The Seybold Report

ISSN 1533-9211

DOI 10.5281/zenodo.6827332

GUIDELINES FOR INDUSTRIAL BUSINESSES IN PREPARATION TO USE CLEAN ENERGY

TADA LERTSINSONGSERM[1]*, SUNEE WATTANAKOMOL[2]and THANIN SILPCHARU[3]

[1*] D.B.A. Candidate in Industrial Business Administration, Faculty of Business Administration, King Mongkut's University of Technology North Bangkok, Thailand.
Email: s5914011950052@email.kmutnb.ac.th, tada988@gmail.com
[2]Associate Professor in the Faculty of Business Administration, King Mongkut's University of Technology North Bangkok, Thailand. Email: Sunee.w@fba.kmutnb.ac.th
[3]Professor in the Faculty of Business Administration, King Mongkut's University of Technology North Bangkok, Thailand. Email: tanin@fbakm.com

Abstract

Energy resources are considered the fundamental factor of production. As the continuous expansion of the industrial sector is increasing, the demand for energy for production is too. Businesses around the world need to step into the transition from fossil fuel energy, to clean energy. This study aimed to investigate preparation guidelines for industrial businesses to use clean energy. Both qualitative and quantitative research was conducted. The findings would then be used to develop a structural equation model of such guidelines. Questionnaires were used to collect the quantitative data from 500 industrial business awarded Green Factory. Descriptive, referential, and multivariate statistics were employed to analyze the data. It was found that guidelines for industrial businesses in preparation to use clean energyincluded 4 components prioritized as followed: innovation and technology ($\overline{X}$ = 4.51), mindset ($\overline{X}$= 4.44), internal process $\overline{X}$ = 4.37), and resources ($\overline{X}$ = 4.35) respectively. The most important guideline item found in each component was: keeping up with the clean energy trend in order to develop innovation and clean energy production technology to keep pace and be ready for change; publicizing the guidelines for using clean energy in the organization through both online and offline media, comparing own organization's energy efficiency with similar entities, choosing to install a solar power generation system with quality solar cells, respectively. As for the hypothesis test, the study showed that the large industrial business recognized the importance of the preparation guidelines to use clean energy than the small and medium ones at the statistical significance level of 0.05.The analysis of the developed structural equation model revealed that it passed the assessment criteria and was consistent with the empirical data. The calculated values of probability of chi-square, the relative chi-square, the index of consistency, and the root mean squared error of approximation were 0.112, 1.136, 0.964, and 0.016, respectively.

Keywords: Structural Equation Model,Preparation, Industrial Businesses,Clean Energy

Introduction

The world is still facing increasingly severe global warming and pollution problems and frequent and catastrophic events across the globe. This is a major cause of climate change (Global Climate Change). The international community therefore attaches great importance to problems that are of concern and challenge to mankind. The origins or major causes of global warming and pollution problems are caused by many factors. Especially climate change. (Department of International Organizations Ministry of Foreign Affairs, 2018) In addition, the situation of carbon dioxide emissions in the industrial sector has continuously increased from 2014 to 2020, as can be seen in Figure 1.

ISSN 1533-9211

DOI 10.5281/zenodo.6827332

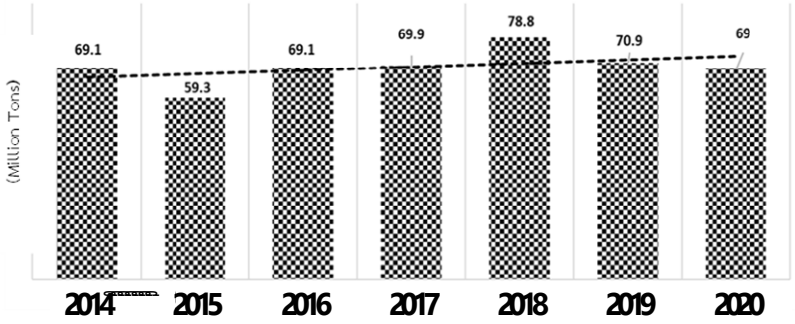


Figure 1:**The amount of CO**2 **emissions from the industrial sector (Ministry of Energy,** 2020)

