

# The Innovation Strategy for Fire Safe Engineering Industry—A Taiwan Fire Safety Engineering Company as a Case

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**Abstract:** The fire safety firms face the competitive pressure from numerous small-and medium-sized fire safety firms along with a price war; hence, they need to seek opportunities for growth in terms of product and service quality in order to increase overall competitiveness. Innovation has been the buzzword in recent years and is overwhelmingly the go-to strategy of firms across all industries in the face of fierce competition; the fire safety industry is no exception. A fire safety engineering firm in Taiwan is used as the subject in a study of how pursuing an innovation strategy enabled the firm to discover an opportunity. This research explored the case firm to gauge the level of innovation as the starting point for conducting further analysis. Furthermore, the analysis can be utilized to understand the case firm versus competitors in terms of differentiation to serve as reference for evaluating the effectiveness of pivoting the business.

**Keywords:** Industry competitive advantage analysis; industry KSF analysis; corporate innovation and competitiveness analysis; SWOT analysis.

## 1. Introduction

With the passage of time, people's expectations about the quality of life have also increased [1]. There has also been a proportionate increase in their emphasis on the safety of their residences. Methods to help increase overall competitiveness in order to provide improved fire safety services to consumers should be the top priority of the fire safety industry as a whole [1]. However, domestic fire safety firms need to seek opportunities for growth in terms of product and service quality in order to increase overall competitiveness [2]. They face competitive pressure from numerous domestic small and medium sized fire safety firms along with a price war.

According to a report from the FireSafety magazine, the Taiwanese fire safety market has long been engaging in destructive competition, especially due to the lack of price standardization or proper segmentation of product quality. In order to prevent escalating the price war, aside from the need for Taiwanese fire safety equipment manufacturers to establish their own brands and brand reputation, the government has a responsibility to create the proper environment necessary for the development of the industry. In Japan for example, the fire safety industry has room for growth due to the appropriate regulations set by the Japanese government. Taiwanese government agencies must increase product-testing standards; otherwise, Taiwanese manufacturers will have to compete against unrestricted entry of imported products and face heavier pressure to survive in this competitive market.

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Using the replacement of extinguishing agents in fire extinguishers as reference, there exists a large amount of illegal manufacturers engaging in said activity, thus aggravating the hidden issues surrounding the product safety of fire extinguishers.

Because of many difficulties, the fire industry is facing [2]. Therefore, how to improve their competitiveness in the fire safety industry and benefit from a highly competitive market must be considered [3]. In order to enhance the competitiveness of enterprises, there are five major strategies intended to be proposed by the case firm discussed in this study, including the establishment of information management mechanisms, the development of innovative products, the alliance with other industries, labor costs and raw material costs reduced, and the development of overseas markets. However, under the condition of limited resources, those strategies should be adopted to ensure that the effectiveness of implementation can be combined with the improvement of customer satisfaction and the increase of business interests. This is the focus of this research.

Therefore, objectives to be achieved in this study are as follows:

- (1) Among the five strategies which innovation strategy should be selected in order to enhance competitiveness?
- (2) After the implementation of the selected strategy, did it result in tangible benefits?
- (3) To provide the case firm with materials for future reference for continuous improvement of the business strategy based on research findings and comprehensive recommendations.

The rest of this paper is organized as follows. The definitions and types of innovation are explained in Section 2. The key success factors analysis is presented in Section 3. The research methodologies of our study are discussed in Section 4. The brief introduction and analysis of the case firm is discussed in Section 5. The data analysis is shown in Section 6. The strategy implementation and results are explained in Section 7. The conclusion is offered in Section 8.

## 2. The Definitions and Types of Innovation

This study uses “innovation” as defined by Shumpeter and other scholars as the basis for this study, as shown in Table 1.

**Table 1.** Definition of innovation.

Scholar	Definition
Schumpeter [4]	Believes that innovation comes from a firm's utilization of resources in new ways to meet market demand. Advocated that innovation can lead to creative destruction that, in turn, drives development in technical expertise. As the earliest scholar to put forward the concept of innovation, Schumpeter believes that innovation is the driver for economic growth. The technical and organizational transformation brought about by a firm's utilization of resources as a new method of production in order to meet market demand is the element of innovation critical to economic growth.
Schön [5]	Innovation is a process that moves from the abstract to the tangible; it is the process of taking what is uncertain and unquantifiable and transforming it into a quantifiable form.
Daft [6]	Activities involving the usage of new concepts or activities that can be considered to be innovation.
Brown & Eisenhardt [7]	Innovation is a new product, process, or system that has the potential to create a new market and could even potentially change the behavior of competitors and consumers.

Scholar	Definition
Tushman & Nadler [8]	The ability to use existing resources to generate wealth in a new capacity and the transformation of resources from the intangible into the tangible are both forms of innovation. Furthermore, innovation is something that can be learned and to be trained for.
Holt [8]	Innovation is the application of knowledge or information to create or to bring about value.
Vracking [9]	A concept, a process, or a type of product, when recognized as being entirely new, can be considered to be innovative. As such, innovation is usually a new concept, process, product, or service. It can be developed internally or obtained externally.
Pennings & Harianto [10]	Innovation is determined by an organization's performance from the application of technical, strategic, and management skills.
Utterback [11]	Proposed a three-phase theory of innovation also known as the Product Life Cycle Theory that argues that a product at different stages of its life cycle emphasizes different elements of innovation. Technical innovation includes both stages of product and manufacturing process innovation, which are the dynamic elements of the innovation process of a business.
Higgins [12]	Innovation comes from an individual or a group; once creativity has been combined with the suitable technical expertise and assimilated into a suitable organizational culture, there can then be innovation. It is through strategic activities that a firm's ability to innovate can be enhanced/and improved. There exists a close relationship between the ability to innovate and the ability to generate competitive advantages.
Nonaka & Takeuchi [13]	Innovation results from the knowledge creation spiral; essentially, an organization's explicit and tacit knowledge are being continuously converted and created, which is the cornerstone of the SECI Model.
Oates [14]	Innovation includes innovation in strategy, innovation in technology, and innovation in management.
Clark & Guy [15]	Innovation is the process of transforming knowledge into tangible products with emphasis on the interactions between people, events, things, and relevant departments along with feedback.
Drucker [16]	The ability to use existing resources to generate wealth in a new capacity, to shift to a new method of wealth generation, to create a different business model, or to provide different services can all be considered as innovation. Innovation refers to the application of new knowledge to provide consumers with new products and services.

In addition, this study is based on the description of the types of innovations made by scholars such as Ansoff & Stewart, as shown in Table 2.

**Table 2.** Types of innovation.

<b>Scholar</b>	<b>Definition</b>
Ansoff & Stewart [17]	<p>Timing the entry of an innovative product into the market based on market research and segmentation of factors such as the market, consumer, price, product, and competitor allows the product to be categorized into one of the four types of innovation:</p> <ol style="list-style-type: none"> <li>1. Market Leader: To be the market leader by introducing innovative products, there must be a significant investment in R&amp;D. This is an aggressive strategy accompanied with greater risks.</li> <li>2. Market Follower: Once the market leader has entered, the market follower will immediately launch a product with similar features in order to capture some of the market leader's market share.</li> <li>3. Application Reformers: Application reformers will apply slight improvements to the existing product. Their competitive advantage comes from improvements made to product quality, functionality, packaging, price, and service.</li> <li>4. Me too: By using counterfeit or licensing methods, their advantage comes from low production costs. This strategy has fewer risks.</li> </ol>
Booz, Allen & Hamilton [18]	Based on the novelty or innovativeness of the product, it can be placed under the following six major types of innovation: (1) brand new product, (2) new product line, (3) new addition to the product line, (4) improvement to an existing product, (5) product repositioning, and (6) reduction of production costs.
Marquish [19]	<p>Innovation is divided into three types:</p> <ol style="list-style-type: none"> <li>1. Incremental Innovation: Achieving innovation through a series of small improvements.</li> <li>2. System Innovation: To innovatively push for system-wide planning that innovates from all aspects. This type of innovation is comparatively more rigorous and time-consuming but results in more concrete changes.</li> <li>3. Radical Innovation: To innovate by making changes to the entire organization or industry.</li> </ol>
Abernathy & Clark [20]	<p>From the perspective of the corporation and the market, the scholars proposed two types of corporate innovation:</p> <ol style="list-style-type: none"> <li>1. Production and technical innovation: Innovation focused on products, design, production, technology, knowledge, information, materials, equipment, and other activities.</li> <li>2. Market and consumer innovation: Innovation focused on market, products, consumer needs, customer management, distribution, sales channels, and other activities.</li> </ol>
Chacko [21]	<p>There are three types of innovation:</p> <ol style="list-style-type: none"> <li>1. Product Innovation: New product.</li> <li>2. Process Innovation: New production methods.</li> <li>3. Organization Innovation: New organizational structure, new management methods.</li> </ol>
Cohen & Levinthal [22]	Innovation can be classified into the following categories: innovation in product or service, innovation in consumer behaviors or values, or innovation in the market.
Damanpour [22]	Innovation consists of two levels: (1) innovation in technology and (2) innovation in management.
Rochford [23]	<p>Product innovation can be understood from three facets:</p> <ol style="list-style-type: none"> <li>1. Perspective of the consumer: Whether or not the new product meets consumer expectations.</li> <li>2. Perspective of the firm: Use the perspective of the firm to define whether or not the product is innovative.</li> <li>3. Perspective of the market: The product is able to distinguish itself in the eyes of the market and open up new markets.</li> </ol>

