FACTORS INFLUENCING THE ADOPTION OF A MANUFACTURING EXECUTION SYSTEM QUALITY MANAGEMENT MODULE IN A PUBLIC LIMITED FOOD EXPORTING COMPANY IN THAILAND

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Abstract

The Manufacturing Execution System (MES) is adopted on the factory floor to monitor and manage the work-in-process. This may include automatic and manual forms of labor as well as production reporting. It may also include links to tasks on-line inquiries and follow-ups. Manufacturing Execution Systems are used to control work orders, shipping, scheduling, receipt of goods, quality control, and maintenance as well as other related activities. The Quality Management module is a part of a Manufacturing Execution System (MES) and is used to control work orders, scheduling and reports in terms of Quality Control.

The involvement of information technology in manufacturing processes has increased over the last few years. Information technology is used to improve the overall result. MES has helped many industries to improve their processes, which has led to a sustainable improvement. North America and Europe account for similar market shares in the global manufacturing execution system market. Since the APAC region is becoming the manufacturing hub for many industries, this region possesses great potential for the MES market and all major players are focusing on APAC. Nevertheless, the consumer adoption intention of an MES Quality management module in a public limited food exporting company in Thailand seems to be limited. Academic and practical studies addressing this issue are also lacking. This signifies the need to conduct the current study.

This study used a questionnaire to collect data from 148 respondents who are production managers, quality managers, IT managers and engineering managers of a public limited food exporting company in Thailand. Descriptive statistics, ANOVA and Pearson Correlation were adopted to analyze the data. It was found that

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respondents have high levels of intention to adopt an MES Quality management module in terms of functional benefits, global standard, distribution channel, product quality, and trust. However, they also intend to adopt in terms of price such as software version upgrade cost, engineering modification cost and software price. Moreover, promotion tools such as websites, YouTube and seminars were found to help in creating consumer intention to adopt an MES Quality management module. The findings of this study could help to extend current knowledge in the relevant literature to serve as guidelines to develop appropriate sales, marketing, and service strategies for an MES solution provider company, which may lead to adoption intention and serve as a reference for future studies.

Introduction and Investigating Constructs

An important issue for Thailand's food export companies is the trade barriers from the US and EU. The overseas market is a large market, with much demand and many competitors. However, most customers are concerned about food safety and the global environment. Therefore, Thailand's food export companies must have the best system to improve their production process and product quality and to present information and report to their customers.

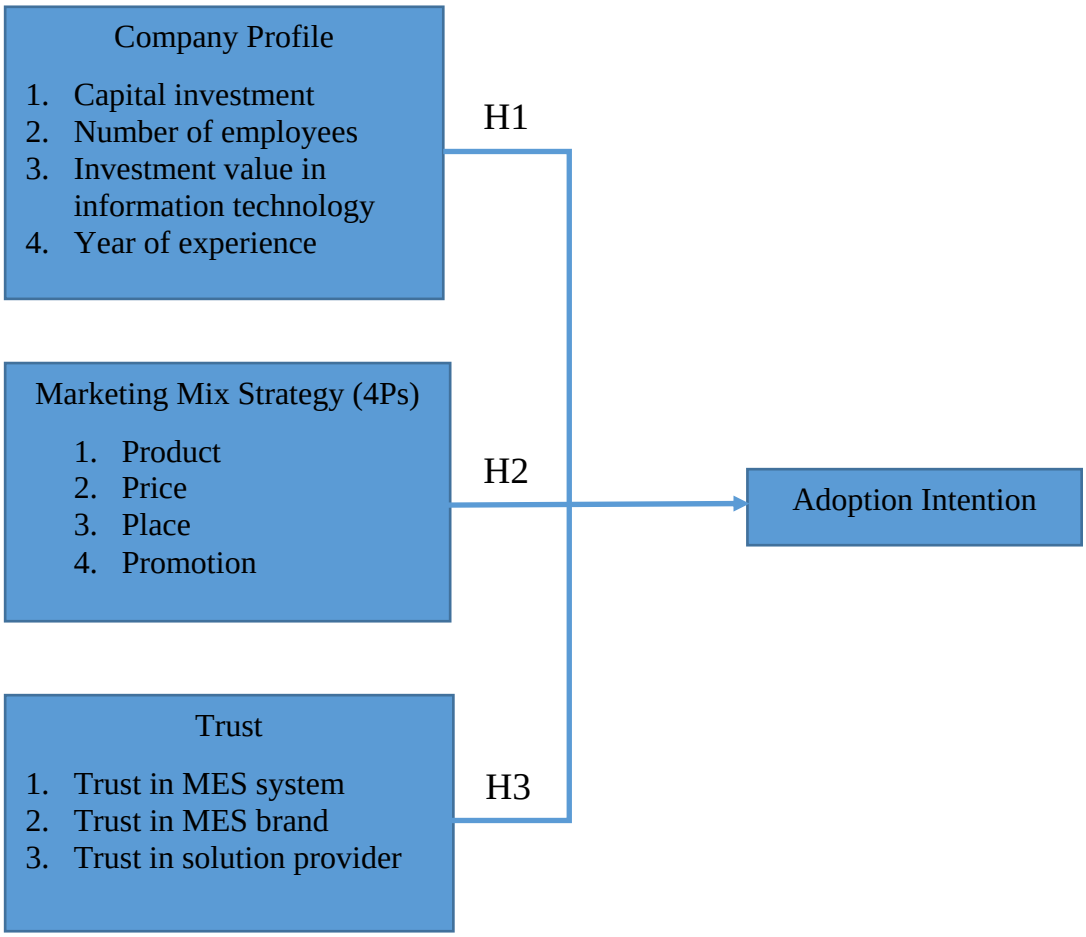
The value of food exports in Thailand slightly increased following the government policy, "Kitchen of the world" because the focus was on product quality. It is a very interesting topic. For example, Wonderware one of the leaders in MES Quality management software, expanded their business into international markets including the Asia region. This signifies the need to study the consumer adoption behavior of MES Quality management module in the Thai market. This study may help MES implementer and developer companies to better understand customers, and the research may be used to improve or develop sales and service strategies that can better reach customers. This study will be useful for making decisions to invest and develop appropriate marketing plans for their business after analyzing the results of the study.

