

# Categorizing the Success Factors for the Phases of Product Development Cycle

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Leveraging project management for excellence, growth and transformation



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## 1.1 Abstract

Commercial Success of a Product is the ultimate benchmark for maturity of New Product Development (NPD) Process adopted by an organization. It is therefore utmost important to emphasize on the Factors & Strategies by which new innovations are more likely to be transformed into successful products through NPD process. It is very essential for the edification of NPD Process to understand the Factors and their relative importance in various phases of a Product Development Life Cycle. The objective of this paper is to accumulate the factors highlighted by various researchers and practitioners in this area through a Literature Survey. The Factors are then categorized in domain of Organizational Factors, Technology Factors, Market factors, and Environmental Factors.

The Factors play an important role in Six Distinct Phases of NPD Life Cycle. The paper maps the 57 different Factors clubbed in Four Categories, the factors cover Six Distinct Phases i.e. from Ideas Incubation to finally the Product Commercialization. After systematic arrangement of Factors the paper will enable to highlight (a) the most critical phase for success in NPD effort and (b) the categories of factors playing vital role. The consequence of this paper may be very useful for the organizations to revitalize their NPD Process by benchmarking with Factors adopted in different phases by the best organizations. This will enable organizations to optimally utilize the resources for addressing issues of time and cost constraints in the NPD projects.

## 1.2 Introduction

The world is changing day by day because of the technological improvements and globalization, which has resulted in an intense competition. New Product Development (NPD) is a vital part of Technology Management. Over the past two decades new product development has become an increasingly important vehicle in developing or maintaining a strong position in the competitive market. Because of the shrinking product life cycles and faster rate of introduction of new products in the market, organizations have started recognizing the importance of New Product Development Strategies.

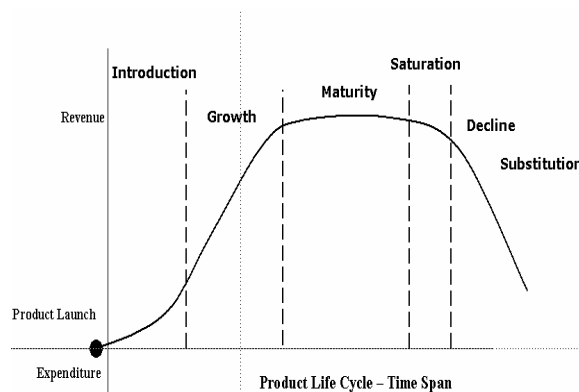
NPD is critical for long-term organizational performance. Due to changing customer needs and tastes, new technologies, shortened life cycles, threat of international and domestic competition, organizations should be able to either upgrade & modify the existing product line or introduce new products. Organizations, which are not capable of making this change quickly, lose an important competitive advantage in the market. At the same time, New Product Development is very risky and costly proposition to adopt. Studies show that out of ten well-developed full-scale projects, only two lead to full-fledged product launch and only the fortunate one succeed in market (Depending on the type of the product). The reasons for new product failure are various from the beginning i.e. a bad product ideas to the end i.e. marketing research problems, wrong market estimates, design problems & many more. Hence we can say that success factors and the best strategies/ practices for NPD are very crucial and critical for the success of any project dealing with new product Development.

## 1.3 About The Paper

The research in this paper aimed to explore the success factors for new product development in Indian organizations. Research and the published literature on the Critical Success Factors or Key Success Factors for new product development is plenty. However, researchers from Germany, Japan, Italy and the USA found that each country has traditional strengths and weakness in NPD. For example the USA has particularly strengths in The PC industry, Italy and Germany in machine industry and Japan and Germany in motor vehicles. This implies that the NPD may be country specific. They further found that there seems to be a little industry consensus on the “Best Practice” on NPD. This implies that the successful factors for NPD are country, Industry and Organization Specific. Recent research on NPD has been focusing on a specific industry, for example, semiconductor industry, auto industry, electronics industry, and food industry etc. The research in this paper is designed to explore the already defined success factors for NPD by various researchers and practitioners. Further the factors are clubbed & arranged into four Categories. To make the study more effective for applicability the paper has analyzed the impact of Factors in different phases of Product Life Cycle (PLC). This analysis has clearly brought the importance of certain phases in prior to the beginning of PLC and also the certain category of Factors. The paper will definitely be helpful for the Indian industry and may be applicable to others country also.

