# EMGT 520/620

# MANAGEMENT OF ENGINEERING AND TECHNOLOGY

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**Research paper:R-10** 

"Product Development Cycle Time and Commercial Success" Marc H. Meyer and James M. Utterback

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## **CONCEPTS AND ISSUES:**

This paper is an analysis of 24 new product development ventures in a large technology-based consumer and industrial product company. When a company develops new products, it has to face several issues.

**Product planning:** The authors underline the importance of product planning and the critical interactions which exist between production, distribution, marketing, technical field support and services and enhancement.

**Relationship between development time and performance:** Time is a very important part of planning. The purpose of this paper is to show that reducing development time doesn't always mean a better performance for the product. Other factors such as, newness of the customer, newness of the market, number of technologies to integrate and many more are critical to the success of a new product.

**Corporate renewal:** Real product planning takes into consideration the renewal of the firm's products and technologies. To remain competitive, firms must develop new products, new technologies and try to compete in new markets. In this paper, 9 of the 24 products were developed for totally new markets. The product development cycle time for product meant to reach new markets is generally longer than for those which are implemented for established markets. Meanwhile taking time to develop these new products and conquering the new market is essential to product planning and the firm's overall strategy.

**Multiple project development:** To remain competitive, the firm has to be present in several markets and to develop several technology-based projects. A multiple project development strategy in a technical environment requires a link in communication between the various products developed at the same time. Technological improvements and problems faced by the projects must be shared in order to reduce development time, cost and improve the final quality of the products. In this example, the authors criticize the way products are developed in this firm and recommend another form of product generation that "encourages sharing technology

building blocks between product groups and a product planning and control system that reaches beyond single product, single period thinking".

# **METHODOLOGY:**

The authors have implemented their research in several steps:

## Step1:

In a prior study, they have observed 12 technological ventures of a large aluminum firm. This firm wanted to extend its core aluminum competencies to new markets. For this first study, they have considered these new ventures dealing with technical newness and market newness. Their objective was to look at the differences between these ventures in terms of creation and management.

<u>Hypothesis</u>: They made the hypothesis that two factors are important in the speed developing product concept:

- The capabilities of the company.
- The products' characteristics.

Conclusions: Finally, the authors came up with three main conclusions:

• Shortening product development time creates pressures on teams which are not necessarily good for certain kinds of business. Moreover, the results may lead to many incomplete things and to the failure of the venture.

• A well conceived program for product implementation can reduce the time of market introduction without losing any value for the product.

• Developing a prototype in parallel increases the expenses but can reduce cycle times and increase the rate of market penetration.

Step 2:

The article uses the previous research and conclusion done in step 1 and studies a sample of 24 developments of new products in a large technology-based consumer and industrial product company.

<u>The authors define their objectives</u>: Their goal is to answer five questions dealing with, the relationship between development time and performance, the important factors that affect time to develop new ideas, how technology increases development time, and how a firm can use its core technology to reach new markets.

Before beginning their experiments, they set up two hypothese:

# Hypothese:

• They expect that there is no general relationship between product development time and commercial success for the development of a new product.

• They expect also that market uncertainty influences more product development time than technological uncertainty, in a technology-based company.

## Analysis:

They took a sample of 24 new product development ventures of a company during the last 5 years.

They selected them as representative of the company's new products.

#### <u>1 The relationship between development time and performance:</u>

Two characteristics of the products studied are measured:

• Development time: From the origin of a product concept to market introduction.

• Expected performance: "The overall success of the new product as perceived by the company management".

The authors assessed several specific factors which seem to have an influence on new product development time (product scope, customer newness, distribution channel newness,

manufacturing process newness, product newness to market...). These factors have been measured with a scale from 1 to 5. Project leaders were interviewed and graded the different factors from 1 to 5.

First set of results: Using Kendall rank correlation [1], the authors didn't find any relationship between the time to develop new ideas and perceived performance for the sample as a whole.

They decided to do a second analysis of the Data. At that time, their goal was to determine the influence of development time when there is a certainty in terms of technology and market. In order to do that, the sample was divided in two groups.

Group1: "high newness group", composed with ventures where the score was 4 or 5 in terms of technology newness, customer newness, distribution channel newness. Nine products are in group1.

Group2: "low newness group" is composed of ventures with a score of 1, 2 or 3 in the previous factors. 15 products are in group2.

Second set of results: Here also, they didn't find any statistically significant relationships. However, there was a strong but not significant relationship (p<0.1) when the new product was developed with existing distribution channels and manufacturing processes.

Finally, they combined all the measures to a general newness dimension by adding all the scores in the four factors (technology newness, customer group newness, distribution channel newness, manufacturing newness) and divided it in two groups of the same size.

Third set of results: No relationship was found between development time and performance.

# 2-Relationship between product characteristics and product development time:

Using Kendall rank coefficients T, Z and p, they show the relationship between products characteristics (technology integration, product newness to market...) and development time. The authors consider that there is a strong correlation between product characteristics and development time when p<0.05 [1]. With this method, they were able to prove that some

product characteristics like customer newness and product newness to market have some influence on development time.