Scholar	Definition
Oates [14]	Innovation includes innovation in strategy, in management, and technology: <ol style="list-style-type: none"> <li>1. Innovation in strategy: Strategic planning to raise customer satisfaction levels with new service or in new market, etc.</li> <li>2. Innovation in management: Innovation in administration, process, organization, business practices, training, education, and other such functions.</li> <li>3. Innovation in technology: Technological improvement and innovation in application to provide superior products.</li> </ol>
Danneels & Kleinschmidt [24]	Providing a holistic theory by approaching the analysis of the level of product innovation from two aspects, that of the consumer and that of the firm: <ol style="list-style-type: none"> <li>1. From the perspective of the consumer: The attributes of innovation, change in consumer behavior and process, and other such considerations form the key elements of innovation.</li> <li>2. From the perspective of the firm: Level of acceptance for the new product on the market, level of innovation in technology and marketing, and other such considerations forming the key elements of innovation.</li> </ol>
Morris [25]	Innovation is the prerequisite for a firm's survival. Innovation is strategic in nature and as such, it requires strategic planning and strategic objectives. In order to innovate, a firm should have a grasp of the following four key concepts: <ol style="list-style-type: none"> <li>1. There are four types of innovation: (a) incremental innovation, (b) disruptive innovation, (c) business model innovation, and (d) innovation through new venture(s).</li> <li>2. In order to innovate successfully, the firm must know how to innovate.</li> <li>3. The five stages of innovation: (a) ideation, (b) targeting, (c) innovation development, (d) market development, and (e) normalization.</li> <li>4. Successful innovation cannot rely solely on a single concept.</li> </ol>

### 3. The Key Success Factors Analysis

The concept of Key Success Factors (KSF) originated from economics. Commons proposed the “Limited Factor” concept and applied it to the management and negotiations of economic bodies [26]. Barnard applied said concept to the theory of management decision [27]. Barnard believed that decisions need to be supported by analytical work that is, in essence, the search for the “strategic factor.” The definition of strategy is to maintain and utilize the minimal required amount of resources to bring about an advantage while at the same time avoiding disadvantage from lacking the required resources.

In this study, the middle and senior managers of the sizable fire safety-engineering firms in the Central Taiwan region are visited. In addition, the Analytic Hierarchy Process (AHP) [28] is used to uncover the KSF for the survival of the fire safety engineering industry: (1) location, (2) prominent characteristics, (3) image and popularity, (4) product, (5) quality of employees, (6) human resources, and (7) comprehensive system. The KSF for the fire safety engineering industry are illustrated in Table 3.

**Table 3.** Outline of the KSF for the fire safety engineering industry.

First layer of factors	Second layer of factors	Third layer of factors	Sequence
Key success factors of the fire safety engineering industry	Location (A)	Location of firm (1)	7
	Product quality (B)	Extinguishing effectiveness (B1)	1
		Variety of products (B2)	
		Safety and nontoxicity (B3)	
	Image and popularity (C)	Image of firm (C1)	6
		Popularity of firm (C2)	
	Uniqueness (D)	Uniqueness of product (D1)	2
		Uniqueness of service (D2)	
	Human resources (E)	Number of employees (E1)	5
		Employee education and training (E2)	
	Employee standards (F)	Employee performance standards (F1)	3
Employees' service spirit (F2)			
Comprehensive system (G)	Company regulations and systems (G1)	4	
	Company expectations on service quality (G2)		

#### 4. Methodology

The “competitive advantage strategy analysis model” was proposed because of the lack of accurate and clear analysis methods in the strategy analysis [29]. Therefore, the competitive advantage strategy analysis model is utilized to conduct its research. In the competitive advantage strategy analysis model assumes that the firm, when undergoing strategy analysis, often lacks a precise and clear analysis method. Therefore, it proposes the competitive advantage analysis model as framework for the analysis. Porter [30] formed the foundation of this analytical model when he proposed the competitive strategy matrix model and value chain model, combined them with the innovation matrix analysis method developed by Schumann et al. [31] and others, and added the industry KSF and concepts of core technology and core competencies proposed by Prahalad & Hamel [32] to form this theoretical framework. This theoretical framework consists of a comprehensive and innovative strategy analysis process which proceeds along the lines of industry, market, and innovation measures for a three-dimensional analysis. The competitive advantage strategy analysis model is as illustrated in Figure 1.

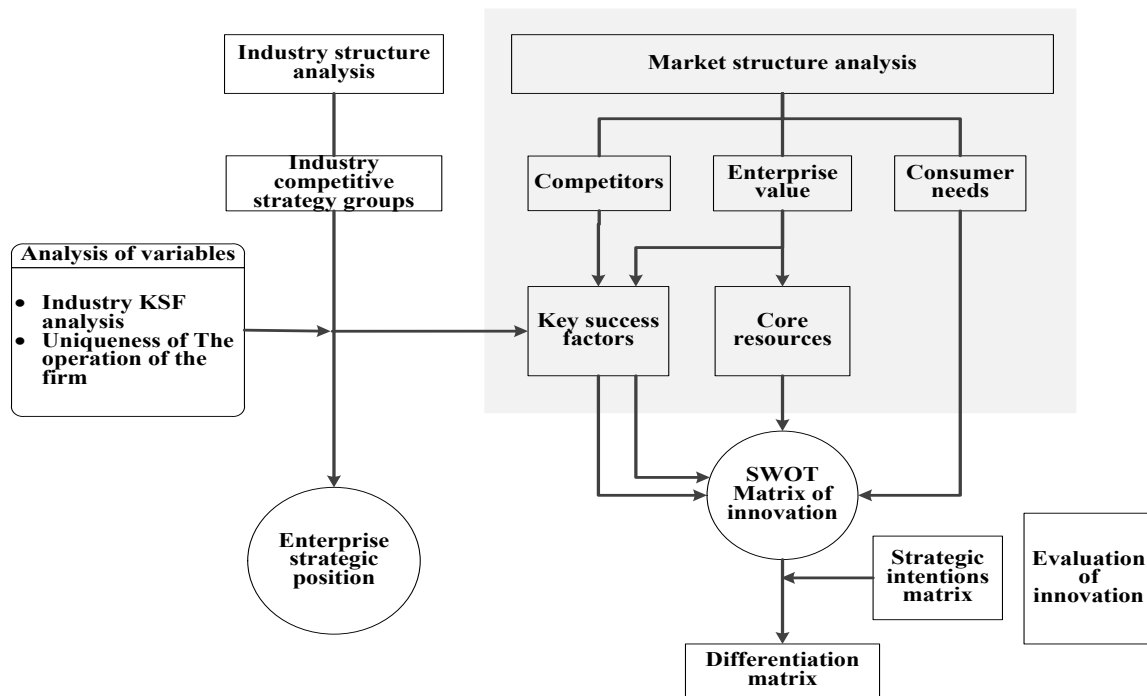


Figure 1. Framework of the competitive advantage strategy analysis model.

The following explains the definitions of the key components of the previously mentioned model [29]:

**(1) Industry structure analysis**

- i. *Industry competitive strategy groups*: First and foremost, the competitors of the firm can be divided into four major competitive strategy groups based on (a) whether the target scope is broad or narrow, and (b) whether the competitive advantage is due to low cost or product differentiation.
- ii. *Industry KSF analysis*: KSF are ways for a firm to create strategic advantages and gain competitiveness. At the same time, it is also a consideration for the firm when internally planning and deciding on the allocation of resources and technical competencies. In general, the so-called KSF possess the unique abilities to create differentiation in the market and withstand events such as environmental changes and the competitor responses. Therefore, for the sake of sustainability, the firm must develop core competencies and build competitive advantages. Through evaluating the innovation of the firm and its competitors versus related industry KSF, the necessary industry KSF of the firm and its competitors can be compared and analyzed. The strengths and weaknesses of the firm will be evaluated to also serve as a reference in the planning of the essence of the firm's competitive advantage.
- iii. *Uniqueness of the operations of the firm*: In different competitive strategy groups, there exists different KSF and with the accumulation of such, lead to different types of business operations with different operational strategies that form different styles of leadership and corporate culture and climate. For example, a firm managed according to market orientation must develop marketing capabilities, product design and production, emphasize quality, and accumulate positive brand perception. A firm managed according to operating with low costs must improve manufacturing processes, engineering design capabilities, and strengthen the management of employee productivity.

**(2) Market structure analysis:** When deciding on a management strategy, the firm must consider the three main factors affecting the market structure: the firm itself, consumers, and competitors. These three main factors have their own operational objectives and needs to be fulfilled. Collectively known as the Delta Model, the key elements in the analysis of the market structure are the analysis of the core resources of the firm, analysis of competitors, and consumer needs analysis.

