GUIDELINES FOR EFFICIENT DEVELOPMENT IN WIRE AND CABLE INSULATED INDUSTRY IN THAILAND

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ABSTRACT

The objective of this research was to study the components of an efficient development approach for insulated wire and cable manufacturing industry in Thailand. The mixed research method was used starting with qualitative research with in-depth interview techniques to find factors to develop into a model and quantitative research collecting data from the sample group of 500 executives of the insulated wire and cable manufacturing industry to develop and analyze the model. Lastly, the qualitative research was conducted with group discussion techniques to verify the validity of the model. The results of the simulation analysis revealed to be consistent with empirical data. The hypothesis testing results showed that financial management directly influenced human resource management technology application and product development at the statistical significance of 0.001 level. The application of technology directly influenced human resource management and product development at the statistical significance of 0.001 level. In addition, human resource management directly influenced product development at the statistical significance of 0.001 level. It could be concluded that the efficient development of the insulated wire and cable manufacturing industry in Thailand should start with financial management as the financial management was an important factor in technology application investment planning, human resource management, and corporate product development in order to compete in the market vigorously and sustainably.

Keywords: Guidelines for the Development, Insulated Wire and Cable Manufacturing Industry

INTRODUCTION

The technological advancement results in the development of the economy and industry on a global scale including the strategies for the development of Thailand 4.0, especially the policy to promote electricity production by using domestic resources for maximum benefits (Energy Policy and Planning Office, Ministry of Energy, 2016). In 2002, the Thai government established the Ministry of Information and Communication Technology and developed into the Ministry of Digital Economy and Society in 2016 to cover the development of the telecommunication industry and information technology to be more sustainable. One of the key products used in these industries is "insulated wire and cable" commonly known as electrical wires, cables, fiber optic cables, electrical transmission cable and telecommunication cables.

With the trend of globalization, the insulated wire and cable industry focuses on production for distribution to the main products in the power generation industry, telecommunication and information technology both domestically and internationally such as telecommunication equipment, Consumer Electronics, automotive electronics, and computer (Department of International Trade Promotion, 2017). This causes the insulated wire and cable manufacturing industry to have the growth direction according to the main products. However, the exports of insulated wire and cable products in Thailand tend to decline as shown in Figure 1.

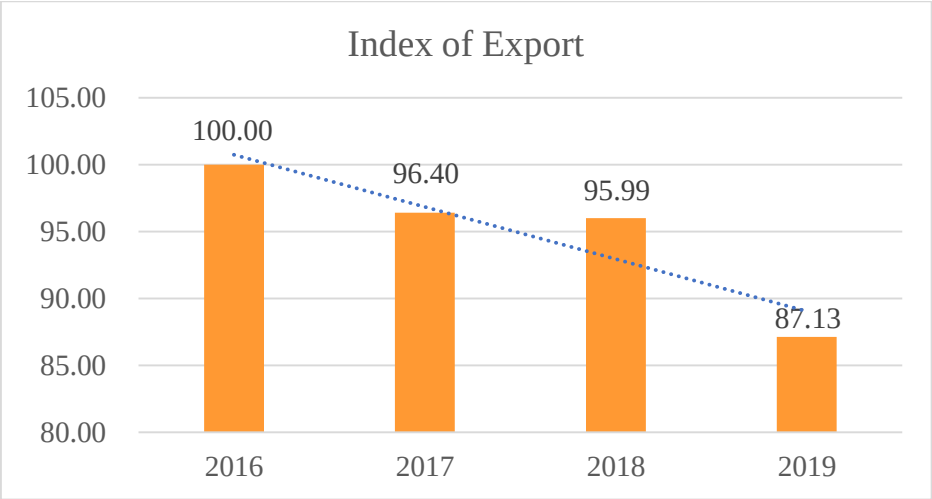

FIGURE 1
EXPORT INDEX FOR THE THAI INSULATED WIRE AND CABLE MANUFACTURING INDUSTRY (INDUSTRIAL ECONOMIC OFFICE MINISTRY OF INDUSTRY, 2020)

