Correlation between New Product Development and Interdepartmental Integration

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Abstract

New product development is critical for the survival of many firms in an ever increasingly competitive market place. Companies expend a great deal of their resources, financial and human in the pursuit of the competitive advantage that can be gained from the successful development of new products and thus avoiding crippling price competition. Unfortunately the NPD process still remains problematic for many firms, why do so many new products fail? Much of the literature in this area points the "finger of blame" squarely in the direction of the low levels of integration between the firms marketing and other functions. Does the degree of integration of functionally specialised activities impact on new product success rates? Empirical evidence suggests a positive relationship exists between the level of integration and successful new product outcomes [1, 2, 54].

The most widely accepted methods to achieve integration between functions are discussed in this paper. These methods also show how to overcome the integration barriers, which confront mostly during NPD. In this paper, a conceptual framework is derived which consists of five integrating facilitator, which help to achieve integration between marketing and other functions during NPD in the organization. Adopting these facilitators will increase the certainty to achieve integration through more collaborative work between departments. As a consequence of this collaborative work between departments, the company will increase the level of integration between marketing and other functions. Furthermore, the characteristics of highly collaborative firms are presented. On the basis of these characteristics a practical implementation and certain recommendations for the companies are presented in the end.

1. Introduction

1.1 Background and Research Problem Statement

What is Innovation?

Innovation is generally defined as "the successful commercial exploitation of new ideas," it is an interactive process that draws on knowledge from a wide range of internal and external sources. Innovative companies thrive because of their ability to generate and exploit new technologies, products and processes faster than their competitors, to meet customer needs. The scale and rate of change in the modern economy means that companies cannot afford to stand still.

New Product Development

Since decades companies are working hard to implement their innovative ideas into reality by having new products. The successful development of new products is an important factor in the survival of the most companies. Organizations depend on new products for long-term growth and survival (Hopkins, 1981).

A new product can be defined as original products, product improvements, product modifications and new brands that firms either develop internally or acquire from external sources (Kotler and Armstrong 1993).
The incidence of new product failure is both very high and costly. Despite efforts by organizations to manage and improve the success of new product development, estimates of new product failure rates ranges from 37% to 80% (Urban, Hauser, and Dholakia, 1987; Crawford, 1987, 1977). Such a high failure risk and cost of new product development makes it necessary for organizations in order to be competitive to seek better methods for the innovation and development of new product. New product development is one of the key activities for most companies to keep current business up to date with changing market conditions or to find opportunities in markets, which are new for the company concerned. Researchers further support these evidences in the late century. And have added many new visions of success. The impact of being the first company to introduce a new product to market could mean the difference between success and failure.

All activities, which are undergone during the new product development process, are done in a manner by creating different functional areas, where specialization takes place. The need of cooperated work among departments is increasing from day to day, as competition is getting intense in the industries. Nowadays the departmental units are more dependants on each other than any time before. Changing customer needs, new market evolutions, technological moves, and especially the role of newly developed markets in the third world countries such as China, India, Taiwan etc. had pressurised companies in the European and north American region to look for new standards of better quality products but with lower prices. Successful new products with high customer value are more likely to emerge when development activities are well executed (Zirger and Maidique 1990, Brown and Eisenhardt 1995).

In recent years the need to understand the interrelationships between marketing and other business functions has increased in importance [54]. Marketing personnel often play a coordinating role, linking demands from outside the organization with the functional department inside the firm that are capable of satisfying those demands. From a marketers perspective, inter-functional interaction is motivated by the desire to achieve both the broad and common objectives of the corporation or business unit and specific marketing objectives and individual goals.

Bringing all organisational units together for the attainment of one common objective is not an easy task. There are many conflicts, which might arise due to differences in the skills, knowledge, educational and professional background, and personal differences. Much of work has been done on this issue many thoughts were brought on the front line to discuss the sensitivities between marketing and other functions in different industries. This paper addresses a main challenge by building an understanding about a high degree of correlation between new product development and interdepartmental integration while developing new products. This issue is being addressed by using an approach to find out *the most important integrating facilitators, which facilitates the integration between Marketing and the other organisational functions.*

1.2 Purpose and Scope

The purpose of this paper is to develop an understanding about the integration difficulties among different departments, whereby focusing mainly on R&D and marketing during new product development process. Furthermore, it will be seen as a base for the further research that might be needed during launches of new product by minimizing the interdepartmental conflicts, which arises due to communication and differences in understanding especially between R&D and marketing. This paper addresses the issues in a way that it will be helpful to resolve the uncertainty in the integration process by minimizing misunderstandings that normally seen as a result of poor communication, at the same time the paper also analysis the most important factors that should be taken into account while integrating different departments.

This purpose of this paper is also to contribute in a way by helping companies to break down the walls that have traditionally separated different functions and instead form a partnership that leverages the strengths of both talented researchers and skilful marketers. The paper addresses the previously mentioned issues with the help of conceptual framework that will be helpful for management by developing and sharing together the clear goals and accountability in order to create a transparent decision-making process such as, the collaboration between marketing and other organizational functions.

