DELAYS AND DILEMMAS IN NEW PRODUCT DEVELOPMENT PROCESS FOR MANUFACTURING STARTUPS

Rokeya Binte Shahid*
Abu Yusuf Mohammad Habibur Rahman**
Shahjady Sultana***

ABSTRACT

New product development is a core component of any startup. Designing and implementing a new product requires specific quality control activities and proper fine tune the external factors of a startup that can manipulate or delay the regular process and development. Depending on the industry, understanding of the right nature of startup and a proper forecast can lead to better product development. However, there are some critical aspects of it for which developing a product can always be delayed. This article mainly discusses the delays and dilemmas and some way out to those problems.

Key Words: NPD delays, Manufacturing startup, Startup, Life Cycle, Control Mechanism, Industry Model, NPD.

1. INTRODUCTION

Product innovation is the process of making a product with novel or altered features that provides the consumer with additional or different advantages. Changes to an existing product's features or packaging, or the creation of a brand-new product to fill a previously unsatisfied market need, are all part of product development. For all startup companies including SMEs, product development processes are poorly described. Hence, very little information is available on how to successfully design, develop, and commercialize a new product in SMEs. Small startups are constrained by limited knowledge, remises and skills. However, on the other hand, they have to continuously develop new products in order to sustain their growth. Being competitive in the global market means that a company needs to be better and faster in new product and process development as well as in designing a development platform for new products. A rapid development of a new platform product development, which meets the requirements on quality, usefulness and minimal costs, is especially important for companies which produce products with a short life cycle. Thus, the competitiveness of a company is mostly dependent on its ability to perform in dimensions such as cost, quality, delivery dependability

*Assistant Professor, Green Business School, Green University of Bangladesh
**Mentor, The Chartered Institute of Marketing, UK
***Phd Fellow, Limkokwing University of Creative Technology, Malaysia

and speed, innovation and flexibility to adapt itself to variations in demand. Nilsson-Witell highlights continuous improvement as an important strategy in improving organizational performance. With the purpose of preserving competition capabilities, an organization needs to focus on timely delivery of high-quality products. Given that the time of NPD is becoming an important competitive advantage, it is essential for the production companies to constantly introduce improvements, not only in the process of NPD but also in the production processes. An organization adopting a continuous improvement program in product development will have several improvement programs working in parallel. Some of them might be focused on improving the products, while others might be aimed at improving the performance of the product development process.

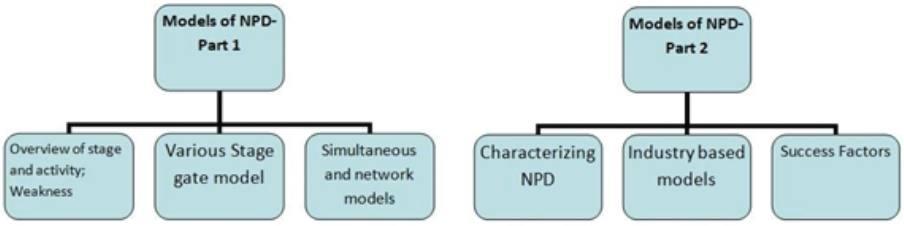

Figure: Structure of Chapter New Product Development

Depending on their niche and industry, manufacturing startups experiencing new product development delays may be working on a wide range of products. In spite of this, some typical goods that manufacturing startups may design may experience delays in the development process, and these include:

Startups in the manufacturing sector that are working on hardware items (such consumer electronics, wearables, or smart home devices) may face setbacks in the form of technical difficulties and supply chain disruptions. Because of the complexity of developing and manufacturing items that need the integration of several technologies and components, such products are not widely used.

Robotics, automation systems, and machine tools are just a few examples of the types of industrial equipment that might cause delays for manufacturing companies. To assure their quality and safety, these products typically require extensive testing and validation.

Manufacturing startups creating medical devices, such as diagnostic instruments or wearable health monitors, may run into trouble meeting regulatory compliance standards and overcoming technical obstacles. In order to ensure the safety and efficacy of these products for clinical use, they must undergo comprehensive testing and validation.

In the consumer goods industry, supply chain interruptions and regulatory compliance requirements can cause production delays for products including household appliances, furniture, and toys. In order to guarantee their quality and safety, these products usually need to go through rigorous testing and validation.