From the data analysis figure 1 on the competitive environment of the insulated wire and cable manufacturing industry, it was found that there were 4 important factors;

1. Problems in applying technology. The insulated wire and cable industry is a rapidly changing technology especially in production communication and information including the lack of use of technology, lack of tools or functionality, lack of modern tools.
2. Lack of efficiency in human resource management: the human resource structure has changed a lot. Longevity increases the number of old people while the fertility rate is decreasing changing social environment. The communication enables everyone to access the Internet for finding the information. Pubbing causes ignorance on those around them with more freedom to work. These are the barriers to building a research organization that can be passed on throughout the organization. The employees have to learn along with their work every day. The organization and the employees must help one another to create learning to occur in the organization.
3. Product development problems are caused by having the products that are not covered for customer needs. Therefore, they are unable to compete with competitors. The original product shape is not up-to-date and does not meet the trends of the world market. Thus, they are unable to compete with the world market. The application of technology results in standardized products, reduction of loss, and quality.
4. Lack of guidelines for financial management: the access to funding is difficult. The financial costs are high. The financial information is ineffective and lack of credibility including lack of financial planning.

In this research, the researcher aimed at studying the development of insulated wire and cable manufacturing to optimize sustainable competitiveness. The combination of research methods was used to obtain an approach that can be applied in solving the problems caused by the obstacles and the 4 constraints as described above. This is the main reason why Thailand continues to encounter export problems in the insulated wire and cable manufacturing industry that tends to decline until now. Therefore, this is the question and objective of this research to develop a structural equation model and guidelines for the efficient development of insulated wire and cable manufacturing industry in Thailand.

LITERATURE REVIEW

From the research objectives, the study of academic papers and the qualitative research was conducted with in-depth interview techniques to develop as a hypothesis and create a research conceptual framework of the structural equation model on the guidelines for the efficient development of insulated wire and cable manufacturing industry in Thailand. The four important factors could be found and distinguished as follows:

Application of Technology

The organizations should focus on adapting to the digital age under today's rapidly changing technological environment to create business opportunities. The technology tools are required to enable the entire organization to work altogether to help managing the complexity of businesses in the digital age (Noorit, Thapayom & Pornpundejwittaya, 2020). Schwab (2017) stated that the power of developed innovation and technology helped increasing the productivity of the organization. The organization that sees the optimism of development and technology will use digital technology in various activities affecting the development and increasing the wealth of the organization.

Human Resource Management

Platonova & Hernandez (2013) said that 80% of organizations with sustainable competitive advantage valued intangible assets which consist of

1. Human capital including personnel with knowledge and ability,
2. Knowledge including personnel that matched the culture and values of the organization,
3. Expertise of personnel including individual compensation focusing mainly on the goals of the organization.

The research and learning could create a new conceptual framework and then forwarded throughout the organization. It is a big challenge and must be done continuously throughout the working life.

Product Development

The product development refers to the process of creating products that are outstandingly beautiful by using elements of various theories and using various materials as raw materials to create works to meet the needs of consumers to be more comfortable. These include the improvements to existing products for the current market such as making them larger, smaller, changing, combining or separating different characteristics of the products to create product quality distinctive from competitors. It is needed to study the consumer needs which is considered the most important part of product development (Brown, 2017).

Financial Management

The financial management means planning, organizing, regulating financial activities, taking advantage of corporate funds and applying the principles of corporate financial resource management for maximum benefits. The financial management is financial planning that must be spent on financial investments according to the investment plan to find the lowest cost funding source. The management on the return of cash received by the organization, the analysis, and the forecast of cash inflow and cash outflow rate can solve the problems in managing financial liquidity and managing corporate assets (Kulchittivej, Pornpundejwittaya & Silpcharu, 2020).

Research Hypotheses

In this research study, the researchers defined the research hypotheses according to the theory to study the influence between components which entrepreneurs and executives in business organizations can use the hypothesis testing results to use in planning management as well as creating the guidelines for the efficient development of insulated wire and cable manufacturing industry in Thailand. There are 7 hypotheses as follows:

H1: The financial management directly influences human resource management.