This ongoing collaboration could bridge the gap between breakthrough scientific discoveries and commercial potential, enabling top-performing companies to target and develop compounds with a high market demand and clear competitive edge, leading to rapid sales uptake.

Besides this there are other issues, which will not be a part of this paper. The paper will not explore much about the importance of integration because past research was mostly addressed the importance of integration in detail. That's why the emphasis will be to resolve the integration issues that possibly arise during NPD process.

2. Literature Review

The importance of integration is being proved through empirical research and evidences, which is briefly described in the previous section. In this chapter a more descriptive view of scientific literature about integration process is being presented. The upcoming lines of the paper are a summarized view of many empirical studies. In this chapter it is not only about a summary of the previous research but more about integrating different views and opinions from researchers in a line of the subject. At first the research of Ruekert et al., [54] regarding integration is presented. Thereafter the study of Moenaert and Souder [45] is being integrated with Ruekert et al., [54] in relation to communication aspect of the integration process. This is followed by integration model of Kahn [31]. Barriers to integration process are presented as well. Later on, the integrating facilitators from Griffin and Hauser [1] are discussed in detail.

2.1 Marketing's Interaction with other functional units

Many researchers have adopted the system-structural perspective in examining relationships both between autonomous organizations and between managers at different vertical levels within a single organization [6, 76]. But still there was a need to understand horizontal interactions between marketing and other functional personnel on the basis of the system-structural perspective. Ruekert and Walker [54] have studied the issue in depth and outlined the major dimensions by providing the conceptual framework, which describes the interaction between marketing and other functional personnel on the basis of the system-structural perspective.

Insert figure (1) about here

Figure 1 outlines the *structural and process dimension* of inter-functional interaction, which can be divided into (1) transactions between marketers and personnel in other functional department, (2) the communication flows between people in the two areas, and (3) the coordination mechanisms used to manage these exchanges. Transaction between marketers and other functional area include exchanges of resources, work, and technical assistance. Such transaction also requires a flow of information, which can be characterized by both the amount of communication and the difficulty of communication between the parties. The coordination dimensions involve formal working rules, the amount of influence a member of one unit can exert on a member of another, and the conflict resolution mechanism used when either formal rules or informal influence fails.

A central issue in examining inter functional interaction is whether the individual or functional department level of analysis is most appropriate [54]. The individual employee or job level of analysis is the most appropriate starting point for studying inter-functional interactions. The major reason for this view is that the flow of resources and information between individuals in different departments serves as the *primary* link between the departments as they carry out their daily activities. A second issue in the study of interactions between functional areas is the appropriate level of interaction.

2.2 Cross functional integration

Since decades firms have become increasingly interested in stimulating, facilitating, and maintaining cooperation between the various functional areas.

This trend had been extended especially to the new product development process, which is inherently cross-functional, involving people from R&D, manufacturing, and marketing [12,58,59,69]. Cross-functional new product teams, quality function deployment, and simultaneous engineering are just some of the techniques frequently used to enhance cross-functional communication in NPD, and ultimately, the likelihood of new product success [21,22,26,59].

2.2.1 Cross-functional cooperation

Cooperation is broadly defined as coordination of behaviour [28]. With respect to new product development there are numerous terms and phrases that have been used analogously, such as inter-functional integration, collaboration, and teamwork [51]. Basically cross-functional cooperation refers to interdependency and information sharing between the various organizational units.

Insert figure (2) about here

As Figure 2 indicates, critical information and other inputs and outputs are exchanged across functions in new product development process [43,44]. For this exchange of information there must be an existence of good cooperation among functional departments. Cooperation is broadly defined as coordination of behaviour [28]. Basically cross-functional cooperation refers to interdependency and information sharing between the various organizational units. In new product development, the propensity for conflict between the functions is great [13,57]. To some degree, marketing and R&D have similar organizational goals [57]. Broadly speaking, both marketing and R&D are interested in creating change through new products and new technology. Conversely, manufacturing's primary objective is the achievement of efficiency in production and cost minimization.

R&D is rewarded for creating new products, whereas marketing is rewarded for creating and maintaining markets and satisfied customers. Manufacturing is charged with efficient utilization of resources, cost minimization, and meeting objective quality standards. Marketing wants broad product lines to satisfy every customer. Manufacturing typically prefers narrower product lines to gain economies of scale and minimize changeover problems. R&D wants to develop break-through, (patenable) revolutionary new products. Marketing wants rapid product delivery across a wide mix of products, whereas manufacturing is moving toward just-in-time delivery systems that minimize inventory investments. Manufacturing wants accurate sales forecasts and frozen design specifications. Marketing wants fast, fluid response to customer demands. R&D strives toward elegance and perfection in product design.

