

Examining Critical Success Factors for Medical Device Industry in Taiwan

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0211

The Asian Conference on Psychology & the Behavioral Sciences 2013

Official Conference Proceedings 2013

Abstract

With the population aging, research indicated that the growing of chronic disease and rapidly increasing costs of healthcare become a burden worldwide. Global medical equipment market size in 2010 is 2,456 hundred million U.S. dollars. It is a big industry output. In a highly competitive market, how to create effective strategies and set successful marketing becomes a key issue. Although there exist few studies been completed on the critical success factors of medical device industry, these studies are all for one or several particular companies. This study aims to explore the critical success factors of the medical device industry in Taiwan.

The research population of this study was the customers within Taiwan. The study use survey research under different dimensions from customers' point of view such as price promotion, perceived quality, customer satisfaction and brand loyalty, etc., to identify the critical success factors of Medical Device Industry which have its own brand. The paper sent out 150 questionnaires in total. The survey returned 135 usable questionnaires; the response rate is 90%.

The paper found that corporate Image, cost / performance ratio, product quality, user Interface operation and service, customer-orientation are the critical success factors of medical device industry. Expectations through examining the critical success factors for medical device industry would achieve a better and deeper understanding of customers' needs, assisting establishing brand.

Keywords: Medical device industry, Critical Success Factors, Branding

I. Introduction

A. Research Background

1. Aging Population

With the rapid economic and technology development, changes the mode of human life. The declining fertility in recent years, the fertility rate decrease from 5 children per woman to 2.5, and is predict to reach 2.2 in 2050. As the fewer children, the share of the population will rise naturally (Bloom, 2011).

The World Health Organization's proposed that active aging has become the core concept of the countries in the world for the elderly health policy formulation (Liu, 2007). With the population aging, the growing of chronic disease and rapidly increasing costs of healthcare become a burden worldwide. It needs new approaches for comprehensive population health management and healthcare service to meet these challenges (Shortell, 2010).

Villavicencio (2011) proposed that the healthcare services demand will rise dramatically (See as Figure 1). After adjustment for inflation, the costs of health care annual increased significantly from \$9,224 in 1992 to \$15,081 in 2006 among older Americans (Villavicencio, 2011).

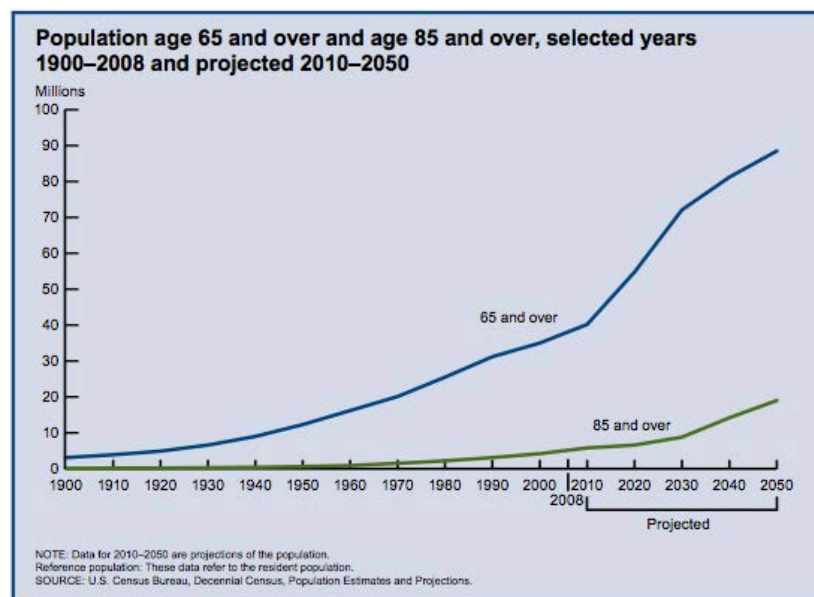


Figure1: The aging population

2. Medical Device Industry

Global health care and medical accounts expenditure in recent years has increased noticeably. To reduce the medical cost and health care burden, the development of medical and tele-homecare equipment has been rapid growth. Global medical equipment market size in 2010 is 2,456 hundred million U.S. dollars. It is a big industry output (Industrial Technology Research Institute, 2012). PR Newswire (Reportlinker.com) announces that “The global medical device industry has experienced significant growth over the last five years and is expected to continue, reaching approximately US \$302 billion in 2017 with a CAGR of 6.1% during next six years (2011-2017). APAC is projected to lead the market and grow at the highest CAGR during the forecast period.”

