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CONTEXTUAL APPROACH IN PRODUCT DEVELOPMENT PROCESS

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ABSTRACT

Companies successful in one product technology or category often fail badly when they enter into new markets or new technologies. This is not due to personnel or poor product design. In most cases the failure results from inappropriate management approach to new product development project. Explanation of the failure and success of new product can be explained by the theoretical framework based on their contextual nature. The proposed framework is guided by the framework given by R. Balachandra and John. H. Friar*, which explicitly lack customer construct. My framework is based on customer construct. This framework leads to determining the right approach for any new product development project based on its contextual nature.*

Keywords: New Product development process, Contextual model, Product life cycle.

Introduction to the Contextual Model

The new product development project (NPD) is truly a complex and difficult task. The company is highly dependent on its successful products, but the inherent property of product to decline in its life cycle (product life cycle) compels a company to go for either modification of the existing product or innovation of new product. The above two things comes under the scope of new product development projects. The company has to go for new product (either modification or innovation).

The company cannot withstand with its old fleet of successful product, it's not only due to the inherent property of product to decline during its life cycle, but also due to competition. The nature of market play a big role, the market-dynamics often compel a company to go for new product development. The competitor's move in terms of competitor product offering is important in this regard.

A large highly successful company dominating its market place is growing rapidly. Its management is well regarded and considered to be excellent. It spends large sums of money on R&D, develops innovative products and processes, has a good management system in place, and treats it employee well. The management also realizes that its current increasing growth rate has to slow down sooner or later, as most of its sales are derived form its one family of products by which the company dominates in the market. The company therefore, decides on a strategy of entering into different, through related, technologies and markets sometimes with the exception of going into totally new market and new technologies.

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But, here comes the tragedy out of 100 new product offering in the market only about 10 products are successful in the market *(Wall street journal story, 1992)* rest are failure. The management cannot understand why these new product failed. They had good experienced people working on the projects. There was sufficient understanding of the technologies involved. But still the new product introductions failed. Meanwhile the employees were getting disillusioned with the new product process. As most of the new products were failures, the employees started to think that being assigned to NPD projects not in the main line of business was the kiss of death. Many would try their best to avoid getting assigned to such projects.

R. Balachandra and John. H. Friar pointed out that there was nothing wrong with the people or with the technology. The problem was with the approach for managing the new product development process and the systems used for managing the project. This insight was surprising to the management, as they thought that the systems and approaches they had used in the past have been very successful. They had developed a very successful approach to developing new product in their main line of business. They applied the same approach to these new products, were not in their-line business. The system which worked so well with their main line of business was no effective in new lines of business.

In fact different NPD projects require different managerial approaches to make them successful. This theme has been suggested by *Krubasik (1984),* who examined two projects developed under different types of market and organizational pressures. *R. Balachanra and John. H. Friar* suggests a theoretical framework for the systematic understanding of NPD projects.

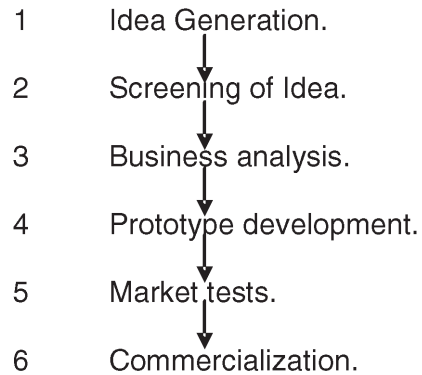
"It says that NPD projects can be categorized according to their contextual nature. A management approach that works well in one contextual combination will not work well with another. For example, an approach that succeeds with a NPD project for a new product with some improvements targeted for current market will not work well if the product is targeted for a new market or if the technology is relatively new".

In the contextual model the categorization is base on NPD projects contextual dimensions.

New Product Life Cycle

We will start with the brief description of New Product Development Process as described by (Stanton,Etzel,Walker) . It starts with the Identification of the strategic role of new products, then

At each stage, management must decide whether to proceed to the next stage, abandon the product, or seek additional.



Generating new-product ideas

New-product development starts with an idea. A system must be designed for stimulating new ideas within an organization and then acknowledging and reviewing them promptly. Customers should also be encouraged to propose innovations. In a recent study, 80% of companies pointed to customers as their best sources for new-product ideas.

Screening of idea

At this stage, new –product ideas are evaluated to determine which ones warrant further study. Typically, a management team screens the pool of ideas.