Figure 1 shows the amount of carbon dioxide (CO2) emissions of the industrial sector. In 2014, it was found that carbon dioxide (CO2) emissions equaled 49.9 billion tons of carbon dioxide and the trend continues to increasefor the health effects of air pollution A study by the Institute for Health and Evaluation, University of Washington, sponsored by the World Bank, found that air pollution is a common contributor to many diseases due to its composition. Many chemicals, from irritants to carcinogens. Which is an important cause of disease, including chronic obstructive pulmonary disease cerebrovascular disease ischemic heart disease, lung cancer, and acute respiratory infections the ozone gas is a lung irritant. This makes the lungs easily infected, so it is a contributing factor to chronic obstructive pulmonary disease. (Pollution Control Department, 2015) The danger of particulate matter of size not more than 2.5 microns (PM 2.5) is still polluted and contaminated in the atmosphere for a long time. Dust is hazardous regardless of its chemical composition, such as mercury, cadmium, arsenic or polycyclic aromatic hydrocarbons (PAHs), which in 2018 the World Health Organization has classified the dangers of toxic dust. PM 2.5 is in the group 1 of carcinogens and in 2016 it was also responsible for 1 in 8 of the world's population of more than 50,000 premature deaths. This affects the economy as a whole. both in terms of government expenditure on public health care The cost of dealing with air pollution problems and labor shortage crisis, etc. by the Pollution Control Department has collected statistics of complaints about pollution from dust and soot during the year 2012-2021, as shown in Figure 2.

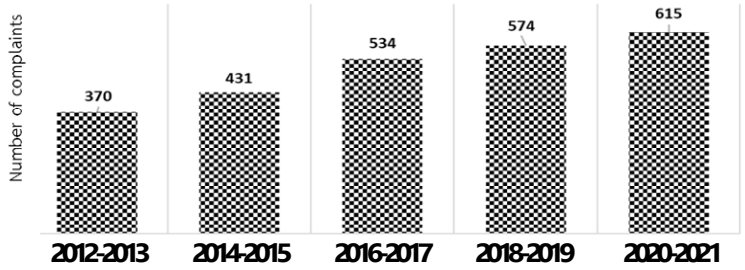


Figure 2:**Number of complaints about dust and soot pollution**

(Pollution Control Department, 2022)

ISSN 1533-9211

DOI 10.5281/zenodo.6827332

The researchers reviewed the literature on how to solve the problem of air pollution caused bysoot emission or hazardous gases from the use of fires that are not burning clean until large dust and toxic contaminants in the air One of the many solutions to and prevent air pollution problems is to use clean energy or to make energy cleaner before it is released into the environment. Which clean energy sometimes it is called Clean Energy or Green Energy. Energy that does not harm the environment, that is, energy derived from nature in various forms does not cause pollution. Which humans can use in consumer industry commercial or used to produce other forms of energy such as solar energy, hydropower, wind energy, including biomass energy, etc.

The reason for the need to develop and create clean energy to use this is because energy, which is a factor that is important to the country's cost in all aspects, economically, politically and socially, is all connected with energy, whether it's daily life. Occupation, and most importantly, the industrial production sector that has developed and continued to grow Therefore, more energy is needed as well. while energy is limited and scarce Including the energy situation in Thailand tends to increase continuously every year. As shown in Figure 3.

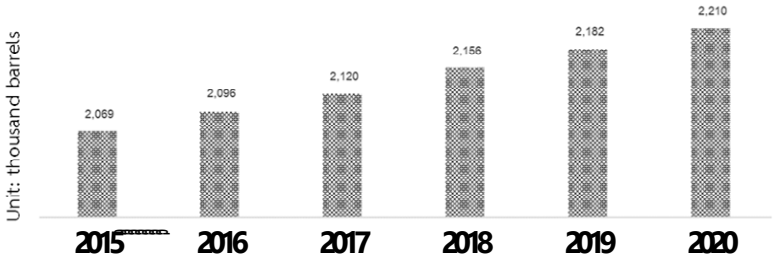


Figure 3:**Initial Commercial Energy Consumption,** 2015-2019 (**Ministry of Energy,** 2020)

Figure 3 shows the gross commercial energy consumption during the year. 2015-2019 found that in 2015, crude oil was used at 2,069 thousand barrels of oil equivalent per day and there is a tendency for the amount of upstream commercial energy consumption to increase. According to the current data in the year 2019, it was found that there is a demand for crude oil of 2,143 thousand barrels of oil equivalent per day due to today's use of energy has an impact on the environment at the community, regional and global level son soil pollution, water pollution and air pollution because there is no use of energy resources.