The financial management is essential to human resource management. Manpower planning is not just about the number of employees, it also includes significant investments in human capital such as training, reward development, and rewarding. When financial management for human resources services is effectively managed, it helps organizations run smoothly (Aalapure, 2017). Human resource management is very beneficial to business success.

H2: The financial management directly influences technology application.

A well-managed entity provides good liquidity for the organization and allows sufficient and appropriate capital to invest in various technologies in the organization. It is correspondent with the study of Wells, et al., (2013) finding that cost and capital are the most important barriers to the application of technology in the organization. Similarly, according to the survey of Statista Research Department (2014), 50% of the barriers to technology application are largely due to lack of budget and financing.

H3: The financial management directly influences the product development.

Tervala, et al., (2017) found that financial management plays a role in supporting the work of product development project managers both in the implementation of the project model and broader reflections on business impact. Davila (2000) who studied the research on the drivers of new product development said that corporate finance would help organizing, controlling, and managing the capital resources of the organization to achieve the highest return under the lowest risk for commercial product development. Therefore, the financial management is an important basis for the development of enterprise products.

H4: The human resource management directly influences the product development.

Malik, Pereira & Tarba (2019) conducted the research study entitled the Role of HR Practices in Product Development and found that the empowerment HR practices were used to explore new ideas and practices. Performance-oriented HR was used to take advantage of the organization's existing strengths. The HR guidelines aimed to develop behaviors that valued collaborative development as a team using a parallel approach to product development.

H5: The technology application directly influences the human resource management.

The application of corporate technology is essential in providing timely and critical information to the HR department in maximizing human resource management (Chen et al., 2018). This is consistent with the research of Piabuo, et al., (2017) findig that financial infrastructure is an effective tool for human resource management. The use of data from ICT systems ensures efficient human resource management. Subhashree & Vasantha (2020) said that the interoperability between HR and IT systems enabled faster transaction processing and reduced data errors. It enhances tracking and control of the actions of HR Department.

H6: The technology application directly influences the product development.

The machine technology and automation equipment such as Rapid Prototype (RP) and 3D Printing machines have come into play in creating prototypes quickly after product design. The support of these devices and machines can help reducing the design process time. It can reduce the cost of producing prototype parts and help reducing the waste in the prototyping process enabling 3D visualization (Tao et al., 2018). This agrees with Babiceanu & Seker (2016) who found that technology application drives the organization's business operations including product development to make the operation of the organization more efficient and potential.

H7: The importance of the overall development of the insulated wire and cable manufacturing industry in Thailand entirely. When classified by business size, they are different.

Large businesses succeed in organizing the management, operational excellence, and development of business performance measurement models to be more up-to-date than small and medium-sized businesses due to the readiness of investment, personnel and administrative tools. The standardized process will be ready to deal with economic volatility and trade competition. Varnakomala & Thapayom (2020) said that in a world without borders, there was the quick access to news all over the world. Small and medium-sized businesses with little investment still not strong enough in business even more are unable to cope with various volatile conditions.

METHODOLOGY

This study was designed as an inductive research with mixed methodology. Qualitative Research using In-depth Interview technique with 9 experts including 3 experts in wire and cable insulated industry entrepreneurs, 3 experts in wire and cable insulated industry from government department and 3 independent scholars in business management academic with structured interview from as opened-end questions followed the concept of four latents which reviewed from theory and literature. The four latents comprised of 1) Apply of Technology 2) Human Resource Management 3) Product Development and 4) Financial Management. These variables were evaluated the index of the corresponding with objective or content using Item Objective Congruence; IOC analysis that showed 0.60-1.00 value (accepted at >0.5). Finally, we obtained the suitable 100 variables in 4 latents for try-out questionnaire that evaluated the reliability from Cronbach's Alpha statistic showed at 0.97 (accepted at >0.8) and discrimination both check-list and rating-scale question items (accepted at >0.3) using Standard Deviation (S.D.) analysis obtained 0.41-1.65 and Corrected Item-Total Correlation analysis obtained 0.31-0.73 respectively.

