EFFECTIVE MANAGEMENT GUIDELINES FOR INDUSTRIAL ESTATE AUTHORITY TO SUPPORT SUSTAINABLE GROWTH OF THE COUNTRY

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ABSTRACT

Aim: *This research investigates the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country.*

Methodology: *The mixed method of qualitative and quantitative study was employed to collect data. Questionnaires were administered with 500 supervisors working in the factories located in the Authority of Industrial Estate. The data were used to develop simulation equation model congruent with the empirical data of light and heavy industry.*

Finding: *The results revealed that: 1) the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country consisted of 4 main components, i.e. plan and policy defining, environment management, infrastructure and transportation management, and knowledge management. The informants rated the importance and the efficiency of the management model at high level with the average of 4.01 and 4.05. 2) The evaluation of the management model showed the congruence with the empirical data with the index of objective congruence (IOC) at 0.969 and the root mean square error of approximation at 0.021. 3) The hypothesis result showed that the plan and policy-defining factor has direct influence on the environment management factor with the factor loading value of 0.29. Moreover, this factor has direct influence on the infrastructure and transportation factor at the factor loading value of 0.52 with 0.001 statistically significant values. However, the plan and policy-defining factor did not show direct influence on the knowledge management factor. The infrastructure and logistics structure show direct influence on the environment management factor with the factor loading value of 0.61. It influences the knowledge management factor at 0.57 with 0.001 statistically significant values.*

Conclusion: *It can be concluded that the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country consists of 4 main components, i.e. plan and policy defining, environment management, infrastructure and logistics management, and knowledge management with the highest value on the knowledge management, environment management, infrastructure and logistics management, and plan and policy defining respectively. The supervisors from both light and heavy industry also gave the highest importance on the knowledge management factor. According to the evaluation of the model, it was found that the developed guidelines were congruent with the empirical data at the qui square probability of 0.056, relative qui square of 1.219, congruent index of 0.969, and the root mean square error of approximation of 0.021.*

Keywords: Management, Industrial Estate Authority, Guidelines for Industrial Estate Authority Management.

INTRODUCTION

Thailand has launched the national Economic and Development Plan since 1961; the government agreed that in order to effectively develop the country economy, The Industrial Estate Authority of Thailand (IEAT) is a state enterprise under the Ministry of Industry; established in accordance with the Announcement of the Revolutionary Council No. 339 dated December 13, 1972 and enacted as the IEAT Act 1979. Later, there was an amendment (Version 2), 1991, as amended (Version 3 1996) the establishment of the IEAT is intended to be a government mechanism to drive the industrial sector of the country. By establishing an industrial estate for increasing investment value of the industrial sector And supporting industrial factory operations to systematically combine To support sustainable economic growth Together with environmental management And causing a balanced and sustainable distribution of economic and industrial development to all regions of the country And amended (version 4) 2007 to expand the scope of area development from the industrial sector to the service sector (Industrial Estate Authority of Thailand, 2018 a). The IEAT has important mission in accordance with the law. And which has been assigned in accordance with the principles of national development policy is the development of public utilities, facilities and facilities for industrial operators to promote and support the development of the industry and service sector. Prosperous growth along with overseeing the environment and safety within the industrial estate not to affect the community (Industrial Estate Authority of Thailand, 2019).

According to the GDP report of the country during, 2013-2018 the growth of industrial economy showed positive trend with the growth rate at 3.47, 3.58, 3.67, 3.78, 3.98, and 4.18 trillion baths respectively (Office of the National Economic and Social Development Council, 2018). However, the expansion and the growth of the industry without systematic administration has resulted in the problem on both the industrial estate and the community nearby. Moreover, it causes problems in establishing new industrial estate especially the problem of pollution control (Pollution Control Department, 2019). According to the accident statistics during 2013-2018, there were 51, 62, 56, 42, 86, and 53 accidents and emergency events related to production industrial chemicals and industrial chemical products respectively.

And when considering the growth rate of the industrial sector towards the growth rate of gross domestic product (%), it is found that the trend is decreasing every year. 2017, which has a growth rate 4.77% higher than the 2013, (Reference year) but if considering the rate of accidents from the industry (%), it is found that the rate of accidents decreased from 2017. However, when considered in the overall picture, the growth rate of the industrial sector to the growth rate of gross domestic product (%) has a direction of significant decline while the rate of accidents from the industry (%) has increased significantly as shown in Figure 1. This is resulting from ineffectiveness of industrial management.

The environmental problem becomes more serious worldwide (Kaur & Lodhia, 2019). Sustainable development becomes the important strategy in conducting business (Taherdangkoo et al., 2019). To pursue the sustainable development, it is important to give the value and the success of organization on 3 dimensions, i.e. economy, society, and environment (Elkington, 1997). With the reasons mentioned above, the researcher tried to develop the simulation model on the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country. The model consisted of 4 main components, i.e. plan and policy defining, environment management, infrastructure and logistics management, and knowledge management. This can be practical guidelines in managing industrial estate effectively to support

the sustainable growth of the country and provide some suggestions to strengthen the potential of industrial business of Thailand.