Be cautious, regardless of the negative consequences that will arise from the use of energy. This causes changes in the landscape; other resources are destroyed and affect public health. For example, industrial plants that use energy with the burning of coal containing sulfur dioxide (SO2), resulting in acid rain, soot, dust. Smoke or petroleum fuel energy that results in the Green House Effect, which causes global warming (Global Warming). Secretariat of the House of Representatives, 2015)

The researcher is interested in studying the guidelines for the preparation of industrial businesses in the use of clean energy. for industrial plants of all sizes from industrial factories

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827332

that have been awarded the Green Factory Award from the Department of Industrial Works by the Ministry of Industry with limitations in preparation for using clean energy, such as innovation and technology internal processes, resources, and awareness-raising of industrial plants the researcher is aware of the limitations of the aforementioned entrepreneurs. Therefore, there is an idea to research and prepare for the concept, method and application of clean energy in the future. This is a strategy for enhancing growth on the quality of life that is environmentally friendly. And the opportunity to create commercial clean energy, that is, to strengthen the natural resource base and enhance the quality of the environment. To support green growth and people's quality of life Reduce pollution caused by production and consumption promote more environmentally friendly production and consumption as well as preparing to reduce greenhouse gas emissions and to increase the capacity to adapt to climate change, including managing to reduce disaster and natural risks. From all the important issues and problems mentioned above, it is the source and problem in research of the researcher who wants to study the preparation of the industrial business sector in using clean energy in the future.

Research Objectives

From the issues mentioned above Therefore, the researcher has set the objectives of the research to study the preparation of the industrial business sector in the use of clean energy, amounting to 3 items as follows:

1. To study the composition of the guidelines for the preparation of industrial businesses in the use of clean energy Classified by industrial factory size

2. To develop a structural equation model, guidelines for the preparation of industrial businesses in the use of clean energy.

Research Methodology

Step 1 Qualitative Research Using In-Depth Interview Technique The population used in research on the approach to improving the competency of scientists to support the growth of the industrial sector. As for this qualitative research, there are 9 key informants, divided into 3 groups: 3 sector operators, 3 government agencies and related agencies. and a group of 3 scholars with the scope and issues studied in 4 elements, namely 1) innovation and technology component 2) internal process management component 3) resource component and4) elements of consciousness building (Mindset).

Step 2 Quantitative Research (Quantitative Research) tools used in this research. The researcher created a questionnaire. (Questionnaire) is divided into 8 steps in order as follows:

Step 1: Study results, principles of questionnaire construction to be used in research and to create a research conceptual framework.

Step 2: Study information from books, documents, articles and related research results, including the results of in-depth interviews from 9 Key Informants as a guideline for creating questionnaires (Item) of the questionnaire.

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827332

Step 3: Determine the point and scope of the questions according to the objectives. and the benefits of research

Step 4 Proceed to create a draft questionnaire.

Step 5: The researcher takes the draft questionnaire along with the assessment form and sends it to the experts. Knowledgeable and direct experience with the research topic, 5 persons to assess the quality of the questionnaire by calculating the consistency index between the question and the content or research objective (Item-Objective Congruence: IOC) The results of the analysis of the Conformity Index or IOC values between the questions and the objectives of this research. It appears that the IOC value is between 0.60 and 1.00.

Step 6 The researcher took the revised draft questionnaire according to the advice of experts and approved by the research advisor. Let's test (Tryout) on a population that is similar to the population of this research. But not the same population as the 30 studies, which is the accepted sample size in the trial (Thanin, 2020).

Step 7 The researcher took the draft questionnaire that was used to conduct the experiment (Tryout) and analyzed the discriminant power. (Discrimination) in the part of the multiple choice questionnaire (Checklist) was used to analyze the standard deviation (Standard Deviation: S.D.) with the value between 0.57 to 0.98 and in the part of the question that is a scale of estimates (Rating Scale), using Corrected Item-Total Correlation method, with values between 0.44 and 0.88 for sentiment analysis. (Reliability) of the whole questionnaire, only in the part of the question that is in the form of Rating Scales, using the method of calculating the Alpha Coefficient of Cronbach (Cronbach) was equal to 0.98.

Step 8: Modify the questionnaire so that it meets the criteria set before the actual data collection. With the sample group, including 500 Green Plant Award-winning corporate executives, a good sample size for composition and structural equation analysis (Comrey, & Lee, 2013).