Business Analysis

A surviving idea is expanded into a concrete business proposal, which means management

a. Identifies product features.
b. Estimates market demand, competition, and the products profitability.
c. Establishes a program to develop the product.
d. Assigns responsibility for further study of the products feasibility.

Prototype development

If the results of business analysis are favorable, then a prototype (or trial model) of the product is developed. In the case of goods, a small quantity of trial model is manufactured to designed specifications. Laboratory tests and other technical evaluations are carried out to determine whether it is practical to produce the product. A firm may be able to construct a prototype of a new type of cellular telephone but be unable to manufacture the new product in large quantities or at a cost that is low enough to stimulate sales and still yield a profit. In the case of services. the facilities and procedures necessary to produce and deliver the new product are designed and tested. That certainly is a necessary step in the development of a new roller coaster ride at an amusement park!

Market tests

Unlike the internal tests conducted during prototype development, these tests involve actual consumers. New tangible product may be given to a sample of people for use in their households (in the case of consumer good) or their organizations (a business good). Following this trial, consumers are asked to evaluate the product. Consumer-use tests are less practical for services due to their intangible nature.

Commercialization

In this stage, full-scale production and marketing programs are planned and finally, implemented. Up to this point in development, management has virtually complete control over the product. Once the product is “Born” and enters its life cycle, however, the external competitive environment of its testing.

Note that the first two stages-idea generation and screening-are tied to the overall new. Product strategy. This strategy can provide a focus for generating new ideas and a basis for evaluating them.

In the six-stage process, the first three stages are particularly critical because they deal with ideas and, as such, are the least expensive. More important, many products fail because the idea or the timing is wrong- and the first three stages are intended to identify such situations.

Each subsequent stage becomes more costly in terms of the dollars and human resources necessary to carry out the required tasks.

Literature Review

New Product Development: The Historical Perspective

Defining the Success Attributes

Over the past 60 years, a great deal of research has been conducted into the NPDP and how it might be defined, characterized and improved. The research-based interest first emerged in the 1950s (Carter and Williams, 1957). During the 1950s and 1960s, the research emphasis was placed on determining the characteristics of products and companies that were successful and innovative (Cochran and Thompson, 1964). In the 1960s and 1970s, the emphasis shifted to comparative studies in which the characteristics of successful and unsuccessful products and/or companies were defined and compared. This proved to be a major turning point in the research in this area (Rothwell *et al.*, 1974). The 1970s and 1980s saw the work concentrating on refinement of detail and the repetition of previous work (Hopkins and Bailey, 1991). This latter approach proved interesting in that previous results were basically confirmed. The evidence suggested that despite decades of research and experience, little had changed in terms of product development success rates, with failure rates being consistent at about 35 per cent of all new products developed (Hopkins, 1981).

Success Factors In NPD Projects

There is vast amount of literature on new product development. The very important role-played by new products in the success and growth of companies lead to a great deal of interest in finding out what actually produces success in new products. Though companies get into new product development with a great deal of enthusiasm, success is not generally assured. According to a *wall street Journal story (1992*) hardly ten out of 100 new product introductions succeed in the market. Many have attempted to identify the factors that lead to successful new products *(Balachanra, 1989).*

For over 35 years researchers have been analyzing these factors. More recently the focus has shifted to processes based on these factors that lead to developing new product successfully. After many studies examining the success factors, the notion of finding a single universal factor was considered *naïve (Souder, 1987).* Studies moved instead to discover the factors that influence new product success *(Balachandra, 1989).* Finally, some authors claimed that there was no longer any disagreement on the factors; instead research should focus on the process. Much of the research in this area has since shifted to discovering the best process for NPD projects.

Recent studies, however, began to question even the notion of a single set of factors, and therefore, the on best approach. For example, consider the factor “developing products in response to customer needs”. In new or emerging markets, customer needs could be determined only after entering the market *(Veryzer, 1989a;Lynn, Morone and Paubon, 1996;Leonard-Barton, 1995)*. So how could this factor be an important success factor? Such findings have implications for the success factors as well as the approach to be taken for managing a NPD project.

Recently *R.Balachandra and John. H. Friar (1997)* examined a large number of studies reporting on new product success and failures to assess the amount of agreement that actually exists in the literature. They found that there was not consistency in the results of the studies. The importance given to different sets of factors varied widely with the studies.

There were even more contradictory findings. And most surprising of all was there were over 70 factors considered important by the studies *(R.Balachandra and John. H. Friar, 1997)* examined in detail: but each study listed only a few (ranging between 3 to 12 factors. There were practically no common factors in these studies.