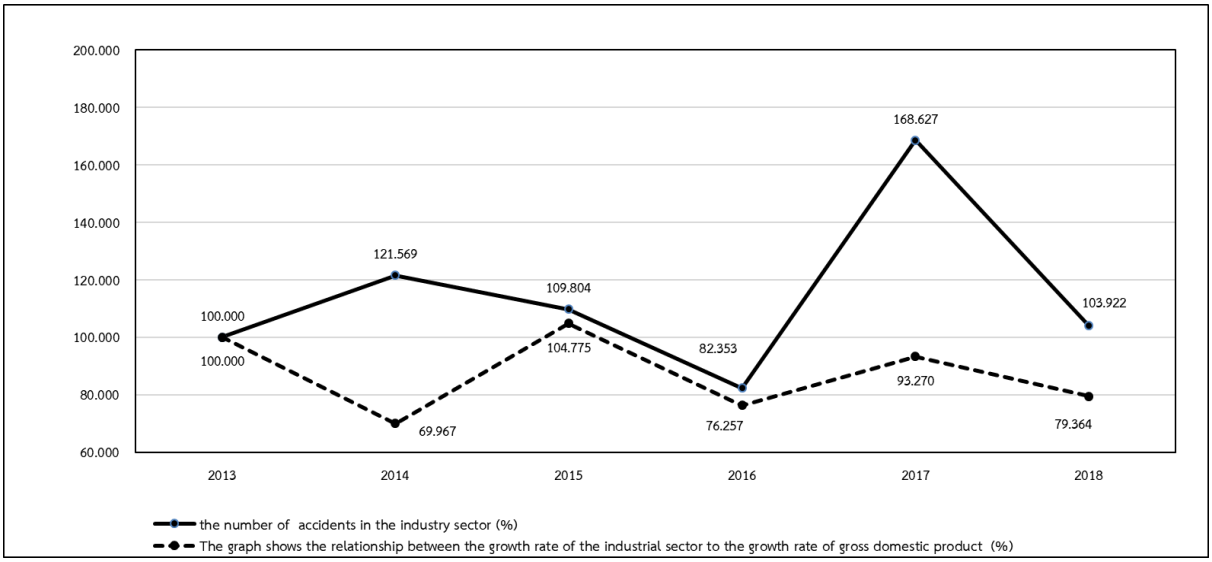


FIGURE 1
THE GRAPH SHOWS THE RELATIONSHIP BETWEEN THE GROWTH RATES OF THE INDUSTRIAL SECTOR TO THE GROWTH RATE OF GROSS DOMESTIC PRODUCT (%). AND THE NUMBER OF AN ACIDENT FROM AN INDUSTRIAL SECTOR (%)

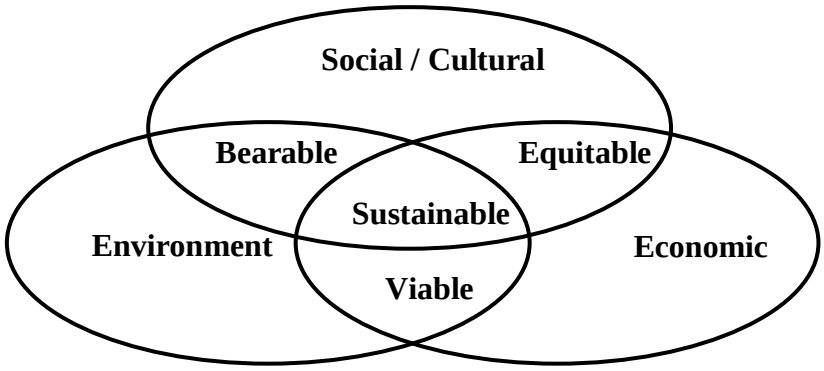
Sustainable Development

The sustainable development is important to every sector with a widely continuous mention in every field. Several researchers pay attention on this topic (Rodriguez et al., 2019) but only few companies pay attention and implement it in the real practice (Munck & Tomiotto, 2019). Therefore, the idea of eco industry is the new concept for the sustainable development of the industry focusing on environmental friendly. The design of the industrial system is based on the existing ecological system by relying on each other and sustainably existing maintaining the flourishment of natural resources for the next generations (Frosch & Nicholas, 1989) through the industrial symbiosis.

In the fast-moving world cannot deny that it was the moment of birth Difficulties with the management of various organizations. Many large companies have to close because they cannot keep up with changes in technology and consumer behavior (Dekhili et al., 2019). Many successful companies in 20th century were unable to withstand the 21st century business trends. The important fact is business organizations are economic institutions in which survival depends on profits. If income is not worth the cost, it must be closed. In the current situation, the survival of business organizations becomes more complicated. When changes in society, politics and the environment make various factors that are externally affected into issues that may affect the survival of the organization. Attempts to find a protective shell for changes may be possible in the short term. But in the long run, business organizations must understand and accept what the world is facing in order to anticipate the future and prepare to respond in a timely manner. All of

this leads to a conceptual framework that is more in line with sustainable development. (Industrial Estate Authority of Thailand, 2018 b)

Sustainable development has become an important strategy of business operations. (Taherdangkoo, et al., 2019) due to the increasing environmental problems causing global crises, global warming, the reduction of natural resources Hazardous waste generated from industrial plants, pollution, deforestation Population increase Unemployment and poverty have turned every country into special attention (Kaur & Lodhia, 2019). The concept of sustainable development is begun in the year 1970, the problem of pollution that has intensified and spread. Led to the United Nations Conference on the Human Environment in 1972 in Stockholm, Sweden. From this point on, various countries have undertaken various activities Related to meet the UN policy International environmental laws were enforced. Later in 1987, the World Commission on Environment and Development (WCED or Brundtl and Commission) defined the term sustainability as: Developing in response to the needs of the present people without compromising the ability to meet the needs of the future. Elkington (1997) has introduced the Triple Bottom Line (TBL) principles interestingly that sustainable development must pay attention to Looking at the value and evaluating the success of the organization in a balanced manner in 3 dimensions (Figure 2).