Step 9.Group Chat to certify a model for the development of scientific and technological competence to support the growth of the industrial sector. by 11 qualified persons

The observed variables that were brought into the study after the improvement of the structural equation model were all 25 variables in each aspect of the components as follows:

1. The mindset component consists of 5 Observed Variables, namely 1) a variable for creating a video clip to disseminate personnel to see the benefits of using clean energy in the organization (MI20) 2) Variable Cultivate personnel awareness of the importance of clean energy from natural resources (MI15) 3) Variables for influencing good global citizenship for all personnel in every opportunity within the organization (MI9) 4) Reward variables to motivate personnel who able to increase the amount of clean energy production for use in the organization (MI7) and 5) variables meeting personnel throughout the organization to know the policy for the adoption of clean energy in the organization (MI2)
2. Components of internal processes (Internal Process) consists of 5 Observed Variables, namely 1) variables for studying and analyzing the amount of clean energy to be used as

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827332

information to prevent problems for the organization in the future (IP16) 2) Structure improvement development variables
3. The administration facilitates the promotion of clean energy within the organization and the process of interaction with other organizations (IP7) 3) The variables integrate clean energy approaches into the organization's vision, mission, policies and strategies (IP13) 4) The variables produce a summary report on the adoption of clean energy in the organization. and disseminate it to personnel through various channels (IP8) and 5) policy orientation variables for the adoption of clean energy to replace the negative energy for the environment (IP1)
4. Resource components consist of 5 Observed Variables, arranged in order of weight values. (Standardized Regression Weight) from highest to lowest, as follows: 1) variables supporting personnel attending clean energy seminars to build their ability to utilize clean energy in theory and practice (RE17) 2) variables to coordinate with energy agencies to request access and participate in the development of a clean energy management system (RE21) 3) The variable has a source of knowledge about clean energy that personnel can search at any time (RE19) 4) The variable to improve the infrastructure system to support the Optimal production of clean energy use (RE14) and 5) and variables that increase the function of maximizing the use of natural energy, such as installing large mirrors to receive natural light. Plant trees to reduce the temperature around the building (RE10)
5. Innovation and Technology components consist of 5 Observed Variables, namely 1) Technology capability evaluation variables.
6. Clean energy production and internal energy demand (IT21) 2) Variables to study the utilization of inexhaustible agricultural waste for biomass production (IT10) 3) Data collection, analysis, and processing variables for energy use. 4) The variables for reviewing the safety of personnel, organizations and communities in creating innovations and technologies to produce clean energy (IT12) and 5) reviewing variables for the production of goods and services to find channels in Adopting clean energy in processes (IT1)

Data Analysis

1. Qualitative Research by using In-depth Interview technique, using Content Analysis method and summarized as a guideline for the preparation of industrial businesses in using clean energy according to the composition

2. Quantitative research (Quantitative Research). Basic data analysis was performed using descriptive statistics, inference statistics, and multiple statistics. (Multivariate) with the packaged program IBM SPSS (Statistical Package for the Social Science for Windows) and in the analysis of structural equation modelling (Structural Equations Modelling: SEM) will be analyzed with the program packaged IBM SPSS AMOS (Analysis of Moment Structures). For Research) as detailed below

2.1 Data analysis by using descriptive statistics and check-list questionnaires by using frequency method and summing it up as percentage (Percentage) for the approximate scale. The values (Rating Scale) were used to find the mean (Mean :) and the standard deviation

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827332

(Standard Deviation: S.D). The open-ended questionnaire was used for content analysis and summarized as a frequency value.

2.2 Data analysis by reference statistics (Inference Statistics) Analysis of the relationship between the pairs of variables of the guideline for the preparation of industrial businesses in using Bivariate Correlations with statistical significance at the level of 0.001, 0.01 and 0.05. For testing the correlation between typical operating characteristics related to the readiness of industrial businesses to use clean energy. The size of the industrial plant was analyzed by Pearson Chi-square values. The statistical significance was determined at the 0.05 level and the differences in the approaches of industrial business preparation for clean energy were tested. Classified by type of industrial plant size Between the mean of the two population groups, 250 small and medium-sized factories and 250 large factories, both groups were independent of each other (t-test). The statistical significance was determined at the 0.05 level.

2.3 Structural equation model analysis use multiple statistics (Multivariate Statistic) Analysis or development of Structural Equations Modeling (SEM) of the industrial business preparation approach for clean energy use. Use the advanced statistical analysis program AMOS to obtain relevant statistical data. Together with the interpretation of the hypothesis testing of the research the model has to go through the adjustment of elements or latent variables (Latent Variable Adjustment) in every research to be complete. The model's consistency was assessed (Evaluation the Data-Model Fit) until each component or every latent variable was consistent with the empirical data. Meet all criteria adjusting the latent variables to be consistent with the empirical data meets that criterion. Will consider adjusting from the observation variable (Observed Variable), which is a variable from the question that has a 5-level rating scale that the researcher obtained from the actual data collection.

