

## Product Development Risk Management in Product Development Process

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### Abstract

It is necessary to manage product development risk in new product development process. This paper puts forward a risk management frame combined the traditional risk management framework and establishes a product development risk system in new product development, which provides new patterns for practice. It is helpful to raising the possibility of new product development success.

**Key words:** Product development risk management; Product development Process

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### INTRODUCTION

Succeed new product development is important to companies in competitive market. However, owing to the existed risk and complicated and difficult product development process, most companies face low success

rate of product development. How to coping with these risks through product development process became new focus on product development risk management. This paper discusses the risk management strategy in the product development process.

## 1. THE OVERVIEW OF PRODUCT DEVELOPMENT

### 1.1 Product Development and its Importance

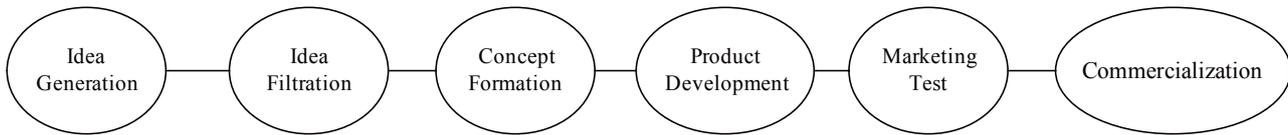
Along with the globalization and increasingly fierce competition, domestic and international manufacturing enterprises face many problems, such as how to shorten the product development time and cost, improve quality and service (Calantone, R.J. and C.A. Di Benedetto, 2000; Langerak, F. and E.J. Hultink, 2005). All the purposes are achieved by product development process, which covers a series of events, such as plan, design, process, production, quality assurance, supply, finance, personnel, teach cultivates, infrastructure and modification. When paying special attention to management of the new product development process, one company can quickly produce high quality new products, reduce the cost of new product development process and make new products with strong market competition (X-W, L. and W. Y-D, 2006; Blau, G., et al., 2000).

Based on understanding customers' needs, product development is to put these market information into the product concept. According to this product concept with appropriate technology, research, development and manufacturing, one company finally satisfied customer demands with shaped goods (De Maio, A., V. R., and M. Corso, 1994; T, C., et al., 2010).

### 1.2 Product Development Process

Due to the difference among enterprise characteristic, product types, technology application and design capacity,

enterprises' product development processes are different. However, the product development series of procedures are basically similar. New product development general process are shown Figure 1.



**Figure 1**  
**Product Development General Process**

### 1.2.1 Idea Generation

Idea generation is the outset of product development process. New product ideas have many sources, such as consumers, scientists, competitors, enterprise's sales staff, distributors, top managers, marketing managers, advertising agents, and so on. Substantive work should be done through this stage, for example, analyzing and forecasting the development level and the growth rate, studying similar products in current market, launching market research which aim is to understand consumers (including existing consumers and potential consumers), understand the market competition, product quality, appearance and function and price. With the information above, new product ideas are gradually formed through the strategy of refined work.

### 1.2.2 Idea Filtration

Idea filtration would be finished in the stage. This work is done by technicians, market researchers and financial personnel exchanging and accepting opinions mutually. The process is finished by standard assessment procedure. Evaluation content include product technical feasibility, production resources quantity, market sales evaluation, cost and price evaluation, relevant financial evaluation and so on. Finally the chosen new product idea has both high market success possibility and the production enterprises rapid operation that fits the company's strategy.

### 1.2.3 Concept Formation

The product concept formation is to show the originality in detail from the consumer's point of view. In formatting new products concept by market research, one company should conduct standardized product performance test, such as determining main parameters and target users, performance, main configuration, target price and cost objectives, sales plan, cost benefit analysis and financial analysis; making quality control plan, process and procurement and product structure layout and so on.

### 1.2.4 Product Development

In this stage, ideas and concepts (text, chart and model description) would be transformed into product. How to ensure valid connection between market personnel, designer and engineering is sticking point to achieve successful product development.

### 1.2.5 Marketing Test

There should be a series of strict test after prototype was produced. The purpose is to improve new product through

experiment feedback about product performance and functions and ensure the problems do not appear in new product in commercial context. Product testing should include performance test and consumer acceptance test. Performance test is to check whether the products meet product quality goal and conform to the regulations standard of enterprise. Consumer test is to ask some consumer to tryout these products and to express his or her opinions.