2.3 Communication between Marketing and other functions

It is proved by previous researches that communications between functional areas are one of the most important factors contributing to new product success in firms. Cross-functional communication between marketing and other functions contributes to the commercial success of a technological product and innovation project [45]. Technological innovation requires the organization to invest human resources in the development of new products. Each person involved in a new product project fulfils a functional role. The previous research showed that the utility of received information is determined by many elements that are related to one of the four components of the source-channel-message-receiver model of interpersonal communication.

- Relevance
- Novelty
- Credibility
- Comprehensibility

Insert figure (3) about here

The relevance of information refers to the extent to which the information is perceived to be appropriate to the user's task or application. The novelty of information refers to the number of new insights perceived by the receiver in an information stimulus. The information's credibility relates to the degree to which the receiver of the information believes the information to be undistorted.

The comprehensibility of information concerns the ease with which the receiver of the information can decode and understand the information. These four information dimensions constitute a parsimonious description of the message-component of Berlo's linear communication model [44]. Within innovation teams, novelty, relevance, credibility, and comprehensibility of information may be necessary prerequisite for information to be judged useful.

Moenaert and Souder [45], have found that the biggest problem R&D managers perceive with marketing information is that it reflects a lack of understanding of product design tradeoffs such as between price and the product features. Furthermore, the perceived credibility and comprehensibility of extra functional information relate positively to the quality of the relationship between the source and the receiver.
It was found by their study that the relevance and the credibility of extra functional information had very strong effects on the perception of information utility, whereas novelty had a marginal effect. The comprehensibility of information had a moderate effect. The analysis of the antecedents of the four information dimensions revealed that the quality of the relationship between message source and message receiver (e.g., marketing and R&D departments) had a strong positive influence on the perceived comprehensibility and the perceived credibility of extra functional information. Also, the more senior the message source vis-à-vis the message receiver, the more novel the information was perceived to be. Prior experience of the source in the function of the receiver (e.g., the marketing person had prior experience as a member of the R&D department) had a positive impact on the perceived comprehensibility. But, it had a negative impact on the perceived credibility.

2.3 Interaction and Collaboration

Interaction represents the structural nature of cross-departmental activities. Such activities address formally coordinated activities between departments. Including routine meetings, planned telephone conferencing, routine conference calls, memoranda, and the flow of standard documentation. These activities are structural in nature because they regulate communication through frequency of occurrence, adherence to a routine schedule/plan, and/or upper management mandates. In sum, the interaction process is structural because it adds structure to how departments interrelate.

Collaboration represents the unstructured, affective nature of interdepartmental relationships. Collaboration is defined as an affective, volitional, mutual/shared process where two or more departments work together, have mutual understanding, have a common vision, share resources, and achieve collective goals. Such activities are intangible, not easily regulated, and difficult to sustain joint efforts, and represent a higher level of interrelationship. The interaction-based philosophy for interdepartmental relationships is believed to stem from a transaction-based philosophy, which has predicated much of business theory and managerial practice. The interaction philosophy favours communication between departments, which encourages managers to hold more meetings and establish greater information flows between departments.

The collaboration philosophy for interdepartmental relationships is a different philosophy that parallels the relationship marketing philosophy currently emerging in the marketing discipline. In the collaboration philosophy, continuous relationships between departments are stressed, not just transactions between departments. There is emphasis on the strategic alignment of departments through a shared vision, collective goals, and joint rewards, along with an informal structure, to manage relationships. Departments are considered interdependent, which facilitates a shared vision across departments and encourages departments to achieve mutual goals. Because goals are similar across departments, penalties for dealing with other departments are nonexistent. Thus, the company's internal environment is one of cooperation, not competition.

2.4.1 Performance Implications of Interdepartmental Integration via Interaction and Collaboration

Empirical research has especially supported a strong relationship between collaboration and performance. Collaboration was highlighted by Lorsch [38] and Lawrence and Lorsch et al., [35,36] as a good predictor of performance. Souder et al., [60, 61] found that cases of severe disharmony between departments (low levels of collaboration) resulted in dramatic failures, whereas harmony between departments (higher levels of collaboration) resulted in significantly more successful projects.

Tjosvold [66] reported that collaboration between departments promoted the winning of contracts, greater satisfaction, improved productivity, improved morale, and department confidence. Kahn [31] found that, department's collaboration with another department will positively influence product development performance and product management performance.

Insert figure (4) about here

The magnitude of interaction's effect on product development success and post-launch success in comparison to collaboration's effect is not clear, however. In analysing the effect of communication difficulty on the effectiveness of the interdepartmental relationship. Ruekert and Walker [54], found that interaction did not relate to relationship effectiveness across all departments. This suggests that interaction may not have as strong an impact on performance as collaboration may have. Schrage [56] further suggests that collaboration might have a stronger impact on performance factors than interaction because the mutual sharing of information and resources will be more cost-effective and promote greater goodwill across departments. Kahn [31] has found that collaboration will have a stronger influence on product development performance and product management performance than interaction will.