The researcher has improved the model based on the Modification Indices: M.I., as recommended by Arbuckle, by considering the value of the program results with theoretical theory to rule out some of the unsuitable observational variables. Exit one by one and perform a new batch processing. Do this until the structural equation model is in perfect harmony with the empirical data. Developing a model to be consistent with the empirical data requires taking into account the criteria to be used in the assessment must be widely accepted and used. Arbuckle (2016) recommends four criteria for model evaluation that should be considered: 1) CMIN–p. Greater than 0.05, 2) CMIN/DF is less than 2, 3) GFI is greater than 0.90 and 4) RMSEA is less than 0.08.

Research Finding

1. General status of industrial business it was found that the respondents were small and medium-sized industrial enterprises. Equal to large (accounting for 50 percent), with the majority of business establishments as limited companies Most of the surveyed organizations were contract manufacturing businesses and had their own brands. (accounting for 38.60%) for the period of business operations of the organization Most are between 10 and 20 years

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827332

old (44.00 percent), and most organizations are certified to industry standards. (41.60% accounted for)

2. The importance of the components of the preparation guidelines of the industrial business sector in the use of clean energy found that the importance of the components as a whole is at a high level. With an average of 4.40 and when considering each component in descending order as follows: 1) innovation and technology components are of the greatest importance. With an average value of 4.51. 2) The constituents of consciousness building It is of great importance. With an average of 4.44 3) internal process components It is of great importance. With an average of 4.37 and 4) resource composition. It is of great importance. With an average of 4.35 and when classified by item in each aspect the top three with the highest priority are:

2.1 Innovation and Technology: following the world's clean energy trends in order to develop innovations and technologies for clean energy production to keep pace and be ready for change. The mean is 4.77 (SD. = 0.45), followed by Review the production processes of goods and services to find ways to use clean energy in the process. The average was 4.77 (SD. = 0.46) and equipment was adjusted to match the clean energy sources to be used. The mean was 4.76 respectively.

2.2 Internal Process Components: Comparison of the clean energy use of the organization with similar departments The mean is 4.68 (SD. = 0.49), followed by Study the regulations and standards on the production, processing, transmission, use and conservation of clean energy sources. As well as control and supervise to be in accordance with regulations and standards the average is 4.68 (SD. = 0.50) and the policy of using clean energy to replace the negative energy for the environment. The mean was 4.66, respectively.

2.3 Resource component: choosing to install a solar power generation system with quality solar cells The average was 4.67, followed by Training personnel to have knowledge and expertise in various types of clean energy with an average of 4.64 and supporting personnel to test their knowledge. Competent to register as responsible for clean energy as required by law the mean was 4.62, respectively.

2.4 Consciousness building components (Mindset): public relations guidelines for clean energy use in the organization through online media and offline media ($\bar{x}$ = 4.72, S.D. = 0.48) Executives are role models in the use of clean energy in the organization ($\bar{x}$ = 4.72, S.D. = 0.49) and instilled in personnel the importance of clean energy from natural resources ($\bar{x}$ = 4.71, S.D. = 0.50), respectively.

3. The results of the analysis of structural equation modeling, guidelines for the preparation of industrial businesses in the use of clean energy After the improvement of the model was completed, it was found that the Chi-square Probability Level was 0.112 greater than 0.05, indicating that the model was not statistically significant. The relative chi-square (CMIN/DF) of 1.136 is less than 2, the correlation index (GFI) is 0.964 is greater than 0.90, and the root mean squared error index (RMSEA).) is equal to 0.016 less than 0.08, so it can be concluded

ISSN 1533-9211

DOI 10.5281/zenodo.6827332

that all 4 statistics passed the assessment criteria. Consistent with empirical data It can be Shown in Figures 4, 5 and Table 1.

Figure 4:Structural equation model in mode Unstandardized Estimate after model improvement