Source: Elkington (1997)

FIGURE 2
TRIPPLE BOTTOM LINE (TBL) PRINCIPLE

Management

There are several processes in resource utilization to achieve the set goal (Dale, 1968) rely on the factors of man, money, and materials (Koontz & Cyril, 1976). This includes the art of working with others (Drucker, 1979) to effectively achieve the organizational target (Somkid, 2015).

Luther & Urwick (1937) developed the concept of Fayol (1964) by adding 7 administrative principles, i.e. POSDCoRB 1) planning refers to set operational plan and operation method of the organization to reach the target. 2) Organizing refers to defining the organization structure, division, and job specification with clear job description. 3) Staffing refers to HR management, i.e. work force arranging, recruitment, promotion, personnel development, morale support, fringe benefits, working atmosphere, and staff evaluation. 4) Directing refers to making decision, supervising, and operation controlling. 5) Coordinating

refers to coordinate work among departments in the organization for smooth cooperation to reach the same goal. 6) Reporting refers to the report of every staff level, so that the management team and other staffs can acknowledge the progress of the tasks regularly. 7) Budgeting refers to arranging the budget, accounting, auditing of both finance assets.

Value Chain

Value chain is the process to increase the competition and stability of any business. Value chain is an important process for product and service comprising the following steps: bringing a product from concept to distribution such as processing raw materials, manufacturing, and marketing activities. A value chain model describes the full range of activities in the value chain divided into 2 main activities, i.e. primary activities and support activities (Porter, 1980).

Planning and Policy

The policy steps focus on the clear description of the government policy and behavior of related organization presented in the form of the policy process or life cycle or policy steps consisting of 3 stages, i.e. defining policy prototype, defining policy, and after the policy implementation (Dror, 1968). The last stage can be categorized into 4 steps, i.e. exploring problems, indicating the policy target, collecting step, and alternative and defining policy (Charles, 1966). Planning is the process of forecast decision on the activities required to achieve a desired goal by deciding what to do, how to do, when to do, and who will do. Planning is the bridge connecting the gap between present and future to achieve the desired target (Koontz & Cyril, 1976).

Environment Management

The sustainable environment management involves the employment of natural resources at the appropriate amount with the ecological balance system. This includes the pollution control at the level of ecological absorption ability (Krairapanond & Atkinson, 1998). The effective management of industrial system can balance the usage of by-product in producing a new product affecting local and global pollution level of managing ability. The management aims at adjusting the production process and consumption from the linear system to the closed-circuit system to make industrial process close to the ecological dynamic. The eco-industrial system compiles the strong strategies of closed-circuit system from factory level, industrial estate, and local area to reach the sustainable development (Savitz & Weber, 2006).

Infrastructure and Transportation System Management

Infrastructure is an important factor for the country development in every area such as economy, society, culture, and country stability by establishing a community structure or the community development in terms of accommodation area, telecommunication system, transportation, and electricity and water system (Infrastructure Management Research Unit, 2016).

The development strategic plan of Thailand on the transportation during 2558-2565 BE has been proposed under the concept of 4-adding and 1-strengthening, i.e. adding communication system to support ASEAN and EEC, increasing the country competitive edge in

exporting, adding transportation standard, and increasing people life quality aiming at strengthening social foundation stability and the safety standard in transportation through the development of 5 s principles, i.e. standard, safety, service, saving energy, and saving world and green environment (Ministry of transport, 2015).

The green transportation system (Pichai, 2015) is the management system based on technology, environmental friendly and intelligent transport system for effective transport system management with safety and environmental friendly (The Center for Sustainable Transportation, 2008).

Knowledge Management

Nowadays, the economic system gives an importance on human capital for sustainable development because human resource results in work production (World Bank Glossary, 2014). The investment in human is normally on education in order to develop knowledge. The knowledge development requires the knowledge development hierarchy (Richard & Stuart, 2006). Knowledge management cycle is the new knowledge starting from personnel in certain organization, which is then transferred to the organizational knowledge creating high value to the organization (Meyer & Zack, 1996). The process of knowledge production and the integration with the organizational feedback (McElroy, 2003) and the overall knowledge management to develop innovation will result in the advantage over the business competitors (Nonaka & Toyama, 2003). To be successful in knowledge management, an organization requires discipline in knowledge sharing (Senge, 1990) and the knowledge in the organization must be clearly explained (Prapon, 2018). Other related researches include:

Aigbe (2011) studied decision making designing process of eco industry by reviewing related theories and researches about the industrial development planning. The results revealed that the pollution affected from industrial sector caused by business operation and production of the industry focusing on the highest profit without effective industrial development planning.

Nuttasak (2014) studied problems and environmental effect on the local community resulting from Mabtaphut Industrial Estate based on the theory of environmental management ability level. It was found that in grouping of any industry in particular area, it requires the consideration on the ability to support industrial activities and its future expansion.

Alodeh (2011) studied the management of supply chain and the technological structure of industrial estate in Jordan revealing that every factory needs to develop its own strategic plan about supply chain management and transportation for the highest profit.

Suriyo (2015) studied the knowledge management to develop production: a case study on food industrial machinery factory revealing that most factories in the industrial estate possess the target on organizational knowledge management in human development, organization development, and operation management. The activities related to knowledge management are formal and clearly defined in the organizational strategy and policy in knowledge management.