Quantitative research: Population of this research is entrepreneurs in wire and cable insulated industry in Thailand which are classified into large industrial business with having more than 200 employees and small and large industrial business with having less than 200 employees (Ministry of Industry, 2019). Sample size determination was carried out by using criteria of component analysis research. 500 samples were determined in very good level (Comrey & Lee, 1992 referred in Tanin, 2020). Multi-stage sampling was used and consisted of cluster sampling, quota sampling and probability sampling using simple random sampling, respectively. Multivariate Statistical Analysis employed Structural Equations Model (SEM) by AMOS with evaluating the Data-model Fit in 4 levels including (1) Chi-square Probability Level over 0.05, (2) Relative Chi-square less than 2, (3) Goodness of fit Index over 0.90, and (4) Root Mean Square Error of Approximation less than 0.08.

The model of Approach to the used of innovation in the Thai food industry to enhance sustainable to the competitiveness approved by 11 experts using focus group analysis techniques in qualitative research.

RESEARCH RESULTS

The results of the analysis on the guidelines for the efficient development of insulated wire and cable manufacturing industry in Thailand are as follows: Industrial development guidelines Manufacture of insulated wire and cable in Thailand effectively, large

Table 1
MEAN AND STANDARD DEVIATION OF THE GUIDELINES FOR THE EFFICIENT DEVELOPMENT OF INSULATED WIRE AND CABLE MANUFACTURING INDUSTRY IN THAILAND

Guidelines for the efficient development of insulated wire and cable manufacturing industry in Thailand	Medium and small enterprises			Large enterprises		
	X	S.D	Level of Importance	X	S.D	Level of Importance

Overall	4.12	0.30	High	4.22	0.24	High
1. Technology application	4.19	0.34	High	4.26	0.28	High
2. Human resource management	4.04	0.36	High	4.15	0.31	High
3. Product development	4.09	0.35	High	4.20	0.28	High
4. Financial management	4.17	0.34	High	4.26	0.27	High

The research results Table 1 found that entrepreneurs in large businesses give more importance to the overall than entrepreneurs in small and medium businesses. The results of each aspect for entrepreneurs in small and medium-sized businesses can be arranged in descending order of average scores, namely, technology application, financial management, product development, and human resource management. For individual consideration on the results of entrepreneurs in large businesses, the average scores can be sorted from highest to lowest in order, namely, financial management, technology application, product development and human resource management. All aspects are of high importance.

According to the results of structural equation model analysis, the researcher continued to improve the structural equation model based on the Modification Indices (MI) as recommended by the (Arbuckle, 2012) to rule out some improper observational variables until a structural equation model is obtained. With statistical values that passed all 4 criteria, it was found that the analysis of the developed structural equation model passed the criteria for evaluating consistency and empirical data with a Chi-square Probability Level of 0.051, Relative Chi-square of 1.187, Goodness of Fit Index of 0.962 and Root Mean Square Error of Approximation of 0.019.