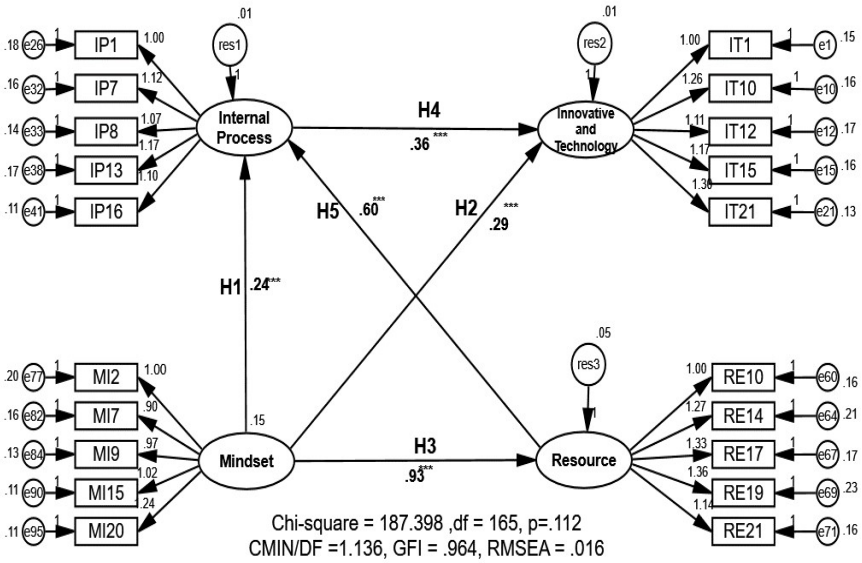
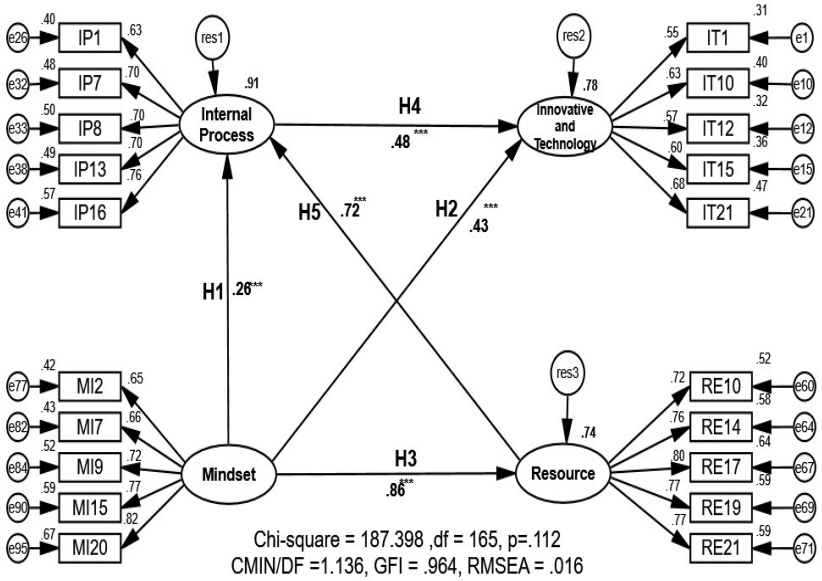


Figure5:Structural equation model in Standardized Estimate mode after model improvement.



The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827332

Table 1 Statistical values obtained from structural equation model analysis after model improvement

Variable	Estimate		R^2	Variance	C.R.	P
	Standard	Unstandard				
Mindset				0.15		
Resource	0.86	0.93	0.74	0.05	12.71	***
Internal Process	0.26	0.24	0.91	0.01	3.32	***
Innovation and Technology	0.43	0.29	0.78	0.01	3.65	***
Resource			0.74	0.05		
Internal Process	0.72	0.60	0.91	0.01	8.01	***
Internal Process			0.91	0.01		
Innovation and Technology	0.48	0.36	0.78	0.01	4.04	***
Innovation and Technology			0.78	0.01		
IT1	0.55	1.00	0.31	0.15		
IT10	0.63	1.26	0.40	0.16	10.36	***
IT12	0.57	1.11	0.32	0.17	9.73	***
IT15	0.60	1.17	0.36	0.16	10.08	***
IT21	0.68	1.30	0.47	0.13	10.83	***
Internal Process			0.91	0.01		
IP1	0.63	1.00	0.40	0.18		
IP7	0.70	1.12	0.48	0.16	14.12	***
IP8	0.70	1.07	0.50	0.14	13.21	***
IP13	0.70	1.17	0.49	0.17	13.31	***
IP16	0.76	1.10	0.57	0.11	13.41	***
Resource			0.74	0.05		
RE10	0.72	1.00	0.52	0.16		
RE14	0.76	1.27	0.58	0.21	16.34	***
RE17	0.80	1.33	0.64	0.17	17.30	***
RE19	0.77	1.36	0.59	0.23	16.56	***
RE21	0.77	1.14	0.59	0.16	16.61	***

Table 1 (Cont)