The contradictions and the abundance of the so-called critical factors (for the success of NPD projects) could be explained by considering the fact that not all NPD projects are similar. There are projects, which are just marginal improvements on an existing product (e.g. new improved tooth-paste), while others may be a radically new innovation (e.g. Digital Video Disk-DVD). One may use the current technology itself, while another may need a new, unfamiliar technology. Managing all such projects with the same approach and using the same success/ failure factors to evaluate them, can lead to inconsistent results and even failure. For example, if the NPD is being planned for an existing market, the marketing issues become critical. One has to perform a thorough market analysis. It is possible to do such an analysis, as here is plenty of market and consumer information available. If the NPD is for a new market, the market analysis cannot be thorough. There is not much information about the customers and their preferences.

The success factors fan their importance; therefore, vary according to the nature of the NPD projects. Different approaches have been suggested for managing the NPD project if the innovation is incremental rather than radical *(Song and Montoya-Weis, 1998;Veryzer, 1998b)*;or if the product is planned for a rapidly changing market rather than a more stable on *(Mullins and Sutherland, 1990).* A recent analysis of NPD best companies, moreover found that best companies succeeded not by just one NPD process but rather by using a number of them *(Griffin, 1997).* It appears from these studies that different approaches are needed for different types of NPD projects. However, there has been very little work done in developing a comprehensive approach to managing NPD projects.

The Contextual Model for NPD Projects

These issues can be resolved by resorting to the contextual model. The model suggests the any NPD project lies in a contextual space. The decisions regarding the success and failure aspects, as well as the managerial approaches to be taken depend on its location in the contextual space. In the contextual model there are three variables.

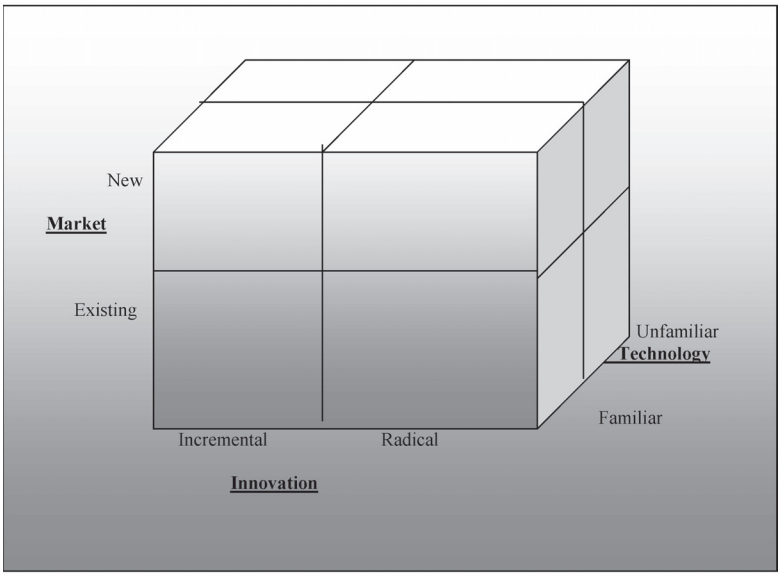
1. Nature of the innovation.
2. Nature of the market.
3. Nature of the technology.

For the NPD project these can be thought of as three dimensions in the contextual space. The contextual variables have a continuous spread in reality. For example, consider the 'nature of market' variable. It can range from an introduction stage to the stages of early growth, growth, maturity and decline. To make the model simpler to visualize and to provide a parsimonious structure the author suggests two levels for each of the variables:

1. Nature of innovation-incremental, radical.
2. Nature of market existing, new.
3. Nature of technology-familiar, new.

The contextual model for NPD projects uses these three dimensions. The model consists of a contingency cube with three variables as the dimensions. As each dimension has two levels, there are eight cells in this cube. A NPD project can be located in one of the cells in

this cube depending on the evaluations it receive along the three variables.



The following paragraphs describe the three contextual variables and their levels.

Nature of the Innovation

The level of innovation for a new product ranges over a wide spectrum. Most of the studies that looked at NPD, however, focused only at the extremes - incremental and radical. An incremental innovation is one where the basic technology and product configuration remain essentially the same, and only minor modifications are made to the performance, flexibility, appearance and other characteristics. A radical innovation is one where the principle of operation of the product is considerably different from the earlier product, or it may be the first of its type in the market.