The literature suggest possible influencing factors on the adoption intention of customers. For example, this study used demographics factors to understand target customers. Demographics is the term of marketing segmentation which is composed of the basic variables such as age, family size, family life cycle, gender, income,

occupation, education, religion, race, generation, nationality, and social class (Kotler & Keller, 2009). The demographics in this study refer to the company profile of customers such as number of employees (company size), age (company experience), information technology investment value, and capital investment value. The marketing mix is probably the most popular marketing term. Its elements are the basic, tactical components of a marketing plan, also known as the marketing mix 4Ps. The marketing mix is "the set of controllable tactical marketing tools; product, price, place and promotion that the firm blends to produce the response it wants in the target market" (Kotler, 2008). The marketing mix is defined as the "range of marketing activities/tools that an organization combines and implements to generate a response from the target audience" (Pickton & Broderick, 2005). Trust in a relationship is a crucial aspect to determine the intention to follow the advice of the other party (McKnight, Choudhury & Kacmar, 2002). Corritore, Kracher and Wiedenbeck (2003) proposed that trust reflects an attitude of confident expectation in a situation of risk in which one's vulnerabilities will not be exploited. Trust plays a key role in situations that involve high vulnerability, risk and interdependence (Ennew & Sekhon, 2007), as it is considered a prime mechanism for reducing customers' uncertainty (Tyler & Stanley, 2007). Generally, trust is acknowledged to have a beneficial influence on customer attitudes, intentions, and behaviors (Swan et al., 1999). It influences the selling of risk-based products and is positively related to the intention to adopt financial service innovations such as internet banking (Yousafzai, Pallister & Foxall, 2009). Much research shows that trust enables users to better evaluate their decisions and to gain more useful information (Pigg & Crank 2004).

Therefore, this research needs to investigate the consumer adoption intention of MES Quality management module in a public limited food exporting company in Thailand and its possible influencing factors such as company profile (demographics), marketing mix strategy and trust on the MES Quality management module in a public limited food exporting company in Thailand. The conceptual framework is depicted in Figure 1.

Figure 1: Conceptual framework of the study



Based on the above research questions and the conceptual framework, the hypotheses of the study are as follows:

H1: Organizational customers with different company profiles are likely to differ in terms of their adoption intention for an MES Quality Management Module.

H2: There is an influence of the marketing mix strategy used by the seller on the adoption intention of an MES Quality Management Module.

H3: There is an influence of trust on the adoption intention of MES Quality Management Module.