Taiwan medical equipment market turnover in 2010 is approximately NT 66.2 billion, 2011 is approximately NT 72.1 billion. (Industrial Technology Research Institute, 2011). Taiwanese medical equipment companies have competitive advantages of flexible manufacturing process, cost management... etc., which are the important competitive in emerging markets; Taiwan is not only has the ability to do the research and development collaborations of medical equipment components, but also has experience with global marketing layout. The average annual growth rate in Taiwan medical equipment market was expected to reach 7.9% (2011-2015). Therefore, Taiwan medical equipment industry occupies an important position (PricewaterhouseCoopers, 2012).

Taiwan's domestic medical device Industry are more emphasis on low-risk in vitro diagnostic instruments, including electric scooter, blood pressure monitors, thermometers, contact lenses, blood glucose meter, blood glucose test strip, dialysis supplies, and other products. Among these technologies, the blood glucose meter and test strips are the largest part. (Ministry of Economic Affairs, 2010)

B. Purpose of Research

With highly homogeneity product features and intense competition situation, if the companies are able to identify the critical success factors of products sales, the overall performance will continue to grow. It can significantly create high value and help Taiwan Medical Device Industry development. Therefore, this study through the industry analysis, secondary data collation to explore:

1. The environment of Medical Device Industry.

2. The critical success factors of buying Medical Device product from a consumer point of view.
3. The operation and development strategy as company's reference.

II. Literature Review

A. Critical Success Factors

To establish the core competence for medical device industry, the most important thing is to examine critical success factors. Daniel (1961) has indicated that a business must manage the key success factors particularly well in order to be successful. Hofer and Schendel (1978) noted the management of key success factors can influence through its decisions that and significantly affect the overall competitive positions of the various firms.

Rockart (1979) defined Critical Success Factors (CSFs, also called Key Successful factor) will ensure the successful competitive performance for the organizations. Aaker (1984) has suggested that a critical successful factor is an asset or skill that is needed to compete successfully. Successful firms are usually strong on several critical success factors. According to Kenichi (1985), the critical successful factor is a method used for strategic advantages identify. The firms should gain competitive advantages by concentrate resources in particular area.

Thompson and Strickland (2002) proposed the key success factors of an industry are related to product capital, competitive advantage, property, etc., which have a close relationship with net sales. Hence, a business could sustainability and gain consistent competitive advantages in an industry.

To Summarize Scholars definitions and opinions on the critical success factors, if the enterprise is able to obtain the critical success factors, it can take competitive advantage in the industry to achieve success. Therefore, the essence of critical success factors is that companies can obtain a competitive advantage in the industry, and increase operating performance.

B. The Application of Critical Success Factors

The researches of critical success factors have been applied in different industries. Hong and Kim (2002) explored the root of such high failure rate from an "organizational fit of ERP" perspective, defining the ERP organizational fit concept, and examining ERP implementation impact with

contingencies. The results from 34 organizations by field survey showed that "ERP implementation success significantly depends on the organizational fit of ERP and certain implementation contingencies."

The survey of Cooper and Kleinschmidt (2003) shows the 10 performance metrics are reduced to two basic dimensions: program profitability and program impact. The research identifies nine constructs that drive performance. The main performance drivers the solid performers from: "a high-quality new product process", "adequate resources for new products", "strategic focus and synergy", "high-quality development teams", etc.

Chen (2004) based on the viewpoint of intellectual capital; systematically investigate the focus on key factor of banking enterprising finance. The study found that the rate of human resource capital value is the highest at 37.7%, the organization capital value are at 31.4%, the customer relationship value are at 30.9%. And the Banking industry is highly concerned on human resource capital value with 58.83%.

Lin (2008) divides two stages to implement the expert advice investigation, utilizes Delphi method to find key successful factors for documentary production in Taiwan. The study discovered in the above 12 key successful factor of record piece manufacture. The highest key success factor for the prospects is the "priority", next for the "enthusiasm", the third is "mission places", "the accomplishment of photographer" fourth, "the specialized ability" rank fifth. The findings may supply the documentary production personnel and the researcher to judgment the documentary success or failure.