Manufacturing startups creating automotive products, such electric automobiles or autonomous driving systems, have technical obstacles and regulatory compliance requirements that can cause product development delays. In order to guarantee the quality and security of these items, rigorous testing and validation is necessary. Also making the SWOT analysis is also mandatory for it. Beginning with a review of stage and activity-based models, this section provides an overview of some significant and well-known models of NPD and then moves on to focus on generic models of NPD.

2. LITERATURE REVIEW

The Development of Models Based on Stages: Literature on NPD is generally seen to have begun in the 1950s (Conway and Steward, 2008), and the many models that have arisen since then can be used as a historical reference to the development of NPD's associated organizational processes. Departmental stage models have been panned since they assume each task is handled by a different department. Effective and contemporary methods, on the other hand, necessitate coordination and communication across traditional organizational boundaries. The following "phase," activity stage models, emerged in response to the critiques leveled against the previous "phase," structural equation models. They depicted the procedure as a series of distinct steps, such as coming up with ideas, eliminating irrelevant ones, and putting your concepts to the test. Whilst these have also been planned for being a "over the wall" strategy, they are generally seen as an advancement because of the feedback loops they include. Models at the decision stage have mostly supplanted those at the department stage and the activity stage. Along with network models, they might be considered the cutting edge of NPD theory. The abundance of writing in this field is a testament to the popularity of these stage-based approaches. This chapter devotes considerable space to explaining them in detail.

Existing NPD models: Outlining Major Phases and Activity-Based Theories When it comes to new product development (NPD), stage-based models can be helpful since they detail each step of the process, in what sequence they occur, what tasks are performed at each stage, and how they relate to one another (Conway & Steward, 2008). One reason these models have become so prevalent is that they are easy to put into practice for managers and consultants. Most stage-based models

depict the process as a sequence of sequential actions with inter-stage feedback loops. The primary emphasis is on outlining a set of critical procedures meant to steer creative endeavors in the direction of marketable final goods. Each 'stage gate' represents a set of evaluation criteria that must be met before the project may go on to the next phase. Hence, the steps are typically interpreted as information-gathering exercises followed by do-or-die gates (Cooper, 2008). This ensures that assessments are made at pivotal junctures and, potentially, helps focus decision- making. NPD process models are helpful because they illustrate the main tasks that must be completed during the process and may be used as a guide that companies can modify as needed. Increasing their use and prevalence has been connected to better business outcomes. Managers can use these models to improve portfolio planning and risk management, ultimately resulting in better resource allocation. In many circumstances, managers lack confidence in their ability to properly handle NPD, hence the adoption of such systems can be advantageous for firms. Using these models can assist ensure that no steps are missed in the process, which is unfortunately quite prevalent. Schelker hypothesized back in 1976 that more than 600 distinct models and approaches existed. Since then, it's apparent that the number has grown, thanks to the expansion of NPD- related writing.

There are a number of stages involved in creating a new product. To be more specific, they consist of: *
It consists of four stages:
(1) Brainstorming
(2) Designing a Product
(3) Analyzing Technology; and
(4) Analyzing
(5) Create and evaluate prototypes

In this paper, we simplify the process by breaking it down into two larger phases: design and implementation. Phases 1–3 above are all part of the Design phase. Four and five are included in the Process phase. The new product enters the market when the Process phase concludes (Market stage). We point out that there are numerous ways to structure the actions contained inside these phases. For the sake of clarity, we will treat the two macro stages, as defined above, sequentially for the rest of this paper. Our focus is on learning how the length of each stage affects the final performance of the brand-new product. The "transfer" of new product performance from one stage to another is of particular interest to us; that is, how the output of new product performance at the end of the Design stage is used as an input to start the Process stage.

3. METHODOLOGY

With the help of secondary sources, we have conducted extensive research for this post and have come up with several noteworthy solutions. However, several steps make up the process for detecting setbacks in the industrial sector's new product development:

One of the first things to do when developing a new product is to pinpoint any possible roadblocks that could slow things down. In order to identify potential technological, regulatory, or supply chain difficulties, it may be necessary to evaluate data from prior product development initiatives, conduct interviews with key players, and analyze the competitive landscape.

Once probable sources of delays have been identified, a thorough plan to address these difficulties should be devised. Timelines, milestones, and a list of tasks for dealing with each potential bottleneck should all be included in this strategy.

Distribute resources: Time, money, and people need to be set aside so that the plan may be carried out successfully. Depending on the situation, this could necessitate adding personnel, contracting out some functions, or purchasing novel pieces of technology. Keep tabs on development as it happens to make sure your product stays on schedule during its creation. Project management software, KPIs, and status reports are all possible means to this end.