Results: The authors have found that technology integration and marketing were strongly related to development time. They also found that distribution channels are also related to development time. Two other factors were also found as critical: the size of the development budget and the competitive environment.

#### 3-Relationship between product development time and corporate renewal:

The sample was composed by 24 products. 15 were product line extensions and 9 were new business developments.

#### Hypothesis:

The authors made the hypothesis that product line extensions and new business development products must be analyzed separately. Indeed, if a product aimed at corporate renewal, it may require more time and money.

## Method:

The authors compared variables like development time, performance, technology integration, customer newness, distribution channel newness, budget...

The method used is the Kendall rank correlation [1]. The goal is to find out whether or not the comparisons were relevant taking into consideration the number of products in each sample. If p<0.05, the variable is considered as significant.

#### Results:

Many differences appeared between product line extensions and new business development. Development time was more important for new business development. Meanwhile, the average performance of both kinds of products was the same. Both kinds of products have to deal with new technologies but new business development products require a high level of multiple technology integration. New business development products require newer market and newer customers than product line extension. Therefore, longer development time is due to the difference between their selling channels.

#### **AUTHORS' GENERAL CONCLUSIONS:**

The authors came up with several important points:

• Rapid development time is not necessarily correlated with expected commercial success. They showed that there was no general relationship between development cycle time and expected commercial outcomes. They point out that trying to force product rapid development in high technological and market uncertainty may produce failure.

- Multiple technologies integration during the development of a new product extend the development time of this new product.
- Newness of customers and distribution channels increase the development time of a new product.

They finally concluded that lower familiarity with technologies or markets must lead to greater patience and commitment during the product development.

## THE PAPER AND THE LITERATURE:

Before the publication date of this paper (Nov. 95), the literature considered cycle time reduction as one of the most important conditions to product performance. Most of the papers showed how to implement cycle time reduction and consider it as a very good factor [2]. Studies of electronic companies like HP [3] dealing with a highly aggressive environment, enhanced this feeling. Indeed, in these industries, time to market is especially critical [4]. "Product Development Cycle Time and Commercial Success" confirms that for some very specific kinds of products, cycle time reduction is essential but shows also that in most cases it is not directly related to the commercial success of products.

This affirmation is confirmed by Cooper [5] who showed with a survey of 103 new projects that, while they are linked, there is not a one to one relationship between profitability and speed.

Most of the authors' analysis of the factors which may influence product performance deal with the concept of "newness" relative to the firm's prior experience. This concept has often been studied in its relationship to performance and strategy [6].

The authors also mentioned that like Krybasik [7], they found that there may exist a trade off between speed and design quality. Previous researches also mentioned the trade off existing between time and quality [8]. Meanwhile, Thomas [9] shows that total cycle time can be reduced and quality improved at the same time.

In this paper, it is also mentioned that for a technology-based firm, it is more difficult to learn about new markets than about new technologies. The authors explained these difficulties by the newness of the customer and the newness of the distribution channel. The importance of the two last factors is a key conclusion of this paper and is not very well established in the literature. The complexity of the technology integration and its role to development time of a new product is also a key conclusion.

# **RESTRICTIONS AND COMMENTS:**

The conclusions of this paper while based on a mathematical method require some precautions and comments. Indeed they come from the intensive study of a single firm and of a very small sample (24 products).

To define and select the characteristics they will measure, the authors made several important hypothese which are very slightly justified and which deserve more explanations and comments. The measure of performance is subjective and done most of the time by the project manager of the new product. Measures from 1 to 5 may differ from one project manager to another. This makes the comparison difficult and therefore the possible correlation between different new products. Whereas the Kendall rank correlation is a mathematical method based on the comparison of different rankings [1], the ranking here is subjective and requires caution in the results analysis.

Meanwhile, the paper analyzes carefully all the factors they have selected to be representative and which may influence new product development time. All the hypothesis and limits of their results are mentioned. They clearly separate the results which come from the analysis of the data from their personal extrapolation. They open new areas of research (see next paragraph) and contribute to a better understanding of the factors which influence the new product development time.

#### **FUTURE RESEARCHES:**

This paper points at several domains possible for future studies. One of the possible research areas may be how to better manage the merging of distinct technologies. Technology integration is a critical point which may require the creation of multifunctional teams. The more different the technologies are involved in a new product creation, the more communication becomes necessary.

Future research will deal with how to create and manage cross functional teams which involve design, marketing, product support, technical service, accounting and suppliers. Bergstrom [10] explains in a recent paper (Jul 1996) that global teams are necessary to integrate more efficiently new technologies and reduce cycle time.

Another area for future research is multiple project management. In the paper 24 different projects were run at the same time and the problem of human and technical resource sharing may occur in any organization which runs several product development projects at the same time. Adler, Mandelbaum, Nguyen and Schwerer [11] have developed a model which give a useful managerial frame work for studying product development. The management of human and technical resources is critical to reduce development cycle time and may require more studies in this area.

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