Research Methodology

The population are 4 managers of each company (production, quality control, engineering, and IT manager) of public limited food exporting companies in Thailand. The number of food exporting companies in the Stock Exchange of Thailand is about 41 companies. Therefore, the number of the population is 164 respondents.

A quota sampling method was adopted to collect the data from 41 food export companies. A questionnaire read by the google forms application was used to collect the data. It consisted of four sections. These are Part I: the basis company profile of respondents including capital investment value, number of employees, IT investment value and year of experience; Part II: Marketing mix strategy composed of product, price, place and promotion; Part III: Trust composed of trust in the system, brand and service provider; and Part IV: the adoption intention of consumers. A 5-point Likert scale was used to determine the level of agreement of consumers toward questions e.g. product adoption intention, consumer considerations.

148 questionnaires were actually received, yielding a relatively high response rate of 90.24%. Therefore, 148 respondents could be used for data analysis.

Data Analysis

The data was screened for normal distribution which could be assumed for the Skewness value range of -1 to +1 and the Kurtosis value range of -2 to +2 (Tabachnick & Fidell, 2001). In part I, company profile data were analyzed by using descriptive method, percentage and frequency. A hypothesis test was conducted by ANOVA test. In part II, III, and IV, data were analyzed by using descriptive method, percentage and frequency. The hypothesis test was conducted by Pearson Correlation test.

Research Findings

The process of analysis was focused on factors influencing the adoption intention of a Manufacturing Execution System (MES) for Quality Management module in a public limited food exporting company in Thailand.

Results of company profile

The majority of respondents' capital investment value were more than 1,000,000,000 Baht (29.7%) followed by the range of 250,000,001-500,000,000 Baht (24.3%), and 500,000,001-750,000,000 Baht (23.6%). The majority of respondents' number of employees in between the range of 4,001-6,000 persons (35.8%), followed by 6,001-8,000 persons (18.2%), and 2,001-4,000 persons (14.9%). The majority of respondents' information technology investment value were less than 10,000,000 Baht (41.2%) followed by the range of 10,000,001-20,000,000 Baht (35.8%), and 20,000,001-30,000,000 Baht (23.0%). The majority of respondents' experience in between the range of 31-45 years (54.1%), followed by 46-60 years (40.5%).

Results of marketing mix strategy (4Ps)

In terms of product, the majority of the respondents strongly agreed that they consider that the product function should be easy to use (mean = 4.622), flexible to modify (mean = 4.439), flexible to integrate (mean = 4.270), global standard acknowledgement (mean = 4.446) and product after sales service (mean = 4.500) when selecting an MES Quality Management module. However, they agreed that they considered the product function should have a real time response (mean = 4.007) when selecting an MES Quality Management module.

In terms of price, the majority of the respondents agreed that they considered the version upgrade price (mean = 4.047), modification price (mean = 3.993), and software price (mean = 3.669) when selecting an MES Quality Management module.

In terms of place, the majority of the respondents strongly agreed that they considered the location of support store (mean = 4.615), and sales store (mean = 4.297) when selecting an MES Quality Management module.

In terms of promotion, the majority of the respondents strongly agreed that they considered that the sales persons should be able to recommend a reasonable solution to them (mean = 4.534), provide special discount (mean = 4.453), provide training free (mean = 4.811), provide consultancy free (mean = 4.527), information that they found from the seminar (mean = 4.453), and reference information about the

service provider on a website (mean = 4.297) when selecting an MES Quality Management module. However, the respondents agreed that they considered that the software version upgrade should be free (mean = 3.966), training should be provided on YouTube free (mean = 3.574), success stories should be on the website (mean = 3.899), success stories should be on YouTube (mean = 3.730), and information that they found from trade fairs (mean = 3.365), product road show (mean = 4.020), and electronic brochure is available (mean = 3.601) when selecting an MES Quality Management module.

Results of Trust

The majority of the respondents agreed that they considered the stability of software (mean = 4.108), brand of software (mean = 3.804), and stability of a particular MES brand (mean = 4.081) when selecting an MES Quality Management module. However, the respondents strongly agreed that they considered the software standard function (mean = 4.365), MES provider performance (mean = 4.412), and MES provider experience (mean = 4.514) when selecting an MES Quality Management module.

Results of Hypothesis testing

H1: Organizational customers with different company profiles are likely to differ in terms of their adoption intention of an MES Quality Management Module.

The study found that there was a partial relationship between the company profile and adoption intention. The capital investment value, number of employees and information technology (IT) investment value had an influence on adoption intention.