The nature of the innovation has different effects on the management of the project. In addition to impacting on the success/failure factors of the new product, it affects how the project will be managed. In the case of a radical innovation, though the technology parameters are reasonably well defined, the technical risk of completion could be high, as some unfamiliar design features may have to be incorporated. On the other hand an incremental innovation does not have a high technical risk. Budgeting and scheduling are simpler, but take on a more important role. New ink jet printers from a variety of manufacturers fall into this category. The nature of innovation impacts on the project management also. An incremental innovation needs a more structured organization, with well-defined budgets and schedules. A radical innovation, on the other hand, requires a more flexible approach. The R&D and the engineering function may have to be provided with more flexibility in their budgets. Continuous and constant interaction between Marketing, Engineering and Manufacturing should be encouraged through task teams rather than through functional hand-offs, typical in traditional NPD processes (Souder & Chakrabarti, 1980).

Nature of the Market

The nature of the market for a new product can be categorized into two types - existing and new -although it can range over a wide spectrum, like the Innovation variable. Whether a

company is innovating in an existing market or trying to create a completely new market will produce differences in success/failure factors. In the former case the new product meets an existing need but with some improvements, and therefore the market uncertainty is relatively low. An example is a 'new improved tooth paste.' In the latter it meets a latent need, and the uncertainty of the market can therefore be very high. An example of such a product is the 'Oral Hygiene System by Water Pik.' The market analyses for the two types are completely different (Shanklin & Ryans, 1987).

Likewise, the quality of the information one can obtain about the market and customers will differ. There will be adequate market information for new products being planned for existing markets. Traditional market research takes on a more important role. On the other hand, the market information will be scanty for new products designed for new markets. Traditional market research has a lesser role to play in defining the market and its size. More creative approaches may have to be utilized to get a reasonable handle on the market. In some cases, it could be an informed guess. In spite of this lack of information, products have to be introduced with a higher market risk. Since the customer's are expected to be different from the earlier customers, greater efforts should be made to identify the potential customers. Information collected from them regarding their preferences should be communicated quickly and with integrity to the engineering and manufacturing functions. The nature of the market of the NPD also affects the marketing approach for the product. A new product for the existing market may gain from using its already existing channels of distribution and infrastructure. The new product for the new market may need completely new channels, and new selling approach. The marketing aspects take on a much broader role for such products.

Nature of the Technology

Although classifying technology is hard, one useful classification for our purposes is how familiar accompany is with the underlying technology of the new product. Familiarity with the technology reduces the technical risk. If it is an unfamiliar technology the company may have to either develop it or acquire it from another firm that has the technology. This is always fraught with risk. However, that risk should not be a deterrent from pursuing the project. For example, one firm routinely gave the go ahead signal even if the probability of technical success (the technical risk) was as low as 0.7 for an unfamiliar technology, while killing projects with a technical risk of 0.9 for projects which were using familiar in-house technology. In other words, the threshold for the technical risk levels will be different depending on the contextual nature of the project.

The level of familiarity with the technology of the new product affects a number of issues in project management. With familiar technologies, the new product development becomes more of an engineering design project. On the other hand, for unfamiliar technologies, the new product development takes on an entirely new aspect. Depending on whether the new technology is being developed within or procured from the outside, the organizational structure of the project team will be different. If the technology is from outside the firm, a strong technology transfer team has to be organized. If it is being developed from within, adequate funds should be provided to make the technology successful and for effective internal transfer of technology to engineering and manufacturing. There should be more flexibility in the organization. The interface between R&D, engineering and manufacturing should be much stronger in the case of unfamiliar technology The contextual model for NPD projects uses these three dimensions. The model consists of a contingency cube with these three variables as the dimensions. See Figure 1. As each dimension has two levels, there are eight cells in this cube. A NPD project can be located in one of the cells in this cube depending on the evaluations it receives along the three variables. Table 1 gives some examples of NPD projects belonging to the eight cells.

It should be noted that the evaluations are made at the time of the development of the new product. Based on its location in this space, appropriate conclusions and decisions can be made.

The Missing Construct

Although the contextual model proposed by *R.Balachandra and J.H.Frair* is able to explain the success and failure of new product to a great extent, but there is a serious deficiency in the existing model. The model does not incorporate the customer construct. The success and failure of any new product is dependent on the customers. It is customers who decide the fate of any new product. During the whole NPD process the role of customer is critical.

