantly reduces the likelihood of expensive late-stage failures, providing a sense of security in the product development journey.

Resource Allocation: The capability facilitates improved resource allocation by enabling organizations to prioritize and invest in projects based on their alignment with strategic objectives and market potential.

Focus on Customer Needs: The Decision-Gate process strongly emphasizes fulfilling customer requirements providing value. This customer-centric approach ensures that the direction of product development endeavors is always aligned with the needs and expectations of the market, making the consumer feel valued and heard.

Improved Decision-Making: It offers a systematic framework for the decision-likelihood of launching successful products that meet customer needs and strategic objectives.

Efficiency: The product development process is optimized by segmenting into manageable stages and gates, thereby enhancing efficiency.

How to Create a Stage-Gate Process:

Define the Stages: From the inception of an idea to its launch in the market, a project typically undergoes several key stages or phases. These commonly include idea generation, concept development, feasibility assessment, prototype development, testing, and commercialization.

Set Objectives: It is essential to establish the objectives and criteria that need to be achieved at each phase. These objectives should be consistent with the organization's overall goals and the project's specific objectives.

Gate Criteria: Critical considerations for evaluating project continuation or termination encompass technical feasibility, market potential, financial viability, and alignment with strategic objectives.

Cross-Functional Teams: The Stage-Gate process thrives on collaboration. By forming cross-functional teams, we combine diverse expertise and perspectives from different departments (such as R&D, marketing, and finance). This enhances the evaluation process and makes each team member feel valued and integral to the project's success.

Gatekeepers: Designate individuals as gatekeepers or decision-makers responsible for assessing project progress and deciding to proceed or halt at each stage. These individuals, often senior members of the organization, must possess the authority to allocate resources and make strategic choices. Their role is crucial in ensuring that only projects that meet the predefined criteria and objectives can proceed, thereby maintaining the quality and focus of the product development process.

Resource Allocation: It is crucial to strategically allocate resources, including budget, human resources, and time, throughout each project phase to guarantee that high-potential projects receive the requisite backing.

Documentation: Thoroughly documenting your progress, discoveries, and strategies at every phase is not just a task; it's a crucial part of the Stage-Gate process. This documented record is pivotal in enabling well-informed decision-making, upholding transparency, and ensuring accountability. Documentation is the backbone of our process.

Iterative Process: The Stage-Gate process is not set in stone. It is designed to be flexible, acknowledging that projects may necessitate revisiting previous stages or undergoing revisions based on gate feedback. This flexibility empowers you to adapt and improve, ensuring the best possible outcome for our projects.

Continuous Improvement: Consistently assess and enhance the Stage-Gate process to align with evolving market dynamics and organizational requirements.

Training and Communication: In academic settings, ensuring that all stakeholders comprehend the Stage-Gate process, their respective roles, and the significance of adhering to the defined criteria and objectives is crucial. This understanding is vital in maintaining a cohesive and effective process implementation.

By implementing a well-designed Stage-Gate process, organizations can enhance their product development efficiency, reduce risks, and increase the chances of success.

Table 5.5: D-Gate 1

	D-Gate 1: Decision Gate 1			Decision
1	Product Idea	Intial Product Idea is developed and documented	Yes	Pass
2	Problem Statement	A clear problem statement is completed	Yes	Pass
3	D-Gate I: Initial Decision Gate	D-Gate I: is completed and pass Intial D-Gate I	Yes	Pass
4	Project Charter Approved	Project Charter is approved	Yes	Pass
5	Risk Assessment	Risk assessment is completed	Yes	Pass
6	D-Gate 1: Idea-Problem	D-Gate 1: Idea-Problem decision Gate is approved	Yes	Pass

D-Gate 1 Requirements: To progress to the subsequent stage, Minimum Viable Product (MVP) of the New Product Development Process (NPD), it is imperative that all

D-Gate 1 Idea/Problem description gate requirements be fulfilled and satisfied. Once all the elements of the D-Gate 1 are completed and passed, then project should move to the next stage.

5.3 Design & Build Minimum Viable Product (MVP)

The Minimum Viable Product (MVP) is a crucial concept in new product development, especially within the framework of the Lean Startup methodology advocated by (Ries, 2011). An MVP is the most basic product version that can be launched to test a new business idea and confirm customer interest and needs. It includes only the essential features required to meet early adopters' needs and gain valuable insights about customers with minimal effort.

Key considerations pertaining to Minimum Viable Product (MVP) in the context of new product development are as follows:

Focus on Core Features: The minimal viable product (MVP) encompasses essential functionalities aimed at addressing the core issue or satisfying the primary requirement of the target customer segment. This approach enables developers to concentrate on constructing a product that aligns with fundamental prerequisites, devoid of the intricacies associated with supplementary features.

Feedback and Iteration: The development team can gather prompt and frequent feedback by deploying the minimum viable product (MVP) to a targeted user segment. This feedback is critical in facilitating rapid iterations to enhance the product, drawing from real user experiences and preferences.

Reduced Time and Resources: Creating a minimum viable product (MVP) requires fewer resources and a shorter timeframe than building a full-featured product.

This approach boosts efficiency, lowers initial investment, and minimizes the risk of significant modifications or product failure.

Validating Business Hypotheses: The Minimum Viable Product (MVP) concept centers around validating foundational business assumptions with minimal risk. Its purpose is to assess the appeal of a product concept among potential customers and their willingness to support it financially before significant resources are committed to full-scale development.

These principles are extensively discussed in "The Lean Startup" by Ries (2011), which promotes adopting flexible product development approaches for startups to adapt and adjust before making substantial investments. Other sources delving into MVP in product development include Steve Blank's customer development theory and the broader lean startup movement. These emphasize the importance of learning as much as possible about customers' needs and behaviors with minimal effort.

Here are the steps to design and build a Minimum Viable Product (MVP):

The development of a Minimum Viable Product (MVP) represents a strategic imperative within the framework of the Lean Startup methodology. This approach empowers businesses to validate their conceptualizations while utilizing minimal resources, with the capability to make alterations based on feedback received. Diverse methodologies are commonly leveraged for MVP development, each tailored to align with specific product categories and business objectives. The ensuing enumeration outlines several of the most efficacious methods, accompanied by pertinent citations and references.

Wizard of Oz MVP: This strategy entails presenting a facade that the service or product is fully operational, while in reality, manual operations are being carried out behind the scenes. It is valuable for gauging customer responses without investing in full

technological development. An iconic illustration is Zappos, where the founder personally handled order fulfillment to evaluate the viability of the online shoe retail concept (Ries, 2011).

Concierge MVP: Akin to the Wizard of Oz, this approach involves the manual provision of services to simulate automation while prioritizing the delivery of personalized and high-touch service to individual customers. This methodology aids in comprehending customer requirements and honing the product (Blank, 2005).

Single-Feature MVP: Focusing on the development and testing of the singularly most crucial feature that addresses the core issue for users, this method enables swift identification of the primary solution's resonance level with the target market (Maurya, 2012).

Piecemeal MVP: Utilizing existing tools and services to assemble the minimum viable product (MVP) minimizes the necessity for extensive preliminary development. By leveraging accessible resources, the primary functionality of the product can be delivered without the need for significant initial development effort (Ries, 2011).

Landing Page MVP: Designing a promotional landing page to delineate the product and assess customer interest through tracking sign-ups or expressions of interest. This methodology proves effective in appraising market demand prior to the product's complete development (Fitzpatrick, 2014).

Explainer Video MVP: Using a video to explain the product's function and value proposition to potential customers. This can be particularly effective for complex products or concepts, allowing businesses to see how the market reacts to the idea before it is built (Maurya, 2012).

Crowdfunding MVP: Leveraging crowdfunding platforms such as Kickstarter or Indiegogo to introduce a product idea to potential backers serves the dual purpose of validating the market and obtaining funding (Ries, 2011).

Each approach possesses distinct advantages and is appropriate for varying circumstances. The selection of the appropriate MVP development approach hinges on multiple factors, such as the product's nature, available resources, target market, and the specific hypotheses the business seeks to validate.

The following are the key steps to Design and Build MVP;

- Perform Functional Analysis
- Develop Functional Model
- Concept Generation
- Concept Selection
- Design and build Minimum Viable Product (MVP).
- Problem solution Fit-lab test MVP

Perform Functional Analysis

Considering a product's functionality and potential use cases can streamline the transition from requirements to the final product. This process is known as Functional Analysis.

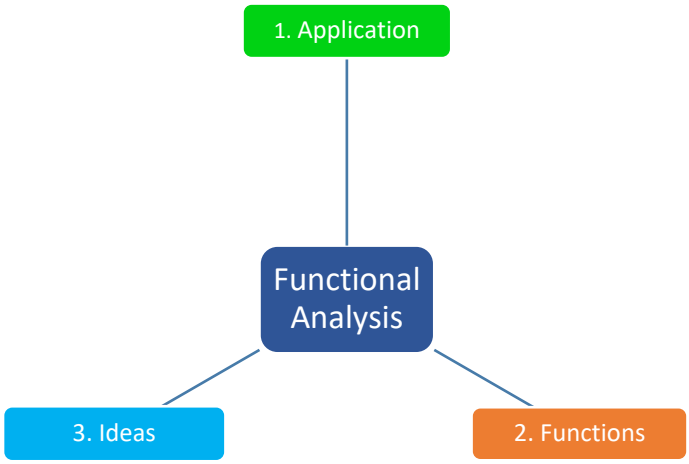


Figure 5.3: Functional Analysis

Understanding and clearly defining a product's applications is crucial for companies to develop and market their products effectively. This understanding is key to aligning our offerings with the needs of our customers, encompassing how they use the product, the needs it satisfies, and the issues it resolves. For instance, a smartphone's applications encompass communication, internet browsing, photography, and mobile payments. By understanding a product's applications in this manner, businesses can customize their offerings to better align with customer needs, thereby enhancing user satisfaction and driving business growth.