## 1.4 Product Development Life Cycle (PLC)

The Product Life Cycle – is the period from Product Launch to the Product Decline & Phase Out through substitution. It usually consists of Four overlapping not very distinct phases, (refer Fig. 1) which are, (1) Product Introduction, (2) Product Growth, (3) Product Maturity, and (4) Product Decline. These universal phases exist and are applicable to all products or services irrespective of technology, industry, or market i.e from a certain make of automobile to a multimillion-dollar lithography tool to a one-cent capacitor. These phases can be split up into smaller ones depending on the product and must be considered when a new product is to be developed and to be introduced into a competitive market.



**Figure 1: Product Life Cycle (PLC)**

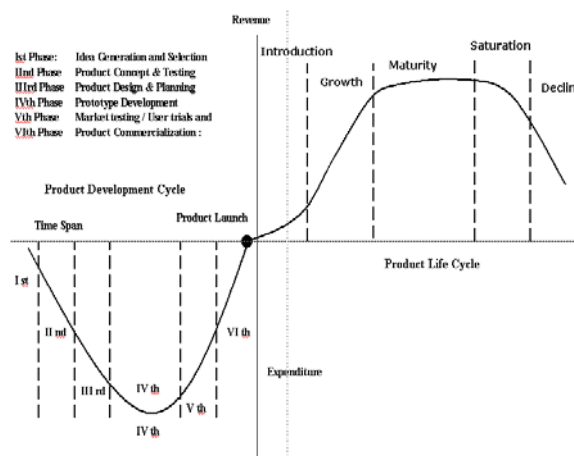
But prior to Product Introduction is major milestone i.e. Product Launch in the market. And to launch a product in the market it has to be developed Thus in spite of focusing on PLC and its four phases the emphasis of this paper is the activities prior to product launch. i.e. the Product Development Phase, which ends up with the Product Launch

is the target of our research. As an effective NPD Process it must lead to successfully launching a Product in the market, it is in this phase the complete inputs and issues of Product Life Cycle are to be considered and taken into account beforehand. We should not forget that developing a technology is not the only aim of any organization, making profit out of it is the main objective. The Company Expenses, Development Expenses, and Resource Expenses are covered by the profit gained by the organization with the help of new product developed and success in the market by the organization.

To analyze this phase of product development, which is prior to PLC, it is further subdivided into Six Sub Phases i.e

- (a) Idea Generation and Selection      (b) Product Concept & Testing
- (c) Product Design & Planning          (d) Prototype Development
- (e) Market testing /User trials and      (f) Product Commercialization


are the six important phases of Product Development Cycle (PDC) for any organization whose utmost aim is to develop a successful product at minimum time and at minimum feasible cost. (Refer fig. 2). The NPD process is the combination of both the Product Development Phase and phases after the Product Launch. This paper takes into account the factors and strategies for the complete cycle as in figure 2 and analyze the importance of factors in the six phases of product development cycle. all the key success factors are to be considered before product launch thus the information from downstream activities is very essential to be considered in early upstream stages of product development cycle.



**Figure 2:** Product Development Cycle along with Product Life Cycle

## 1.5 Success Factors For NPD Process

Success factors of NPD are those best practices and strategies, which successful organizations have implemented to increase the success rate of their NPD effort. These factors are also termed as Key Success factors (KSF)



We, through the intensive literature survey, have re-collected the KSFs which are implemented by various organisations and which are highlighted by various researchers like LYNNETAL, COOPER, and POOLTON & BARLY.

After collecting majority of Success Factors, which were around 94 in numbers, we have clubbed those factors into 57 most important and valuable factors. This clubbing of factors is based on interactions with the experts and practitioners in context of Indian Product Development Industries.