H2: There is an influence of the marketing mix strategy used by the seller on the adoption intention of an MES Quality Management Module.

The study found that there was a partial relationship between the marketing mix strategy and adoption intention. In terms of product, software integration should be flexible, data should be indicated in real time and software should be acknowledged by global standard organizations had an influence on adoption

intention. In terms of price, software version upgrade cost, engineering cost for function modification and MES Software price had an influence on adoption intention. In terms of place, sales store had an influence on adoption intention. In terms of promotion, success stories on website, success stories on YouTube, MES seminar and reference site via the provider's website had an influence on adoption intention. Most of them agreed about promotion on websites.

H3: There is an influence of trust on the adoption intention for an MES Quality Management Module.

The study found that there was a partial relationship between the marketing mix strategy and adoption intention. The trust on standard functions of an MES system, a particular MES brand, the stability of a particular MES brand, provider's performance and provider's experience had an influence on adoption intention.

Conclusion and recommendations

This study aims to identify the adoption intention of a Manufacturing Execution System (MES) for Quality Management module in a public limited food exporting company in Thailand, and to determine the effect of different company profiles, marketing mix strategies and trust on the adoption intention for an MES Quality Management Module.

It was found that there was a significant relationship between the company profile of a public limited food exporting company in Thailand, such as capital investment value, number of employees, and information technology (IT) investment value and the intention to adopt. The result was in line with the study of Sriuthenchai (2010) who explored the factors affecting the purchasing behavior of badminton court service customers in Bangkok and metropolitan area. The study revealed the customers with difference status, monthly income and amount of spending per time have different behavior on purchasing of badminton court services in Bangkok and metropolitan area. Such a consistent result implies that customers with different

company profiles (e.g. capital investment value) affect the intention to adopt an MES Quality management module.

In terms of marketing mix strategy 4Ps, the respondents agreed about the importance of product, price, place, promotion mix. This was related to Sriyabhya (2008) whose study on the marketing mix of service businesses influences consumer behavior in using car care services within Bangkok. The study revealed that the most important factors of the marketing mix focused on by the customers are service staffs, price, promotions, services, physical evidence, processes and service channels, respectively. Such a consistent result implies that marketing mix strategy 4Ps (e.g. product, price, place, promotion) factors affect the customer's decision making regarding the intention to adopt an MES Quality management module.

In terms of trust, the respondents agreed about the importance of trust in the brand, trust in the system, and trust in the solution provider. This was related to Hoffmann (2011) whose study on the influence of trust on the consumer intention to adopt a fee-based advisory model in an empirical study on retail banking. The study revealed that the most important factors of trust focused on by the customers are trust in the bank (financial service provider) and trust in employees (personal service advisor). Such a consistent result implies that trust (e.g. provider, brand) factors affects the customer's decision making when intend to adopt an MES Quality management module.

Managerial Implications

Based on findings from the research, the majority of the respondents had the intention to adopt an MES Quality management module because the data channel was easy to source, and there was brand awareness and provider awareness. These criteria help the MES provider especially, to promote a MES Quality management module in Thai market. They can get a competitive advantage in the market although they are new. Mostly consumers choose an MES Quality management module that is flexible to integrate, has real-time information and has global standard acknowledgement. However, consumers also consider the importance of price. In terms of decision

making, customers always choose an MES Quality management module that has lower cost; version upgrade cost, function modification cost and software cost. The website is the most important promotion for an MES Quality management module. Most consumers tend to find information about an MES Quality management module themselves either by searching information or from seminars, which is another important tool to promote an MES Quality management module. Consumers like to find information from seminars because they can ask for information that they need directly from an MES consultant and provider. However, in the end, customers make a decision on selecting an MES Quality management module by themselves. So, the MES provider should consider the effects of websites and seminars to better communicate with prospective and existing customers. For example, the MES provider should promote products, success stories and reference sites on websites or in seminars. Lastly, trust is the most important factor in terms of decision making as customers always choose an MES Quality management module because of trust in the MES system, MES brand and MES provider.

Recommendation for Future Studies

This research focused mainly on the factors influencing the adoption intention of a Manufacturing Execution System (MES) for Quality Management module in a public limited food exporting company in Thailand. Actually, public companies often have sub-companies or sub-manufacturing. So, the number of the population should be more than this and the result might be more powerful than in this study. In this study, the influential factors were identified from existing literature.

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