2.4 Barriers to Integration Process

A rich stream of research [4, 25] has identified a number of factors that can hinder functional integration including lack of communication, lack of senior management support, spatial separation, existence of reward systems that do not encourage and may even discourage cooperation, and the lack of credibility. Other factors found to be related to integration include trust, inter group conflict caused by competition between functional areas for scare organizational resources, personality difference between functional area managers and the effects of environmental complexity, organizational strategies and structure, conflict resolution mechanisms and the outcomes of previous interactions on interactions between functional areas [54].

Several studies have found that a lack of integration between marketing and R&D / engineering leads to conflict and failure of new product development. Weinrauch and Anderson [73] give the following reasons for the existence of conflict: (1) differences in tasks, goals and objectives of the two functions, (2) polarization of behavior, with marketing wanting customized products and engineering wanting to manufacture standardized products, (3) stereotyping of personality traits, (4) overestimating the competition and changes in the business environment, and (5) ignoring differences in the power and organization of the two functions. Meanwhile, Crittenden et al., [13], when considering the conflict between marketing and manufacturing functions, found that conflict arises from the need to manage diversity in such things as the number and breadth of products, customization of products, and product quality. They also suggest ways in which this diversity can be managed to reduce conflict with improved communications between engineers and marketers being needed, together with more networking. However, they do acknowledge that to reduce conflict a radical overhaul of organizational structure and reward systems is also necessary.

Many researchers especially in an increasingly competitive business environment in which products are increasing in complexity further reinforce the importance of teamwork. This need for managing flows across marketing and R&D boundaries was recognized as important in the 1970s, and research in the area was initiated. Managing the interface became critical in the 1980s and has continued to be important to firm success since then. That's why this section of the thesis emphasizes only on the integration between marketing and R&D. There are many barriers to achieving cooperation and communication between marketing and R&D. Empirical research indicates that disharmony between marketing and R&D is the rule, rather than the exception. [43]. The main barriers to integration has been seen by researchers are (1) personality, (2) cultural thought worlds, (3) Language, (4) organizational responsibilities, and (5) physical barriers.

By taking a literature into consideration a briefed conceptual framework is being build, which is presented in the next Chapter.

3. Conceptual Framework

After studying the previous researchers and work about the integration between Marketing and other functions in the organization, it has made clear that still there are many facts, which are in need to be highlighted. This paper is trying to combine the work of different researchers in order to find out the effects of different factors on integration process. In this chapter first a conceptual framework will be presented, which is based on the work of previous researchers. Later on, conceptual framework will be followed by hypotheses, these hypotheses are formed to check out the relevance of the factors with integration process.

Insert figure (5) about here

3.1 The effect of personnel movement on Collaboration

In the model, the integrating mechanism is being represented by five methods to achieve the functional integration [1]. Personnel movement would make it possible to collect the information from different departments and from different people to one platform. While working together with other functional people it is even more useful in a sense that it resolve the conflicts of having different views on different technical and managerial backgrounds, which facilitates the task completion process in together. Furthermore, it enhances the mutual understanding of the technical and non-technical knowledge of the personnel, which moves from one unit to other. Thereby helps to develop personnel skills and giving them a feeling of belonging to one unit as whole This as a result would enhance to achieve the targets sets by the management and working on them as collective goals. This leads us to form a Hypothesis;

H1: ***Personnel movement between marketing and other functions leads to collective goals***

3.2 The effect of informal social system on collaboration

Informal social system has nevertheless same effect as the free personnel movement between different departments. Furthermore, it enhances an information sharing process by letting different personnel get together and talk to each other freely at "pulse meeting points". Many companies nowadays trying to put single coffee machines and drink points somewhere between departments. As this gives them a chance to know each other well in a very informal way. While mixing up with different people from other functions a new bond of personal relationship is build, which leads to trust each other in a more mechanistic way. This enhances the credibility of the information that passes by one person to other in different departments. This leads to form a hypothesis;

H2: ***Informal social system has a positive effect on the information sharing process between marketing and other functions.***

3.3 The effect of organizational structure on collaboration

Organizational structure plays an important role in the success of any company. Coordinating groups as part of organizational structure, which are formed on the basis to help each other's functions in order to have a more collective approach of the set targets. These groups would lead to minimize the conflicts among the members by having collective goals, which enhances the decision-making process. This leads to form a hypothesis;

H3: ***Coordinating groups in organizational structure lead to achieve collective goals.***

A matrix organization is another way in organizational structure to achieve the targets set by the management. *Matrix organisations* increase product development success by reducing differences between functional responsibilities while increasing the amount of information available during a project and enabling processes to be followed that lead to completed tasks [1]. Mutual interdependence must be created and information must be exchanged in order for each of the functional areas to operate more effectively [43]. Information found in one functional area becomes an important input variable in the decision-making and operation of other functional areas.