- i. *Analysis of the core resources of the firm:* The objective of analyzing the firm's structure is to uncover the core resources of the firm that hold strategic value, which include both tangible and intangible assets along with competencies. Core resources exist in the different operational capabilities and value-adding activities of the firm. As such, the value chain analysis model will be used to conduct analysis of the firm's core resources with a focus on the firm's value chain, main and supporting activities, analysis of operational efficiency, strengths, weaknesses, ability in handling pressure, and others which will be organized into groups for analysis. The operational advantages experienced in different activities will be inferred upon to sort out the firm's core resources.
- ii. *Competitor analysis:* Competitor analysis is divided into two parts: identifying the competitors and understanding the competitors.
  - (a) Identifying the competitors: Based on the four major competitive strategy groups of the industry structure analysis framework, the different firms in each competitive strategy group can be clearly identified, making it easy to determine the competitors.
  - (b) Understanding the competitor: After identifying the competitor, the next step is to understand the competitor. It is to focus on proceeding through analyzing industry KSF possessed by the firm and by the competitors in order to compare and contrast them to understand the level of advantage the firm has to form the basis for planning competitive strategies.
- iii. *Consumer needs analysis:* The main mission of a firm is to, through marketing techniques and sales channels, deliver the product or service into the hands of the consumers while at the same time satisfying the needs of the consumers and creating purchase intent which leads to profit generation for the firm. As such, consumer needs analysis is an important topic which, through market segmentation analysis and consumer purchase intent analysis, is used to discover the driving force(s) behind purchases and the characteristics of purchase needs. This is then used to analyze product characteristics to target different consumer groups to proceed with market segmentation in order to satisfy consumer needs.
  - (a) Market segmentation analysis: Using consumer needs, consumer groups, consumer behavior, product characteristics, price, brand, segmentation, and other factors as basis for market segmentation to satisfy the needs of different consumer groups.
  - (b) Consumer purchase intent analysis: After completing market segmentation, the next step is to proceed with the analysis of factors affecting the purchase decision-making process of the consumers, such as price, advertisements, promotions, service, channels, brand, and corporate image. Other consumer-related factors are occupation, educational attainment, income, and others which can be used as the basis for analysis to get a grasp on the purchase intent of the consumers.



Market structure analysis can help in understanding the core resources that affect the success and failure of the firm, the categories of product characteristics that affect consumer needs, and the results of comparing the industry KSF versus that of the competitors and of the firm. The results of comparing the firm's core resources, categories of consumer needs, and competitors with the KSF of the firm will be used to proceed with analyzing innovativeness. In the process of analyzing innovativeness, four major matrices of innovation can be arrived at. They are the competitor innovation matrix, industry advantage innovation matrix, corporate advantage innovation matrix, and consumer needs innovation matrix.

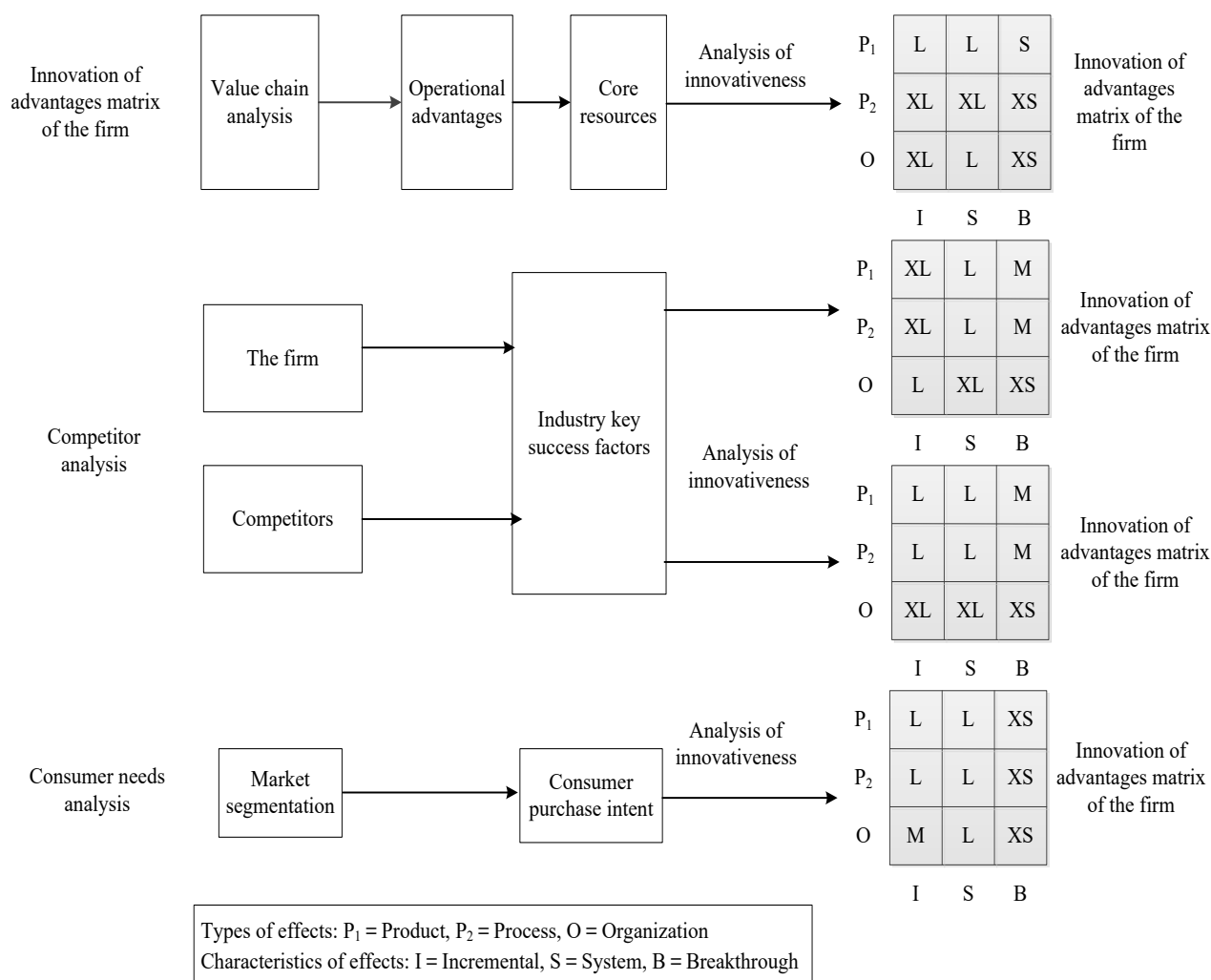
**(3) Method of analyzing the innovation matrix**

- i. *Illustration of the innovation matrix:* The purpose of evaluating innovativeness is to shift from using the traditionally complicated and non-systematic SWOT analysis to a simple quantitative model for representation. When deciding on the firm's strategy, this aids in getting a grasp of the KSF and the core resources of the firm which provides a clear picture of both the internal and external environment. The following will be used to proceed with an impact analysis: (a) analysis of the types of innovation: “Product (P<sub>1</sub>)”, “Process (P<sub>2</sub>)”, “Organization (O)”, (b) analysis of the characteristics of innovation: “Incremental (I)”, “System (S)”, “Breakthrough (B)”, (c) strengths and weaknesses analysis of innovation which is divided into levels 1 to 5. The three major requirements for the analysis of innovativeness, through the market structure, can be organized into a 3 by 3 innovation matrix in order to focus on analyzing the requirements of each strategy and provide a quantitative result. This allows for a clear identification of the strengths of the firm and how it will be affected by external opportunities. The innovation matrix of the market structure is illustrated in Figure 2.
- ii. *Four major innovation matrices for market structure analysis, as illustrated in Figure 3.*
  - (a) Analysis of the core resources of the firm: In the market structure analysis, this is to focus on the value-adding activities and the core resources (assets and competency) of the firm as the basis for evaluation, to proceed with the analysis of innovation, and establish the competitive advantage innovation strategy.