Variable	Estimate		R^2	Variance	C.R.	P
	Standard	Unstandard				
Mindset				0.15		
MI2	0.65	1.00	0.42	0.20		
MI7	0.66	0.90	0.43	0.16	12.79	***
MI9	0.72	0.97	0.52	0.13	13.79	***
MI15	0.77	1.02	0.59	0.11	14.62	***
MI20	0.82	1.24	0.67	0.11	15.25	***

*** Significant Level 0.001

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827332

Discussion

1. Guidelines for the preparation of industrial businesses in the use of clean energy Innovation and technology components are of the greatest importance. It was found that the sector that is most important to the preparation of industrial businesses in the use of clean energy is Innovation and Technology component, consistent with the findings of Sivaram. ,Dabiri and Hart (2018) found that the use of clean energy such as wind energy requires innovation and technology to convert into electrical energy from power converters from power generators, such as turbines. Power with Turbine Array Technology and the results of a study by Nguyen (2019), which examined Generation of electricity from tidal currents By using innovative technology to convert energy from tidal currents by using innovative techniques to install poles in the sea and the vibrations from sea waves until it can be converted into electrical energy.
2. The results showed that the items that are important to The preparation of the industrial business sector in using clean energy the most is following the world's clean energy trend in order to develop innovations and technologies for clean energy production to keep pace and be ready for change. Consistent with the findings of Lui (2022), the clean energy demand forecast model analysis requires quality data on clean energy consumption rates and growth trends to be used to forecast demand. Clean energy precisely for a complete and reliable model. And the research by Li &Haneklaus (2022) found that the information needed about the trend of clean energy demand is increasing due to clean energy. This information can be used to improve the quality of the environment even more. For every 1% increase in clean energy consumption, CO2 emissions are reduced by 0.68%, for example. This is consistent with a study by Wang, et al. (2020), which found that the trend in clean energy consumption is high. continually rising This is because data on clean energy use can help reduce the amount of combustion and greenhouse gas emissions into the atmosphere.
3. The results showed that Mindset elements have the most direct influence on The0.86-weighted resource component, statistically significant at the 0.001 level, is consistent with the findings of Ekung, Ohama, and Ajiero (2020), which examined developments to enhance knowledge, understanding and awareness of importance. of clean energy of personnel in the organization as well as recruiting volunteers to participate in clean energy projects by investing in personnel training. This can be considered as an investment for human resource development. It is necessary to consider the cost-effectiveness and effectiveness of spending on human resource development. as well as allocating money to motivate personnel This is consistent with the study by Nowotny et al. (2018) on the scale of raising awareness and understanding of the importance of efficient, clean energy conversion. It is necessary to develop a knowledge transfer program with a comprehensive educational program. and appropriate use of media to educate, such as the use of clean energy for sustainability, etc.
4. The results showed that mindset components had the highest overall influence on internal process components at a weighted value of 0.88, significantly at the 0.001 level, consistent with the results of Moon (2018). How to use energy by adopting clean energy Such modifications need to be supported by raising the awareness of personnel about the importance and benefits of using clean energy. It uses the process of transforming people's

ISSN 1533-9211

DOI 10.5281/zenodo.6827332

thinking through the application of analytical and creative thinking and techniques to raise awareness about clean energy use. It is also consistent with the results of a study by de Oliveira, et. al. (2021) found that raising awareness of clean energy use requires a process, approach, application or internal management of the organization to achieve sustainable development (Sustainable Development) by using clean energy for the environment and in accordance with the results. A study by Guney and Kaygusuz (2019) found that raising awareness and environmental friendliness through the use of clean energy. Must start from being driven from work processes within the organization such as the development of environmental management systems. energy source conservation Premises design Supervision of the utility system of the organization, etc.

New Knowledge from Research

New knowledge gained from the study on the preparation of industrial businesses in the use of clean energy It developed from 4 components, namely 1) Innovation and Technology component 2) Internal Process component 3) Resource component and 4) Awareness building component. (Mindset) which can be modelled as Mr. MR.2I as shown in Figure 6.