H4: ***Matrix organizations in organizational structure enhance information sharing process.***

Cross functional project-development teams in organizational structure lead to higher marketplace success and shorter times to market decreasing the barriers of functionally specialized thought worlds, languages, and organizational responsibilities, and providing a forum in which information is utilized better, decisions are made more effectively, and conflicts are resolved [1]. Over time, as individuals from different functional areas work together, they learn about each other's abilities. They learn how they can help one another perform better, what each can contribute to a particular project and how to take maximum advantage of each other's previous experiences [56]. By using each other's experiences properly and taking full advantage of them organizations can develop new products more innovatively and efficiently in less time.
This would lead to shorter period of product development and its launch in the markets, as a result company can enjoy maximum market share and product success.

H5: ***Cross-functional project development teams in organizational structure have a positive effect on the speed.***

3.4 The effect of incentives and rewards on collaboration
Performance evaluations, which recognize the interrelated rewards to marketing and R&D, based on ultimate product-development profits (or indicators thereof) decrease the inherent barriers between the functions due to differing organizational responsibilities and lead to increased profits by encouraging cross-functional decision-making and task completion and by providing incentives for resolving conflicts between the two functions. Furthermore, teams are ready to make joint targets, which enhance the collaboration as well. As a result all members of organization started to pursue those goals by having an ideology, which is based on a common vision. This leads to follow a hypothesis;

H6: ***Joint reward system between marketing and other functions is positively related to the common vision.***

3.5 The effect of formal integrative management process on collaboration
A formal management is a process, which specifies that what tasks should be completed in what order and by whom. This clarifies the decision authority. Mostly in firms conflicts are raised due to the decision-making and power mechanism. Each department tries to be dominant by taking decisions, which are in their own favour. There is always a very less room for negotiation because shortage of time. Hence, negotiation costs too much time that might be used for the new innovations and creative thoughts in the organization. Therefore it is very much important that everyone knows about his duties and responsibilities regarding the development of new products. This becomes much easier once there is a clear decision-making authority. As a result firms could follow more complete processes and develop more successful products. This helps to form a hypothesis;

H7: ***Formal integrative management processes clarify the decision-making authority.***

Furthermore, the formal integrative management process would lead to the cost efficiencies by saving lot of efforts, which needs to define the job responsibilities. Some research has shown that using a formal process can lead to improved development process would eliminate significant time from the development cycle. As the speed of the product development counts a lot. Most of the time companies are trying to be the first into the markets in order to enjoy the advantages and try to maximize the market share.

H8: ***Formal Integrative management processes are positively related to the speed.***

4. Conclusion

In this chapter, the whole analysis and review of literature is concluded. Hypotheses are going to be reminded again and their possible explanations are sought in the light of already discussed literature. Specifically the integrating facilitators with their possible outcomes are being summarized in a form of table (Table 5). Furthermore, the role of collaboration is being resulted into an extension of integration as a cross-functional linkage (Table 6). The role of communication between marketing and R&D is presented as a scientific evidence showing enhancement in new product success (Table 7).

There is no single process that offers only its benefits without having some percentage of risks. It is equally important here to discuss the benefits and risks associated with integration process. Benefits and risks of integration process are also summarized in this chapter.

The chapter will be concluded its study by having an implication of integration for companies. Company's role of strategic scope in integration process will be presented by showing an interdependence of marketing and R&D on each other. Furthermore, the effect of strategic scope and specialized resources will be presented. A schematic picture (Figure 7) is made to show a priority that management should be having in order to increase the integration level between marketing and R&D for a better new product development and performance. At last the limitation of study and recommendations for future research will be discussed.

4.1 Summary of the purpose of this study

This paper was written in order to give an answer to the problem statement presented in the first chapter. Rewriting it from page (12), the problem statement was as following:

"building an understanding about a high degree of correlation between new product development and interdepartmental integration while developing new products.".

In the second chapter, the paper has given a broader and more structured knowledge about the most important concepts regarding integration between marketing and other functions during NPD. The 2nd chapter has introduced different definitions, approaches, difficulties, and complexities in order to attain integration between functions that can assure harmonious relationship. Moreover hinderness to integration process and how to overcome such -complexities were also a part of the section. In the 3rd chapter a conceptual framework has been introduced. This conceptual framework was based on the literature analysis of different factors from Griffin and Hauser [1], Kahn [31], and Moenaert and Souder [45]. The basic concept was to increase the collaboration between different functions of the organization during NPD process. In order to achieve an optimal collaboration between functions, an effect of different factors has been studied. These factors could effect the collaboration through different components.

4.2 Hypotheses and Results

In chapter 3, a conceptual framework was presented (Figure 5) that helped us to answering the problem statement. The model consists of 5 integration facilitator factors, those having a direct effect on the integration between marketing and other functions during NPD. The effectiveness of these 5 factors is measured by using collaboration as measurement mean for the integration process. *Moving personnel across functions* increases market place success and decreases time to market by decreasing thought world, language, and physical barriers between the functions, increasing information utilization and cross functional coordination, and decreasing technical uncertainty. *Temporary transfers* are more effective in the long run because they enhance integration without eroding valuable functional skills. Developing *informal cross-functional* networks reduces the language, thought world, and physical barriers to integration, enables more information to be communicated and utilized, increases coordination and decision-making, and decreases project uncertainties, leading to higher success on all three measures. *Coordinating groups* achieve higher market success and profit levels by overcoming language and organizational responsibility barriers, allowing better decisions to be made and resolving conflicts. Their stability can reduce one dimension of uncertainty in extremely unpredictable environments.