		Characteristics of effects			
		Incremental	System	Breakthrough	
Type of effects	Product	M	L	L	Strengths and Weaknesses
	Process	XL	S	XS	
	Organization	L	L	M	

Symbol: XL, L, M, S, XS  
Weighted score: 5, 4, 3, 2, 1

**Figure 2.** Innovation matrix of the market structure.



**Figure 3.** Four major innovation matrices for market structure analysis.

- (b) **Competitor analysis:** In the market structure analysis, this is to focus on the industry strategy group that the firm belongs to, to proceed with analyzing the industry KSF of the said group, and decide on strategic factors. When proceeding with analyzing both the firm itself and the competitors in the same strategy group, the competitors' innovation strategy can be established based on the grasp of the industry KSF. By conducting analysis on the KSF of the industry strategy group, the industry competitive advantage innovation strategy can be established.
- (c) **Consumer needs analysis:** To focus on the product characteristics that affect consumer demand, such as the evaluation of variables, to conduct further analysis, and to establish the consumer needs innovation strategy.

iii. *SWOT Matrix of Innovation, as illustrated in Figure 4.* The SWOT Matrix of innovation consists of four major matrices of innovation with them being the competitor innovation matrix, industry advantage innovation matrix, corporate advantage innovation matrix, and consumer needs innovation matrix to form the results of the innovation matrix analysis. The SWOT matrix of innovation is primarily composed of the actual corporate advantage innovation matrix and the customer needs innovation matrix, which first considers the differences between the competitor innovation matrix and the industry advantage innovation matrix, then uses the corporate advantage innovation matrix as basis to determine the differences in strengths and weakness versus the competitors to determine the actual corporate

advantage innovation matrix. This analysis can provide business managers with an analytical tool for measuring the organizational strategic objectives, provides the opportunity to understand the actual competitive advantages and external opportunities possessed by the firm, verify and evaluate the effectiveness of the strategic objectives, and finally formulate the optimal strategy. In the SWOT matrix, the results of the corporate advantage innovation evaluation are mainly based on the evaluation of the corporate advantage innovation matrix with the addition of the firm and competitor's grasp of the KSF. If the firm is better than competitors in its grasp of the KSF in the innovation matrix evaluation, an upgrade in its rating of the competitive advantage in this measure should be considered. If the opposite is the case, then a downgrade in its rating should be considered.

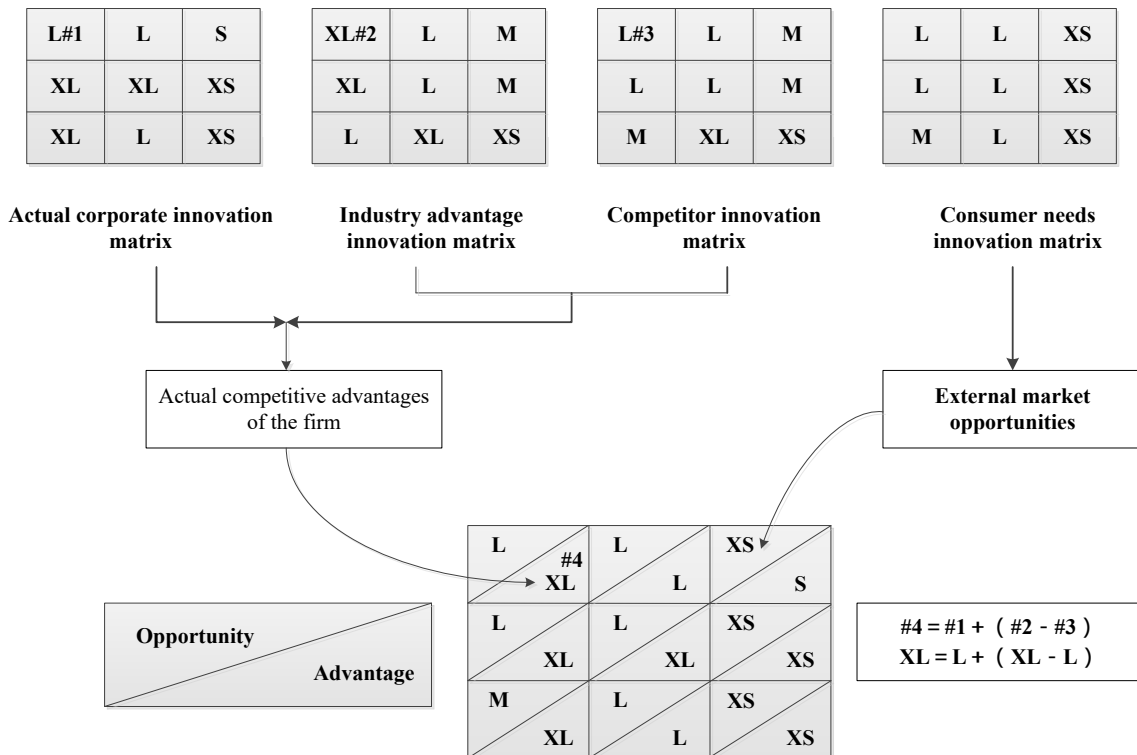
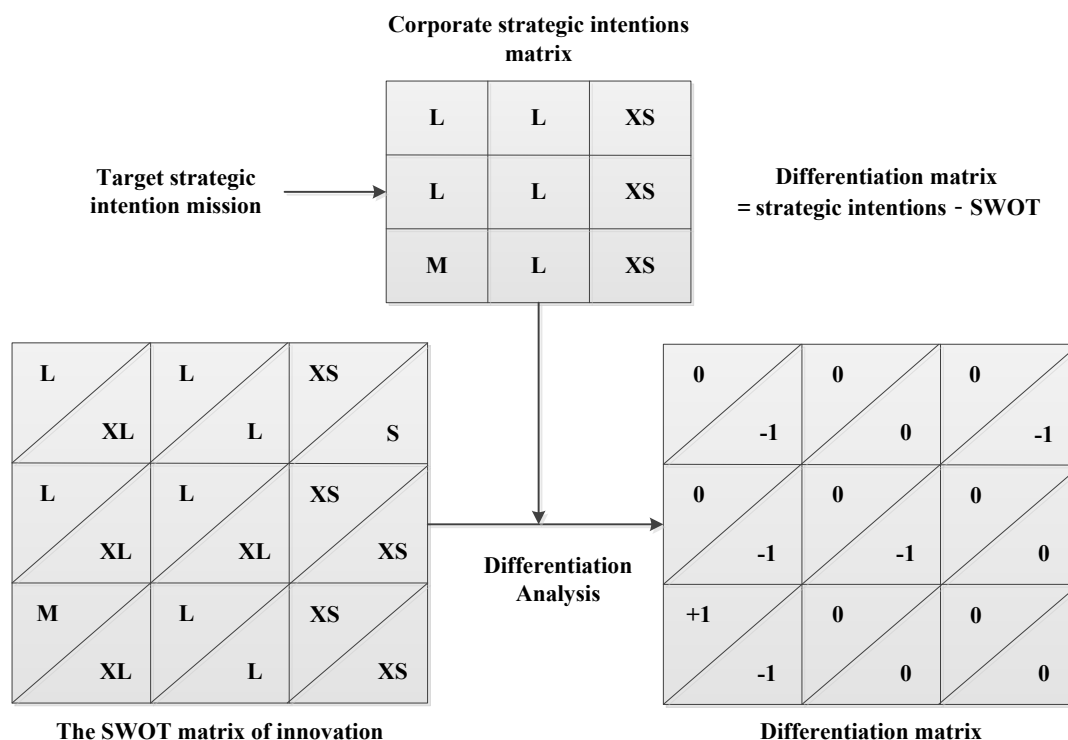


Figure 4. SWOT Matrix of Innovation.

- iv. *Differentiation matrix*: The main objective of differentiation analysis is to help business managers formulate the firm's strategic intention matrix according to their mission, understanding of the objectives, and the firm's development plan. By excluding the strategic intentions matrix from the SWOT matrix of innovation, what remains is the differentiation matrix. Through the results of analyzing the differentiation matrix, the business manager can verify whether the established vision, mission, objectives, and strategy are compatible with the suitable resources, competencies, and aware of the external opportunities. In other words, differentiation analysis can help a business manager understand the usefulness of strategic intent planning and make prior amendments to the most suitable development strategy for the organization. The differentiation matrix of the market structure is illustrated in Figure 5.



Meaning behind the evaluation of the differentiation matrix  
 Evaluation rating greater than zero (+): Indicates the firm's strategic intentions are greater than the actual competitive advantage of the external opportunity cost.  
 Evaluation rating less than zero (-): Indicates the firm's core resources are not fully utilized or the lack of awareness of external market opportunities.

**Figure 5.** Differentiation matrix of the market structure.

In summary, this research will utilize the industry structure analysis and market structure analysis and compare them versus the results of the strategic analysis of innovativeness evaluation, followed by utilizing the strategic intentions matrix and SWOT matrix of innovation to discover a differentiation matrix different from that of competitors.

### 5. Brief Introduction and Analysis of the Case Firm

Allianz Fire Engineering Corp. was founded in 2001 [33]. The firm's primary operations are sale of fire extinguishers and periodic replacement of extinguishing agents. Due to the low barrier to entry, competition is fiercer. As such, this research has selected, as specified by the firm, Fly Eagle Fire Engineering Corp. and Cheng Deh Fire Protection Industrial Corp. as its competitors. The brief introductions are as follows:

- (1) Fly Eagle Fire Engineering Corp. [34]: the Corp. was established in 1985. Fly Eagle Fire Engineering Corp. sells various classes of fire equipment, fire extinguishers, emergency lights, lights, switchboards, sprinkler systems, and emergency escape equipment. From the catalog of Fly Eagle Fire Engineering Corp., it can be seen that the firm is primarily involved in businesses related to fire extinguishers which is a clear competitive advantage versus the case firm of this research.
- (2) Cheng Deh Fire Protection Industrial Corp. [35]: the Corp. was established in 1962. At the time of establishment, it was known as Cheng Deh Chemical Corp. Furthermore, the firm rose up to become one of the most professional fire appliance and fire equipment manufacturers in Southeast Asia.