With the retention rate of insurance agents getting lower and lower, the insurance companies faced with some impact such as the customer satisfactions decreasing, company resources waste, homogeneous competition, the pressure of institution and license requirements, etc. To confront the challenges which insurance agents face, Chen(2012) applied the Analytic Hierarchy Process (AHP) survey to conduct twelve key success factors of insurance agent performance such as: "Personal Characters", "Organization Culture", "Success Motivation", "Supervisor Leadership", etc.

The research of key success factors in different industries summarized in the table 1:

Table 1: Research of critical success factors in different industries

Industry	Topic	Year	Author(s)
Enterprise resource planning (ERP) implementation	The critical success factors for ERP implementation: an organizational fit perspective	2002	Hong and Kim
New Product Development	Benchmarking the Firm's Critical Success Factors in New Product Development	2003	Cooper and Kleinschmidt
Corporate and Commercial Banking	The Study on The Key Success Factor about Intellectual Capital Formation of Corporate and Commercial Banking -- In Contrast with AHP and SJT	2004	Chen
Documentary Production	A Study of Key Success Factor for Documentary. Production in Taiwan.	2008	Lin
Insurance	Explore Key Success Factors of Insurance Agent Performance	2012	Chen

C. Research of Critical Success Factors in Medical Device Industry

Wang (2003) identified the six critical successful factors such as "innovation ability", "web site business strategy", "the maturity of internal and external environments", etc.. Meanwhile, the study also found that there are several variables impacted the key factors of e-marketplace business successfulness like "the industry characters", "safety requirement", "technology intensity", etc. According to the industry characteristics, the critical successful factors are highly interrelated to the performance of e-marketplace. The companies can enhance performance and get succeed in biotech Industry by implementing e-marketplace.

Brown et al. (2008) focused on 68 responses of UK and Ireland medical device companies and proposed a new product development process in the medical devices industry. The result showed that the success factors influence new product development process improvement include: the financial analysis used throughout the developing process, the propagation of new product development priorities staff, and the involvement level of end users in development process... etc. The findings demonstrate the importance of the use of financial indicators, integration, and innovation to sustained successful product development.

Zenios et al. (2011) provided a taxonomy of the different roles that physicians play in device innovation, and identified which may not be well managed by today's institutions that the most susceptible to conflicts of interest. For better patient care, the study also provides recommendations on better manage

conflicts without physicians and companies' jeopardizing collaborate.

The research of critical success factors in medical device industry including several areas such as technical part, new product develop process improvement, medical service, the case study in particular countries or several particular companies, or the industrial development and industrial trend.

Although there exist studies been completed on the critical success factors of medical device industry, these studies are focus on the developing of medical device industry in global or particular countries or several particular companies. Some studies focus on the role of physicians in device innovation and medical service, some focus on the new product development process in different area. This study focus on the enterprise operation, try to find the critical factors for business strategies, aims to explore the critical success factors of the medical device industry in Taiwan.

III. Research Methodology

The method to carry out this study was using a survey. The survey under different dimensions from customers' point of view such as price promotion, perceived quality, customer satisfaction and brand loyalty, etc., to identify the critical success factors of Medical Device Industry which have its own brand. The main steps of in this study are as follows:

1. Collect medical equipment information and secondary data, to understand the market characteristics and overview.
2. Review the literature of medical equipment industry and critical successful factor.
3. Establish the structure and scope of the study, design the questionnaire.
4. After the data collection, finally conduct the data analyzed.

This study reviews the literature of the medical equipment industrial characteristics, consumer behavior, and critical success factors; reference the variables from: Cheng (1998), Cheng (2000), Sun (2007), construct 20 variables of critical success factors for medical device industry from various scholars.

The subject was asked to fill out a questionnaire which elicited information concerning his attitude and motivation. The questionnaire includes two parts: the first part is to find the important considerations when consumer purchase and select the brand of glucometer, include 20 questions, and used a five point Likert scale to judge

the importance of each item in this research. The second part is personal information of respondents, include: gender, age, the highest degree, job, salary, and experience (ever bought any medical device).

Before the official release, the questionnaire have commissioned 5 SME employees in Taichung, adopted the recommended of staff, modifying the semantics which is unclear or use unknown words. The research population of this study was including: teaching and administrative staff in Taichung and Miao-li, executive master of business administration students in National Chung Hsing University, private enterprise employees in Taichung, and community people. The paper sent out 170 questionnaires in total. The survey returned 141 usable questionnaires; the response rate is 82%.