Piyachat (2013) studied the knowledge management in every industrial estate of the country finding that most factories employed the knowledge management as a part of development policy on better knowledge management.

Objective

The purpose of this research is to investigate the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country.

Hypothesis

This research has 5 hypotheses:

H_1 The factor on planning and policy has direct influence on the factor of pollution management.

Ineffective planning and industrial development designing will result in problems and consequence on pollution from industrial sector especially the industry that focuses on the highest profit together with customer value added without environment consideration (Aigbe, 2011) and lack of the balance usage of natural resource resulting in environmental problem on the community nearby (Nuttasak, 2014).

H_2 The factor on planning and policy has direct influence on the factor of infrastructure and transportation management.

The factories wanted to develop the management of supply chain and the technological structure of industrial estate in Jordan and they need the government and related organizations to define the policy about supply chain management and transportation for the highest profit (Alodeh, 2011) which is in line with the study by Rada (2014) stating that the effect from Tawai Deep Sea Port which is the policy from Myanmar Industrial sector has direct effect on the infrastructure system of Thailand due to the move of the production base and the move of goods transportation route.

H_3 The factor on defining planning and policy has direct influence on the factor of knowledge management.

Policy is the key in defining the knowledge management direction to reach the target. The organization has to announce the target to the staffs of every level for the same understanding. The objective of knowledge management in industrial factories is normally to develop human resources, organization, and work method (Suriyo, 2015). It was also found that most factories employ knowledge management as a part of development policy (Piyachat, 2013).

H_4 The factor on infrastructure and transportation system management has direct influence on the factor of environment management.

The ecofriendly transportation prototype has been developed to support ASEAN transportation based on the European concept by spreading the connecting points of goods delivery to the local parts of the country. This can save time, cost in transportation, and develop life quality of the people in the local area (Phathombut & Chockchai, 2014). Logistic management is the process to increase the effectiveness of goods delivery from the manufacturer to the consumer which can increase the ability of business and industrial sector on cost reduction, value added, energy saving and environment conservation (Pichai, 2015).

H_5 The factor on infrastructure and transportation system management has direct influence on the factor of knowledge management.

The factor on infrastructure and transportation system management has been changing all the time making the organization adjust itself and prepare to develop the staffs' capability for the business competitive edge (Napatchara, 2013). The change of organization structure on logistic management shows that the successful companies have good preparation on transferring the required knowledge to the staffs for the operation before the change of the structure (Roh, 2011).

METHODOLOGY

This study has been designed as an Inductive Research with Mixed-Methodology.

1. The Qualitative data were derived from an in-depth interview with 9 specialists consisting of 3 administrators from industrial factories, 3 Presidents of the industrial estates, and 3 academic experts in the field of business and social science study. They were given an interview form with open-ended questions. The questions came from the review of literature of 4 latent variables, i.e. policy and plan, environmental management, infrastructure and logistics, and knowledge management. The findings from the interview were analyzed to construct the questionnaire of 113 items with the alpha coefficient by Cronbach at 0.989 (>0.8), discrimination value of the checklist between 0.42-1.52 and Corrected Item -Total Correlation analysis between 0.357 – 0.846.
2. The quantitative data were derived from questionnaires administered with 500 samples (Comrey & Lee, 2002) working in the industrial factories in industrial estates from heavy and light industry. The questionnaire was 5-scale Likert type (Tanin, 2014). The data were analyzed with descriptive statistics and multivariate statistical analysis, which were developed into Structural Equations Modeling (SEM) by AMOS. The evaluation of the Data-Model Fit criteria consisted of 4 values, i.e. (1) Chi-square Probability Level > 0.05, (2) Relative Chi-square < 2, (3) Goodness of fit Index > 0.90, and (4) Root Mean Square Error of Approximation < 0.08 (Arbuckle, 2011).
3. The model on effective management guidelines for industrial estate authority to support sustainable growth of the country approved by 7 experts by using focus group analysis techniques in qualitative research.

RESULTS

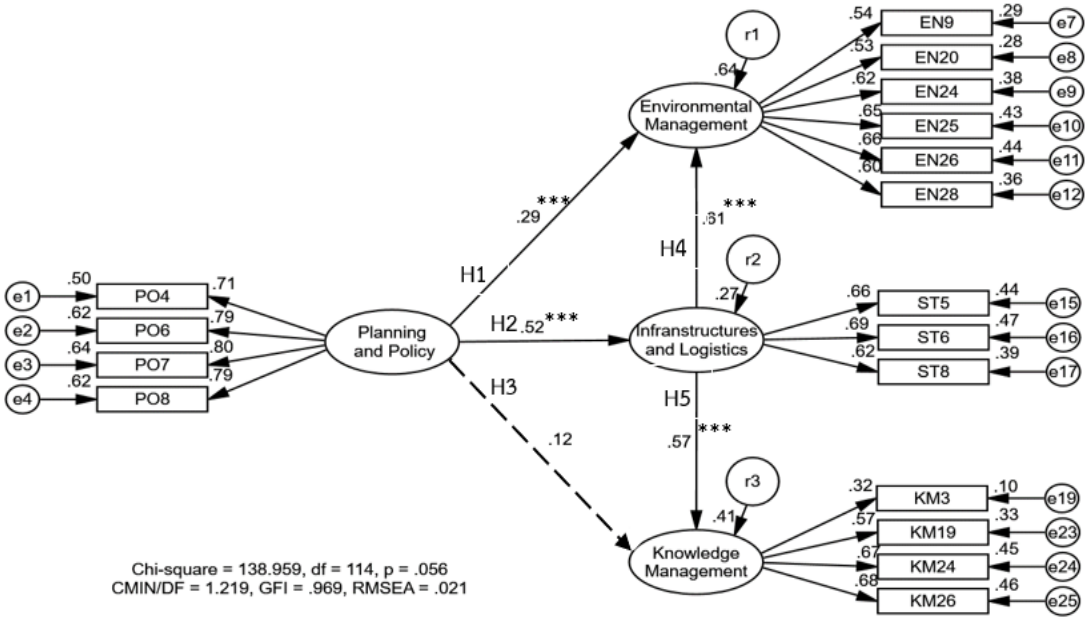
The results of the study on the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country can be concluded as follows in Table 1.