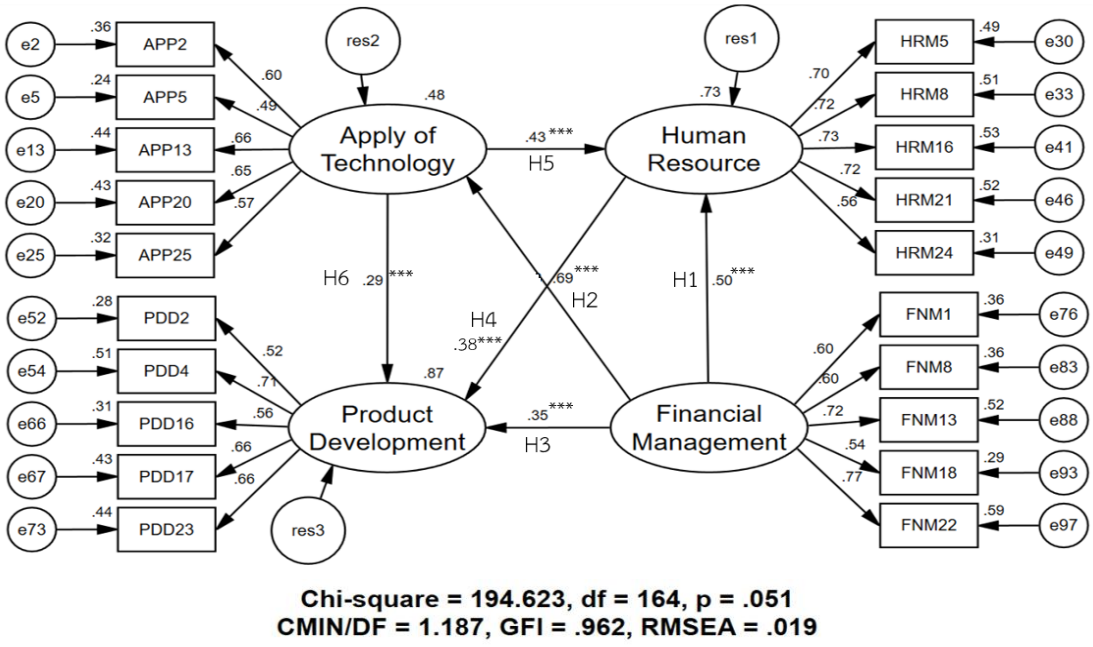

FIGURE 2
STRUCTURAL EQUATION MODEL OF THE GUIDELINES FOR THE EFFICIENT DEVELOPMENT OF INSULATED WIRE AND CABLE MANUFACTURING INDUSTRY IN THAILAND

In summarizing the results of the structural equation model analysis of the research, it was found that the structural equation model of the guidelines for the efficient development of insulated wire and cable manufacturing industry in Thailand after improving the model is consistent with empirical data. The results of the statistical hypothesis test were consistent with the research hypothesis set as shown in Figure 2.

Table 2
STATISTICAL ANALYSIS OF STRUCTURAL EQUATION MODEL FOR GUIDELINES FOR EFFICIENT DEVELOPMENT IN WIRE AND CABLE INSULATED INDUSTRY IN THAILAND IN STANDARDIZED ESTIMATE MODE

Variable	Estimate		R^2	Variances	C.R.	p
	Standard	Un-standard				
Financial Management				0.28		
Human Resource Management	0.50	0.56	0.73	0.09	6.61	***
Apply of Technology	0.69	0.64	0.48	0.12	8.83	***
Product Development	0.35	0.31	0.87	0.03	4.11	***
Human Resource Management			0.73	0.09		
Product Development	0.38	0.30	0.87	0.03	3.80	***
Apply of Technology			0.48	0.12		
Human Resource Management	0.43	0.52	0.73	0.09	5.70	***
Product Development	0.29	0.28	0.87	0.03	3.54	***
Apply of Technology			0.48	0.12		
APP2	0.60	1.00	0.36	0.43		
APP5	0.49	0.84	0.24	0.52	8.94	***
APP13	0.66	1.08	0.44	0.36	11.05	***
APP20	0.65	1.08	0.43	0.37	10.96	***
APP25	0.57	0.98	0.32	0.48	9.93	***
Product Development			0.87	0.01		
PDD2	0.52	1.00	0.28	0.57		
PDD4	0.71	1.21	0.51	0.31	10.89	***
PDD16	0.56	0.92	0.31	0.40	9.44	***
PDD17	0.66	1.38	0.43	0.55	10.42	***
PDD23	0.66	1.07	0.44	0.31	10.49	***
Financial Management				0.28		
FNM1	0.60	1.00	0.36	0.50		
FNM8	0.60	0.94	0.36	0.43	10.78	***
FNM13	0.72	1.17	0.52	0.35	12.24	***
FNM18	0.54	0.90	0.29	0.56	9.85	***
FNM22	0.77	1.13	0.59	0.25	12.71	***
Human Resource Management			0.73	0.09		
HRM5	0.70	1.00	0.49	0.37		
HRM8	0.72	0.98	0.51	0.32	14.42	***
HRM16	0.73	0.97	0.53	0.29	14.67	***
HRM21	0.72	1.01	0.52	0.33	14.52	***
HRM24	0.56	1.04	0.31	0.86	11.39	***
*** Statistically significant at the 0.001 level						

