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## Assessing Integration between Project Management with NPD Process in Heavy Industrial Components Industry and Developing a Framework to align them

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### Abstract

This report aims to provide a research how companies align New Product Development (NPD) Process and Project Management in their organizations. Developing a new product on time and within budget is a huge challenge to be faced in today's competitive marketplace. One of the major constraints faced for NPD success is day to day Project Management. The Research results explored how companies structure their NPD process and Project Management to strike a balance between the needs to optimize efficiency and flexibility of both, which often carry opposing implications for organizing and managing projects and NPD process.

This paper proposes a set of requirement for establishing a design and framework for Heavy Component Industries. The framework can aid Project Management Teams and New Product Development Process Teams to work in alignment and could optimally allocate resources and dynamically respond to unexpected delays and budget overruns.

**Key words :** *new product development, project management, heavy component industry*

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## 1. Introduction

The challenges faced by Organizations across the world are to integrate technology and business strategy is to match technology push to market pull. The product portfolio management of the Organization integrates the technical expertise with the business strategy.

A New Product Development Process flow is most appropriate in the long-term product development process. New Product Development (NPD) process is a phase/gate process that integrates proven business practices (customer-driven marketing and pricing, global engineering, preferred parts and suppliers, reverse auctions) with industry best practices in new product development. Engineering, Marketing, Procurement, and other functional areas must collaborate continuously to fully leverage the opportunities of the New Product Development process. NPD process helps the firm maximise on its expertise and also provides a framework for Efficient and Reliable products; and also ensures that all the projects follow same development process and have uniformity.

NPD plays a vital role in determining the economic success of organizations. Companies must continuously strive to develop new products to satisfy the needs of the market as well as to compete with other companies. NPD is the key to becoming market leader and emphasis must be given to the product design effort so that overall cost as well as design and development time can be reduced to the minimum. By building in quality during product design, later engineering changes, production time and overall cost can be reduced. In NPD, organizations often struggle to achieve both efficiency as well as flexibility due to their often opposing implications for organizing and managing NPD projects along with project management.

Cost escalation in projects management is the result of many important factors, most of which can be directly attributable to design and sourcing decisions at the early developmental stages of the project. Very seldom are real data of NPD gets integrated into design. Through design and integration at the early stage of Project Management, difficult manufacturing processes can be avoided. Traditionally, design and manufacture have been executed in serial order and the consequence of design decision on subsequent processes such as manufacturing become apparent only during process planning.

In sequential Project Management, communication and cooperation between upstream and downstream phases are limited, which further results in large feedback loops, more iterations, uneven workloads, inefficient use of resources, and therefore lengthy development cost. Sequential designing de-emphasizes the need for cross-functional teamwork which can result in communication breakdown. Sometimes, the project Management is carried out in adhoc manner, where most of the activities are not recorded and properly documented. Sometimes each engineer has their own method of managing the work and this can create substantial variation in the project

management leading to complications during manufacturing stage.

Research was aimed at achieving a better understanding of these two management processes by investigating initial planning activities as well as planning carried out throughout the course of the project. The study applies the data analysis concept to understand the project Management and New Product Development Process for optimal allocation of resources and dynamically response to unexpected delays and constraints.

As a result, it integrated the project management of the organization as per the dynamic market Scenario along with the Organization NPD Process to leverage the maximum market share.

## 2. LITERATURE REVIEW

Many published paper on NPD management have put forward a wide variety of framework related to NPD planning and performance evaluation. The design framework or model proposed so far are not suitable to be applied due to various differences of alignment with project management. Very little attention is given to the integration of NPD with Project Management framework. The below mentioned work discusses selective works carried out in similar areas.

### 2.1. Framework by S. Pugh

Pugh's design is very technical in nature which is mainly meant for designing part due to technical aspects and emphasis is on the design flow. The framework does not show kind of tools and techniques to be used at various stages of the model which can be a setback to an organization that wants to use it. Concurrency with other project management is not emphasized and it shows there could be significant iterations back and forth between each phase of the model.