Table 5.6: Application, Function & Ideas template

Application	Function	Ideas to deliver Function

The product description and its uses should be presented as a hierarchical series of functions or behaviors. This includes the listing of all functions, encompassing primary as well as secondary functions. Each function should be expressed as a combination of an action verb and a noun.

Table 5.7: Identify functions by action verb-noun combination

Identify Functions		
Action Verb	**Action Verb-Noun Combination**	
Generates	Generates detailed stock reports	Detailed stock reports
Generates	Generates Summary Stock Reports	Summary stock reports
Provides	Provides recommendations of top ten stocks	Recommendations of top ten stocks

Generate multiple ideas to fulfill each function.

Table 5.8: Application, Function, and list of ideas to fulfill each function

Application	Function	Ideas to deliver Function

Develop Functional Model

A functional model functions as a graphical illustration that encapsulates the chief functional components or subsystems of a system or product. It showcases the interplay and collaboration among these elements to accomplish overarching objectives. Frequently applied in engineering and new product development, the function model provides a high-level depiction of the system's functionality and structure. Moreover, it aids in refining problem formulation by unearthing the core issue at hand.

The functional model identifies and interrelates the various functions performed or generated by the product. These functions can be categorized as useful functions, which encompass desired operations, and harmful functions, which encompass undesired operations.

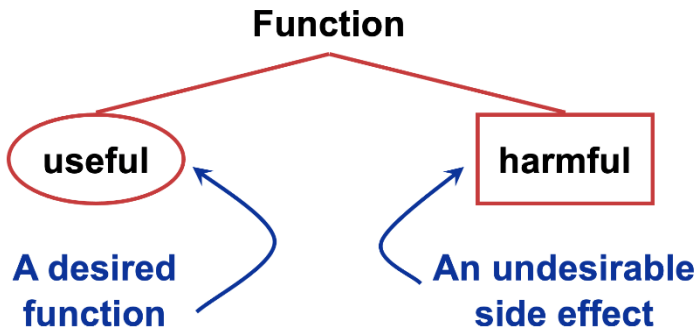


Figure 5.4: The function produces useful and harmful effects or contradiction

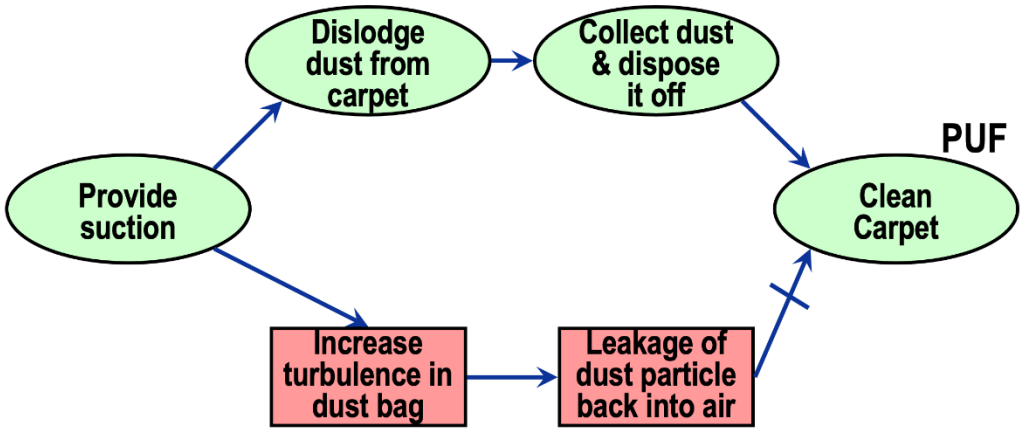


Figure 5.5: Functional model of a vacuum cleaner

The design team addresses undesirable functions and contradictions identified in the Functional Model by promoting innovation and creativity.

Concept Generation

As per Amabile (1983), generating multiple concepts allows for exploring a broad spectrum of ideas and solutions pertaining to a given problem. This diversity of concepts heightens the probability of identifying innovative and creative solutions.

After creating a Functional model, here are the steps to develop multiple concepts;

- Identify Functions
- Generate multiple ideas to deliver each function
- Develop MVP concepts to fulfill core function
- Ideas are generated at a function level
- The goal is to generate lots of ideas to fulfill each function
- No idea is ridiculous – something crazy may lead to something wonderful

- Two major sources for ideas:
- Brainstorming techniques
- Benchmarking

1. Primary Function	2. Secondary Function	3. Secondary Function
Idea 1-3	Idea 1-1	Idea 1-1
Idea 2-2	Idea 2-1	Idea 2-1
Idea 3-3	Idea 2-3	Idea 3-2

Develop MVP Concept

1. Primary Function	2. Secondary Function	3. Auxiliary Function

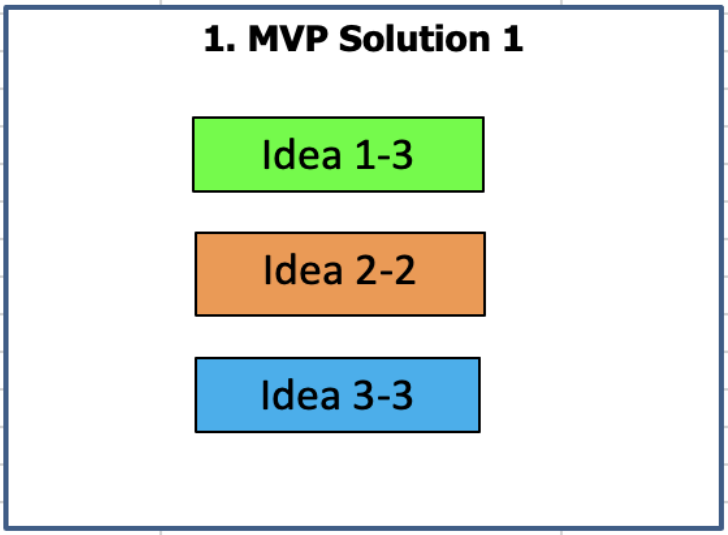


Figure 5.6: Develop multiple concepts

Table 5.9: Develop MVP

Design & Build MVP		
Application	Function	Ideas to deliver Function
Homes carpet cleaning	Clean carpet	Dust Extracting Equipment
	Provides suction	Vacuum pump
	Dislodgde dust from carpet	Rotating brush
	Collect dust and dispose off	Dust Container
	Clean carpet	

Problem Solution Fit: Lab Test: Ensuring a "Problem-Solution Fit" is a critical early stage in the lifecycle of a startup or any new product. It entails ensuring alignment between a market need (problem) and the product or service designed to address that need (solution). Successfully achieving problem-solution fit means that a company has identified a significant problem and has created a solution that effectively tackles it. This fit is essential before a business can scale or seek a product-market fit.

Key aspects of achieving problem-solution fit include: Validating the Problem: Demonstrating the existence, significance, and widespread impact of a problem necessitates comprehensive validation, often through rigorous laboratory testing and solicitation of customer feedback. This process is essential for substantiating the need for a viable solution.

Developing the Right Solution: The proposed solution should not just tackle the issue, but should do so in a manner that is feasible, enduring, and superior to other existing options. The initial solution concepts are validated through the creation of prototypes or Minimum Viable Products (MVPs).

Customer Validation: Feedback from prospective users is essential as it validates whether the solution adequately addresses the needs of the target audience.

Achieving problem-solution fit is crucial because it confirms that the product development efforts align with genuine needs, paving the way for customer adoption and sustainable business growth. According to Osterwalder et al. (2014), three types of fits can be utilized: 1. Problem-Solution Fit, 2. Product-Market Fit, and 3. Business Model Fit.

1. Problem Solution Fit (On paper): This refers to designing a Minimum Viable Product (MVP) that effectively addresses a specific customer problem on paper.
2. Product Market Fit (In the Market): This occurs when there is tangible evidence that your products and services have been thoroughly tested.
3. Business Model Fit (In the Bank): This stage is achieved when there is clear evidence that your product can generate profit and is scalable within the business model.

It is important to note that only Problem Solution Fit must be attained at this stage.

The provided Problem-Solution Fit assessment tool evaluates the alignment between a given problem and its proposed solution.

Table 5.10: Problem Solution fit assessment

	MVP Product Solution Fit	Expample: Carpet Cleaning Solution MVP	
			Problem
	Customer Requirements	Customer Problem	Solution Fit
1	Clean carpet	Current solution do completely clean the carpet	7
2	Light weight	Available solutions are heavy weighs >10 Lbs	8
3	Easy to dispose off dirt	Difficult to dispose off dirt	7
4			
5			
6			
	Problem Solution fit score		7.33
	Problem Solution fit validated		Yes
		Decision Making	
		Between 1-4: Pivot	4
		Between 4-5: Itrerate: Caution	5
		Between 6-10: Go	6

In new product development, specifically within the framework of achieving problem-solution fit, there isn't a universally fixed percentage of customer requirements that must be met before considering the problem-solution fit validated. However, the key is not merely to meet a specific percentage of requirements but to ensure that the solution effectively addresses the target customers' core needs or pain points. The focus should be on the most critical aspects of the problem as identified through customer feedback and market research.

Principles for Validating Problem-Solution Fit:

Core Problem Identification: Identify and focus on solving the core problem most significant to your target customer group. This does not necessarily mean solving every aspect of the problem or meeting every requirement but addressing the most painful or critical parts that provide value to the customer.

Customer Feedback and Iteration: Use customer feedback to iterate on the product. Initial customer interactions and testing should reveal whether the solution is on the right track. This feedback is crucial to refine the solution to meet customer needs better.

According to (Ries, 2011) in The Lean Startup, a startup's first product versions should aim to provide a new solution to a problem or a significantly better solution than is currently available on the market, based on feedback from early adopters.