### 1.2.6 Commercialization

During the last stage of new product development, the product has been from concept transformation into the practical sense of goods. The enterprise would push the products into market. During the early stage of manufacture, technical personnel should ensure product schedule meeting market needs. Based on market sales figures and future market sales trend, financial system should make the real benefit analysis. Executives should make the following decisions: opportunity of introducing new products, influence to latent consumers and control of commercial cost.

## 2. RISK CONCEPT AND RISK MANAGEMENT FRAMEWORK

Risk is actually that all possible consequences that we can beforehand learn and the probability of occurrence in all the consequences. Uncertainty and influence are two basic elements of risks. Uncertainty indicates lack enough information and knowledge to predict a project output. Continually eliminating uncertainty is to reduce the risk fundamentally. Influence is consequence that events produced. Under the same conditions with uncertainty, the smaller the influence is, the less the risk is. Under the same conditions with influence, the smaller the uncertainty is, the less the risk is.

Enterprises product development risk has characteristic as follows: (1) Randomness, the randomness of time of risk occurrence, duration of risk and consequences of risk (2) Complexity, the complexity of risk wide, risk type and the various relationship between risks. (3) Incompleteness, the risk of information incomplete and fuzziness; (4) dynamics, risk changing quickly and having transfer effect (Zhang, Z. and A. Grey, 2005; MacCormack, V. A., and M.

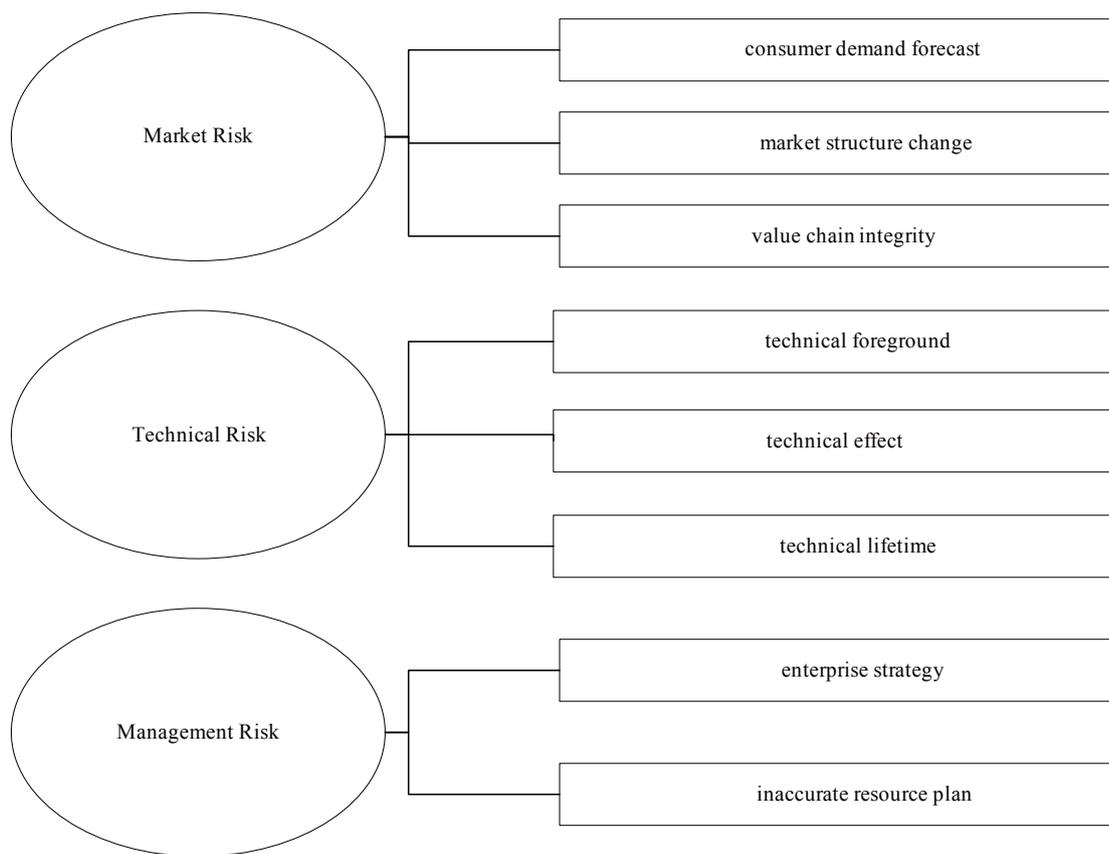
R. and Iansiti, 2001).

