

Managing the New Product Development Process in a cost optimisation software module in an Automobile Industry at Chennai - A Case Study

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ABSTRACT

In developing the new products (NPD), different phases face various challenges in view of organizational dynamics. The study was carried out in a light motor vehicle manufacturer having global reputation in Chennai. The generation of idea about the new product while passing through various stages culminating in a software module for optimizing a component manufacturing cost had to face the collaborative issues within and between various functions in the organization including Research & Development.

This paper analyses the various dimensions involved in understanding the issues during the product development phase. This case study involves an Organisation and is based on a combination of observations and interviews of the participants. The outcome of the study indicates that the difficulties in creating a strong concept during the early phase are related to the incongruence of interests arising between Marketing and R&D. The root cause of such conflicting interests can further be related to the strong interdependencies existing between the functions.

Achieving a better understanding of the interdependencies and the different functional views may reduce the incongruent aspects which otherwise tend to become barriers to the far-reaching integration required for synergy. Collaboration between functions, as advised in the literature, is not enough and needs to be expanded to cover empathy based professional view in order to move away from the many non-productive conflicts arising during the early phase.

KEY WORDS: Automobile Industry, New Product Development, Organisational dynamics.

1. INTRODUCTION

Organizations are under constant pressure to meet the dynamic changes in the market place. In the industry like automobile manufacturing it is of higher intensity. (Breitsprecher, 2004; Branstad, 1999). The changes in market places necessitate the organisations to have a conscious focus on product development, alternative raw materials, manufacturing cost optimisation and innovations in designs and features. These aspects warrant the manufacturers to lay emphasis on New Product Development (NPD).

Besides the resources like time and money, the NPD process calls for collaborative approach among various functions within the organisation (Breitsprecher, 2004; Branstad, 1999). A study has been conducted at Chennai in India at an automobile manufacturing plant, in the development of a new software product which would reduce the manufacturing cost of the components.

During different phases of development, conflicts and collaboration among members were seen as major impacting factors in the development of the product. Thus, in the early stages a clear understanding has to be established without any ambiguity among the various constituents of the new product development process. (Khurana and Rosenthal, 1997, 1998; Kim and Wilemon, 2002). The problem is highly accentuated when a new product is developed for their utility value in the organisations.

The implementation of computer technologies such as computer aided design (CAD), computer-aided engineering (CAE), and computer-aided manufacturing (CAM) has created tremendous impact in the area of military, aerospace, automotive and stamping industries. Innovative changes in stamping industry are the implementation finite element. Thus, in the early stages a clear understanding need to be established without any ambiguity among the various constituents of the new product development process. (Khurana and Rosenthal, 1997, 1998; Kim and Wilemon, 2002). Performance of FTI's Fast Blank Software Module, Validation of the usefulness of the software to the users, The Perception of the users about the software and the suitability of the output from using this software in decision making process in respect of optimal blank shapes.

The software developed was found to be really useful in minimizing the material costs but the organizational dynamics had great impediments in developing the product.

Review of literature: New product development (NPD) is defined as the transformation of a market opportunity into a product as a result of the integrative coupling of market assumptions with technological possibilities (Song and Parry, 1997a, b; Krishnan and Ulrich, 2001; Griffin and Hauser, 1992, 1996).

NPD is a multifunctional process and warrants collaborative contribution across the functions. The magnitude of collaboration or conflict depends on various organizational, personal and inters personal behavioural dynamics. The general perspectives of NPD are often stated to be R&D, marketing, and manufacturing.

Earlier studies indicate that the interdependencies between perspectives and functions vary throughout the development process (Griffin and Hauser, 1996; Song, 1998). Creating a thorough concept and broad product

definition wherein prioritized product properties are defined is argued to require the highest level of integration between marketing and R&D (Gomes, 2003; Griffin and Hauser, 1996).

The vision of the product to be created has to be clarity on what the product should be. Thus, creating the concept warrants the mechanisms of proactive thinking, systematic learning, and the integration of various perspectives in order to produce new knowledge concerning what is unknown (Leonard and Straus, 1997; Verganti, 1999).

During the subsequent development phase, there is not much time for experimentation and exploration on the concept in the wider perspective across disciplines and functions that the early phase enables (Bowen, 1994; Kim and Wilemon, 2002). Once the product is created through various phases of idea generation, screening, concept development and testing, feasibility, implementability of strategies, test marketing and commercial production and marketing, the veracity about performance of the product has to be established within the organization. (Kim and Wildman, 2002; Keen, 2001). Dependence on skills and development approach capabilities have been identified as the cause of inter-group conflict between marketing and R&D in NPD (Brett and Rognes, 1986; Ruekert and Walker, 1987), as well as the fact that conflict between R&D and marketing may be the most destructive and complicated form of conflict to resolve (Crawford, 1977). This is due to the role definition in most of the organizations.