## 6. Data Analysis

In order to gather the required information for the competitive advantage strategy analysis model, the senior managers of the case firm were interviewed, related academics were consulted, and questionnaires on the fire safety industry core resources and KSF of the fire safety industry were designed. First, this research sent the related questionnaire to *all* managers of the case firm and to those of the main competitors, Fly Eagle Fire Engineering Corp. and Cheng Deh Fire Protection Industrial Corp. A total of 27 answered questionnaires were received, including 14 from the case firm, 6 from Flying Eagle Fire Engineering Corp., and 7 from Cheng Deh Fire Protection Industrial Corp. Questionnaires were used to objectively discover the competitive advantages that the case firm has over its comparable competitors in the industry.

Subsequently, by going through every category of the firm's core resources, the findings and discussion points of the 14 questionnaires answered by senior managers and employees of Allianz Fire Engineering Corp. were organized into Table 4. Subsequently, the results were combined to form the corporate advantage innovation matrix based on the organized results which are divided into the type of impact, characteristics of impact, and evaluation of the degree innovation which are further categorized and evaluated, resulting in a 3\*3 innovation matrix, as illustrated in Table 5 and Figure 6.

**Table 4.** Evaluation of the core resources of Allianz Fire Engineering Corp.

Core resource categories	Type of impact	Characteristics of impact	Strength of the impact
Corporate culture	O	I	4.00
Human resource system and training and development	O, P <sub>2</sub>	S	3.71
Financial situation	O	I	4.14
Loyalty and solidarity	O	I	3.29
Culture and environment of innovation	O	I	3.43
Product innovation skills	P <sub>1</sub>	I, B	4.29
Facilities maintenance skills	P <sub>2</sub>	S	3.29
Bargaining power	P <sub>1</sub>	S	4.29
Negotiation and communication skills	O	S	3.71
Inventory management skills	P <sub>2</sub>	I, S	3.86
Flexibility and adaptability of employees	O	B	3.57
Friendly customer service	P <sub>2</sub>	I, S	4.29
Price/quality	P <sub>1</sub>	S	3.57
Brand image	P <sub>1</sub>	I	3.86
Marketing planning and implementation skills	P <sub>2</sub>	B	3.14
Grasp of market situation	P <sub>2</sub>	B	3.14
Skill in managing product installation and construction personnel	P <sub>1</sub>	S	3.43
Number of product installation and construction personnel	P <sub>1</sub>	S	3.71
Skills of employees in carrying out installations	P <sub>1</sub>	S	4.00
Team work ability	P <sub>2</sub>	I	3.57
Complete product line	P <sub>1</sub>	S	2.57
Popularity of the product	P <sub>1</sub>	S	2.43
Smooth processing of customer orders and operations	P <sub>2</sub>	S	4.14
Customer recognition	P <sub>1</sub>	I	3.57

Core resource categories	Type of impact	Characteristics of impact	Strength of the impact
Safe and environmentally friendly	P <sub>1</sub>	S	3.57
Parking space	P <sub>1</sub>	S	3.43
Special features of the product	P <sub>1</sub>	B	4.29
Grasp of customer needs	P <sub>1</sub>	B	4.29
Periodic marketing campaigns	P <sub>2</sub>	B	3.29
Good reputation of the firm	P <sub>1</sub>	I	3.43

**Table 5.** Evaluation standards.

<u>Type of Impact</u>	<u>Characteristics of Impact</u>	<u>Evaluation of The Degree</u>
P <sub>1</sub> (Product).	I (Incremental).	<u>Innovation</u>
P <sub>2</sub> (Process).	S (System).	Questionnaire evaluation of
O (Organization).	B (Breakthrough).	the average.

After understanding the competitive advantages of the firm has over its competitors at the current time, an analysis was conducted on the evaluation of innovation on the competitors of Allianz Fire Engineering Corp. that pose a threat, such as Fly Eagle Fire Engineering Corp. and Cheng Deh Fire Protection Industrial Corp., and the analysis was to understand the firm's grasp on the industry KSF. The evaluation of Allianz Fire Engineering Corp's innovativeness in the industry KSF of is illustrated in Table 6. Based on the analysis organized in Table 6, the innovation matrix of the industry KSF of Allianz Fire Engineering Corp. and its competitors, Fly Eagle Fire Engineering Corp. and Cheng Deh Fire Protection Industrial Corp., can be attained as illustrated in Figure 7.

The summary of the types of innovations of the industry KSF and the evaluation of the competitor innovation matrices are illustrated in Figure 8, from which the following important strategic implications can be discovered. Aside from possessing the necessary competitive advantages, the firm must understand whether or not the needs of the customer or market match with its competitive advantages. In this research, industry experts and related academics were interviewed. Upon completing, the design of the customer needs survey, the employees of the case firm were asked to hand out the questionnaires when conducting field services. A total of 127 completed questionnaires were collected. The results have been organized in Table 7 and are illustrated in Figure 9.

Using the aforementioned analysis results, the advantages and disadvantages of the case firm can be understood. The SWOT matrix analysis of the firm is illustrated in Figure 10. Arriving at the previously described customer needs analysis through external market opportunities from the customer needs innovation matrix, the internal advantages of the firm resulting from the evaluation of competitive advantages can be attained through the combination of the firm's advantage innovation matrix and the industry advantage innovation matrix.

<b>Type of Impact</b>	<b>Product (P<sub>1</sub>)</b>	<ul style="list-style-type: none"> <li>Product innovation skills (4.29)</li> <li>Brand Image (3.86)</li> <li>Customer Recognition (3.57)</li> <li>Popularity (3.43)</li> </ul> <p style="text-align: right;"><b>3.79</b></p>	<ul style="list-style-type: none"> <li>Bargaining power (4.29)</li> <li>Price/Quality (3.57)</li> <li>Skill in managing product installation and construction personnel (3.43)</li> <li>Number of product installation and construction personnel (3.71)</li> <li>Skills of employees in carrying out installations (4)</li> <li>Complete product line (2.57)</li> <li>Popularity of the product (2.43)</li> <li>Safe and environmentally friendly (3.57)</li> <li>Parking space (3.43)</li> </ul> <p style="text-align: right;"><b>3.44</b></p>	<ul style="list-style-type: none"> <li>Product innovation skills (4.29)</li> <li>Special features of the product (4.29)</li> <li>Grasp of customer needs (4.29)</li> </ul> <p style="text-align: right;"><b>4.29</b></p>
	<b>Process (P<sub>2</sub>)</b>	<ul style="list-style-type: none"> <li>Inventory management skills (3.86)</li> <li>Friendly customer service (4.29)</li> <li>Team work ability (3.57)</li> </ul> <p style="text-align: right;"><b>3.90</b></p>	<ul style="list-style-type: none"> <li>Human resource system and training and development (3.71)</li> <li>Facilities maintenance skills (3.29)</li> <li>Inventory management skills (3.86)</li> <li>Friendly customer service (4.29)</li> <li>Smooth processing of customer orders and operations (4.14)</li> </ul> <p style="text-align: right;"><b>3.86</b></p>	<ul style="list-style-type: none"> <li>Marketing planning and implementation skills (3.14)</li> <li>Grasp of market situation (3.14)</li> <li>Periodic marketing campaigns (3.29)</li> </ul> <p style="text-align: right;"><b>3.19</b></p>
	<b>Organization (O)</b>	<ul style="list-style-type: none"> <li>Corporate culture (4)</li> <li>Financial situation (4.14)</li> <li>Loyalty and solidarity (3.29)</li> <li>Culture and environment of innovation (3.43)</li> </ul> <p style="text-align: right;"><b>3.72</b></p>	<ul style="list-style-type: none"> <li>Human resource system and training and development (3.71)</li> <li>Negotiation and communication skills (3.17)</li> </ul> <p style="text-align: right;"><b>3.44</b></p>	<ul style="list-style-type: none"> <li>Flexibility and adaptability of employees (3.57)</li> </ul> <p style="text-align: right;"><b>3.57</b></p>
		<b>Incremental(I)</b>	<b>System(S)</b>	<b>Breakthrough(B)</b>
<b>Characteristics of Impact</b>				

Figure 6. Corporate advantage innovation matrix of Allianz Fire Engineering Corp.