### 2.2. Framework by G. Boothroyd, P. Dewhurst, W.Knight

The framework presented had typical steps in concurrent engineering as shown in figure. The steps shown were simplified because it started from a design concept assuming that customer requirements had been captured earlier. The steps are heavy on techniques but lack other issues such as human interface, technology as well as techniques for monitoring the whole project. The framework proposed had been meant for planning stage of NPD and disregards other members involved in process.

### 2.3. Framework by A.J. Peters, E.M. Rooney, J.H. Rogerson, R.E. Mcquarterm, M. Spring and B.G..Dale

This Framework is the most comprehensive to date where the coverage is much wider and includes tools and techniques, process summary as well as facilitation issues. However this framework does not integrate with project management. Quality tools and techniques are recommended for use but the framework does not specify

which one to use at different stages. The framework does not show input requirement of the NPD process which are necessary since the resources are limited and shared with the project management process as well.

#### *2.4. Framework by K.T. Ulrich and S.D. Eppinger*

Ulrich and Eppinger proposed a generic product development process which consists of six phases. The structured approach can help managers to plan and execute their task accordingly. For organization the common practise is not to do production ramp-up for NPD products. The framework did not include what tools to be used at which stage and did not show other factors such as technology and customer input that are necessary for any process. The framework is incomplete even though it is simple and easy to understand.

### **3. THE STUDY**

#### *3.1. AIM OF THE STUDY*

Research has shown that planning and process of NPD and Project Management positively contributes to a number of success measures, such as time, reduction of failure rates, financial returns and innovation levels. Aside from the acknowledged relevance of Project Management and NPD, most studies do not look in any greater detail into the various aspects related to planning and present them collectively under one heading.

This study tries to develop a deeper understanding of Project Management and NPD Process Planning.

The objectives of this research paper are shown below:

- 3.1.1. Analyzing the Project Management and New Product Development Process for allocation of resources and response to constraints
- 3.1.2. Developing the framework to integrate Project Management of the organization with the NPD Process to leverage the maximum output

#### *3.2. HYPOTHESIS*

Organizations are facing gap between NPD department and day to day Project Management because of regular deadlines and follow-ups for New Product Development

#### *3.3. SELECTION OF SAMPLE*

The literature was reviewed to understand the NPD processes and Project Management which helped in developing a standardized questionnaire. For this research report the questionnaire was sent to three major organizations involved in heavy component manufacturing based in Pune. The organizations selected are major MNC's who implement NPD and Project Management on regular basis. These organizations are leaders in their field and represent different industries to get the varied responses. The Questionnaire sent to these organizations can be found in Appendix1.

### 3.4. *SAMPLE SIZE*

The questionnaire was sent to 80 people involved with Project Management and NPD process teams in their respective organizations. The number of people responded was 63 and their response has been recorded for the analysis.

### 3.5. *PILOT STUDY*

The pilot study was conducted with 10 respondents and on the basis of responses, a few questions were altered to likert scale for easy and specific responses from respondents.

### 3.6. *DATA COLLECTION*

An online Google doc of Questionnaire was sent to respondents through point of contact and the responses were automatically recorded in the Google spreadsheet. The responses recorded can be found in Appendix 2.

## 4. **RESULTS & KEY FINDINGS OF THE STUDY**

The hypothesis taken in the beginning that organizations are facing gap between NPD department and day to day Project Management because of regular deadlines and follow-ups for New Product Development was proven correct after the analysis of survey results. Further finding from the research are mentioned below:

- All the respondents agreed that Management driving the New Product Development Process, thus the support and vision of management plays a major role in establishing processes.
- The product portfolio management of the Organization integrates the technical expertise with the business strategy.
- Use of Company portals are online portals for storage of data showed that organizations are willing to develop a standard database for storing of database. The same can be used in the future for reference if required.
- As a result of survey it came out that Day to Day Task of Project Management is a major hindrance for nearly 46% of respondents.
- The response recorded clearly shows that Documentation is another major hindrance in NPD process.
- Difficult terminology of NPD is a major hindrance for 37% of the respondents as it was designed and framed by the higher officials