Research and Development has the focus on process, cost, substitution, technology and related feasibility whereas marketing looks at customer acceptance, product differentiation, sustainability, maintaining non-limitability and prevention of cloning by competitors. This leaves the negative conflicts unresolved. Then development can be very costly since the cost increases in step with how late the changes of concept occur.

Of even greater importance is the fact that while these conflicts remain unresolved, there will be no significant common representation of the concept as there is a tendency for divergence as regard to what the concept really is. This can be devastating for the entire development project (Crawford, 1977; Griffin, 1997; Hayes, 1988).

Walton and Dutton (1969) have found that inter-functional conflicts in organizations often develop out of mutual task dependence where there are task-related imbalances, conflicting performance criteria, rivalry to share the common resources, and in congruency of goals. The underlying causes of these differences are due to specialization and differentiation in a functional organization. (Lawrence and Lorsch, 1967).

As organizations grow, the specialization of work increases and, over time, the different disciplines will grow a part (Griffin and Hauser, 1996). The differences between marketing and R&D that cause conflicts are often claimed to be based on different values, educational backgrounds, and ways of working (Shaw, 2003).

Even though the different functions work towards the same corporate goals, the focus is different for Marketing and R&D and may thus lead to different functional goals (Souder, 1977). Consequently, understanding one another's goals, trade-offs, and priorities with empathy is required while striving to achieve the common goals.

Further increasing awareness of the interdependencies when creating a product concept between the different functions may lead to less negative conflicts (Ruekert and Walker, 2012). While the literature indicates, proper communication across the functions would reduce the conflicts for the importance of having a thorough concept developed across functions during the pre-phase of NPD and having results indicating that such a concept is difficult to accomplish, less detailed accounts have been reported regarding the implications of conflicts and how to solve these conflicts in a productive way between the inter-depending functions during the early phase of NPD.

The underlying causes of many of these conflicts during the early phase are argued in this paper to be related to a lack of acknowledging and focusing on the strong interdependence between Marketing and R&D, a relationship also to be found in general NPD studies (Griffin and Hauser, 1996; Gupta, 1986a; Kahn, 1996). Achieving high standard quality products in almost no time with great economy in industry demands for a technology that helps requirement to develop the new products.

This paper highlights development of 'draw' component and the changes made in product design due to manufacturing and assembly reasons considering the design intent; and also the advantages of using various 'CAE' software's used in designing draw tools. (Dhulugade, 2013) The manual design of any type of drawing die is complicated and tedious procedure. In spite of all precautionary measures there are several chances of denting, cracking and wrinkling which needs to be rectified.

As the design and development of sheet metal deep drawn die is a comprehensive technique which needs accuracy in the apprehension of working for high order and its rectification in forming process. (Suryaprakash, 2012). Sheet metal forming simulation is a powerful technique for predicting the formability of precision oriented parts. Compared with traditional methods such as the use of try-out tools, sheet-metal-forming simulation enables a significant increase in the number of tool designs that can be tested before hard tools are manufactured.

Another advantage of sheet-metal-forming simulation is the possibility to use it at an early stage of the design process, for example in the preliminary design phase. (Andersson, 2004), which will enable the control over cost, material wastage, material composition parameters etc. In sheet metal forming, the optimal blank shape has advantages of optimizing the material cost, minimizing the forming defects, improvement of the quality of formed part, etc. However, finding the optimal blank shapes could be difficult and time consuming.

In this paper, an efficient blank design methodology is proposed based on geometrical resemblance, which requires several iterations of finite element analysis simulation to obtain an optimal blank shape. In order to verify this methodology, two case studies on deep drawing processes and one experimental validation have been carried out.

The methodology has been shown to be computationally efficient, requiring as few as four finite element iterations to obtain an optimal blank shape. (Chen Yang, 2014).

2. METHODOLOGY

Case studies include a number of various applicable methodologies that complement one another. In this study, a combination of participant observations (Atkinson and Hammersley, 1994), interviews (Kvale, 1996), and the studying of formal documents has been used.

In the specified context, the inter personal dynamics in the organizations particularly the non-alignments that erupt between marketing and Research & development functions were focused. Observations of participants are based on an ethnographic method whereby the researcher spends sometime within the community being researched, a society, an organization, and a specific group of interests. The ethnographic method is used when the researcher wants to understand all the local idiosyncrasies and to pay attention to the subtle nuances of a specific culture or community.

The participants were observed at workshops, executive meetings, weekly and monthly meetings, and other formal or semi-formal administrative arrangements taking place at Ethnographic Case study Method (ECM) during the autumn of 2003 and the spring of 2004, totaling 20 hours. During these meetings and workshops, detailed field-notes were made, including observations of actual activities as well as more personal reflections on the progress of the discussions and other relevant issues. These field-notes were transcribed, analyzed and filed.

The ethnographic approach has been used in organizational studies at manufacturing companies (Dalton, 1959; Burawoy, 1979), service companies (Hochschild, 1983), and knowledge-intensive companies (Kunda, 1992). There were 24 interviews with the relevant staff from the marketing, R&D, Design, Finance, and Project Management, Human Resources, Manufacturing, Systems Support and software development departments of ECM. Male managers and female managers, representing different areas and nationalities were covered.