The results of table 2 the structural equation model analysis of the research revealed that the Financial Management found a variance of 0.28 directly influencing the Human Resource Management aspect at the Standardized Regression Weighs of 0.50 with statistical significance at the 0.001 level. The squared correlation factor (R^2) was 0.73 while the variance was 0.09. It directly influenced the Apply of Technology aspect at the Standardized Regression Weighs of 0.69 with statistical significance at the 0.001 level. The squared correlation factor (R^2) was 0.48 while the variance was 0.12. It directly influenced the Product Development at the Standardized Regression Weighs of 0.35 with statistical significance at the 0.001 level. The squared correlation factor (R^2) was 0.87 while the variance was 0.03. In Human Resource Management, the variance was 0.09 which directly influenced the Product Development at the Standardized Regression Weighs of 0.38 with statistical significance at the 0.001 level. The squared correlation factor (R^2) was 0.87 while the variance was 0.03. In the Apply of Technology aspect, the variance was 0.12. It directly influenced the Human Resource Management at the Standardized Regression Weighs of 0.43 with statistical significance at the 0.001 level. The squared correlation factor (R^2) was 0.73 while the

variance was 0.09. It directly influenced the Product Development at the Standardized Regression Weighs of 0.29 with statistical significance at the 0.001 level. The squared correlation factor (R^2) was 0.87 while the variance was 0.03.

In summarizing the results of the structural equation model analysis of the research, it was found that the Financial Management is an Exogenous Latent Variable that influences Endogenous Latent Variable. Other aspects are Application of Technology, Product Development, and Human Resource Management with statistical significance at the 0.001 level. The sum of influences on Product Development yielded the squared multiplicative correlation (R^2) of 0.87.

DISCUSSION ON THE RESEARCH RESULTS

The key points found from research findings on the guidelines for the efficient development of insulated wire and cable manufacturing industry in Thailand revealed that the insulated wire and cable manufacturing industry needed to improve its technology application for sustainable competitive efficiency management approach. It should be prioritized starting from financial management because financial management is an important factor in financing decisions and investment decisions. The principle is that in financing, it should be the source of funding with the lowest cost and lowest risk. It also results in increased sustainable competitive efficiency in other areas of management as well. This is consistent with the hypothesis testing of the research.

The financial management influences the technology application. It shows that the financial management allows information to take into account investment decisions. A well-managed entity provides good liquidity for the organization and allows sufficient and appropriate capital to invest in various technologies in the organization. According to the study of Wells, et al., (2013), it was found that the cost and capital were the most important barriers to the application of technology in the organization. Similarly, according to the survey of the Statista Research Department (2014), 50 percent of the barriers to technology application are largely due to lack of budget and financing.

The financial management influences product development showing that corporate financial management helps organizing, controlling, and managing the organization's capital resources in order to achieve the highest return under the lowest risk. For product development, the aim is to turn the concept into a commercial product (Davila, 2000) to increase the competitiveness of the company by investing in Research and Development (R&D) to create new products that are different. The organizations should consider the costs involved, therefore, financial management is an important basis for the development of an organization's products. This is consistent with the study of Tervala, et al., (2017) finding that financial management plays a role in supporting the work of product development project managers.

The financial management influences human resource management showing that the important thing is to understand manpower planning. It is not just about the number of employees but also includes significant investments in human capital (such as training, reward development, and rewarding) (Aalapure, 2017). Therefore, effective financial management will ensure smooth running of human resource management services. This is consistent with the study of Sao (2017) finding the strong relationship between financial management and HR management which is highly beneficial for business success.

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