- The management tried to maintain the ease and thus doesn't act as major hindrance for most of the respondents.
- Seeking differentiated product in case of NPD Process is critical and respondents were aware of that.
- Voice of customer is a very critical factor while considering the success of any NPD process and the same had been justified by the respondents answers where 41% respondents gave rating of 5 and 30 % gave rating of 4.
- No respondents think that they can succeed in NPD without clear and early product definition as the ambiguous information regarding the same can lead to complete disaster of NPD process.
- The Planning and resourcing early market launch is a critical factor and thus no respondents said that it is not important at all for success of NPD.
- The responses of three organizations under study gave maximum response of 33% to most important rating i.e. 5 to strategy of attacking from position of strength.
- Building international orientation into NPD is critical and organizations under study are well aware of the fact. It clearly shows that there is majority agreement with large importance of criticality to the factor.
- Process details, Sequence Flow and Deliverables are the most common documents maintained for NPD Process in organization as per 92% of the respondents .
- Organizations are most regular with monthly reviewing of projects as compared to weekly and quarterly reports.
- 32 respondents does not share their documents at common place and they are maintained individually.
- Exactly equal responses of 27% were given to highest and high detailing of Project Management Plan. This clearly shows that detailing of Project Management Plan is not good in these organizations.
- Project Scheduling is a very important document for Project Management and it should be given detailed attention.

- It can be inferred that organization are doing more detailing for High Level Project Planning.
- 14% respondents said, highest level of detailing while selection of the project team.
- A moderate and slightly high level of detailing is being followed by organizations for scope of plan.
- All the employees agree that detailing of Project Plan is important and cannot be ignored, thus organizations gave high importance to the detailing of the same.
- Quality Assurance Planning is a very critical part of Project management and maximum number of responses 32% said that their organization gives highest detail with 5 rating.
- Risk Planning is a very important part of Project Management and should be done in detail according to the respondents.
- 3/4th of the respondents agree that they have enough resources to undergo NPD and Project Management in their organization.

## 5. DEVELOPMENT OF FRAMEWORK FOR NPD AND PROJECT MANAGEMENT

NPD has been considered a challenging task to management practice. On the basis of Research's results, in it clear that, how to connect the works of NPD process, in a collaborative design environment, to the economic objectives of a company is a matter of concern.

### 5.1. EXISTING FRAMEWORK OF NPD IN ORGANIZATION

In most practices, the emphases are usually on the budget and the schedule of a NPD project. This implies that NPD engineers may not be aware of the overall strategic objectives of the company, and so they cannot recognize the cause and effect interactions that their resolutions may have in the company. Furthermore, the NPD engineers usually do not have adequate feedback information about their work. So an alignment model is essential for linking the NPD activities to the management system of a company in order to provide a clearer context for the overall management. In the current highly competing environment, a fast NPD process is the key to win the market share. Since the focus of management is still human, they always play an important role in the process. Aligning people to strategy is critical to the success of a business. By connecting the business strategies to the works of NPD engineers will make a company focus more clearly.

Figure : Corporate NPD Framework and Portfolio Management

## 5.2. NEW DEVELOPED FRAMEWORK OF NPD

There is a need for an NPD framework, given the strategic alignment with Project Management and shortcomings of exiting frameworks to address the problems in NPD. A framework can help integrate design and planning activities and should consist of all the elements that will make the NPD process and Project Management successful. The frame can link and tie up all important element together and act as a foundation for further works to be carried out.

A workable frame work should be able to formalize both NPD and Project Management activities to include up front requirements of customers, authorities and other stake holders. Through formalizing of the NPD Process, all parties can assume more uniformity rather than focusing on their own individual interests. Without the structured framework, the activities will have no direction and would be difficult to monitor. By linking every function in the organization through their contribution, team working can be optimized. The framework can assist in downstream planning and act as a master plan that will guide the operational plan to achieve the objective. Also, Process monitoring can be much easier and any backtracking or iteration can be minimized by modifying the framework for the next project.