During the interviews, a semi-structured interview instrument was used. In the meetings held between Marketing and R&D during the early phase prior to the initiation of the development project, there are already too many detailed issues to discuss and merge. The different functions have done their homework and have already prepared documents describing the product from their specific points of view.

R&D often has a document describing the product content on the system level, together with the estimated cost. The documents that Marketing has developed describe the product attributes in relation to the desired positioning of the vehicle, based on customer target groups and the competition, as well as a description of the vehicle on a more detailed level with specifications of the engine types, power train, platform, body types, etc. When exchanging information and ideas during the early phase, this is mostly done by sharing documents between the departments and through some informal meetings.

At this point in time, there has not been very much cooperation and the receivers of the documents often react in relation to their view within their function, expressed thus by one manager in R&D: "The initial product description we get from Marketing needs to be translated before being submitted to the engineers; this is because their description is too general and not sufficiently defined.

This causes the R&D people to see the description as a "wish list" rather than the description of a product to be developed. We thus need to make it more specific, while keeping it on a general level from the R&D perspective" (Manager 3, R&D). At this point in time, R&D are facing the need for detailed planning, also seeing it as their responsibility to make the vehicle more concrete and translate the description in to a specification that is possible to develop within the financial and technical frame work they have identified.

It is noted that the R&D staff take on that work themselves and do not get back to Marketing for clarification or to work it out together. A manager further illustrates this thus: "One issue concerning conflicts is that we work differently. Marketing uses relative definitions regarding an attribute definition, while R&D use a technical specific solution to describe the attribute.

Over time, this causes a problem as at one stage, the departments can agree on the different definitions, while at a later stage, Marketing has a different interpretation that is based on changes in the marketplace, etc. An example of this is that Marketing might state that the vehicle needs to be "leading in performance", without saying what that is.

Thus, we need to define it into functions and systems, as we need to have it on a detailed solution level in order to calculate the development cost". The departments already seem to be locked into solutions and there are many conflicting issues. Something that is not brought up is the vision of the product, what it represents, and the further attributes that make up the car.

Instead, a lot of detailed work has been carried out within each function without having had a common and

more general discussion about what to develop or a common goal. Furthermore, regarding the cooperation and relations between Marketing and R&D during the initial meetings, a marketing manager expressed the differences and complexities thus: "The risk, however, of continuing with this process is that the definitions of the products will be the ones the project believes in, and not the ones decided upon in the strategic plan. Consequently, there will be a high risk of developing competing products – more of the same – not products that are differentiated enough".

Based on observations, it is found that the different functional works and documents are rarely compared in order to identify gaps or conflicting issues. This indicates that there is a lack of intensive collaboration and interaction between Marketing and R&D. Not dealing with these gaps may be one reason why development projects need to re-work some of their conceptual input later on during the development phase, as too many contradictions are built in. The difference in requirements that was causing conflicts between Marketing and R&D seems to have come to the surface.

Until recently, each function has had a decision board consisting of executive managers from different functions. One unclear issue has been the scope of each decision board.

DISCUSSION

This case study illustrates the difficulties of creating a thorough common concept during the NPD, but now a sense of urgency has emerged with regard to improving the concept creation and management of the early phase of NPD.

Very early on in the discussions regarding a new product held between Marketing and R&D, detailed issues are brought up. It seems to have been problematic that marketing and R&D have made assumptions based on their own perspectives rather than first having a joint discussion concerning the vision of the product in order to secure a common understanding of the needs, priorities, opportunities, and restrictions to be considered during development of the concept.

Taken to this level, work can be very problematic as the different functions have separately developed their own ideas about the concept within the framework of each discipline, thus lacking a holistic view and a common goal. The differences in the views, standpoints, and reasoning of the functions involved, based on the differences in the focus, definitions, and complexities of each discipline, then causes conflicting views.

Even though NPD is a multidisciplinary process, research has shown that the strengths of the interdependencies vary over the development cycle and that the strongest interdependency during the early phase is found to be between Marketing and R&D, which is why far-reaching integration is argued to be necessary between Marketing and R&D when creating the concept during the early phase (Gomeset, 2003; Griffin, 1997).

3. CONCLUSIONS AND MANAGERIAL IMPLICATIONS

In this case study, which has been successful over a long period of time in developing new products with a high level of profitability, organizational complexities are many. In view of conflicts among functional objectives, incongruence between marketing and Research & development, required synergy has not been arrived as the literature indicates.

When creating the vision of the product, the critical properties and characteristics need to be identified, something which will further be explored in order to define the product specification at the level the concept requires. As integration between Marketing and R&D continues and new knowledge is developed via collaboration, new capabilities and possibilities may emerge, when viewed from a different perspective than previously, which might create new, innovative, and competitive products (Kim and Wilemon, 2002).

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