Minimum Viable Product (MVP): Develop an MVP that includes only the essential features necessary to solve the core problem and start gathering user feedback. According to (Maurya, 2012), running Lean emphasizes using an MVP to validate the core underlying assumptions about a business model quickly and with minimal cost.

Measure and Validate: Metrics should be established to measure how well the solution is addressing the problem. This could be user engagement, satisfaction ratings, usability assessments, or other relevant metrics, depending on the nature of the product and the problem it solves. Given that a Minimum Viable Product (MVP) serves to enhance understanding of customer needs and employs an iterative process to evolve from an MVP to a prototype, and if an MVP addresses over 60 percent of the core problem, it is considered to have achieved problem-solution fit.

Once all the required elements are completed for Stage 2: Design & Build MVP, the Project leader makes necessary arrangements to set up D-Gate 2: MVP gate review with the Gate review team. The gate review team consists of key stake holders; Product owner and other stake holders.

D-Gate 2: Design & Build MVP stage gate review

Upon successfully completing and approving the D-Gate review, the product development team is authorized to advance to the subsequent phase, which entails gathering and analyzing customer feedback for the Minimum Viable Product (MVP).

Table 5.11: Stage gate D-Gate 2: MVP

	D-Gate 2: MVP			Decision
1	D-Gate 1: Idea Propblem	All open items from D-Gate I are closed	Yes	Pass
2	Functional Analysis	Functional Analysis is completed	Yes	Pass
3	Functional Model	Functional Model is completed	Yes	Pass
4	Concept Generation	Multiple concepts are developed to fullfil core function	Yes	Pass
5	Minimum Viable Product (MVP)	MVP Is developed and addressed the Core Problem	Yes	Pass
6	Problem Solution Fit	Ensure that problem solution has perfect fit	Yes	Pass
		Problem Solution fit validated	Yes	

5.4 Customer Feedback (CFB)

Obtaining customer feedback is not just important; it's a game-changer during the MVP stage of product development. It plays a pivotal role in ensuring that the product aligns with customer needs and exhibits potential in the market. This feedback is not just instrumental in validating the MVP's efficacy in addressing the targeted issue; it's a guide for continuous improvements to enhance its features and functionality. In other words, it's all about discerning between indispensable and non-essential features; and offering valuable insights into user interactions and contributing significantly to user experience design. It’s just a tool for market validation; a signal of the product's readiness or the necessity for adjustments. Involving customers in the feedback process is not just about fostering a strong relationship and their investment in the product; it's about mitigating the risk of incorporating unwanted features. In summary, feedback ensures that MVP development remains attuned to market requirements and customers' evolving preferences, providing reassurance of the effectiveness of the development process.

1. Identify early Adaptors
2. Identify information needed

3. Customer feedback collection methods
4. Gathering customer feedback
5. Synthesize customer feedback using Affinity Diagram
6. Kano Model
7. Prioritize customer feedback using AHP

Identify early adaptors

Identifying early adopters is dynamic, evolving as one accumulates more insights and data on the minimum viable product (MVP). However, what remains constant is the importance of maintaining an ongoing relationship with the target audience. This emphasis on your value and integral role in the process should make you feel appreciated. Adapting to changing customer needs and ensuring the new product meets their expectations is crucial. Effective customer identification constitutes a fundamental aspect of successful new product development. It entails pinpointing and defining the individuals or groups who will derive benefit from and employ a new product. This process necessitates an understanding of the characteristics, needs, behaviors, and preferences of prospective customers to form a clear depiction of the target audience.

Customers can be divided into three distinct categories.

Table 5.12: Dividing customers in categories

Stakeholders	Internal Customers	External Customers
• Suppliers • Management • Shareholders	• Sales & Marketing • Engineering • Manufacturing	• Buyers • Users

	• Operational Leadership • Business Leadership	• Dealers / Distributors • Bystanders • Regulatory Agencies (Indirect)

Identify information needed

Customer information and their requirements can be categorized by following types of customer needs:

Table 5.13: Customer information and information/requirements

Category	**Information/Requirements**
Features	Extra items added to basic features
Reliability	Probability product will operate over time
Conformance	Meeting pre-established standards
Durability	Life span before replacement
Serviceability	Ease of getting repairs; speed and competence of repairs
Aesthetics	Look, feel, sound, smell or taste
Perceived quality	Subjective perceptions - reputation
Cost	Price; Customer willing to spend
Safety	Safety Requirements

Delivery	Delivery needs

Customer feedback collection methods

There are several methods available to gather customer feedback. Following is list of methods can be used to gather customer feedback;

Table 5.14.: Customer Feedback collection Methods Customer Feedback collection Methods

Customer Feedback Collection Methods	**Information/Requirements**
Surveys and Questionnaires:	Create surveys and questionnaires to gather quantitative data from a large audience. Use tools like SurveyMonkey, Google Forms, or specialized survey software. Ensure that questions are clear and relevant to your product concept.
Interviews:	Conduct in-depth interviews with key stakeholders, potential users, and existing customers. Open-ended interviews can provide valuable qualitative insights. Ask about pain points, needs, and expectations.
Focus Groups:	Organize focus group discussions with a small group of target users. These sessions can provide in-depth insights and allow participants to bounce ideas off each other.
User Feedback Channels:	Implement feedback channels within your existing products or prototypes, such as feedback forms, chat support, or user forums. Actively listen to and analyze the feedback received.
Social Media and Online Communities	Monitor social media channels, industry-specific forums, and online communities related to your product or industry. Engage in conversations and observe what customers say about your product and competitors.
Competitor Analysis:	Analyze competitor products and reviews. Identify common issues or areas where competitors excel. Use this information to inform your product development strategy.

MVP & Prototype Testing:	Develop prototypes or minimum viable products (MVPs) and test usability with real users. Observe how they interact with the product and gather feedback on usability and features.
Feedback Aggregation:	Collect and organize all feedback and data from surveys, interviews, focus groups, and other sources. Use spreadsheets, data analysis tools, or specialized software to manage and categorize the information.
Identify Patterns and Themes:	Analyze the collected data to identify common patterns, themes, and recurring issues. Pay attention to both positive and negative feedback.

Gathering customer feedback

Cross-Functional Collaboration: Emphasize the crucial role of cross-functional teams in the synthesis process, including product managers, designers, developers, and marketers. Their diverse perspectives and expertise are invaluable in determining the best approach to addressing the insights that have been identified.

Document customer feedback: In order to optimize the Minimum Viable Product (MVP) design and features, it is essential to thoroughly document all customer feedback. This task involves more than simply recording consumer requirements; it entails designing a product that fulfills their wants. By implementing improvements and refinements based on the insights gathered from customer feedback, we can develop a more user-centric product that stands a better chance of success in the market.

Problem Solution fit Validation: Stress the importance of validating the problem-solution fit to ensure it meets the current and future market needs. This step is crucial in ensuring the product's relevance and competitiveness.

Feedback Loop: It's important to maintain an ongoing feedback loop with early adopters. This ensures that new products remain aligned with the evolving needs and preferences of the dynamic market. Following these steps, you can effectively gather and

synthesize the Voice of the Market in new product development. This process has significantly increased the likelihood of creating a successful and customer-focused product, giving us confidence in our approach.

Synthesize Customer feedback: Affinity Diagram

Managing a large number of individual requirements can be overwhelming and time-consuming. Grouping them together streamlines the process and saves time during development. It simplifies the complex landscape of customer requirements, allowing the development team to focus on specific areas of importance. This clarity helps in understanding and prioritizing what truly matters to customers. It enables efficient allocation of resources, both in terms of time and budget. By grouping similar requirements, redundant efforts can be avoided, and resources can be concentrated on addressing common needs. Grouping requirements provides a structured basis for decision-making during the product development process. Teams can make informed choices about which features to prioritize and how to design the product. Synthesized requirements are easier to communicate to cross-functional teams, stakeholders, and partners. Clear, well-organized requirements improve collaboration and reduce misunderstandings. Grouping requirements ensures the product aligns more closely with customer needs and expectations. It provides a systematic way to prioritize features that have the greatest customer impact. Identifying and addressing the most critical requirements within each group mitigates the risk of overlooking important customer needs, reducing the chances of product failure or customer dissatisfaction. Development teams can work more efficiently with concise requirements that guide their efforts, enabling them to focus on developing features and functions directly aligned with customer priorities.

As customer demands evolve or alter, consolidating requirements into synthesized groups serves as a framework for swiftly evaluating their impact on the product and effecting necessary adjustments. A comprehensive understanding and effective response to customer needs confer your product a competitive advantage. Synthesizing requirements enables a focused approach to the aspects that set your product apart from competitors. Grouping requirements in a customer-centric manner reinforces the primacy of prioritizing customer needs in product development and promotes a more customer-driven mindset within the team.

Consolidating a substantial volume of customer requirements into coherent categories can present a complex yet essential challenge during the product development. The following steps outline the process of synthesizing customer feedback:

Customer feedback: Gather all available customer requirements and ensure you have a comprehensive list of customer inputs. Create a comprehensive list of all the raw customer feedback.

Create Affinity diagram: The affinity diagram, originally developed by Japanese anthropologist Jiro Kawakita, is not just a methodological tool. It is a transformative tool specifically designed to facilitate the conceptualization and organization of a substantial amount of unstructured data into logical and coherent groupings based on inherent relationships. This process is invaluable for guiding teams in the transformation of raw data into actionable insights through systematic categorization and analysis. By highlighting the transformative power of the affinity diagram, we can make the audience feel the potential impact of this tool in their work.