**Table 6.** Evaluation of innovativeness in the industry KSF.

Industry key success factors	Innovation Type	Characteristics of innovation	Evaluation of the strengths and weaknesses of the innovation				Difference (5) = (4)-(3)
			Cheng Deh Fire Protection Industrial Corp.(1)	Fly Eagle Fire Engineering Corp.(2)	Competitors		
					(3)=(1)+(2)/2	Allianz (4)	
Grasp of market situation	P <sub>2</sub>	B	4.00	3.67	3.83	3.14	-0.69
Loyalty and solidarity	O	I	2.75	2.67	2.71	3.29	0.58
Product installation and construction manpower	P <sub>1</sub>	S	4.00	3.33	3.67	3.71	0.04
Reasonable and flexible pricing	P <sub>1</sub>	S	4.00	2.67	3.33	3.57	0.24
Employee education and training	P <sub>2</sub>	S	2.75	2.67	2.71	3.71	1.00
Team work ability	P <sub>2</sub>	I	2.50	2.00	2.25	3.57	1.32
Complete product line	P <sub>1</sub>	S	3.25	3.67	3.46	2.57	-0.89
Popularity of product	P <sub>1</sub>	S	2.75	3.00	2.88	2.43	-0.45
Smooth processing of customer orders and operations	P <sub>2</sub>	S	2.25	2.67	2.46	4.14	1.68
Customer recognition	P <sub>1</sub>	I	3.25	2.67	2.96	3.57	0.61
Safe and environmentally friendly	P <sub>1</sub>	S	2.50	3.00	2.75	3.57	0.82
Parking space	P <sub>1</sub>	S	2.75	3.67	3.21	3.43	0.22
Special features of the product	P <sub>1</sub>	B	1.50	3.00	2.25	4.29	2.04
Grasp of customer needs	P <sub>1</sub>	B	2.50	3.00	2.75	4.29	1.54
Periodic marketing campaigns	P <sub>2</sub>	B	2.50	2.67	2.58	3.29	0.71
Reputation of the firm	P <sub>1</sub>	I	3.75	3.33	3.54	3.43	-0.11
Skill in carrying out installations	P <sub>1</sub>	S	3.00	3.33	3.17	4.00	0.83



		Competitors		Allianz
Type of Impact	Products (P <sub>1</sub> )	<ul style="list-style-type: none"> <li>Customer recognition</li> <li>Reputation of the firm</li> </ul> <p>3.25   3.5</p>	<ul style="list-style-type: none"> <li>Product installation operational manpower</li> <li>Reasonable and flexible prices</li> <li>Complete production line</li> <li>Safe environmental</li> <li>Parking spaces</li> <li>Skill in carrying out installations</li> <li>Popularity of product</li> </ul> <p>3.21   3.33</p>	<ul style="list-style-type: none"> <li>Special features of product</li> <li>Grasp of customer needs</li> </ul> <p>2.5   4.29</p>
	Process (P <sub>2</sub> )	<ul style="list-style-type: none"> <li>Teamwork ability</li> </ul> <p>2.25   3.57</p>	<ul style="list-style-type: none"> <li>Training and education</li> <li>Smooth processing of customer orders and operations</li> </ul> <p>2.59   3.93</p>	<ul style="list-style-type: none"> <li>Grasp of customer needs</li> <li>Periodic marketing campaigns</li> </ul> <p>3.21   3.22</p>
	Organization (O)	<ul style="list-style-type: none"> <li>Loyalty and solidarity</li> </ul> <p>2.71   3.29</p>	<p>0   0</p>	<p>0   0</p>
		Incremental(I)	System(S)	Breakthrough(B)

Characteristics of Impact

Figure 7. Comparison of the innovation matrices of the case firm and its competitors.

	3.5	3.33	4.29
	3.57	3.93	3.22
	3.29	0	0
	<b>Allianz</b>		
	Industry advantage innovation matrix		
	3.25	3.21	2.5
	2.25	2.59	3.21
	2.71	0	0
	<b>Competitors</b>		
	Industry advantage innovation matrix		
( Allianz - Competitors )	0.25	0.12	1.79
=	1.32	1.34	0.01
	0.58	0	0

Figure 8. Summary of the evaluation of innovation of the industry KSF.

Lastly, this research still needed to know the senior managers' proposed strategic intents to analyze their feasibility and sequence of implementation. According to the chairman of the firm, he hopes that the firm could achieve the following objectives: establish a management information system, develop new types of extinguishing agents and innovative products, form cross-industry strategic alliances, reduce labor and raw material costs, expand into overseas markets, etc. In this research, the strategic intents in the questionnaires distributed to the seven managers of the firm were organized into the strategic intents matrix as illustrated in Table 8 and Figure 11.

**Table 7.** Evaluation of innovation for customer needs.

Category of customer needs	Type of effects	Characteristics of effects	Evaluation of strength and weakness
Inexpensive price	P <sub>1</sub>	S	4.11
Reasonable price	P <sub>1</sub>	S	4.21
Prompt service	P <sub>1</sub>	S	4.14
Product expertise	P <sub>1</sub>	S	3.78
Product brand	O	S	3.65
Production history of the product	P <sub>1</sub>	B	4.44
History of customer service	P <sub>2</sub>	B	4.67
Employees' ability in answering customers' questions	P <sub>2</sub>	I	4.01
Product's ease of use	P <sub>1</sub>	S	4.00
Reasonability of product price	P <sub>2</sub>	S	4.23
Appropriateness of employee communications	O	I	3.78
Friendly and cordial attitude	O	I	4.21
Standard operating procedures	P <sub>2</sub>	I	4.56
Anticipation of customer demands , proactivity of services	P <sub>2</sub>	S, B	4.34
Level of care and patience exhibited by employees	O	I,	4.33
Initiative in addressing the customer's complaints from the customer's position	O	S	4.08
Supervisor's initiative in asking about the customer's product use of product and satisfaction level	P <sub>2</sub>	S	4.35
Initiative in reminding customers about the need to replace the extinguishing agent	P <sub>2</sub>	S	3.98
Safety and nontoxicity of product	P <sub>1</sub>	S	3.92
Extinguishing effectiveness of product	P <sub>1</sub>	I	4.28
Possession of adequate fire engineering expertise	O	S	4.46
Sufficient inventory level	P <sub>2</sub>	S	4.23
Product under full insurance coverage	P <sub>2</sub>	S	4.44
Required services immediately provided to the customer	O, P <sub>2</sub>	S	4.38
Digitized customer service system	O, P <sub>2</sub>	S	4.20
Complete quality check	P <sub>2</sub>	S	4.49
Prompt correction of errors	O	S	3.29
Compatibility of product types with customer needs	P <sub>1</sub>	B	4.65
Emphasis on customer feedback	O	S	4.58

The differentiation matrix is the result of the strategic intentions matrix without the SWOT matrix of innovation, as illustrated in Figure 12. If the remaining value after deduction is positive, it means the firm's objectives and strategic intents lie outside of what the external opportunities or the resources and competencies of the firm can provide. It is recommended that the firm consider pivoting its business direction or abandon its plans. If the remaining value after deduction is negative, it means the firm will be unable to fully utilize its one advantages or fully grasp the external opportunities. It is recommended that the firm strengthen itself or seek other methods. So again, the differentiation analysis matrix has been reorganized, as illustrated in Figure 13.

With regards to the innovation strategy analysis, according to Figure 13, results falling in

between positive and negative 0.5 indicate that the strategic intents are compatible with the market opportunities and the firm's core competitive advantages; the objectives set by the firm are worth pursuing and achievable.

<p>Products (P<sub>1</sub>)</p> <ul style="list-style-type: none"> <li>Extinguishing effectiveness of product (4.28)</li> </ul>	<ul style="list-style-type: none"> <li>Cheap prices (4.11)</li> <li>Reasonable prices (4.21)</li> <li>Fast service (4.14)</li> <li>Professional knowledge (3.78)</li> <li>User friendliness of products (4.00)</li> <li>Product safety and non-toxicity (3.92)</li> </ul>	<ul style="list-style-type: none"> <li>Product history (4.44)</li> <li>Compatibility of product types with demands (4.65)</li> </ul>
<p>Process (P<sub>2</sub>)</p> <ul style="list-style-type: none"> <li>Ability in answering Customer questions (4.01)</li> <li>Standard operating Procedures (4.56)</li> </ul>	<ul style="list-style-type: none"> <li>Reasonable pricing (4.23)</li> <li>Proactive consideration of customer requirements (4.34)</li> <li>Supervisor initiates inquiry on product usage conditions and customer satisfaction (4.35)</li> <li>Proactively reminder for customer to replace chemicals (3.98)</li> <li>Adequate stock (4.23)</li> <li>Adequate insurance coverage for products (4.44)</li> <li>Immediate accurate customer Service (4.38)</li> <li>Information oriented customer Service (4.20)</li> <li>Comprehensive product inspection (4.49)</li> </ul>	<ul style="list-style-type: none"> <li>Customer service history (4.67)</li> <li>Proactive consideration of customer requirements, proactive provisions of service (4.34)</li> </ul>
<p>Organization (O)</p> <ul style="list-style-type: none"> <li>Appropriate speech of staff (3.78)</li> <li>Friendly and cordial attitude (4.21)</li> <li>Caring and patient service of staff (4.33)</li> </ul>	<ul style="list-style-type: none"> <li>Brand image (3.65)</li> <li>Proactive resolution of customer complaints (4.08)</li> <li>Adequate fire safety professional knowledge (4.46)</li> <li>Immediate provision of accurate Flexible responsiveness of staff customer service (4.38)</li> <li>Information oriented customer Service (4.20)</li> <li>Timely correction of errors (3.29)</li> <li>Value customer opinions (4.58)</li> </ul>	<ul style="list-style-type: none"> <li>Flexibility and adaptability of employees (3.57)</li> </ul>
	<p>Incremental(I)                      System(S)</p>	<p>Breakthrough(B)</p>