Table 1
MEAN AND STANDARD DEVIATION THE EFFECTIVE MANAGEMENT GUIDELINES FOR INDUSTRIAL ESTATE AUTHORITY TO SUPPORT SUSTAINABLE GROWTH OF THE COUNTRY

Factors of the effective management guidelines for industrial estate authority to support sustainable growth of the country	Heavy industry			Light industry		
	$\bar{x}$	S.D.	Significant level	$\bar{x}$	S.D.	Significant level
Overall	4.02	0.35	High	4.12	0.60	High
1. Planning and Policy	4.01	0.49	High	4.05	0.56	High
2. Environmental Management	3.98	0.41	High	4.15	0.64	High
3. Infrastructures and Logistics	3.97	0.39	High	4.13	0.65	High
4. Knowledge Management	4.12	0.42	High	4.17	0.62	High

1. The results are separated into heavy and light industry with the overall high important level at the mean of 4.02 and 4.12 respectively. When considering in details, it was found that the heavy industry gave the importance on every aspect with the highest component on knowledge management ($\bar{x}$ = 4.12), policy and plan ($\bar{x}$ = 4.01), environmental management ($\bar{x}$= 3.98), and infrastructure and logistics ($\bar{x}$ = 3.97) respectively. The light industry gave high importance on every aspect with the highest variable on knowledge management ($\bar{x}$ = 4.17), environmental management ($\bar{x}$ = 4.15), infrastructure and logistics ($\bar{x}$ = 4.13), and policy and plan ($\bar{x}$ = 4.05) respectively.
2. The comparison showed that the light industry paid more importance on the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country than that of the heavy industry with the t-test value at 0.05 statistics significance.
3. The evaluation of data model fit of the developed SEM model showed that the Chi-Square Probability Level = 0.000, Relative Chi-square = 2.491, Goodness of fit Index = 0.601, and Root Mean Square Error of Approximation = 0.055 which did not pass the criteria.

Thus, the researcher developed and adjusted the model by considering the value based on Modification Indices by Arbuckle (2011). After the model adjustment, it was found that Chi-Square Probability Level = 0.056, Relative Chi-square = 1.219, Goodness of fit Index = 0.969, and Root Mean Square Error of Approximation = 0.021 passing the criteria of the model fitting with the empirical data as show in Figure 3.



FIGTURE 3
SIMOLATION MODEL FOR THE EFFECTIVE MANAGEMENT GUIDELINES FOR INDUSTRIAL ESTATE AUTHORITY TO SUPPORT SUSTAINABLE GROWTH OF THE COUNTRYIN STANDARDIZED ESTIMATE MODE

From Figure 3, The results of the hypothesis test on the developed structural equation model based on the 5 hypotheses are as follows: The hypothesis 1(H1) The factor on defining policy and plan has direct influence on the factor of pollution management was at the statistics significance 0.001 with factor loading of 0.29. The hypothesis 2 (H2) the factor on defining policy and plan has direct influence on the factor of infrastructure and transportation management was at the statistics significance 0.001 with factor loading of 0.52. The hypothesis 3 (H3) the factor on defining policy and plan has direct influence on the factor of knowledge management showed no statistics significance 0.05. The hypothesis 4 (H4) the factor on infrastructure and transportation system management has direct influence on the factor of environment management was at the statistics significance 0.001 with factor loading of 0.61. The hypothesis 5 (H5) the factor on infrastructure and transportation system management has direct influence on the factor of knowledge management was at the statistics significance 0.001 with factor loading of 0.57.

Table 2 represented the estimate regression weight between factors of simulation model, squared multiple correlations (R^2) identify the statistical relation between variables and P-values as a statistical criteria of evaluating the significant level between variables. The results of latent variable analysis on observational variables can be explained as follows:

Table 2
STATISTICAL ANALYSIS OF STRUCTURAL EQUATION MODEL FOR THE EFFECTIVE MANAGEMENT GUIDELINES FOR INDUSTRIAL ESTATE AUTHORITY TO SUPPORT SUSTAINABLE GROWTH OF THE COUNTRYIN STANDARDIZED ESTIMATE MODE

Variable	Estimate Regression Weight	Square Multiple Correlation R^2	P-value
Policy and Planning			
Environmental Management	0.29	0.64	***
Infrastructures and Logistics	0.52	0.27	***
Knowledge Management	0.12	0.41	0.082
Infrastructures and Logistics			
Environmental Management	0.61	0.64	***
Knowledge Management	0.57	0.41	***
Policy and Planning			
PO4	0.71	0.50	
PO6	0.79	0.62	***
PO7	0.80	0.64	***
PO8	0.79	0.62	***
Environmental Management			
EN9	0.54	0.29	
EN20	0.53	0.28	***
EN24	0.62	0.38	***
EN25	0.65	0.43	***
EN26	0.66	0.44	***
EN28	0.60	0.36	
Infrastructures and Logistics			
ST5	0.66	0.44	
ST6	0.69	0.48	***
ST8	0.62	0.39	***
Knowledge Management			
KM3	0.32	0.10	
KM19	0.57	0.33	***
KM24	0.67	0.45	***
KM26	0.68	0.46	***
KM19	0.57	0.33	***