Take care of problems as they appear: Even with meticulous preparation, unexpected problems might crop up at any point in the product development cycle. In order to keep the project on schedule, these problems must be dealt with as they emerge.

After the product development project is finished, it's important to do a post-mortem analysis to assess how well it went and where improvements may be made for the future. As part of this process, it's common to check in with project participants, examine relevant indicators, and assess how well the strategy and allocated resources are working.

Delays in the manufacturing industry's new product development process can be mitigated through the following steps: (1) identifying potential sources of delays; (2) developing a comprehensive plan; (3) allocating necessary resources; (4) monitoring progress; and (5) responding to issues as they arise; and (6) conducting a post-mortem analysis to assess the project's success and identify areas for improvement in future projects.

4. RESULTS

In this situation, the product performance of the company over time. The demand window for the new product. Such a demand window exists in high-tech product markets with severe obsolescence. According to House and Price (1991), HP calculators display comparable demand characteristics. Similar demand windows exist for packaged software, computer hardware and peripherals, and consumer goods.

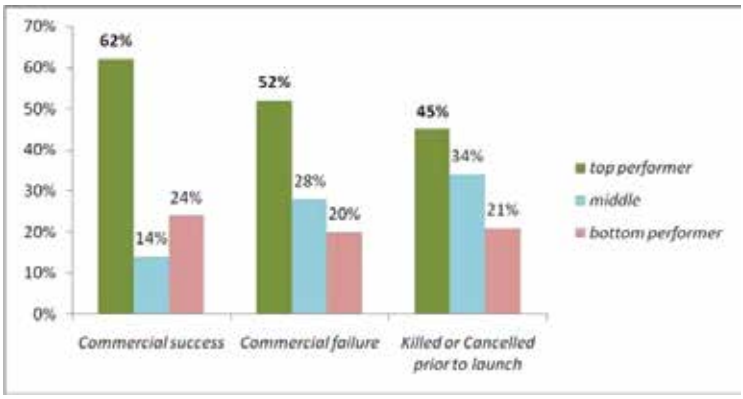

Figure: Overall NPD life cycle

The above chart illustrates the NPD lifecycle. The success or failure of a new product's development is highly dependent on a number of factors and the complexity of the process itself. There are important distinctions between "commercial success," "commercial failure," and "killed or cancelled before to launch" in terms of new product development outcomes. From the graph, we can deduce that the most successful companies (or the most successful startups) receive the most coverage across all three categories. Startups in the "medium" category, on the other hand, have a higher likelihood of product failure and are less likely to see significant revenue growth. Therefore, while having roughly 20% chances of being unsuccessful or being killed, bottom performers have 24% commercial success.

Successful products in the marketplace sell in large quantities and are often well-liked by consumers. The bottom line and public perception of a company's name benefit when a product is financially successful. A commercially successful product is one that accomplishes the firm's goals, satisfies the needs of the target market, and gives the company a strategic edge in the marketplace. A rise in sales, market share, and customer loyalty are all possible outcomes of a well-executed product launch.

The term "commercial failure" is used to describe a product that does not meet sales projections and is generally unpopular with consumers. A commercial flop may be devastating to a company's bottom line and its image. When it comes to new product development, a product is considered commercially unsuccessful if it fails to do any of the following: achieve the firm's goals; suit the needs of the target market; or give the company a competitive edge. It's possible for sales, market share, and customer loyalty to all suffer after a botched product introduction.

When a product is "killed" or "cancelled" before it is released to the public, it means that its development was abandoned or suspended before it was set to enter the market. Changes in the market, regulatory concerns, or internal troubles are just few of the many factors that can lead to the death or cancellation of a product during the course of its development. Cancelling or killing a product that the corporation has already put time and money into developing can be costly. On the other hand, it could be a calculated move to cut losses.

Establishing a solid NPD strategy can help startups avoid common pitfalls and save time during the NPD process. To promote efficient collaboration across teams, this strategy should lay out specific goals and deadlines, as well as include a system for handling risks and facilitating open lines of communication. Startups must also put money into the necessary people and tools to back up the NPD procedure.

Control Variables

The variables related to development time due to delay in new products launch or due do difficulties in meeting established targets or deadlines.