Further these 57 factors are separated into four major categories according to their importance in respective area. The four major categories according to the classification are:

- ◆ Organizational Factors (O)
- ◆ Technological Factors (T)
- ◆ Market Factors (M)
- ◆ Environmental Factors (E)

### **1.5.1 Organisational Factors**

It is the most critical category for KSFs for New Product Development process. Proper monitoring of all the part of project is mandatory but other than monitoring there are so many factors, which comes under organization category like Top Management Support, Decision Making Planning & Scheduling, Suggestions, Corrective Actions, Team Building etc. Basically organizational factors depend upon the management skills of the top management and planning team. If top management is taking care of all the organizational factors then it will automatically benefit the development of the product. Refer the table below for details of organizational factors

### **1.5.2 Technology**

Next category is technology factor; in this category the factors that are relevant to innovation are considered. The degree of innovation or technology is an important point of consideration. The level of technology implemented in the product should be of user-friendly interface and should not be ahead of time. These factors are most important for the starting three phases of the New Product development. It plays an important role in commercial success of the product.

### **1.5.3 Market**

Market factors are very important for R&D as well as new product introduction for commercialization. Actually the market decides the success or failure of the product. Market factors in this paper are those factors, which help to study the market and also those factors, which may help the product to make its place in market. Market analysis is an important part of new product development and market factors help us to analyze the market.

### **1.5.4 Environment**

A supportive environment plays a vital role in the completion of project within defined time and cost. Environment inside the organisation is not the only factor which decides the project success but outer environment like political & social factors, public interest in product and social acceptability also play a vital role.

For arranging these 57 factors as per four categories, we took the help of experts involved in product development process in Indian Industries. With their experience 57 factors were clubbed into categories refer table below. After arranging these 57 factors into 4 main categories we now identified the importance of each factor in six different phases of product development and mentioned in a tabular form below.

It should be noted that a particular factor might fall in more than one category and also make his presence in more than one phase of product development. For assigning the importance of each factor in different phases of PDC, a questionnaire was presented to set of expert in this domain and was told to assign the phase number to each factor if they feel the importance of those particular factors in the phase. Refer the table for details. The table below would make all the above statement more lucid.

#### FACTORS OF SUCCESS OF NEW PRODUCT DEVELOPMENT PROCESS

S.No.	FACTORS FOR NEW PRODUCT DEVELOPMENT	CATE GORY	PHASES OF PDC
1	A Detailed Project Planning	T	1,2,3,4
2	Clear Goals and Milestone Measurements Metrics	T	1,2,3,4
3	Up-Front Planning - to Define & Defend the Project & Product	T	1,2,3
4	Build in the Voice of Customer	T	1,2,3
5	Seek Differentiated, Superior Product - Build USPs	T	1,2,3
6	Demand Pull vs. Technology Push	T	1,2,3
7	Incremental Product	T	1,2,3,4
8	Innovative product	T	1,2,3
9	Continuous Training on New Product Management	T	1,2,3,4,5,6
10	Probability of Technology Success - Technological Gaps	T	1,2
11	Technology Route for Technology Acquisition	T,O	1,2
12	Sharp and Stable Product definition	T	1,2,3
13	Commitment of Project Team	O	1,2,3
14	Error Free Production	O	6
15	Securing Top Management Support for the Project	O	1,2,3,4,5,6
16	Project Monitoring and Feedback	O	1,2,3,4
17	Product / Technology Newness to Organization	O	1,2,3
18	Organizational Vision / strategies / Plans	O	1,2
19	Project Manager as Product Champion	O	1,2,3,4,5,6
20	Competent & Trained Project Manager	O	1,2,3,4,5,6
21	Methodologies of Project Selection	O	1,2
22	Trained, Competent and Professional Workforce on Project	O	1,2,3,4