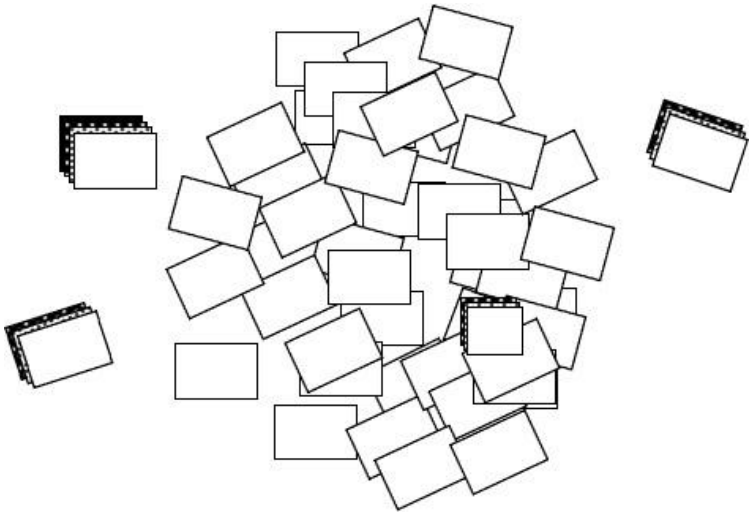


Figure 5.7: Raw Customer Requirements

The creation of an affinity diagram typically follows these stages:

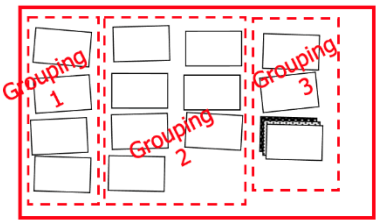
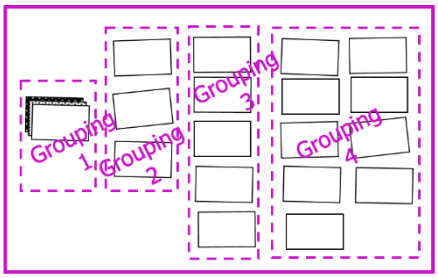
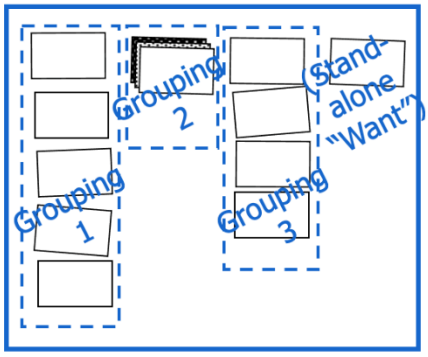
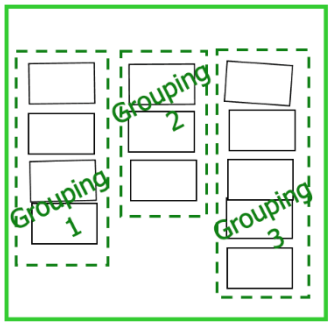
Data Gathering: This involves the frequent collection of ideas and observations, often through collaborative brainstorming sessions or from data sources such as customer feedback or survey findings. This collaborative approach ensures a diverse range of perspectives and insights are considered.

Recording: Each datum or concept is recorded on adhesive notes or cards. Participants group these notes based on inherent similarities or thematic connections during the clustering process.

Theme Development: Every group is assigned a heading that effectively encapsulates its fundamental theme.

The affinity diagram serves as a valuable tool in the analysis of data patterns and relationships. It does this by facilitating the identification of potential solutions or areas for further exploration. This step is crucial in turning raw data into actionable insights. This method, a key element in the comprehensive quality management approaches outlined by Kawakita, is not just a theoretical concept. It is a practical tool widely used in

fields such as business development, user experience, and education. Its particular strength lies in its ability to address situations where the path forward is ambiguous, or when there is a need to process complex or subjective data. By emphasizing its real-world applications, we can make the audience feel the immediate relevance and applicability of the affinity diagram in their professional domains

Category 1: Quality	Category 2: Cost
	
Category 3: Delivery	Category 4: Safety
	
Category 5: Performance	Category 6: Functionality

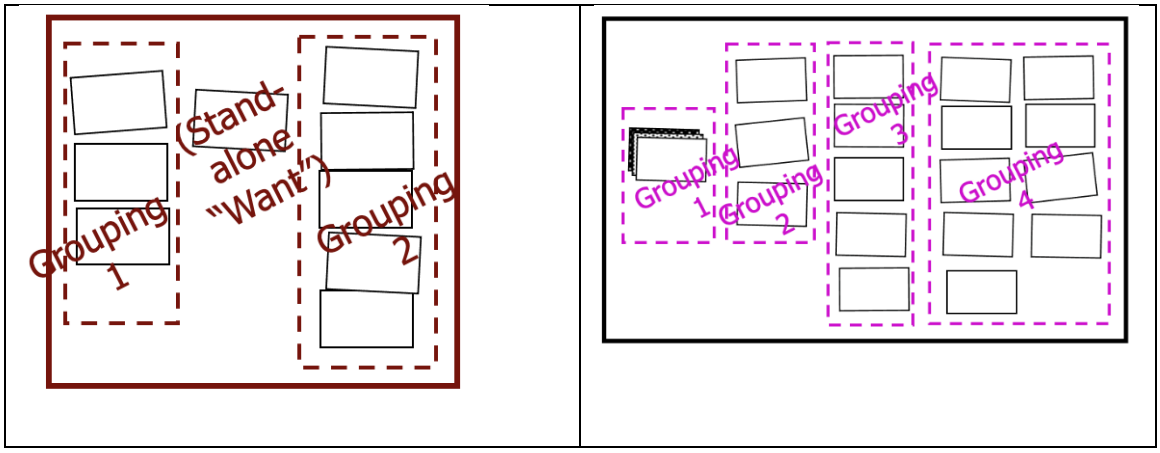


Figure 5.8: Requirement categories and grouping of customer feedback

Categorize customer feedback: Begin the process by categorizing the raw requirements into broad themes or overarching classifications. This initial step is crucial as it lays the groundwork for effective analysis and management of customer feedback. These categories should accurately represent the fundamental aspects or functionalities of your product or service.

Cluster Similar customer feedback into groups: When evaluating the criteria within each category, it is important to identify any common characteristics or functionalities. This collaborative effort is essential to consolidate the requirements relevant to similar customer needs or operational features, fostering a sense of teamwork.

Create customer feedback groupings: The task is to create clusters or subgroups of requirements based on their similarities. Each cluster should distinctly represent a specific aspect of the product or service.

Label Groupings: Assign precise and descriptive labels or titles to each requirement cluster. This is a critical step as it facilitates easy reference and understanding. These labels should succinctly communicate the shared theme or function of the grouped requirements.

Summarize Grouping Requirements:

For each requirement cluster, generate a concise summary outlining the primary customer needs or functions it includes. This will serve as a convenient reference for comprehending the cluster's content.

Eliminate Redundancies: Reviewing the grouped requirements to identify and eliminate any redundancies or overlaps is essential for ensuring that each requirement is unique and contributes to the overall understanding of customer needs. This process, which is an integral part of, helps to streamline the requirements and enhances the clarity and effectiveness of the overall understanding of customer needs, giving confidence in the outcome.

Kano Model for New Product Development

Professor Noriaki Kano introduced the Kano Model, a significant framework in new product development, in 1984. It categorizes customer requirements into five distinct classifications, helping businesses identify the features that will most impact customer satisfaction. This model is a powerful tool for understanding and prioritizing customer needs and preferences, and it effectively organizes these requirements into three categories.

a) Basic Requirements. The fundamental requirements are essential for the proper functioning of a product. Their absence or inadequate performance will lead to high levels of customer dissatisfaction. Conversely, their presence and satisfactory performance do not necessarily result in customer satisfaction; they are considered prerequisites. In the context of the banking industry, "Online Banking" is a fundamental requirement. The absence of online banking services would lead to customer dissatisfaction, while the presence of such services is considered a standard expectation.

b) Performance Requirements. These requirements are directly linked to performance levels: higher performance leads to greater customer satisfaction, while lower performance results in lower satisfaction. Gas consumption in automobiles serves as a pertinent example of such requirements. Typically, customers explicitly stipulate their performance demands.

c) Excitement or Delighter Requirements. The following conditions play a crucial role in ensuring customer satisfaction. They will lead to higher satisfaction if they are met or adequately fulfilled. Conversely, customers will not become dissatisfied if they are unmet or their fulfillment is inadequate. For example, while presenting an unexpected gift after a restaurant meal will undoubtedly enhance satisfaction, its absence will not necessarily result in dissatisfaction, as it is not a requirement or expectation of the customer. Neutral requirements, also known as 'indifferent' requirements, do not elicit either satisfaction or dissatisfaction. These are features that customers neither expect nor desire, and their presence or absence does not impact customer satisfaction. For example, the color of a product's packaging may be a neutral requirement for some customers.

By adopting the Kano Model in the context of new product development, companies can design products that meet and exceed customer expectations. This customer-centric approach leads to elevated customer satisfaction and success in the marketplace.