Independent Variable:

Trust: The guaranteed way to create value for a customer is to bring and earn the trust of that customer. Researches show that trust is the indispensable decision-making variable whenever a customer is deciding whether to buy from one competitor or another in any developed market where product price and quality are roughly comparable. Whenever a customer finds a company trustworthy, it is worth investing to ensure that the relationship continues.

Customer-company Identification: The term "customer-company identification" (CCI) describes the social bond that develops between a business and its clientele. While previous studies have highlighted the advantages of CCI, the method by which CCI influences consumers' positive and negative responses to new product and service offerings has not been investigated. By simulating the effects of CCI (commitment to the firm and a sense of belonging to an in-group) on consumers'

reactions to brand extensions, this study hopes to provide more nuanced understanding of this process.

Dependent Variable:

Customer Loyalty: While a customer repetitively comes to buy a product or takes a service, then such types of repetitive behavior is called loyalty.

A customer's loyalty to a brand or product can be shown in their repeated purchases over time. This loyalty might have psychological, financial, practical, and contractual origins.

Limitations – A domineering owner/manager, prioritizing time and money over other critical aspects, and an inability to see the significance of product design are cited as three typical managerial challenges that impact new product development.

Due to time and money constraints, the organizations discussed in this paper must make do with a limited set of IT products and services. Researchers have found that when faced with such severe time and financial constraints, business owners and managers prioritize financial and time-related concerns over all others. Many consequences follow from this situation, such as:

- Development is hampered from the start due to unreasonable expectations
- We let short-term thinking hijack our decision-making
- Iteration and alternative evaluation are viewed as wasteful processes
- Compromised quality, and we skip through vital phases of development like market research.

In terms of the product development described in the case studies, these effects are exacerbated by a lack of understanding on the part of owner/managers of product design and development processes. In all three of the case studies, owner/managers are unwilling to devote appropriate time and remises to the implementation of a systematic design and development approach. In each case the design remises were under constant pressure to cut corners and reduce costs.

Lack of awareness of product design

Capturing consumer needs, defining design intent with thorough computer-aided design or prototype models, branding, and strategic ties with startup development are all part of the product design process. In the context of new product development at a small IT business that was short on resources, the product design phase was viewed as the "front end" of the development process, and its strategic value was largely disregarded due to the pressures of time and money.

Managers at the case-study businesses erred in their thinking because of the prevalence of IT expertise within the workplace. They questioned whether or not they had designed the proper product for manufacture, rather than the correct product for the client. Several signs of this were present. Due to the lack of formal design clearance, Business A's most important customer has rejected many major design revisions. To put it bluntly, Business B did not care what its customers thought, avoided conducting market research, and only responded to consumer requests when required by contract. Company C, in the end, set material requirements in isolation, leading to the quick rejection of their important product when presented to their primary multi-national customer for testing due to a violation of the customer's material-safety criteria. This lack of professionalism prolonged the product development cycle overall, and in one case resulted in a six-month delay in the release of the product.

5. DISCUSSION

By analyzing the observed issues, it became clear that a possible source of NPD management issues is the companies' reluctance to hire people with technological expertise. Employing experts with a strong expertise in NPD would help solve such challenges because they have a holistic view of NPD rather than focusing solely on isolated activities. This would allow for improved integration among NPD-involved domains and the early identification of the most relevant tasks and activities. Misunderstandings between the New Product Development (NPD) group/department and the Commercial sector are commonplace when dealing with delays and course corrections in initial initiatives. It is preferable in this case for businesses to anticipate their customers' wants in advance, since this will help them avoid initiatives with shifting goals. A further delay could be caused by defective prototypes or a manufacturer's inability to produce the new product if the product and process projects aren't coordinated. An approach that can help prevent customer unhappiness and complaints regarding product performance is to conduct tests and project validation before starting full-scale production. All recognized challenges result in delays or even in products performing below what was intended, thus it is vital for organizations to concentrate themselves on their individual reasons to prevent them, and this begins with problem identification and categorization. In more complicated cases, disagreements amongst departments within the firm over the new product project and its development can have a negative impact on the NPD as a whole. In a perfect world, during NPD, everyone on the team would be on the same page with project goals, and those goals would align with the company's strategy and the demands of the market.

6. CONCLUSION

In closing, the NPD process frequently faces problems such as delays and dilemmas. Yet, startups can lessen the impact of these difficulties by implementing a strong NPD strategy, allocating sufficient resources, and fostering open lines of communication and collaboration inside the company. In this way, businesses can raise the likelihood of the success of their product releases.

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