23	Training and Development of Human Capital	O	1,2,3,4,5,6
24	Having a Structured New Product Development Process	O	1,2,3,4,5,6
25	Having a Clear and Shared Goal for the Team	O	1,2,3,4,5,6
26	Development and Launching a product within the Time Schedule	O	5,6
27	Cross-Functional Integration - Team Synergy	O	1,2,3,4,5,6
28	Applying Lessons Learnt from Past Projects	O	1,2,3
29	Retaining Team Members with Relevant Experience	O	1,2,3,4,5,6
30	The Culture of the Organization	O	1,2,3,4,5,6
31	Appropriate Organizational Structure for Project	O	1,2,3
32	Focus on Value Addition	O	1,2,3,4
33	Innovation Strategies Practice	O	1,2,3,4
34	Generating good ideas/idea generation	O	1,2
35	Competent Development Partners / Vendors / Suppliers	O	2,3,4,5
36	Communication System for Information Sharing	O	1,2,3,4,5,6
37	Flexibility and Responsiveness to Change	O	1,2,3,4,5,6
38	Top management Acceptance of Risk	O	1,2,3
39	Support for an Entrepreneurial Culture	O	1,2,3,4
40	Build Go - Kill Decision Points into NPD Process - Stage Gate	O	1,2,3,4,5,6
41	Project Leadership Skills	O	1,2,3,4,5,6
42	Availability of resources	E	1,2,3,4,5,6
43	Public interest in product	E	1,5,6
44	Govt.Regulation	E	1,2,5,6
45	Political / Social Factor	E	1,2
46	A Global Orientation - International Teams & Networks	E	1,2,3
47	Competitive Environment	M	1,2,5
48	Competitor Analysis	M	1,2,5
49	Early Analysis of Market and Business Viability	M	1,2
50	Early to Market	M	1,5
51	Meeting Customer Needs/ Wants	M	1,2,5
52	Perceived Value by the Customer	M	1,2,5
53	A Well-Planned, Adequately Researched, - Product Plan	M	1,2
54	Correct Distribution Channels / Service Network	M	5,6
55	Create Market Interface - External Focus	M	1,2,5



56	Strong Sales Force for Trails & Product Acceptance	M	5,6
57	Timing of Launch - Time to Enter Market	M	5,6

CATEGORY OF FACTORS	ABBREVATED AS
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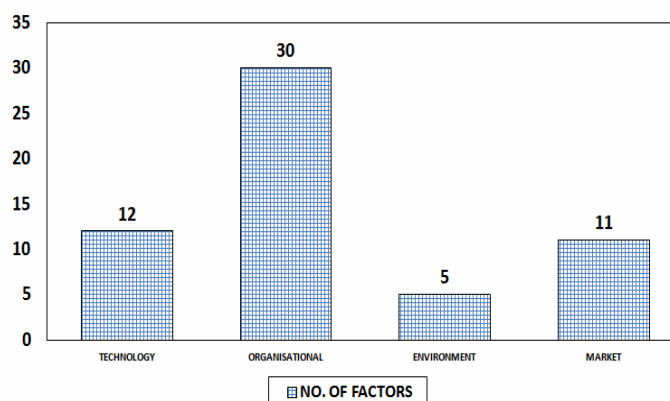
TECHNOLOGY	T
ORGANISATIONAL	O
ENVIRONMENTAL	E
MARKET	M

PHASES OF NEW PRODUCT DEVELOPMENT
-----------------------------------

1st	IDEA GENERATION & SELECTION OF IDEA
2nd	PRODUCT CONCEPT AND TESTING
3rd	DESIGN AND PLANNING
4th	PROTOTYPE DEVELOPMENT
5th	MARKET TESTING/USER TRIAL
6th	PRODUCT MANUFACTURING AND COMMERCIALISATION

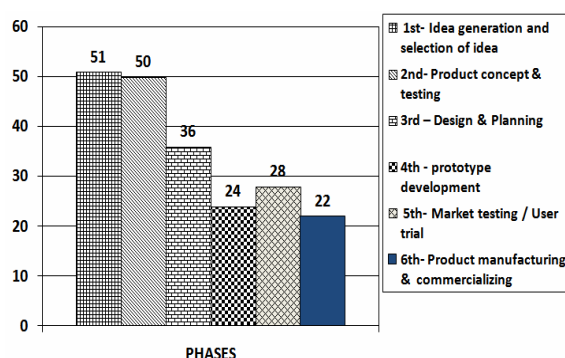
## 1.6 Analysis of Table

On analyzing the table above it is predicted that out of these 57 factors clubbed into four categories namely Organizational, Technological, Marketing and Environmental. The experts in the realm of Product Development have assigned the importance to each factor in six different phases on Product Development Cycle Refer figure 3 for four different category of factors where 12 factors fall in category of Technology, 5 factors fall in category of Environment, 11 factors are of Market orientation and the maximum stress is on 30 Organizational Factors.