Note: ***Significant level at 0.001

The factor loading of planning and policy were represented in the following components: Conducting the plan to handle the effect of move of production based due to ASEAN community (PO4) with the factor loading of 0.71. The committee provided the follow-up measurement from internal and external stakeholders (PO6) with the factor loading of 0.79. Regulation revision of the investment condition to support and attract the investors (PO7) with the loading factor of 0.71. Providing sufficient budget in operating according to policy and plan (PO8) with the factor loading of 0.79.

The environmental management consisted of the following variables with the factor loading are as follows: the IEAT revised the operation steps in keeping the standard of environment by allowing the staffs in the revision (EN9) with the factor loading of 0.54. The environment management was based on the Sufficiency Economy Philosophy (EN 20) with the factor loading of 0.53. The IEAT managed the zoning suitable for the types and industrial ecology (EN24) with the factor loading of 0.62. Every factory was encouraged to do green accounting (EN26) with the factor

loading of 0.66. The IEAT also collected the data of every factory in database with the monitoring system (EN 28) with the factor loading of 0.60.

The infrastructure and logistics system consisted of several variables with the factor loading as follows: Alliance with the private sector was conducted to provide the services on infrastructure and facilities (ST5) with the factor loading of 0.66. The information technology of the IEAT was employed for effective publicity (ST6) with the factor loading of 0.69. The infrastructure was developed to link both inside and outside the industrial estates of the country (ST8) with the factor loading of 0.62.

The knowledge management consisted of several variables with the factor loading as follows: The innovation has been continuously encouraged (KM3) with the factor loading of 0.32. There has been a policy of knowledge management with other organization and outside stakeholders such as customers, business partners, and business alliance (KM19) with the factor loading of 0.57. The knowledge map is user-friendly (KM24) with the factor loading of 0.67. The knowledge management process and the change management process are conducted together for the effective (KM26) with the factor loading of 0.68.

DISCUSSION

From the results of the importance of 4 main variables in the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country of heavy and light industry was at the statistics significance 0.001. The heavy industry gave the highest importance on the knowledge management (mean = 4.01) followed by the policy and plan, the environmental management, and infrastructure and logistics management. While the light industry gave the highest importance on the knowledge management (mean = 4.17) followed by the environmental management, infrastructure and logistics management, and the policy and plan respectively. The KM system is the collection of the knowledge distributed in the organization, then, arranged and grouped for all staffs for easy access. Therefore, the staffs can learn the new knowledge by themselves and understand their own responsibility correctly with better cooperation (Suriyo, 2015). KM aims at developing human resources with better knowledge and capacity for higher satisfaction to reach the organization target. The size of the organization and the types of industry affect the type of KM process (Piyachart, 2013). Moreover, this research covers the model of industrial estate management starting from defining policy and plan to authentic operation for the strengths of both people and community with the focus on people, sufficiency economy, and strong community (Keating, 1993). The planning and policy of the production must be conformed with the ability of the factory on the waste control together with the new KM process to reduce waste releasing to the nature. The infrastructure and logistics should be designed effectively (Techa, 2016) with the concept of sustainable environmental management (Wisakha, 2012).

With the important variables mentioned above, it can be clearly seen that every business is highly competitive. It's a borderless competition. Therefore, organizations need to have a strategic management plan in order to increase the potential of employees to work efficiently and effectively. And increase the ability to compete Knowledge management is part of a strategic plan that encourages and encourages organizations to increase their ability to compete. Helps increase productivity for all parts of the organization promoting new innovations in both products and services while promoting learning comment and exchange knowledge which will result in increased quality personnel and able to apply knowledge in operations that benefit the organization, as well as help the organization be ready to adapt to changes in the environment

conducting business for survival and competitive advantage. KM is a part of the strategic plan to encourage the organization's competitive edge.

The results showed that the infrastructure and logistics management got the highest factor loading because the development of infrastructure provides the quality of life for people and community. At the same time, the existing infrastructure must be maintained and expanded to reach the optimal utilization. The infrastructure and logistics in the future should rely on appropriate technology to become the main variable for the country development (Pichai, 2015). In addition, other variables included the defining and revising the policy and plan. The IEAT has regularly revised their regulations for the convenience to attract the investors (PO7). They set up the follow-up measurement, task evaluation, and revision of policy and plan (PO6) which is congruent with the 4 Deming Circle (Deming, 1986). It is necessary to provide enough budgets for operating activity based on the policy of the organization (PO08) (Diana & Peter, 1984).

The infrastructure and logistics management are the basic systems in national development. Therefore, to develop it requires education and knowledge to find real information with analysis of existing infrastructure and existing logistics systems. There is a study of the possibility of using modern technology to build a new infrastructure and logistics system together with the development of the old infrastructure and logistics system to be more efficient. As well as plans to review various policies regarding the development of the old infrastructure and logistics systems since the development of the infrastructure and logistics systems will affect the development of other systems of the country's industrial business. Therefore, the management of the development of infrastructure and transportation systems is efficient and environmentally friendly. Therefore, it is necessary for sustainable industrial development.