IV. Results

The analysis used the SPSS statistical software package, do the exploratory factor analysis (EFA). First, the descriptive statistics were computed. Next, reliability as a measure of internal consistency was calculated. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .852 (>0.8), the significance of Bartlett's sphericity test was .000; the result is suitable to do the exploratory factor analysis (EFA). The explanation capability is 68.857%. After Varimax method, the meaning of the various factors is more obvious and easier to interpret. The result shows that there are five factors.

The study names the five factors as: corporate Image, cost / performance ratio, user Interface Operation and service, Customer-orientation, Product quality.

V. Discussion and Conclusions

A. Factor one: corporate image

Corporate image are significant and indirect impact on customer loyalty, which is driven by both corporate and the image disconfirmation of expectations (Andreassen and Lindestad, 1998). The purchase intention can be influence by customer's familiarity and recognition of the products, and the enterprise functional, social, and perceptual image (Hsu, 2011).

Gray and Balmer (1988) proposed a pragmatic operational model (see Fig. 2). The model proposes the fundamental components of the process are including corporate identity, communication, image and reputation. It traces the

interrelationships amongst the components and indicates the feedback and correction are essential factors to the efficacy of the process. The Corporate identity is the reality of the enterprise. It refers to the distinct characteristics of the organization or what the organization is. To management the corporate identity, involves the dynamic interplay amongst the business strategy, corporate culture, the philosophy of its key employees, and organizational design. In the sensitive business milieu today, the strategic advantage and ultimate survival may well depend on corporate reputation. If enterprises can build good corporate image, it main have competitive advantage in the industry.

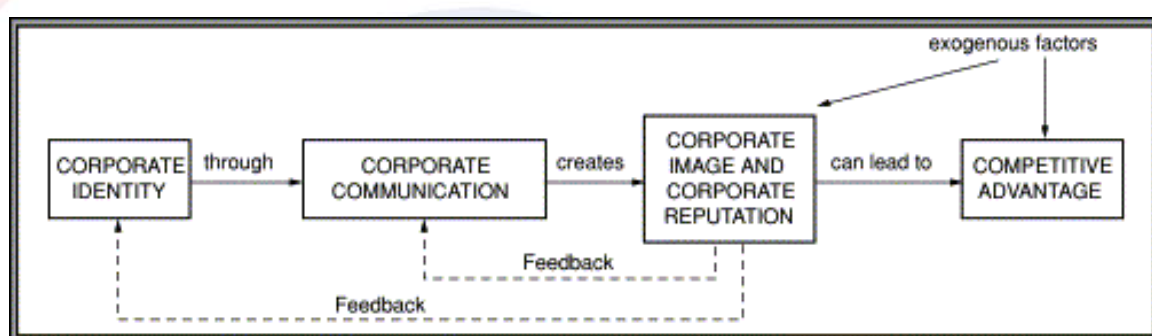


Figure 2: Pragmatic operational model

B. Factor two: cost / performance ratio

Elizabeth (2012) indicated the essentially four major outcomes possible when determining cost-performance ratio in figure 3, proposed that the cost-performance can also be used to analyze trends in production, and help buyers with making purchasing decisions. The most desirable outcome is area "C" that the item is low cost, but high performance. In the middle of the scale are area "A" and "D" that either high performance and high cost, or low performance and low cost. The least desirable ranking is area "B" which tends to be for a product that is high cost, but low performance.