**Figure 3: Category of Factors**

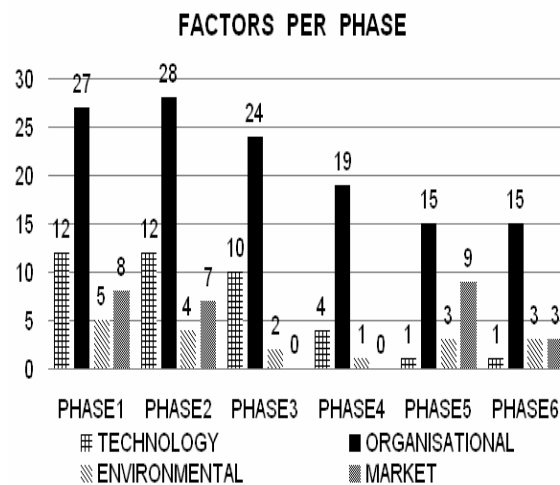
Further to see the importance of each of 57 factors in different phases of product development process, expert opinion was sought and tabulated in the table above. For example factors at S No. 1 i.e. A Detailed Project Planning Technological Factor is important in phase 1,2,3 and 4. In the same manner all the 57 factors were assigned importance in six different phases of product development cycle explained in figure 2 above. the detail analysis of table reveal that 51 factors are critical for 1<sup>st</sup> Phase i.e Idea generation and Selection, for the 2<sup>nd</sup> Phase i.e. Product Concept & T there are 50 factors in all four categories are important to be considered. For the 3<sup>rd</sup> Phase i.e. Design and Planning there are 36 factors are of importance, for the 4<sup>th</sup> Phase Prototype Development 24 factors are essential to be considered. and for the 5<sup>th</sup> Phase Market Testing and User Trail 28 factors are important and for the Phase 6 product Manufacturing & Commercialization there is a list of 22 key success factors essential for consideration. Figure 4 below present the number of factors in each phase of Product development Cycle.



**Figure 4:** Number of Important Factors in each Phase of PDC

Refer figure 3 , it is evident from the analysis that out of four categories of factors listed by experts mostly fall in category of Organizational Factors followed by Technological Factors. Thus the success of a PDC is dependent on an Organizational Issues i.e. Policies, Strategies, and Management Practices adopted by an organization. Where as other three categories of factors are important but play little role than the Organizational Factors. Refer figure 4 and also after the analysis of table we can conclude 1<sup>st</sup> and 2<sup>nd</sup> phase i.e. **“Idea Generation & Selection”** and **“Product Concept & Testing”** of Product development are two phases where maximum number of factors are important as sighted by the experts in the domain of product development. Thus initial two phases were maximum consideration has to be provided to establish the best practices. Taking numbers into account we can also conclude that 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> phase have almost equal importance with 36, 24 & 28 factors respectively. 6<sup>th</sup> phase i.e. **“Product manufacturing & commercializing”** is the least important with 22 factors but obviously cannot be ignored.

Also to establish the relative importance of four different categories of factors, refer figure 5 below, it is evident from the figure that Organizational factors are the most import in all the phases of PDC and technological factors play important role in first three phases of PDC. It is clearly brought out by the analysis that for developing a successful product at set time and defined cost an organization should first give importance to the Organizational Factors which are mentioned above in the table and most importantly take care about the factors which are critical for the starting phases of product development cycle.



**Figure 5:** Relative Importance of factors in four categories

## 1.7 Conclusion

Best Practices adopted by the world-class originations can serve as key success factors to be adopted for the success of Product Development Process. These factors are highlighted in many studies and surveys. The success factors can be clubbed into various categories, our study has used four important categories of factors. These factors play important role in six different phases of PDC. it is concluded that Organizational Factors which are 51 in number are most important and figure highest in all the phases of PDC. Thus Organization Issues are vital for success in Product Development Process. Further it is evident from analysis that out of six phases the first three phases are important because maximum importance to realign the Product Development Process as per Success factors is only in initial phases, where these factors play an important role.

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## 1.9 Author(s) Profile



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