**Figure 9.** Advantages innovation matrix of customer needs.

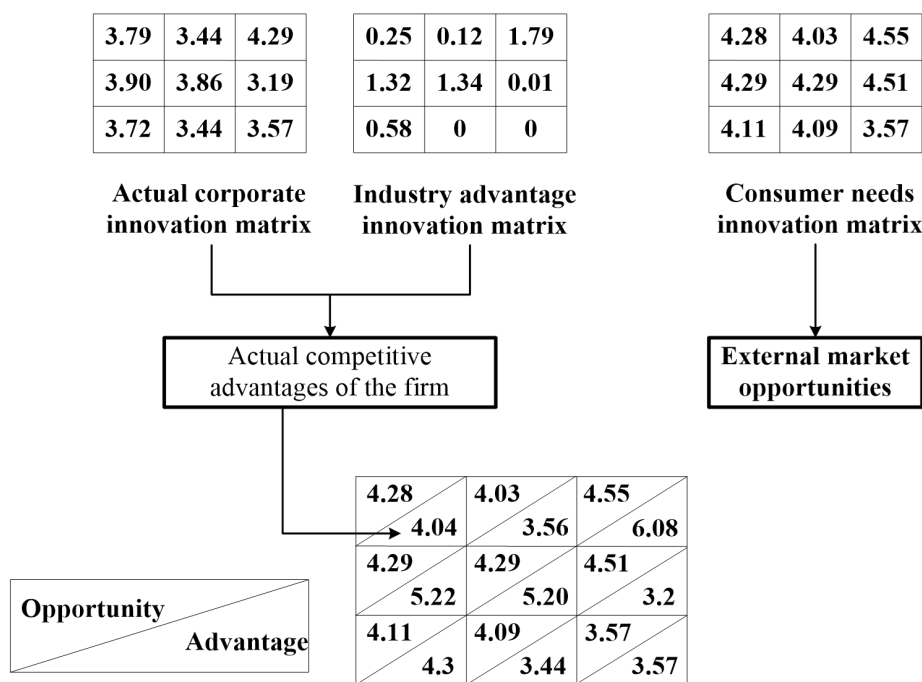


Figure 10. SWOT matrix of innovation of the case firm.

Table 8. Strategic intents of Allianz Fire Engineering Corp.

Category of objective	Types of effects	Characteristics of effects	Evaluation of strength and weakness
Develop new types of extinguishing agents	P <sub>1</sub>	I, B	4.21
Establish a management information system	O	I, S	3.89
Establish a cross-industry alliance to engage in integrated marketing	P <sub>1</sub> , P <sub>2</sub>	B	4.13
Reduce costs	P <sub>2</sub>	I, S	3.67
Increase sales volume	P <sub>1</sub>	I, S, B	4.70
Expand into overseas markets	O, P <sub>1</sub>	B	3.43

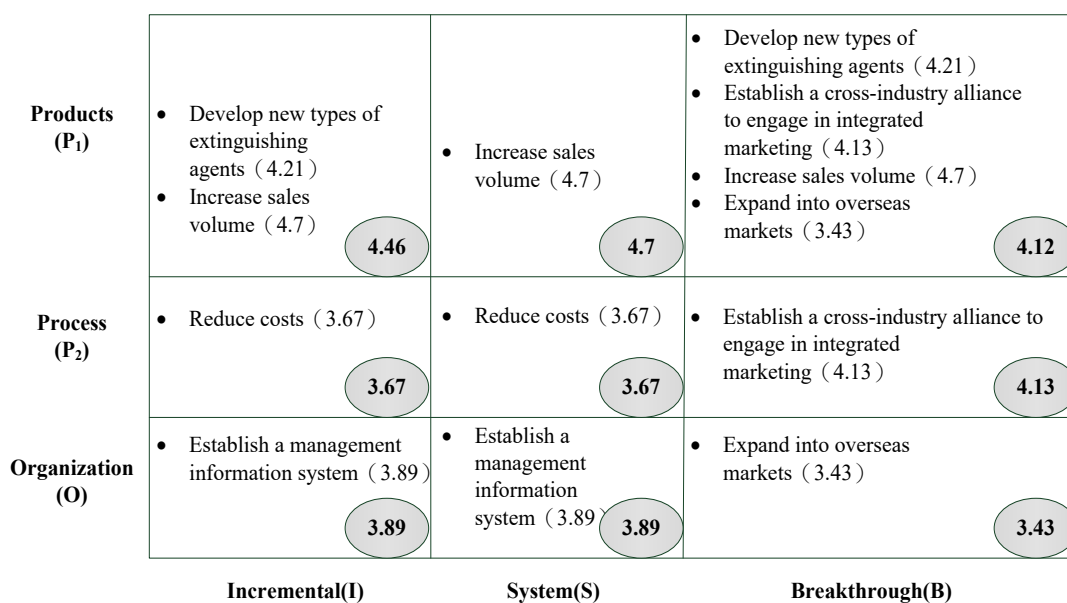


Figure 11. Strategic intents matrix of the case firm.

Able to fully grasp the market opportunities / Unable to fully utilize the advantages of the firm	Strategic intents lies outside of external opportunities / Strategic intents lies outside of the advantages of the firm	Able to fully grasp the market opportunities / Unable to fully utilize the advantages of the firm
Unable to fully grasp the market opportunities / Unable to fully utilize the advantages of the firm	Unable to fully grasp the market opportunities / Unable to fully utilize the advantages of the firm	Able to fully grasp the market opportunities / Strategic intents lies outside of external opportunities
Able to fully grasp the market opportunities / Able to fully utilize the advantages of the firm	Able to fully grasp the market opportunities / Able to fully utilize the advantages of the firm	Strategic intents lies outside of external opportunities / Able to fully utilize the advantages of the firm

Figure 12. Differentiation analysis matrix.

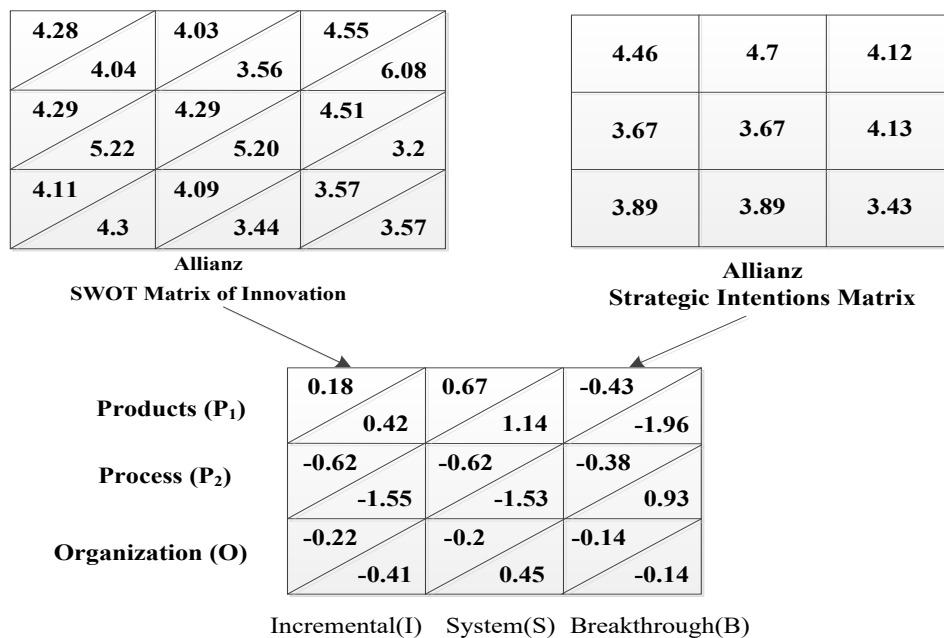


Figure 13. Innovation differentiation analysis matrix of the case firm.

However, values greater than positive or negative 0.5 should be reviewed. Their respective analysis is as follows:

- (1) OB(Organization and Breakthrough) and P<sub>1</sub>S(Product and System) with values greater than 0.5 indicate that the two strategic intents of expanding into overseas markets and increasing sales volume lie beyond what the market opportunities can offer, meaning that the market available for expansion or growth is not that large, the overseas and domestic market is saturated, or the sales volume in the overseas and domestic market simply is not that large. The firm should abandon pursuing these two strategic intents.
- (2) P<sub>2</sub>S(Process and System) and P<sub>2</sub>I(Process and Incremental) with values less than -0.5 indicate that the strategic intents of lowering costs will be unable to fully utilize the advantages of the firm. In other words, these strategic intents have been set too low for the firm. The firm should be able to better utilize its advantages to achieve even more ambitious objectives. In other words, the firm can work towards clearly defining

the objective of reducing costs and concrete actions to achieve said objective.