Matrix organizations increase product-development success by reducing differences between functional responsibilities while increasing the amount of information available during a development project and enabling processes to be followed which lead to completed tasks. *Cross functional project-development teams* lead to a higher market place success and shorter times to market by decreasing the barriers of functionally specialized thought worlds, languages, and organizational responsibilities, and providing a forum in which information is utilized better, decisions are made more effectively, and conflicts are resolved.

Performance evaluations, which recognize the interrelated rewards to marketing and R&D, based on ultimate product-development profits (or indicators thereof) decrease the inherent barriers between the functions due to

differing organizational responsibilities and lead to increased profits by encouraging cross-functional decisions-making and task completion and by providing incentives for resolving conflicts between the two functions. *Formal integrative management processes* increases product success and decrease development time by ensuring that necessary tasks are completed during development. Furthermore, decrease integration barriers due to differing organizational responsibilities across functions. They also encourage decision-making, allowing the technical and market uncertainties of the projects to be reduced. Moreover, they reduce the marketing/ R&D barriers of different thought worlds, languages, and organizational responsibilities and provide mechanisms to increase information utilization across the functions as well as resolving conflict between them.

Insert figure (6) about here

4.3 Benefits and risks associated with integration process

The core of any company usually consists of three major functions: R&D (to create), manufacturing (to make), and marketing (to market). The NPD process consists of a set of activities either simultaneously or sequentially conducted by these functions. Many NPD tasks require inputs and cooperation from multiple functions to reduce uncertainty and improve the quality of NPD decisions [43]. For example, R&D provides information to marketing regarding product characteristics and to manufacturing regarding product and process specifications; marketing informs R&D about consumer needs and manufacturing about customer delivery requirements; and manufacturing provides information to R&D concerning production limitations and to marketing concerning production capacity and lead times.

Many studies demonstrate that cross-functional integration improves NPD performance [1]. A primary advantage of cross-functional integration is the improvement of horizontal communication linkages [43]. Inter-functional dependencies can be handled through direct information transfers between functions, thus increasing efficiency. Frequent communication and exposure to a variety of perspectives also stimulate creativity and increase the likelihood of generating valuable new knowledge [19, 46], and in turn increase the likelihood of producing more successful new products.

Despite these advantages, cross-functional integration has several disadvantages. First, it violates two classic management principles (authority should equal responsibility, and every subordinate should be assigned to a single manager), thus complicating the relationship between functional areas and increasing organizational conflict [14, 30]. Second, joint involvement introduces conflict at an individual level. Personnel from different functional areas often have different orientations, goals, and values [39, 49]. These diverse backgrounds lead to conflicting expectations and an excess of demands on individuals. The stress from conflict in cross-functional relationships can disrupt work patterns and consume an inordinate amount of time for those involved. This leads to decreased productivity and poor decision-making [72]. Third, cross-functional integration can be costly. Many meetings are required to facilitate information flows, and reaching a consensus on decisions made across functions can take considerable time. Finally, management of the interface can be difficult. It requires managers with special training to coordinate the complex process of developing a product with such a diverse set of individuals [14].

4.4 Integration implication for companies

4.4.1 The Role of Strategic Scope in integration process

Many researchers had been addressing the question; whether the strength of the multiplying or mitigating effect of integration on the underlying resources is the same for different type of companies? Leender's et al., [41] argued that there may be differences, depending on the approach the company follows in new product development, i.e. the NPD strategy.Concept of strategy group has been already developed in previous researches. Strategic groups reflect an economic orientation to collectives of firms. The rationale behind the group concept is that firms observe each other to gain information about what works in the environment. As a result, firms are expected to converge toward specific strategic clusters (e.g. Cool and Schendel [11], Bogner, Thomas, and McGee [9]) postulate that a company's strategic scope is an important dimension of a company's strategy.

A narrow scope or a *convergent* NPD strategy [11, 18]) involves achieving leadership in specific market segments with selected products. A broad scope or *leverage* NPD strategy is defined as targeting a broad spectrum of customers with a great variety of products in different market segments.

4.5 Limitations of study and recommendations for future research

This is not the end, but a start. The conceptual model that has been presented in chapter 3 could be taken as a base for future research; one might be able to come up with more influencing and value added factors that have a certain effect on the integration between marketing and other functions during NPD process. These factors could be a combination of already presented ones, or even totally new factors based on different assumptions and conditions. The purpose of this paper was to be an exploratory literature review that combines some of the most important concepts of integration between functions during NPD process, in order to give a satisfying answer to the problem statement.