The results also revealed that the factor on the policy and plan did not affect directly on the Km factor because KM is a tool of HR management. Training is the process in qualitative dimension, i.e. skills, knowledge, and other human capabilities leading to work production. The development of this dimension can be achieved by education investment and work training (World Bank Glossary, 2014). The researcher thinks that KM is necessary for every organization with no necessary for the organization to set up as policy and plan. KM can develop the capability of human resources, reduce the turnover rate, and increase career growth.

The knowledge management is necessary to every organization, and the organization does not need to be defined as policies and plans. Because knowledge management is a tool for developing an organization to be competitive. It also helps the organization to reduce losses in all areas due to lack of personnel. Work ability or do not have enough knowledge to develop oneself for further growth in a field or across fields.

CONCLUSSION

The results revealed that the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country consisted of 4 main components, i.e. plan and policy defining, environment management, infrastructure and transportation management, and knowledge management. The heavy industry gave more importance on the planning and policy than the environmental management with the close rate at 4.01 and 3.98 respectively. This can be explained that the planning and policy directly affect goal achievement. Moreover, it was found that there was different management between heavy and light industry at the statistics significance 0.001.

From the analysis of the effective management guidelines for Industrial Estate Authority to support sustainable growth of the country, it is found that both the heavy industry and light industry as a whole have a high level of importance with an average of 4.07 and when considering each aspect

found that Regarding knowledge management, the highest importance level was 4.13, with the highest level of significance. Currently, every business is highly competitive. It's a borderless competition. The organization must have a management strategy in order to increase the potential of employees to work efficiently and effectively. And increase the ability to compete Knowledge management is Part of the strategic plan that will encourage and support the organization to increase the capability in Competitive Because knowledge management is a collection of all the knowledge that is distributed in the organization Organized into categories Can be easily accessed for employees to be flexible in self-learning and the result of knowledge management is Employees have the right knowledge and understanding of the work they are responsible for, reduce problems in the work, reduce errors in the operation. And reduce the loss of resources due to operations another benefit of knowledge management is Make employees learn and understand the operation of other departments, thus reducing the gap in communication and coordination.

Another important variable is the learning organization or Knowledge management (KM) because knowledge management is important for the operation of staffs. The organization should knowledge exchange from several departments to improve and acquire outside knowledge applied in their work. The aim is to create innovation from operation in the form of knowledge banking.

From the results of an analysis of effective management guidelines for Industrial Estate Authority to support sustainable growth of the country, when considering each item found that the formulation of policies and plans for personnel development in various positions to match educational background have a high level of importance, with the highest average of 4.24. And currently, many organizations have adjusted or promoted staff in higher positions and sometimes being appointed to be a supervisor or executives across departments, which sometimes new jobs that are responsible may not match with the basic knowledge. Or past experience which will result in the formulation of policies and plans to develop organizations with problems and obstacles.

And also found that in general, when classified by industrial type, there is a high level of importance with the heavy industry having an average of 4.02 and a light industry with an average of 4.12 and found that the heavy industry and light industry have different management at the statistical significance level of 0.001. In business operations, at present, the heavy industry focuses on to follow the specifications or international standards, since most of the heavy industry's trade partners are in foreign countries. So the specifications Therefore, trade is necessary to refer to international standards. (International Organization for Standardization) such as ISO-9001, ISO-14001, ISO-18001 and ISO-50001, but while light industry most of them deal the business in the country, which focuses on doing business to pass the minimum standards or various regulations that the Industrial Estate compulsory. But if done in order to create an organization's image or done to cooperate social responsibly then Heavy industry will be more consider then light industry.

The least important variable for both heavy and light industry is the infrastructure and logistics system management. This might be from the awareness of the company on the environment and community. Therefor infrastructure and logistics system is a part of sustainable environment management.

Suggestion for Further Study

Knowledge management (KM) process is the most important variable in this study; so, there should be an in-depth study on teach organization and Knowledge management (KM) for sustainable development.

REFERENCES

Aigbe, T.O. (2011). *A decision-based design process for eco-industrial parks*. Unpublished doctoral dissertation.

Alodeh, M. (2011). *The current situation of supply chain management and technology structure at Al-Hassan Industrial Estate in Jordan*. Unpublished doctoral dissertation.

Arbuckle, J.L. (2011). IBM SPSS Amos 20 user's guide. *Amos Development Corporation, SPSS Inc*..

Charles, J.E. (1966). *Policy & Bureaucracy*. New York: Princeton.

Comrey, A., & Lee, H. (2002). *A first course in factor analysis*. Hillsdale, N J: Erlbaum.

Dale, E. (1968). *Management: Theory and Practice*. New York: McGraw-Hill Book.

Dekhili, S., Achabou, M.A., & Alharbi, F. (2019). Could sustainability improve the promotion of luxury products?. *European Business Review*.

Deming, W.E. (1986). *Out of the Crisis*. MIT Press. Cambridge, MA.

Diana, C. & Peter, H. (1984). *An Introduction to Development Planning in the Third World*.

Dror, Y. (1968). *Public Policymaking Reexamined Scranton*, Penn: Chandler.

Drucker, P.F. (1979). *The practice of management***.** London: Pan Books.

Elkington, J. (1997). *Cannibals with Forks: The Triple Bottom Line of the 21st Century Business*, New Society, Stony Creek, CT.

Elkington, J. (2001). The triple bottom line for 21st century business. *The Earthscan Reader in Business and Sustainable Development*, 20-43.