Table 5.15: Kano Model Satisfier Matrix

Kano Model Analysis: CS-Coefficient Satisfier and Dissatisfier matrix		
	Satisfier	Dissatisfier
Like: Strongly	10	1
Like: Moderately	9	2
Expect: Strongly	8	3
Expect: Moderately	7	4
Expect: Strongly	6	6
Neutral	5	5
Don't care:	4	7
Don't care: Modereate	3	8
Don't care: Strognly	2	9
Do not Like	1	10

Table 5.16: Kano Model Analysis of CS-Coefficient

Kano Analysis table	Input	Input	CS-Coefficient	
	Positive	Negative		
Features/Requirements	Satisfier	Dissatisfier	Satisfier	Dissatisfier
Open Sundays	9	1	0.90	0.10
Free Coffee	8	2	0.80	0.20
Insurance Service	6	3	0.60	0.30
Branch in Super market	8	6	0.80	0.60
Online Banking	8	7	0.80	0.70
Free Checking	3	8	0.30	0.80
Phone Banking	2	7	0.20	0.70
ATM	2	9	0.20	0.90

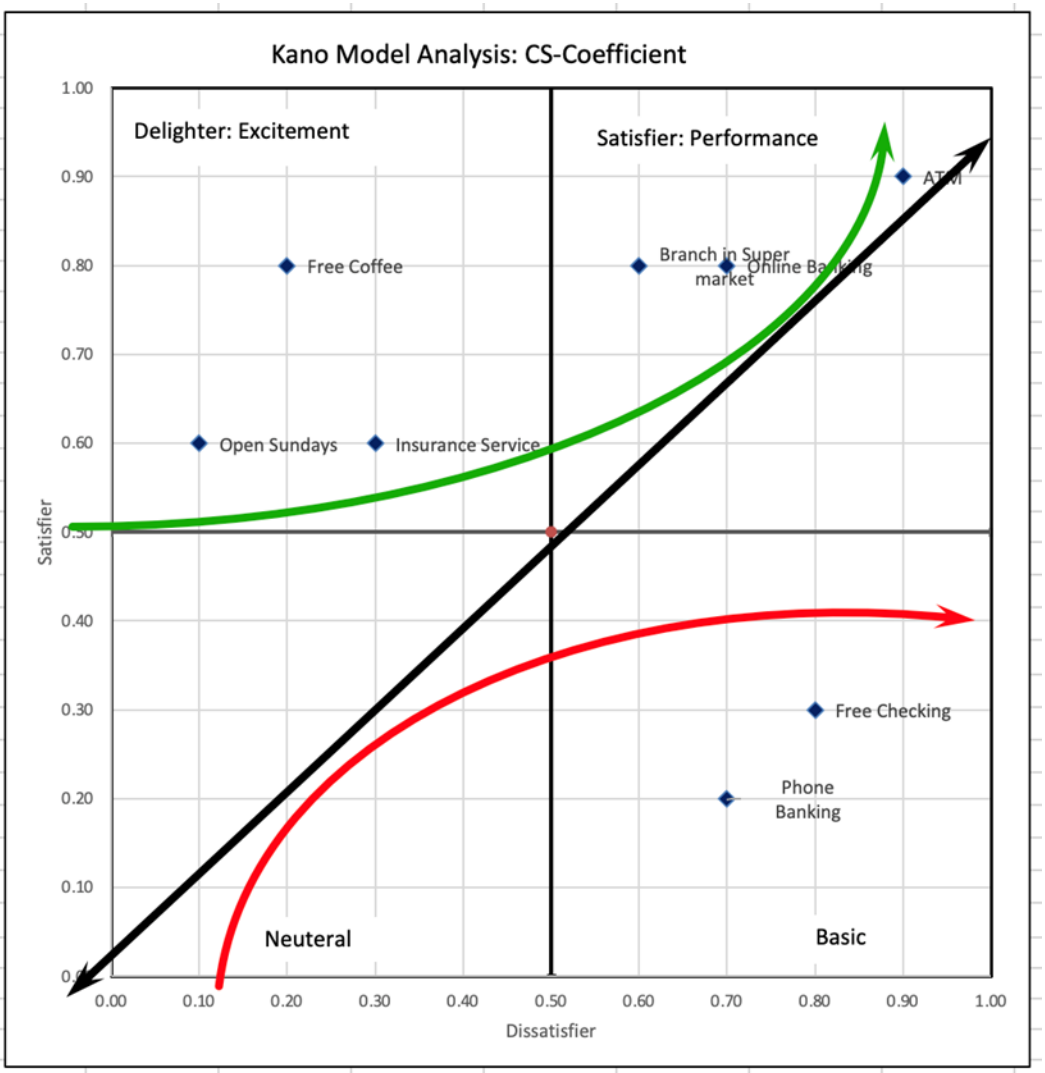


Figure 5.9: Kano Model Analysis of CS-Coefficient

The Kano Model empowers product development teams by revealing that certain features, such as complimentary coffee, Sunday branch operations, and the availability of insurance services, may not inherently impact customer satisfaction. However, their provision can result in delight among customers. On the other hand, the absence of expected services like free checking accounts and telephone banking can lead to customer dissatisfaction. Additionally, having a branch located within a supermarket and offering online banking services can act as satisfiers. This understanding enables teams to develop

products that not only satisfy but also delight their customer base, making them feel capable and influential in the process.

Prioritize customer feedback using AHP

While the product development team values all customer feedback, it's crucial to recognize that not all requirements carry the same weight. Therefore, it's important to prioritize feedback and requirements so that the team can focus on the most critical ones. This process not only aids in efficient decision-making but also makes the audience feel valued and integral to the process. As a result, the Analytical Hierarchy Process (AHP) is utilized to prioritize these requirements.

The Analytical Hierarchy Process (AHP) is not just a decision-making methodology and mathematical framework pioneered by Saaty in the late 1970s. It's a versatile tool that aids individuals and organizations in navigating intricate decisions that involve multiple criteria and alternatives. AHP proves particularly advantageous in scenarios presenting conflicting objectives or necessitating subjective judgments in decision-making, instilling confidence in its application.

Key components of the Analytical Hierarchy Process (AHP) include:

Hierarchy: AHP commences by organizing the decision problem into a hierarchical model, which comprises three primary levels:

Goal or Objective: At the top level, define the overarching goal or objective of the decision.

Goal or Objective: At the highest echelon, it is imperative to articulate the overarching aim or objective of the decision-making process.

Criteria: In pursuing a goal, it is essential to limn the criteria that play a crucial role in its attainment. These criteria often encompass various factors or attributes significantly influencing the decision-making process.

Alternatives: When deciding, list the alternatives or options at the lowest level. These are the choices that require evaluation.

Once the pairwise comparisons have been completed, AHP employs mathematical calculations to determine the relative weights for the criteria and alternatives. These weights reflect the importance or contribution of each criterion and alternative to the overall decision.

Aggregation and Scoring: The relative weights are then utilized to aggregate the scores of the alternatives, considering their performance across the criteria. This produces a final ranking or score for each alternative, aiding decision-makers in identifying the optimal choice.

Sensitivity Analysis: AHP allows for sensitivity analysis, which assists in evaluating how responsive the final decision is to changes in the judgments made during the pairwise comparisons. This helps in assessing the resilience of the decision.

Pairwise Comparisons: In AHP, decision-makers are asked to make pairwise comparisons between the criteria and alternatives. For example, they may be asked to compare how important one criterion is relative to another, or how well one alternative performs compared to another with respect to a specific criterion. These comparisons are usually expressed using a numerical scale, often ranging from 1 (equal importance) to 9 (extremely more important)

Mathematical Calculations: After the pairwise comparisons, AHP utilizes mathematical calculations to determine relative weights for the criteria and alternatives.

These weights signify the significance or contribution of each criterion and alternative to the overall decision.

Aggregation and Scoring: The relative weights are then employed to aggregate the scores of the alternatives, considering their performance across the criteria. This produces a final ranking or score for each alternative, assisting decision-makers in identifying the optimal choice.

Sensitivity Analysis: AHP permits sensitivity analysis, enabling an assessment of how vulnerable the final decision is to changes in the judgments made during the pairwise comparisons. This aids in evaluating the resilience of the decision.

The Analytic Hierarchy Process (AHP) finds applications in various fields such as business, engineering, healthcare, environmental management, and new product development. It is beneficial for addressing complex decision problems involving multiple criteria, trade-offs, and subjectivity. By structuring the decision process hierarchically and incorporating both quantitative and qualitative inputs, AHP offers a systematic and transparent approach to decision-making. This assists stakeholders in making informed choices that align with their objectives and priorities.

You can start by creating a table that lists the evaluation criteria, with requirements on both the X and Y axes of the table. Then, work row by row to determine whether each row is more important than the corresponding column and, if so, how much more important. If the row is more important than the column, enter a score of 1-9. If the row is less important than the column, enter the inverse of the scores of 1-9, as shown in the following table.

An Excel template for AHP has been developed to prioritize the requirements. Fill out the upper right side of the matrix in orange, and the lower right side will automatically be calculated using the AHP template.

According to Saaty (1980), a scale of 1-9 using specific definitions works best for AHP.

- Equally important
- Moderately more important
- Strongly more important
- Very strongly more important
- Overwhelmingly more important

Table 5.17: AHP Importance table

Strength	Row More Important than Column	Column More Important than Row
Equally Important	1	1
Moderately	3	1/3 = 0.333
Strongly	5	1/5 = 0.20
Very Strongly	7	1/7 = 0.143
Overwhelmingly	9	1/9 = 0.111

Table 5.18: Analytical Hierarchy Process (AHP) to prioritize requirements

Requiremenst	Open Sundays	Free Coffee	Insurance Service	Branch in Super market	Online Banking	Free Checking	Phone Banking	ATM	Sum of Normalized Ratings	Relative Score
Open Sundays	1.00	7.00	0.14	5.00	0.11	3.00	0.14	0.14	0.52	6.5%
Free Coffee	0.14	1.00	0.14	0.20	0.11	0.20	0.20	0.33	0.21	2.6%
Insurance Service	6.99	6.99	1.00	5.00	0.11	5.00	7.00	0.14	1.31	16.3%
Branch in Super market	0.20	5.00	0.20	1.00	0.11	7.00	0.20	0.14	0.44	5.5%
Online Banking	9.01	9.01	9.01	9.01	1.00	9.00	0.14	0.20	1.69	21.2%
Free Checking	0.33	5.00	0.20	0.14	0.11	1.00	0.14	0.20	0.28	3.4%
Phone Banking	6.99	5.00	0.14	5.00	6.99	6.99	1.00	0.20	1.36	17.0%
ATM	6.99	3.00	6.99	6.99	5.00	5.00	5.00	1.00	2.19	27.4%
Column Totals	31.66	42.01	17.83	32.34	13.55	37.19	13.83	2.36	8.00	

According to the Analytic Hierarchy Process, clients consider the availability of automated teller machines (ATMs), internet banking, telephone banking, and insurance services to be extremely important compared to other needs. Therefore, it is crucial for product development teams to give priority and guarantee the provision of these essential services.