Thus, risk management generally includes the following several steps: identification of various risk source that may reduce the enterprise value; measuring risk loss frequency and degree of loss; making enterprise risk management strategy; developing and selecting proper risk management methods; continuously supervising and evaluating enterprise risk management enforcement and feedback result. From the enterprise's sustainable development view, risk management is a cyclical advanced process, and each individual risk management process is an effective clip that can be reproduced.

### 3. RISK MANAGEMENT OF THE PRODUCT DEVELOPMENT PROCESS

#### 3.1 New Product Development Risk

Because of internal and external environment uncertainty of the enterprise and complexity of the production and operation of enterprises, new product development risk usually induces to product development failure. In order to ensure successful new product development, Enterprises must enforce risk analysis, find out the key risk factors, control, eliminate and avoid product development risks before new products development launching.



**Figure 2**  
**Product Development Risk System**

New product development is a complex, dynamic and continuous process, which include information gathering, scheme selection and determination, resource investment, production and marketing strategy formulation. So, product development risk consists of a series of risks from different facet. From the enterprise market knowledge, technical ability and the management coordination three aspects, this paper puts forward a product development risk system as figure 2 (De Maio, A., V. R., and M. Corso, 1994). There are technical risk, market risk and management risk in the system.

Market risk refers to the ability to consumer demand

forecast, value chain integrity and so on. Technical risk refers to technical factors that may lead to new product development failure. Technical risk includes the following factors: the uncertainty of technical foreground, the uncertainty of the technical effect, the uncertainty of technical lifetime. Management risk refers to risks caused by management mistakes, such as failure to clear understand enterprise strategy and inaccurate resource plan.

#### 3.2 Risk Management Based on Product Development Process

The risk management goal of product development is to

ensure the realize project goals. By identifying risk and measuring risk, enterprises discover all kinds of risks, control risks through various methods and techniques and properly handle the adverse consequence of risk accident. It mainly includes the following aspects in view of product development process.

**Risk Identification.** Enterprises can identify project internal and external risk and analyse the possible consequences according to definition and description, completed project plan and various historical information. The method using in the process include risk inspection, process analysis and expert judgment. The purpose of the project management work is to reduce the possible lose.

**Risk Analysis and Risk Evaluation.** Enterprises can evaluate potential risk sources, project risk loss and duration by the methods of probability analysis, risk expectation, expert judgment and other risks statistics methods.

**Risk Control.** Risk control is to identity risk events, avoid risk events and eliminate the risk events consequences. Enterprises can formulate risk control system by obtaining various external resources, presenting the master risk management plan and emergency plan. According to the risk control system, actual risk events and the potential risks can be in the hand of enterprises.

Considering of the first stage in the product development process, the major risk is market risk. The key of the process is to understand consumer demand and market structure. Enterprises can get higher market share and sales profit by adopting QFD and need analysis methods.

During the stage of idea filtration, the main risk is management risk. The key is to ensure rational resources allocation which is influenced by the market, business strategy, internal organization and individual characteristics. The break-even point analysis tools are effective to reduce the risk in the stage.

It is required to cooperate between department of marketing, sales, operations and technology in concept formation stage. During this stage, the main risk is also management risk. The key is to ensure that effective organization integration of different departments. Formulating rational process by the DSM, GERT tools can ensure the partition and integration of different departments or groups.

During marketing test stage, the main risk is comprehensive management of technology risk, market risk and management risk. All the factors that consumer effective information feedback, department cooperation level and coping with the different development scheme ability with technology diversity are necessary to product development risk management.

Because enterprises face different internal and external environment, product development process are also different, the enterprises often put emphasis on different stages (Kettunen, P. and M. Laanti, 2005).

However, summarizing up experience about risks, updating and tracking risks in each stage based on the product development process are effective methodology on managing product development risk. In conclusion, constructing risk management system by the above methods can improve projects success probability.

For the enterprise constraint, constructing reasonable product development process, controlling and managing product development comprehensive risk is effective guide line in enterprise risk management process. How to design the reasonable product development process relies on the enterprise decision making level, organizational skills and products' own attribute (Tsai, M.-T. and Y.-C. Huang, 2008). It also needs to be further researched in the future.

## CONCLUSION

In the view of the operation research and risk management, we analyzed the product development process and its risk, put forward comprehensive product development risk management strategy. Although it is only a foundational frame, few researches synthesized the risk management frame which include risk identification, risk analysis and risk control and process management frame which include idea generation, idea filtration, concept formation, product development, marketing test and commercialization in product development. In addition to the synthesized frame put forward in the paper, different methods resolving different risk also listed in the paper. It is significant to future researches.

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