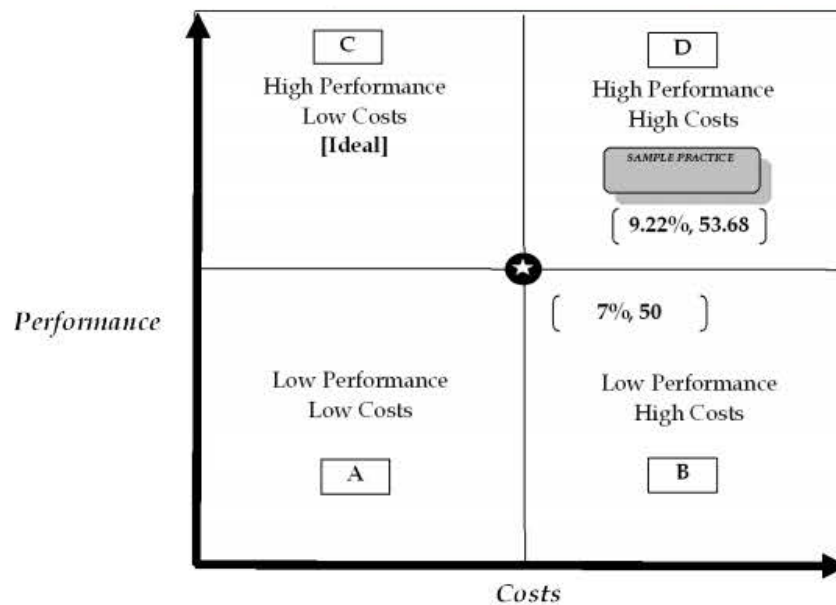


Figure 3: Cost Performance Ratio

To increase the sale of the products, the enterprises should provide valuable quality or service to the customer, which are low cost, but high performance.

C. Factor three: product quality

The product quality and the service quality variables influence customers' evaluation. (Sang and Eze, 2012) Enterprises need to maintain or upgrade their product and service quality measurement, be able to attract and retain customers as changes in the business environment. Also, the influence of new technology development becomes more pervasive in this 21st century (Sang and Eze, 2012).

For product quality control, firms can through several methods and tools such as: Total Quality Management-TQM (Docstoc, 2011), Quality Management System (Siliconware Precision Industries Co., Ltd.), Six Sigma method (Huang and Syun, 2012), ISO 9000, ISO 9001(Lin, 2011), ISO 14001(Iñaki and Boiral, 2013), etc.

The quality improvement strategy is related to customer perceptions, satisfaction and decides where changes in organization's services will improve its competitiveness (Lee and Burns, 1990). If enterprises can provide enough quality, it can directly influence customers' evaluation, create better corporate identity, and also, make a long-term relationship with their customers.

D. Factor four: user interface operation and service

The users of medical device products are community people. The interface design should also consider the different ages especially the elderly populations.

Lin and Yang (2006) research in developed home environment e-related home appliances designed for the elderly populations, and home environment lighting system operation interface, the operating using of convenience, compatibility, and adaptability. The results shows that language-based, graphical, and automatic creation interfaces and Interface icons (should be clearly identification) are important factors of operation.

Chou (2008) investigates the current difficulty and differentia of the ATM (Automatic Teller Machine) usage of young-adult and middle-aged users, and examines the universal design of ATM interface. The research concludes that: the middle-aged users prefer round keystroke on “Keystroke Design” and the keystrokes should be concentrated in an area with same shape. On “Page Allocation”, the background shall be as simple as possible, and preferred to use blue background with yellow or white font; in order to enhance the readability, the font of titles and important contents should be in size 36 or above; etc.

For service, the most likely sources of service improvement are better and management extra resources. Clear and quantified strategic priorities can lead to better organizational outcomes (Boyne, 2003)

In this study, the scores of user Interface item from the respondents is pretty high. The design of the Interface may directly influence the purchase intention. The enterprises should view it as an important consideration during the new product develops process.

E. Factor five: customer-orientation

Customer satisfaction measurement is a relatively new concept for many companies. Enterprises now recognize that new global economy has changed things forever (Cacioppo, Metronic). With the increased competition, crowded markets with small product differentiation and continual sales growth rate followed by two decades of the flattened sales curves have indicated that their focus must change (Cacioppo, Metronic).

The firms' choices and decisions related to customers' needs and preferences (Sang and Eze, 2012). It directly related to customers' evaluations of

employee service performance, physical goods, and services capes (Brady and Cronin, 2001). Ramendra (2012) suggest that salesperson's customer orientation has six domain areas which include: "providing information to customers", "understanding customer needs", "fulfilling customer needs", "creating and delivering customer value", "sustaining customer satisfaction", and "maintaining long-term relationships with customers" (see Fig. 4).