- (3) OI(Organization and Incremental) and OS(Organization and System) with values between 0.5 and -0.5 indicate that establishing a management information system can fully utilize the advantages of the firm and market opportunities. The firm should consider quickly establishing a management information system which will be of great help to reducing costs.
- (4) P<sub>1</sub>I(Product and Incremental) with a value less than 1 but greater than 0 indicate that the strategy of developing new types of extinguishing agents is greater than the competencies of the firm and market opportunities, but is suitable for the objective set by the firm. The case firm should also consider how to take on the least cost in order to utilize its advantages in the development of new types of extinguishing agents.
- (5) P<sub>2</sub>B(Process and Breakthrough) with a value greater than 0.5 indicate that establishing a cross-industry strategic alliance to engage in integrated marketing exceeds the advantage of the firm, which means that under the current circumstances, the firm should defer establishing cross-industry strategic alliances in order to engage in integrated marketing. However, this strategy has a value of -0.25 in terms of market opportunities, indicating that there is a degree of market feasibility and that the cross-industry development of extinguishing agents is a viable opportunity.

Based on the above summary, the most urgent strategies for the firm to pursue are the establishment of a management information system and the development of new types of extinguishing agents, both of which will help reduce costs and improve customer satisfaction and profitability. Accordingly, the firm began to pursue these two strategies. Section 7 will explain the implementation processes and results of these two strategies.

## 7. Strategy Implementation and Results

The case firm decided to implement the strategies of establishing a management information system and developing new types of extinguishing agents, both of which will help reduce costs and improve customer satisfaction and profitability.

### 7.1 Develop New Types of Extinguishing Agents

The case firm is a fire safety engineering firm that does not have the competency required to develop new extinguishing agents. Therefore, the firm has decided to collaborate with domestic firms with such competencies and finally selected Hongyi Energy Technology Corp. [36] as their partner. Due to the Dissolvable Tiny Foamed Fire Extinguishing (D.T.E.) has been developed by the partner firm, hence the case firm can partner to gain refilling technology for fire extinguishers and develop various types of extinguishing agents and wolf repellents.

D.T.E. is an advanced water spray tiny foamed fire extinguishing agent which, aside from possessing highly effective fire extinguishing properties, has a neutral PH value and uses environmentally friendly substrates. All of these make D.T.E. safe for humans and the environment, which will not cause harm or release toxic substances. Therefore, despite being a synthetic compound, D.T.E. will not pollute the environment. In other words, the production or usage of D.T.E. will not exacerbate the greenhouse effect. At the same time, due to its exceptional fire extinguishing and fire control properties, the use of D.T.E. during fires can effectively improve protection of life and property. In essence, D.T.E. has the following four irreplaceable properties:

- (1) Fast fire extinguishing, cooling, and prevention of re-ignition. The exceptional penetrativeness of D.T.E. and its water retention property swiftly cools off and minimizes the probability of re-ignition.
- (2) Compliant with environmentally friendly and nontoxic requirements: By using environmentally friendly substrates, the compound will not cause harm or toxicity to humans or the environment.
- (3) Instant dissolution: Automatically dissolves into water through a non-power-assisted water-soluble process with no segregation, stratification, or sedimentation afterwards
- (4) No issues after usage: Compliant with environmental standards. The compound combines with fungi in the soil and decomposes into nutrients after use.

Based on the properties of the product that have been described, the firm insists on prioritizing environmental protection which aside from reducing the product's environmental impact, also gains the recognition of the customers at the same time.

## **7.2 Establishing a Management Information System for the Extinguishing Agent Replacement Services**

Fire extinguishers are the most commonly used extinguishing equipment in a fire. Fire extinguishers are also product types recognized by the Ministry of the Interior. Due to location, service life and other factors, fire extinguishers can exhibit surface corrosion, component failure, solidification of the extinguishing agent, deterioration, or other such issues. As such, fire extinguishers should undergo periodic external inspection and performance checks in order to maintain normal performance levels.

In view of this, in order to make the fire inspection or fire extinguisher extinguishing agent replacement process more transparent, avoid overdue inspections and replacement issues, the case firm has taken steps to improve its operating and equipment maintenance procedures. Beyond recording previously purchased items of the customer and aside from contract information, if there are records of previous works done, they will be entered into the system to create a complete customer profile which includes historical data. This can be used as reference for services or promotions but also as a means of ensuring the fire safety of the customers. Therefore, the solution steps include: (1) Set up an electronic label production system; (2) Develop an application for handheld devices to query the historical records of a fire extinguisher; (3) Integration of the electronic label production system and dispatch system; (4) Investment in accounting management system; and (5) Establish an agent replacement service management system.

## **7.3 Evaluation of the Benefits**

Upon implementation of the two strategies previously mentioned, aside from gaining more effective firefighting products, the integration of the electronic label and account management system with the dispatch system have resulted in efficient manpower and time management, increased service quality, and indirectly, improving customer satisfaction. Overall, the concrete results include:

- (1) Increased service revenue: After raising service efficiency, enhancing service quality, raising customer satisfaction, improving customer referral rates, service revenue naturally grew.
- (2) Increased productivity: Through system integration, improvements to the efficiency of the operator's overall dispatch operations flow included the printing speed of the electronic bar codes, accuracy of dispatch information, simplification of the archiving process, and reduction of time spent on account balance management. The

aforementioned improvements are expected to result in doubling the efficiency of the administrative staff.

- (3) Reduced costs of duplicated tasks: Upon systemizing the dispatch work supplemented by the system integration, there has been a significant decrease in wasted labor costs due to duplicated tasks by managers or input errors.
- (4) Reduced labor turnover costs: Because each system functions independently, when employees resign, the handover of existing tasks and training of new employees are very time consuming, which also causes lapses in customer relationship management.
- (5) Reduced supplies cost: By investing in the new system, the firm no longer needed to separately print out information after archiving dispatch work information, helping it save on paper, printer ink, computer supplies, and other office supplies.
- (6) Other benefits: Enhanced efficiency in case processing, transparent customer service process flow, prevention errors, enhanced work efficiency of field employees, simplification of the account management process, increase in accounting staff productivity, enhanced image of the firm, environmental protection, energy-saving, and carbon reduction, and improved customer satisfaction.

## 8. Conclusion

This study is based on analyzing the firm's operations, through the investigation and collation with the managers, it was discovered that the firm's advantages from innovation are as follows: the firm performs exceptionally in terms of product innovation skills, bargaining power, and friendly customer service. Rather, the firm needs to improve in terms of possessing a complete product line and product popularity to improve its competitive advantage.

This research focused on the firm's affiliating industry along with its relevant competitors Fly Eagle Fire Engineering Corp. and Cheng Deh Fire Protection Corp. to conduct analysis on the evaluation of their innovation in order to understand the industry KSF. The industry KSF determined through the research results are as follows:

- (1) The case firm has strong advantages over competitors with regards to special product features, smooth processing of customer orders and operations, grasp of customer needs, teamwork ability, and employee training and development.
- (2) The case firm is comparatively weaker than its competitors with regards to possessing a complete product line, product popularity, grasp of market conditions, and other criteria.

From what was discovered, the case firm needs to develop its competitive advantages to offset deficiencies in other aspects. The analysis and selection of subsequent strategic intents were based on meeting this need. Through the customer needs innovation evaluation analysis, the following customer needs were determined:

- (1) Consumers have higher demands for and expectations of fire engineering products and equipment with regards to history of customer service, standard operating procedures, compatibility of product types with customer needs, valuing customer feedback, and other aspects.
- (2) In terms of product brand and prompt correction of errors, consumers believe that whether or not the fire safety firm fulfils those criteria is unimportant, as such, operators can reduce their efforts with regards to those criteria. The reason is perhaps that consumers are not familiar with the brands of fire extinguishing equipment and that the reputation of the service firm is more important. In addition, the regular consumers are unable to determine whether or not their choices in purchasing fire extinguishers or having the extinguishing agent replaced are the correct ones. Since



errors are hard to detect, there are naturally no urgent need for prompt correction of errors.

External market opportunities can be known through the customer needs innovation matrix. By combining the firm's advantage matrix with the industry advantage innovation matrix, the firm's internal competitive advantages can be known. Through visiting the operators of the case firm to understand its future objectives with a questionnaire, these were organized into the strategic intent analysis as follows:

- (1) The two strategic intents of expanding into overseas markets and increasing sales volume lie beyond what the market opportunities can offer, meaning that the market available for expansion or growth is not that large, the overseas and domestic markets are saturated, or the sales volumes of the overseas and domestic market are simply not that large. The firm should abandon pursuing these two strategic intents.
- (2) The strategic intent of lowering costs will be unable to fully utilize the advantages of the firm. The firm can work towards clearly defining the objective of reducing costs and concrete actions to achieve said objective.
- (3) Establishing a management information system can fully utilize the advantages of the firm and market opportunities. The firm should consider quickly establishing a management information system which will be of great help to reducing costs.
- (4) The strategy of developing new types of extinguishing agents is greater than the firm's competencies and market opportunities but suited for the objective set by the firm. The case firm should also consider how to take on the least cost in order to utilize its advantages in developing new types of extinguishing agents.
- (5) Establishing a cross-industry strategic alliance to engage in integrated marketing exceeds the firm's advantage, meaning that under the current circumstances, the firm should hold off establishing cross-industry strategic alliances in order to engage in integrated marketing.

Based on the results of the analysis, it is recommended that the firm quickly implement the strategies of developing a new type of extinguishing agent and establishing a management information system.

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