This paper has investigated and recommended major integrating issues and implementation strategies only for marketing and R&D during NPD process. A time and resource factors can be taken as one of the limitation of this paper, which binds it to investigate the integrating issues only between marketing and R&D of this paper. Future research could be even more explicit and detailed about integrating mechanism between marketing and other functions besides R&D. Due to the fact that this research is exploratory only, hypotheses were developed instead of being tested. But with the help of this paper, the hypotheses can be further developed in order to come up with some testable hypotheses. The results of the empirically tested hypotheses can be used later as a rough blueprint draft that can guide companies along the complex path of achieving integration between marketing and other functions during NPD process.

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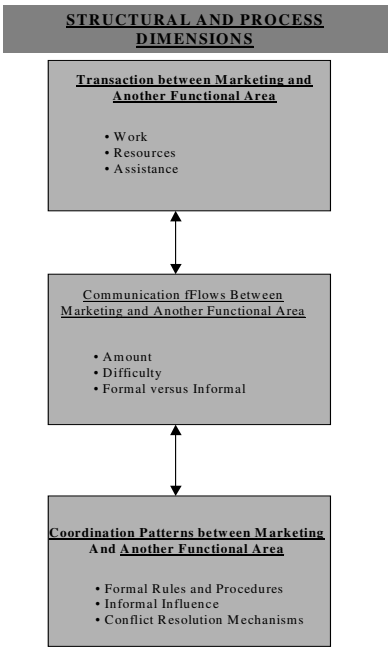
Figure 1: A Framework for Assessing Marketing's Interaction with another Functional Area



Source: Ruekert, R.W. & O.C. Walker, Jr. [54]

Fig 2: Cross-functional Cooperation Source: Urban and Hauser [69]

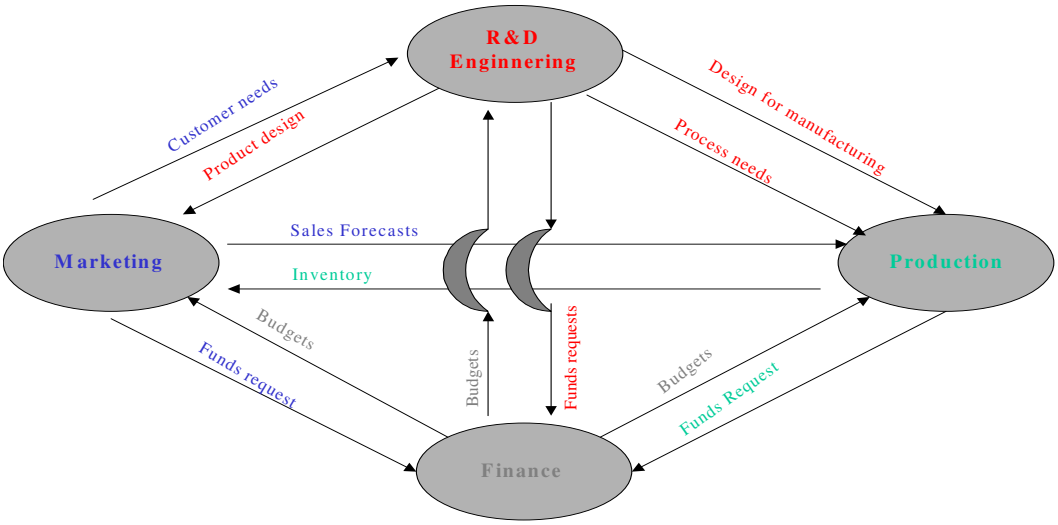


Figure 3: Information dimensions

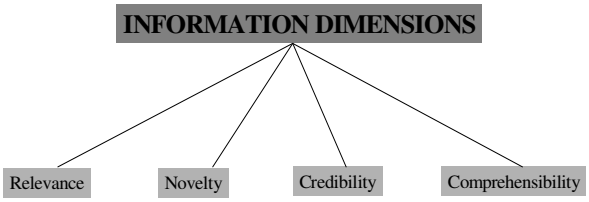
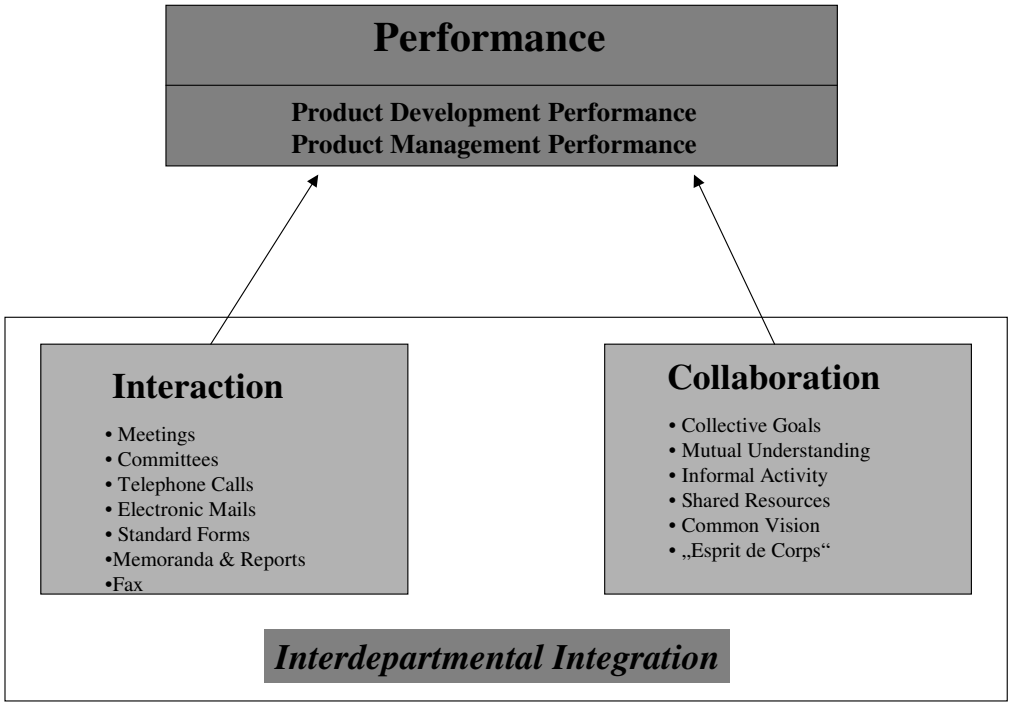