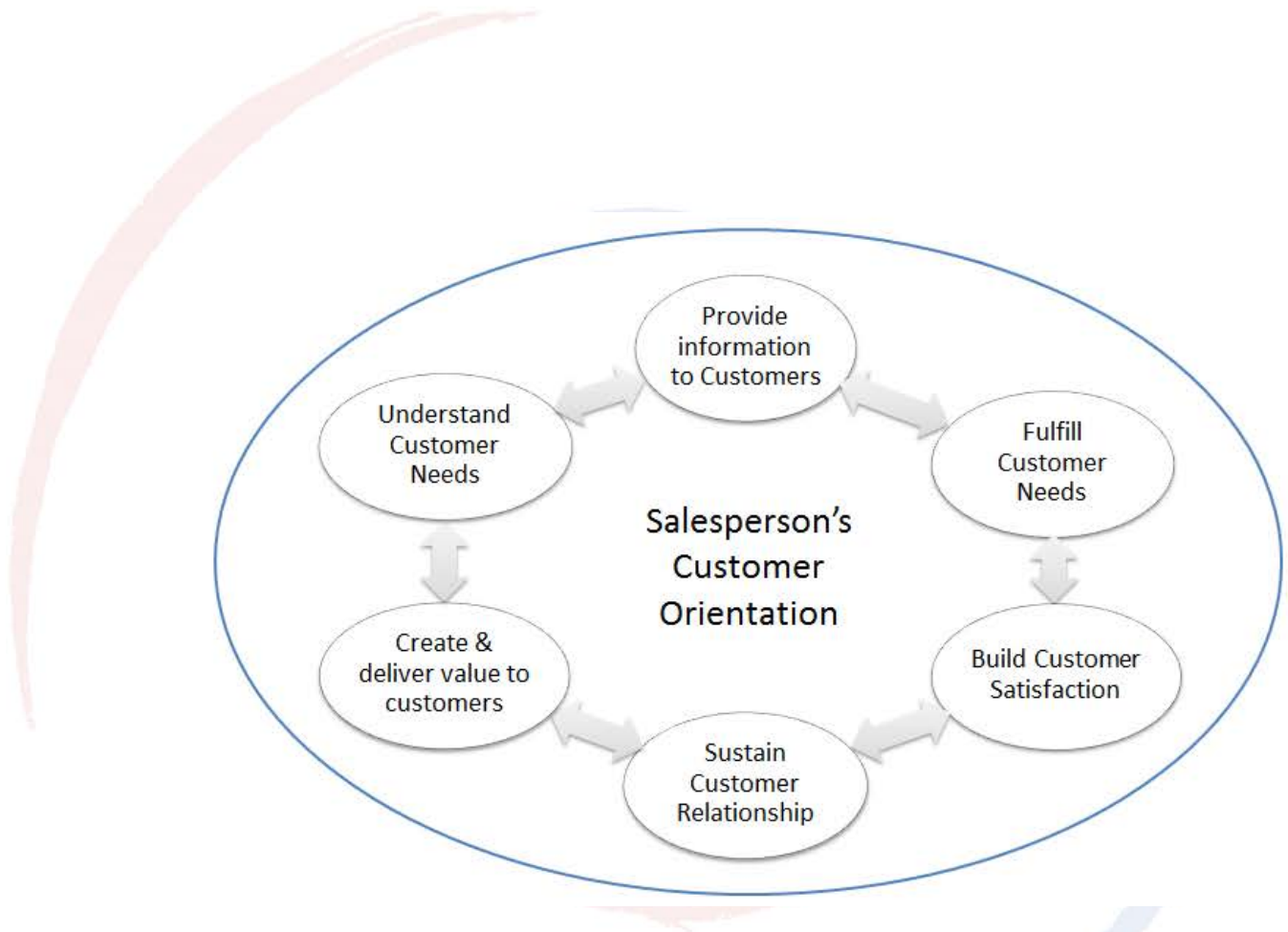


Figure 4: Salesperson's customer orientation has six domain areas

The sales managers can now apply specifically of the customer-oriented selling in six domain areas, and understand which conditions under particular domain area are important for customers. The study clearly explicates that defining customer-oriented selling in the changed world (Singh, 2012). If the enterprises focus on customer-orientation, it may create better customer satisfaction and maintain better sales.

F. Conclusions

To identify the critical success factors of Medical Device Industry which have

its own brand, the company should stand on the customers' point of view. The five critical successful factors are: corporate Image, cost / performance ratio, product quality, user Interface operation and service, customer-orientation. The findings expect to achieve a better and deeper understanding of customers' needs, assisting establishing brand.

VI. Limitations of the Study and Recommendations for Future Research

For Future Research, the study expects to expand the scope of subjects. Search for the potential customers of medical equipment products, and find the successful strategy for setting up a new medical equipment brand.

Although the study has identified five critical successful factors of medical device industry, the limitation is that the brand established is a difficult task. Customers' rely on exist bland and exist products. Many companies used to spend highly cost on marketing such as advertisement, TV commercial, or other promotions (same in other industries). How to reduce the cost of marketing in medical device industry can be deeper research in the future.

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