Prioritized customer requirements: Feedback (CFB)

Table 5.19: Prioritized customer requirements:Feedback (CFB)

Priortized Customer requirements & Feedback(CFB)

Product/Process:(MVP) Date:

Priority	Priortized Customer's feedback/ Requirements	Percent	Kano Ranking	Comments
1	ATM	27%	Satisfier	
2	Online Banking	21%	Satisfier	
3	Phone Banking	17%	Dissatisfier	
4	Insurance Service	16%	Delighter	
5	Open Sundays	7%	Delighter	
6	Branch in Super market	5%	Satisfier	
7	Free Checking	3%	Dissatisfier	
8	Free Coffee	3%	Delighter	
9				
10				

Customer Feedback Summary: Gathering customer feedback for the MVP is crucial for validating problem-solution fit. It enables iterative development to enhance product features and functionality. Feedback assists in prioritizing essential features, understanding user interactions, and refining user experience. Additionally, it serves as a market validation tool, offering insights for potential product adjustments and helping in building customer relationships. Systematic feedback collection and analysis, utilizing methods such as surveys, interviews, and tools like Affinity Diagrams and the Analytical

Hierarchy Process (AHP), are vital for synthesizing and prioritizing customer feedback. Involving customers in the feedback collection process fosters their investment in the product's development and reduces the risk of incorporating unwanted features. Ultimately, customer feedback ensures the MVP remains aligned with market trends and customer preferences. Various methods such as surveys, interviews, focus groups, and social media engagement can be employed to collect customer feedback. Synthesizing this feedback using tools like Affinity Diagrams assists in managing and organizing customer requirements. Prioritizing the feedback with the AHP ensures that the most critical customer needs are addressed first. Employing frameworks like the Kano Model further helps in categorizing customer requirements into basic, performance, and excitement factors, guiding product development towards customer satisfaction and product success.

D-Gate 3: Customer Feedback (CFB) stage gate review:

Customer feedback gate review is crucial in the MVP stage of product development as it plays a key role in ensuring the product meets customer needs and has market potential. It helps to verify the MVP's effectiveness in solving the intended problem and informs iterative refinements to enhance features and functionality. Inaccurate customer feedback can lead to potential product failure. Therefore, it is imperative that the Customer feedback gate review successfully passes the review before embarking on designing and building the prototype product. Prioritized customer requirements will help build a prototype to achieve product-market fit and collect additional customer feedback.

Upon the successful completion of all requisite components for Stage 3: Customer Feedback, the Project Leader shall undertake the necessary preparations to convene D-

Gate 3, designated as the Customer Feedback Gate Review, with the Gate Review Team. This team comprises essential stakeholders, including the Product Owner and others.

Subsequent to the approval of Stage 3 by the review team, the product development team is authorized to advance to the subsequent phase of product development, which entails the Design and Build of the Prototype.

Table 5.20: D-Gate 3: Customer Feedback

	D-Gate 3: Customer Feedback			Decision
1	Open actions from D-Gate 1	All Open actions are completed & closed	Yes	Pass
2	**Open actions from D-Gate 2**	All Open actions are completed & closed	Yes	Pass
3	Market segment & early adaptors	Market segments and early adators are identified	Yes	Pass
4	Customer identification	Customers: Early adaptors are identified	Yes	Pass
5	Customer feedback gathering method	Customers Feedback methods are identified	Yes	Pass
6	Affinity Diagram	Affinity Diagram: Customer feedback have been synthesized	Yes	Pass
7	Priortize customer feedback(AHP)	Requirements are prioritized	Yes	Pass
8	Kano Model	Kano Analysis is completed and incorporated into the Requirements	Yes	Pass
9	Priortized list of customer feedback	Final priortized list of the customer feedback	Yes	Pass
	D-Gate 3: Customer Feedback	**D-Gate 3: Customer Feedback: Gate review is completed and appro**	Yes	Pass

CHAPTER VI:

DUSCUSSIONS & CONCLUSION

6.1 Summary

The Lean Startup technique, known for its iteration of quick generation and validation of ideas, continues to offer research possibilities, especially in implementing its tools and handling user feedback. Likewise, the user-centered problem-solving approach of Design Thinking requires additional research to determine the most effective ways to integrate it with frameworks such as Agile and Lean Startup.Design Sprints also necessitate further investigation to ascertain their capacity for synergy within wider innovation processes.

Moreover, although the Stage-Gate framework is commonly used in innovation management, there is limited study on how confluence might be effectively merged with other techniques. The study's primary objective is to establish a New Product Development Framework that greatly enhances the success rates of new goods, hence decreasing failure rates and associated expenses. This enhancement has the potential to result in more efficient use of resources, a stronger brand image, a competitive edge, consistent revenue, trust from stakeholders, quicker market entry, and greater market intelligence.

The study also conducted a comprehensive analysis to identify tactics that could redefine the success of product development. The study aims to optimize the New Product Development process by identifying and refining key elements and stages. It seeks to achieve Problem-Solution Fit by understanding the market problem, developing a Minimum Viable Product (MVP), gathering, synthesizing, and prioritizing customer feedback, and building a Prototype and subsequent Beta model for a successful market

launch. This research aims to offer helpful insights for firms looking to improve their product development operations and market performance.

6.2 Case Study – Jyoti Bansal Analysis

Jyoti Bansal is an international bestselling author on Udemy online marketplace who teaches stock trading using technical analysis. Her company JyotiBansalAnalysis wanted to expand their business by utilizing their existing traffic.

Figure 6.1: ENPD Case Study – Company Profile

JBA was already working on a product called StockAssist which provided a product market fit yet it didn't pass D-Gate-1 for various reasons. I was hired by the company for a period of 12 months to solve their issue and help them with a successful product launch.

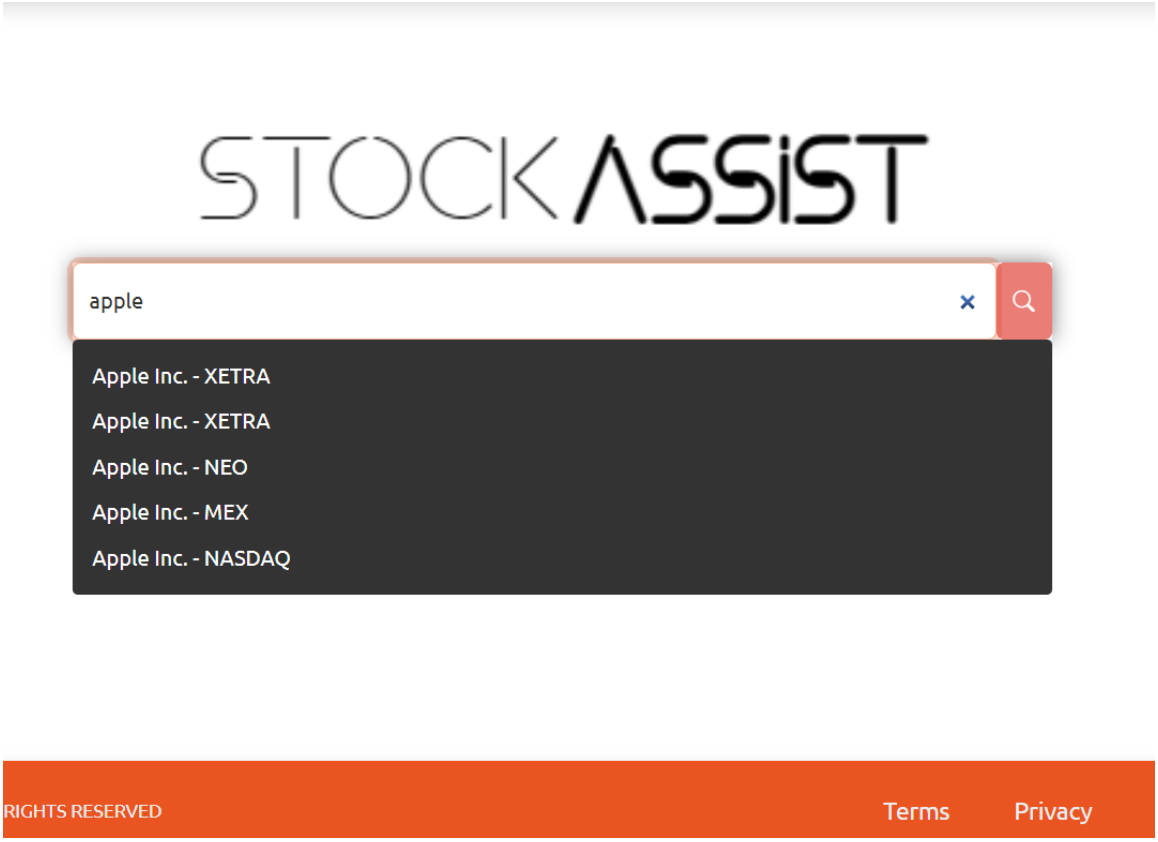


Figure 6.2: ENPD Case Study – Existing Project

Using the ENPD, multiple ideas was discovered, researched and tested. The final MVP ended up being an indicator users can access on a monthly subscription basis. It's called True Leading Indicator as it provides the product market and product problem fit by giving people signals before something happens in stock market.