Fayol, H. (1964). *General and Industrial Management*. London: Pittman and Sons.

Frosch, R.A. & Nicholas E.G. (1989). *Strategies for Manufacturing. Scientific American 189(3) 152.*

Industrial Estate Authority of Thailand. (2019). *Heading towards industrial development for sustainability*. Retrieved May 10, 2018 from http://167.99.79.250/

Infrastructure Management Research Unit. (2016). Thailand Infrastructure history. Retrieved May 10, 2018 from http://www.infra.chula.ac.th/about.php

Kaur, A., & Lodhia, S.K. (2019). Key issues and challenges in stakeholder engagement in sustainability reporting. *Pacific Accounting Review*.

Keating, M. (1993). *The Earth Summit's agenda for change: A plain language version of Agenda 21 and the other Rio agreements*. Centre for Our Common Future.

Koontz, H. & O'Donnell, Cyrill. (1976). *Management: A Systems and Contingency Analysis of Managerial Functions*. New York: McGraw-Hill.

Krairapanond, N., & Atkinson, A. (1998). Watershed management in Thailand: concepts, problems and implementation. *Regulated Rivers: Research & Management: An International Journal Devoted to River Research and Management*, *14*(6), 485-498.

Luther, G., & Urwick, L. (1937). Paper on the Science of Administration. *Institute of public Administration. New York*.

McElroy, M.W. (2003). The new knowledge management: *complexity, learning, and sustainable innovation*. KMCI Press.

Meyer, M., & Zack, M. (1996). The design and implementation of information products. *Sloan Management Review, 37* (3), 43-59.

Ministry of transport. (2015). *Strategy for the development of transportation systems in Thailand for 20 years*. Retrieved January 15, 2019 from www.unescap.org/sites/default/files/Country%20presentation%20-%20Thailand_3.pdf

Napatchara P. (2013). *The Study on the Logistics of Orchids as Export*, Kasetsart University.

Nonaka, I. & Toyama, R. (2003). The knowledge-creating theory revisited knowledge

Nuttasak P. (2014). *the study of environmental impacts from maptaphut industrial estate on local communities through the environmental carrying capacity theory*, King Mongkut's institute of Technology Ladkrabang.

Office of the National Economic and Social Development Council. (2018). *Gross domestic product*. Retrieved January 15, 2019 from http://www.onep.go.th/env_data/2016/01_2/

Phathombut K. & Chockchai S. (2014). *The development of Logistics Model for Thailand's Environmental to ASEAN*, Mahidol University.

Pichai, L. (2015). *Green Logistics for Sustainable Development*, the Far Eastern University.

Piyachat, J. (2013). *The Methods for Knowledge Management in Industrial Sector: A Case Study on Industrial Estate Thailand*, Ramkhamhaeng University.

Pollution Control Department. (2019). *Pollution complaints from industrial sectors*. Retrieved January 15, 2019 from http://www.pcd.go.th/

Porter, M.E. (1980). *Competitive advantage: creating and sustaining superior performance: with a new introduction*. NY: The Free Press.

Prapon, Ph. (2018). *Knowledge management for the dream of the future. The institute for knowledge management for society*. Retrieved January 15, 2019 from shorturl.at/doDV5

Rada S. (2014) *Success factor and the effects on transportation and logistics in Thailand from the dawei deep seaport and industrial zone development project*. Retrieved January 15, 2019 from https://www.tci-thaijo.org/index.php/JIRGS/article/view/227383

Rodriguez, R., Svensson, G., Høgevold, N. M., & Eriksson, D. (2019). Factors and determinants of value-and business-driven sustainability initiatives in health care organizations: intrinsic differences and extrinsic similarities. *Corporate Governance: The International Journal of Business in Society*.

Roh, J.A. (2011). *The supply chain management organization within the global firm: A structural change perspective*. Michigan State University. Logistics.

Savitz, A., & Weber, K. (2006). The triple bottom line: *How today is best run organizations are achieving economic, social and environmental success - and how you can too*. San Francisco: Jossey Bass.

Senge, P. (1990). *Thefifth discipline: The art and science of the learning organization.* Currency Doubleday, NewYork, NY.

Somkid, B. (2015). *Organization and management*. Bangkok. Wittayaphat.

Suriyo, K. (2015). The Knowledge Management for product Development: *A Case study of the machine manufacturing in food industry*. Thammasat University.

Taherdangkoo, M., Mona, B., & Ghasemi, K. (2019). The role of industries' environmental reputation and competitive intensity on sustainability marketing strategy. *Spanish Journal of Marketing-ESIC*.

Tanin, S. (2014). *Research and Statistic data analysis by SPSS and AMOS*. Bangkok: Business research and development institute.

Techa, B. (2016*). Logistics Management - Business and Environment*. Bangkok: Chulalongkorn University.

The Center for Sustainable Transportation. (2008). *Sustainable transportation*. Retrieved March 29, 2019 from https://environment.transportation.org/pdf/sustainability_peer_exchange/AASHTO_SustPeerExh_BriefingPaper.pdf

Wisakha P.V. (2012). Consistency of principles of eco-industrial estate with sufficient economy principles, *Journal of Environmental Managemen*t, *3*(1). Retrieved March 29, 2019 from https://www.tci-thaijo.org/index.php/JEM/article/view/31980

World Bank Glossary. (2014). Retrieved February 18, 2019 from http://documents.worldbank.org/curated/en/541831468326979631/World-Bank-glossary-general