The Proposed Model

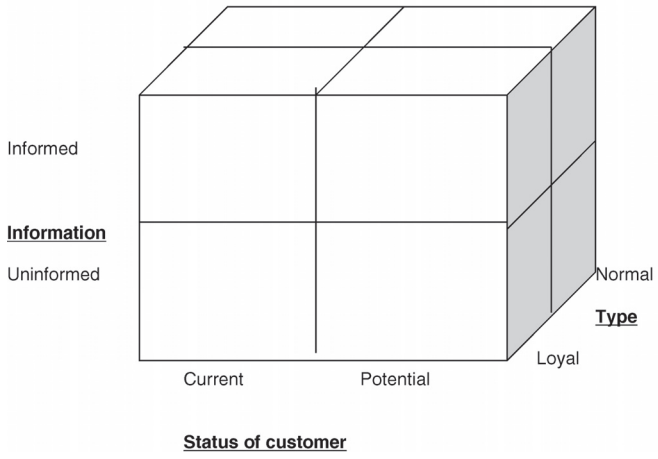
We wish to introduce a new framework that is the extension of the existing model .It is based on the customer construct.

We have used three dimensions of the customer.

1. Information about the product (technology, features, benefits, pros and cons of using the product.
2. Status of the customer (looking customer in holistic view).
3. Type of the customer in relation to the firm.

We suggest two levels of each variable

1. Information-Informed, uninformed.
2. Status-Current, potential.
3. Type-Loyal customer, Normal customer



The following paragraph describes the three contextual variable and their levels.

Information about the Product

This variable of contextual model is important, infact this variable look the information part of the customer. Information about the product is critical to the customer while going for the

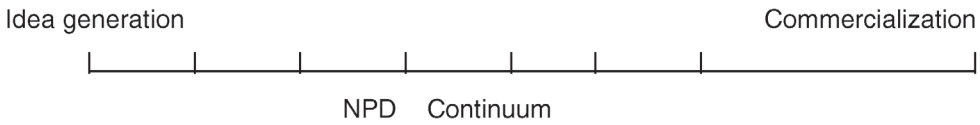
actual purchase of the product. The success of any new product depend on the purchase behavior of the customer, and the purchase behavior to a great extend is guided by the information about new product, to be successful it is must to know the state of the information about the product in the mind of the customer. Here information about the product is a wider term, which incorporate all the aspects about the product, such as its feature, technical specification, benefits and costs related to the product.

The two levels are informed and uninformed, in fact I have taken the two extremes, there is a continuum from informed to uninformed, but for the sake of convenience for the model I have take two extremes.

The customers are here either informed about the product or they don't know about the product. The organization has to make different strategy for both of the levels of customers; they need to plan their marketing efforts accordingly.

Status of the Customers

This variable of contextual model is very critical, infact the status of customer to a great extent affect the success and failure of new product. The organization has to develop appropriate strategy keeping in mind whether the customer base is current or potential. In fact the NPD process has a definite time interval.



The originations has to track the status of the customer carefully, its because during the NPD process the status of the customer change, the customer base that is in the stage of Idea generation may or may not be the customer base in the commercialization stage .It means that the organization has to carefully track the status of the customer and access its customer base. The company has to take care of current as well as the potential customer. This variable is important because when the product comes up at the commercialization stage the customer base is different from what it would have been in the idea generation stage. If we access the exact customer base we can with a greater probability say the product will be successful.

Type of the Customer

The third variable in the contextual model is the type of the customer (Loyal and Normal customer).

The NPD project's success depends on the nature /type of the customer base. If the customer base is loyal then, say during the idea generation stage we can get different ideas then those given by normal customer. I mean to say there is a huge difference between loyal and normal customer and the NPD phenomenon is well affected by the type of the customer in the sense of getting valuable inputs and/or information regarding their like, dislike, needs etc. until and unless we know the exact needs of the customer, we cannot claim that the new product will be a success when it enters into the market.

Strategic Implication of the Proposed Model

Although the model proposed by *R.Balachandra and J.H.Friar* could suggest the success and failure of new product development projects. Success in new products cannot be guaranteed,

it's a fact. However, the chances of winning with new products can be improved considerably by identifying the nature of the new product *(as proposed by R. Balachanra and J.H.Friar)* and the customer (as proposed by me) by managing the NPD project in the way suitable for its type. We have proposed the extension of the existing model, which captures difference in a meaningful way. Identifying the contextual type of the NPD project will help in determining the success factors that are relevant for the project as well as the weights to be assigned to them. This will also help in identifying the appropriate management approach to be followed to increase the success probability of new product development projects.

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