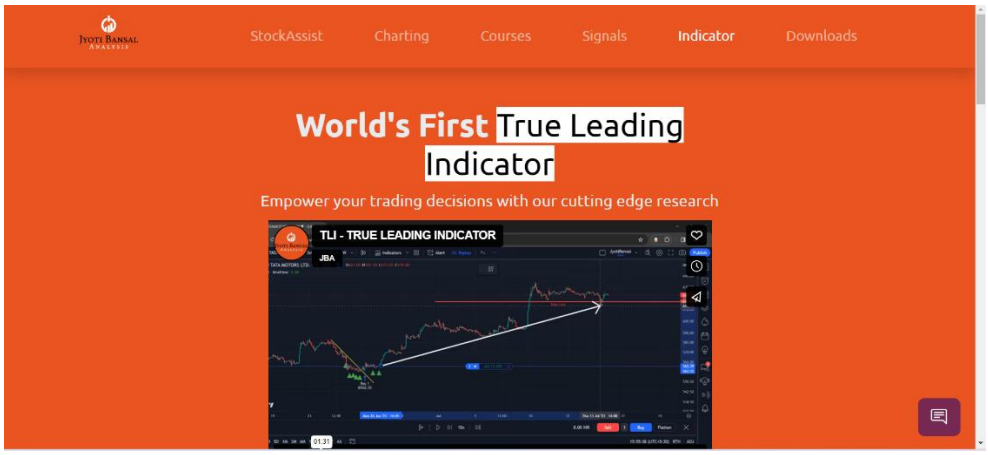


Figure 6.3: ENPD Case Study - True Leading Indicator Homepage

The most common quality definition identified in this case was trust and effectiveness. Users are going to put the real money in market based on the signals generated by this tool. They wanted something reliable. Hence, we designed this product on the world's largest charting platform – tradingview. Further the tool was tested on real market for the effectiveness and the sales page needed up with those our results for transparency.

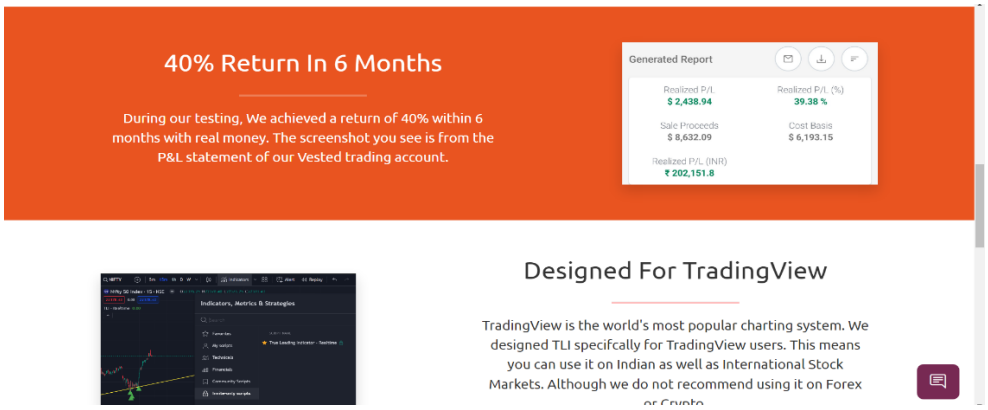


Figure 6.4: ENPD Case Study - True Leading Indicator Quality

We were able to get a lot of feedback from users due to the AI chatbot on the page. They usually had concerns on product pricing, not understanding what TradingView username was, and if the product worked on futures and options segment. Customer feedback collected through the chatbot has enabled the product development team to continually enhance the product by integrating customer needs and requirements achieving Product Market Fit(PMF).

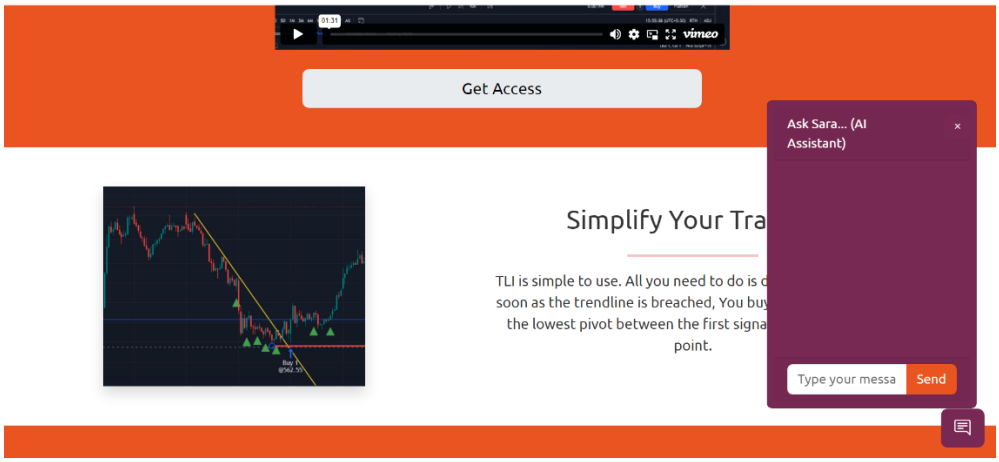


Figure 6.5: ENPD Case Study – AI Chatbot to gather feedback

The chatbot was reprogrammed to answer all the concerns of users but a detailed FAQ sections was added before the purchase options. This drastically decreased issues faced by users.

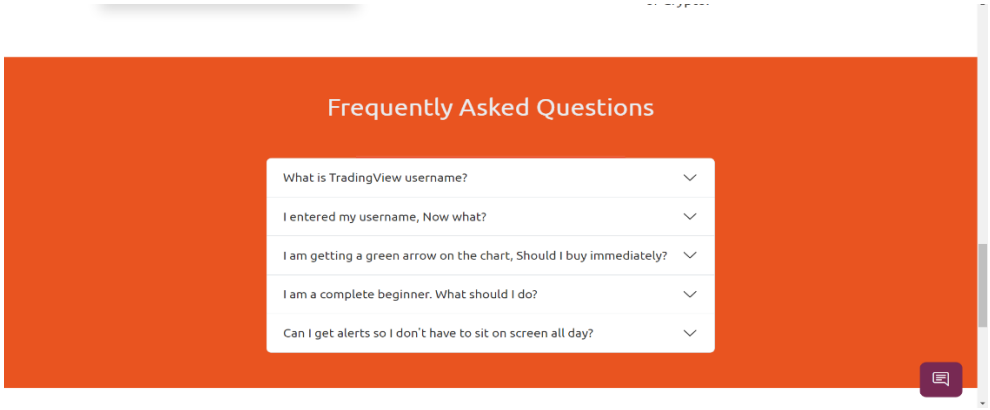


Figure 6.6: ENPD Case Study – FAQ section based on CFB

Within 6 months, we managed to sell 800+ monthly subscriptions at a pricing of $30 per month totaling $24K monthly recurring revenue.

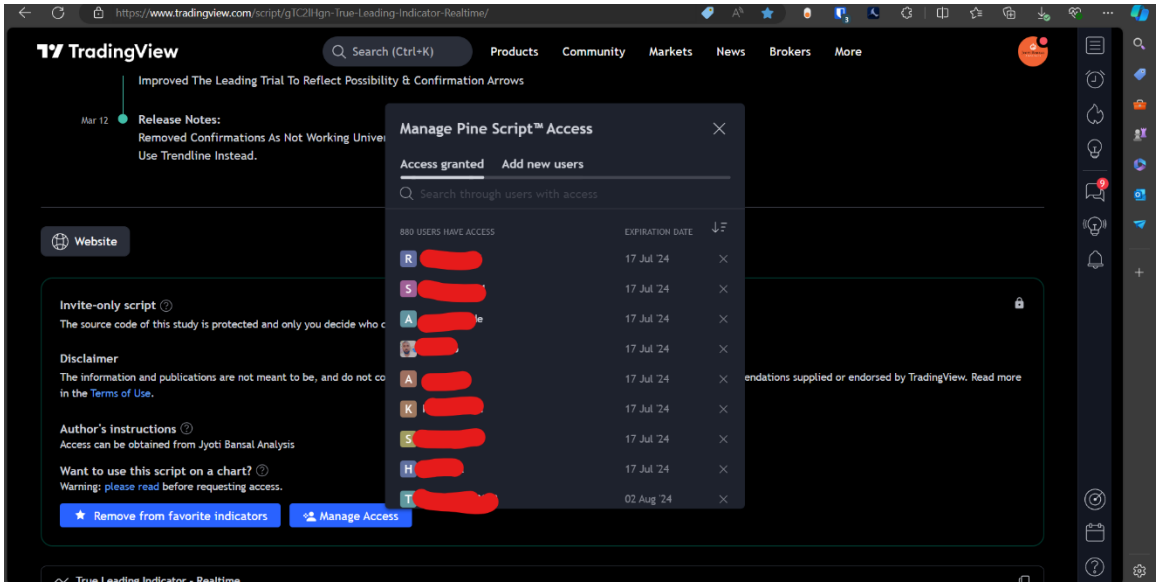


Figure 6.7: ENPD Case Study – 800+ paying customers generating over $24K per month

6.3 Recommendations for Future Research

Product development is a complex process that involves multiple interdependent components. The flawless integration of these components is crucial for achieving complete success in launching new products. Nevertheless, the task of establishing a comprehensive and unified system for product development goes beyond the boundaries of this research. This research will exclusively concentrate on the initial three phases of the new product development framework: 1. Ideation/Problem description, 2. Design and construct Minimum Viable Products (MVP), and 3. Customer Feedback (VoM).

The scope of this study included ideation/problem definition, designing and building a minimum viable product (MVP), as well as gathering, synthesizing, and prioritizing consumer feedback. Nevertheless, it is essential to recognize that the remaining stages of the product development framework, such as prototyping, beta model development, and the transition to market-ready products, necessitate additional examination to guarantee the successful development and launch of new products, ultimately resulting in market triumph.