The conceptually developed framework is shown below with the operational details:

The framework considers necessary changes in the following points :

- Take control of circumstances, rather than them controlling us
- Depend on co-operation between functional groups
- Produce deliverables as essential checks to ensure that products and services are delivered on time to expected standards and costs. Thoroughly assess and define business opportunities, risks and the investment needed at the beginning of a project.
- Monitor progress throughout the project against required standards and schedules, validating assumptions and appropriately escalating issues as required
- Confirm ability to deliver the products and services expected by our customers for a good return on investment
- Prevent defects by spotting problems early in the lifecycle so you have time to put things right and eliminate or minimize the risks that can cause delays in schedule and product introduction, unplanned costs and customer dissatisfaction.
- Gate reviews are required at each Phase exit
- Gate Review is the means by which we check the project's progress, deliverable's results and the ability to succeed at every key phase, or milestone, in a project's life

Companies achieve a balance by formulating this framework and employing a participative management style to

insure extensive communication flows among the parties evolved in the project. Decision gates are equally distributed across.

With regard to the planning efforts undertaken by the company's initial planning and turbulence seem to be most influential factors for the success of Project Management and NPD.

## 6. RECOMMENDATIONS

Due to the operational structure of organizations, there are certain features that are recommended for further study and use:

- Linking between Activities and Processes-

The Day to Day activities should be lined with the whole process instead of taking place in isolation. It was analyzed that due to personalized document storage, employees may not become part of the process and thus the linking has to be done with all the members of the team.

- Share the roadmap of NPD and Project Management-

The Complete framework of the NPD Process should be shared with the stakeholders of the project since the communication aspect is vital. The smooth flow of information has to be established from one member to another and is vital for the framework to address this.

- Standardization in organization-

The standardization of Processes is vital for the employees to plan their work accordingly. The completion of each process should be allowed by a review and used as a milestone. The Process should be supported by a set of procedures that are easily followed.

- Integration between Process and Management-

The Process and Management are different approach followed by organizations. The management approach leads to planning part of the NPD and process part leads to the execution part of NPD. The two are usually differed due to gap present in level of integration among the two. There should be integration of the two for the employees and team members.

- Concurrent Processes-

The use of concurrent processes in the organizations will ensure that all activities are reviewed simultaneously. It will avoid the complexity which causes confusion among various team members and functions within the organization. This would encourage more participation and avoid resistance among project team members.

- Use of Tools and Techniques-

The organizations should use latest tools and techniques as it is very important for the success of developed framework. The use of tools and techniques at different stages of NPD should be addressed. This can guide the Process in each stage by the structured approach.

## 7. CONCLUSIONS

In the highly competing environment, a fast NPD process is the key to win the market. Connecting the Process Management to the NPD will make the business focus more clearly. This research focuses on analyzing the gap between deployment of project management strategy and a strategic alignment model for new product development is constructed.

Companies tries to achieve a balance by management drive but also employing an organization wide NPD Process to insure success of processes as per the market. Most of the organization use company portal and online portal but still leaves a huge cope for radical and incremental innovation in the process. Critical Factors are distributed across the organizations and various approaches are applied for processes. Following these processes a number of problems were frequently taken care of with the help of project management techniques, but the gap remained as it is because of lack of integration between the two.

With regard to the planning, efforts undertaken by the companies NPD and Process Management seem to be the most influential factors for project success. As aggregate scores for initial planning activities in these cases are also virtually identical, in these cases the responsible parties have to be better at anticipating the future developments and changes in tools and technologies. It is not sufficient for companies to rely solely on initial planning and trying to anticipate as many of the possible changes during the course of the project but it is equally important to maintain flexibility in order to be able to introduce changes late in the project without suffering considerable cost disadvantages.

In today's highly dynamic environment, the business strategy should be deployed to every level of an organization to obtain the synergy. For penetrating the management levels, especially the NPD, a Strategic Alignment Model for New Product Development, where management roadmap, technology roadmap, NPD, market segment, and core competence should be all aligned together.

The Framework addresses the issue of concurrent Process management and helps in speeding up the processes by reducing the iterations and backtracking between activities. The Framework is suitable and applicable to organizations and applies suitable tools for New Product Development and Project Management.

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