Fig 4: A Model of Interdepartmental Integration



Source: Kenneth B. Kahn [31]

Figure 5: A comprehensive Model for Marketing Interfaces
(Based on: Griffin and Hauser [1], Kahn [31], Moenaert and Souder [45])

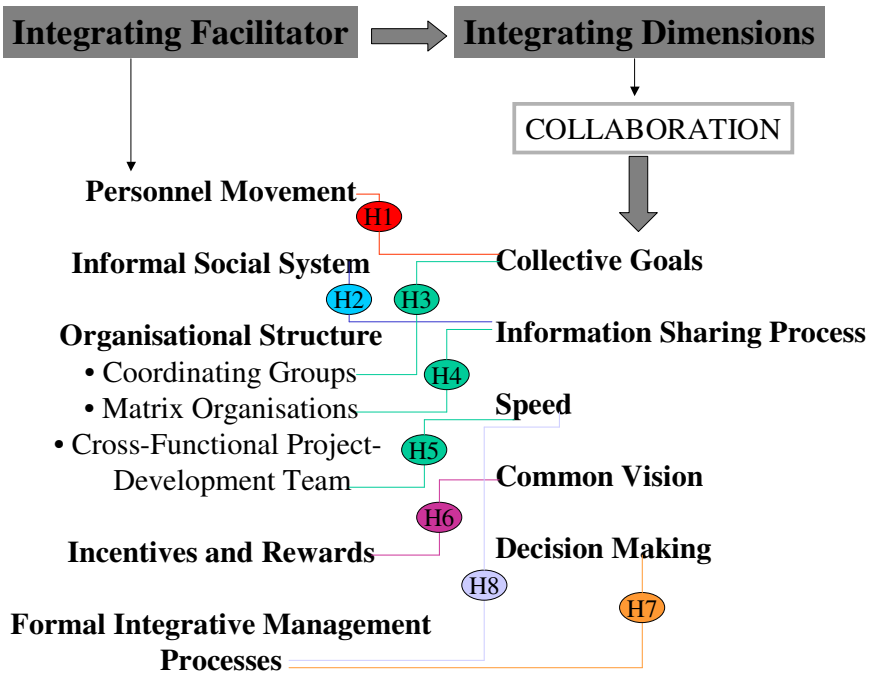


Figure 6: Integrating Mechanism and How they Impact Product Development Success

Integrating Mechanism	Barriers Overcome	Aspect of Integration	Uncertainty Reduced	Outcome Affected
➢Personnel movement:	-Personality -Thought Worlds -Language	- Information utilization -Complete tasks -Resolve conflict	-Technology	-Success
➢Informal Social systems:	-Thought worlds -Language -Physical separation	-Information amount -Information utilization -Decision made -Resolve conflict	-Technology -Market	-Success -Profits -Time
➢Organizational structures:				
• Coordinating groups	-Language -Org. Responsibilities	-Decisions made -Resolve conflict		-Success -Profits
•Matrix organizations	-Org. Responsibilities	-Information amount -Tasks complete -Processes followed		-Success
•Project teams	-Thought worlds -Language -Org. Responsibilities	-Information utilization -Decision made -Resolve conflict		-Success -Time
➢Incentive and rewards:	-Org.responsibilities	-Task completion -Decision made -Resolve conflict		-Profits
➢Formal Integrative Management Processes:	-Org.responsibilities	-Tasks complete -Follow processes -Decisions made -Resolve conflict	-Technology - Market -Market	-Success -Time/Profi -Time/Profi
	-Language	-Tasks complete -Information use	-Technology	-Success
	-Thought worlds	-Information amount	-Market	-Success

Source: Griffin and Hauser [1]