Further investigation is needed for the following stages of the ENPD framework;

Design, build and test the Prototype;

Research is required to develop frameworks that address the scalability of rapid prototyping techniques, ensuring a seamless transition from small-scale prototype development to large-scale manufacturing. This entails investigating the economic feasibility, material properties, and quality control mechanisms essential for scaling.

Additionally, there is a need for research on frameworks and tools that enhance cross-disciplinary collaboration and knowledge integration throughout the New Product Development (NPD) process. This involves identifying the barriers to effective communication and formulating strategies to overcome these obstacles.

Design, build and test Beta Model;

There is a need for comprehensive research on methodologies that ensure a smooth and effective transition from prototype to beta model. This includes investigating best practices for scaling designs, maintaining quality and functionality, and managing the complexities of this phase.

Limited research exists on the application and impact of advanced technologies such as artificial intelligence, machine learning, and virtual/augmented reality in the prototyping phase of Engineering New Product Development (ENPD). There is a need for guidelines on leveraging these technologies to enhance the design, build, and test stages of beta model development.

Market Ready Products;

There is a lack of comprehensive research on frameworks and strategies that address the scalability and manufacturing readiness of beta models. This includes understanding how to scale up production efficiently while maintaining product quality, cost-effectiveness, and meeting regulatory standards.

What are the best practices for scaling up production from beta models to full-scale manufacturing while ensuring consistent product quality?

Furthermore, the Enhanced New Product Development (ENPD) framework is agile and flexible, making it applicable globally. It can be utilized both for starting new businesses and for developing new products to enhance existing product offerings.

6.3 Conclusion

An analysis of research gaps in different product development processes has highlighted the need for more systematic and evidence-based approaches. The absence of comprehensive frameworks for identifying problems and prioritizing customer needs, coupled with the uncertainties surrounding the design and validation of Minimum Viable Product (MVP) hypotheses, are particularly noticeable.In order to obtain a complete understanding of consumer involvement and happiness, data collection methods must be innovative and incorporate advanced feedback systems to facilitate rapid learning and improvement.

Furthermore, enhancing the data analysis process to convert information into practical and useful insights is essential. This should be done by prioritizing knowledge exchange among different areas within the company to facilitate strategic decision-making

Additional examination is required to ascertain the efficacy of different approaches to defining problems and generating ideas, as well as to improve the repetitive creation of prototypes and the incorporation of user input during testing stages.

The Stage-Gate framework reiterates the importance of risk identification and management and the refinement of decision-making criteria within each gate to ensure consistency and empirical rigor. Idea Generation and Screening should be revitalized with innovative techniques, while Concept Generation and testing require creative methods to foster unique distinctiveness.

The highlighted gaps present fruitful potential for research to improve problem identification, enhance customer requirement analysis, design and create MVPs, and incorporate feedback into the iterative cycles of product development. By implementing the suggested solutions, which include creating a Project Charter to define the problem, using Affinity Diagrams and AHP to synthesize customer feedback, and prioritizing

customer feedback, the chances of new product entries succeeding in the market can be greatly enhanced.

Furthermore, employing a strategic method for conducting market research and segmentation, supported by cutting-edge techniques like the Kano Model for analyzing client preferences, will guarantee that product advancements are closely in tandem with market needs and consumer anticipations. Collectively, these solutions seek to improve product development procedures, hence increasing the effectiveness of risk management, concept generation, and decision-making processes in product innovation. By employing the Enhanced New Product Development framework, we were able to recruit a large number of early adopters at the Minimum Viable Product (MVP) stage.

This resulted in a substantial amount of consumer input, which we used to make improvements to the MVP as we progressed to the next step of product development: designing and building a prototype. The scope of this study includes ideation/problem definition, designing and creating a Minimum Viable Product (MVP), as well as obtaining and synthesizing consumer feedback.

Nevertheless, it is imperative to recognize that the remaining stages of the product development framework, such as prototyping, beta model development, and the transition to market-ready products, necessitate additional examination to guarantee the successful development and launch of new products, ultimately resulting in market triumph.

APPENDIX A:

SURVEY QUESTIONNAIRE

Title: Evaluating the Efficacy of New Product Development Frameworks

Introduction: Thank you for participating in our survey. The objective of this survey is to gather insights on the effectiveness of existing New Product Development (NPD) frameworks and identify the areas where organizations face challenges. Your responses are crucial for understanding the current landscape and driving improvements in NPD frameworks.

Section 1: General Information

What is your role in your organization?

A. Product Manager
B. Innovation Lead
C. Market Research Analyst
D. R&D Manager
E. Other (Please specify)

What industry does your organization operate in?

A. Technology
B. Consumer Goods
C. Healthcare
D. Automotive
E. Other (Please specify)

Section 2: Current New Product Development Framework

Which New Product Development (NPD) framework does your organization currently use? (Select all that apply)

A. Stage-Gate
B. Lean Startup
C. Design Thinking
D. Agile
E. Six Sigma
F. Custom Framework
G. Other (Please specify)

How satisfied are you with the current NPD framework your organization uses?

A. Very Satisfied
B. Satisfied
C. Neutral
D. Dissatisfied
E. Very Dissatisfied

Please rate the effectiveness of your current NPD framework in the following areas:

A. Product Market Fit
    - Very Effective
    - Effective
    - Neutral
    - Ineffective
    - Very Ineffective
B. Market Research
    - Very Effective
    - Effective
    - Neutral
    - Ineffective
    - Very Ineffective
C. Product Quality and Performance
    - Very Effective
    - Effective
    - Neutral
    - Ineffective
    - Very Ineffective
D. Value Proposition
    - Very Effective

- Effective
- Neutral
- Ineffective
- Very Ineffective

E. Distribution Channels
   - Very Effective
   - Effective
   - Neutral
   - Ineffective
   - Very Ineffective

F. Customer Feedback Integration
   - Very Effective
   - Effective
   - Neutral
   - Ineffective
   - Very Ineffective

Section 3: Specific Challenges and Issues

To what extent do you agree with the following statements about the challenges faced in NPD?

1. The absence of fit between the product and its intended market affects our product launches.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree
2. Inaccurate or inadequate market research has led to product failures in our organization.
   - Strongly Agree
   - Agree
   - Neutral
   - Disagree
   - Strongly Disagree

3. Substandard product quality and performance have been issues in our new product developments.
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree
4. Our products often lack a unique or differentiated value proposition.
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree
5. Inefficient distribution channels have impacted our product success.
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree
6. We struggle to effectively incorporate customer feedback into our product development.
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

Section 4: Methodologies and Framework Improvements

What key factors do you believe should be included in an ideal NPD framework to address these challenges?

A. Thorough Market Research
B. Customer Feedback Loop
C. Unique Value Proposition
D. Strong Product-Market Fit Analysis
E. Efficient Distribution Strategy
F. High-Quality Standards

G. Other (Please specify)

Section 5: Feedback and Suggestions

Based on your experience, what suggestions do you have for improving NPD frameworks to better address the issues faced by organizations? (Open-ended)

Would you be willing to participate in a follow-up interview to provide more detailed insights?

- Yes
- No

Conclusion: Thank you for your time and valuable insights. Your feedback is essential in helping us understand the current state of NPD frameworks and identify areas for improvement.

APPENDIX B:

INTERVIEW GUIDE

Title: Identifying Issues with Steps or Processes in NPD Frameworks

Introduction: Thank you for agreeing to participate in this interview. The objective of this discussion is to delve deeper into the specific steps and processes within current New Product Development (NPD) frameworks, understanding where issues arise, and gathering insights for potential improvements. Your detailed feedback will help us in pinpointing areas needing enhancement.

Section 1: Background Information

Can you briefly describe your role in the NPD process within your organization?

Which NPD framework does your organization currently use?

How long have you been using this framework?

Section 2: Initial Satisfaction and Effectiveness

How satisfied are you with the overall effectiveness of the NPD framework your organization uses? Why?

What were the key reasons behind choosing this particular NPD framework?

Section 3: Detailed Framework Evaluation

Could you outline the key steps or stages involved in your current NPD framework?

Which of these steps do you find most challenging? Why?

At what stage in your NPD process do you evaluate product-market fit?

What tools or methods do you use to ensure a good product-market fit?

Have you encountered challenges in this stage? If so, what were they?

How does your framework incorporate market research?

What methodologies do you use for market research?

Are there any specific issues you face in gathering or analyzing market data?

How is product quality and performance monitored throughout the development process?

What quality control measures are in place?

Have there been instances where product quality did not meet expectations? What caused them?

How does your framework address the creation and validation of a unique value proposition?

Are there any steps specifically dedicated to differentiating your product from competitors?

What difficulties have you faced in this area?

At what point in the NPD process do you evaluate and plan distribution channels?

What challenges have you experienced with distribution channel planning or execution?

How is customer feedback collected and integrated into the NPD process?

Are there any barriers to effectively incorporating customer feedback?

Can you provide examples of successful or unsuccessful customer feedback integration?

Section 4: Specific Framework Challenges

Can you describe a time when the framework failed to meet expectations? Which step was particularly problematic?

Are there any steps in the framework that you believe are redundant or require significant reworking?

How flexible is your NPD framework in adapting to new information or changing market conditions?

Have you found the need to iterate beyond what the framework prescribes? If so, how was this managed?

Section 5: Improvement Suggestions

What specific improvements would you recommend for the steps or processes within your current NPD framework?

Are there elements from other frameworks (e.g., Agile, Lean Startup, Design Thinking) that you believe could enhance your current process?

What emerging trends or technologies do you think should be incorporated into NPD frameworks to better address current challenges?

In your opinion, what would be the characteristics of an ideal NPD framework for your industry?

Closing Thoughts:

Is there anything else you'd like to add about your experiences with NPD frameworks and processes?

Would you be willing to participate in future discussions or provide further feedback on this topic?

- Thank you very much for your time and insights. Your feedback is invaluable in helping us understand the intricacies of NPD frameworks and identify areas for improvement.

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