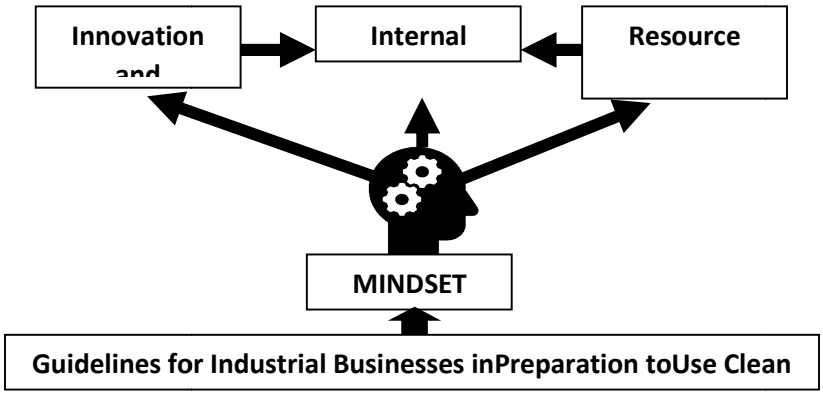


Figure 6:**MR.2I Model**

Recommendation from Research in Operation Level

1.Organizations should review and apply the success factors of successful model organizations as an idea to adapt and prepare for the adoption of clean energy for their own organizations.

2.The organization should create an energy information database (Big Data) for use in forecasting future energy demand.

3.Organizations should plan to develop more commercial clean energy production. to generate additional income for the organization

4.The organization should find ways to dispose of waste or hazardous waste from materials used in the production of clean energy so that it does not become an additional environmental problem.

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827332

Recommendation for Future Research

1. Study other elements to develop a model of preparation of industrial businesses in the use of clean energy such as sustainability components, etc.

2. Study other variables more to be applied to other types of organizations can cover more such as the manufacturing industry and the creative economy industry, etc.

3. For the benefit of the workshop, there should be a study by applying the structural equation model developed from this study to be put into practice with the organization.

4.Apply the structural equation model to project research (Project Management) in collaboration with educational institutions. Government agency and industrial plants

5. Using the knowledge gained from this study to disseminate and educate the community to collect additional data from stakeholders.

Reference

Arbuckle, J. L. (2016). AMOS 24 user's guide. Crawfordville, FL: Amos Development Corporation.

Aslam, F., Aimin, W., Li, M., & Ur Rehman, K. (2020)." Innovation in the era of IoT and industry 5.0: absolute innovation management (AIM) framework". Information, 11(2), 124.

Arbelo-Pérez, M., Arbelo, A., & Pérez-Gómez, P. (2020). Technological heterogeneity and hotel efficiency: a Bayesian approach. Cornell Hospitality Quarterly, 61(2), 170-182.

Campanale, C., Mauro, S. G., &Sancino, A. (2021). Managing co-production and enhancing good governance principles: insights from two case studies. Journal of Management and Governance, 25(1), 275-306.

Coccia, M. (2021). How a good governance of institutions can reduce poverty and inequality in society?. In Legal-Economic Institutions, Entrepreneurship, and Management (pp. 65-94). Springer, Cham.

Comrey, A. L., & Lee, H. B. (2013). A first course in factor analysis. Psychology press.

Davis, P. J., & Simpson, E. (2017). "Resource-based theory, competition and staff differentiation in Africa: Leveraging employees as a source of sustained competitive advantage". American Journal of Management, 17(1), 19-33.

de Oliveira, K. B., dos Santos, E. F., Neto, A. F., de Mello Santos, V. H., & de Oliveira, O. J.(2021). Guidelines for efficient and sustainable energy management in hospital buildings. Journal of Cleaner Production, 329, 129644.

Ekung, S., Ohama, V., &Ajiero, R. (2020). Strategies for reducing the costs of clean-energy technologies in buildings in Nigeria. Clean Energy, 4(4), 349-359.

Fatima, N., Li, Y., Ahmad, M., Jabeen, G., & Li, X. (2021). Factors influencing renewable energy generation development: a way to environmental sustainability. Environmental Science and Pollution Research, 28(37), 51714-51732.

Gibson, C. B., Gibson, S. C., & Webster, Q. (2021). Expanding our resources: Including community in the resource-based view of the firm. Journal of Management, 47(7), 1878-1898.

Gupta, G., Tan, K. T. L., Ee, Y. S., &Phang, C. S. C. (2018). "Resource-based view of information systems: Sustainable and transient competitive advantage perspectives". Australasian Journal of Information Systems, 22.

The Seybold Report
ISSN 1533-9211
DOI 10.5281/zenodo.6827332

Gao, D., Xu, Z., Ruan, Y. Z., & Lu, H. (2017). "From a systematic literature review to integrated definition for sustainable supply chain innovation (SSCI)". Journal of Cleaner Production, 142, 1518-1538.

Guney, M. S., &Kaygusuz, O. (2019). Renewable energy, green building and sustainable water management. Journal of Engineering Research and Applied Science, 8(2), 1197-1204.

Hamid, I., Alam, M. S., Kanwal, A., Jena, P. K., Murshed, M., &Alam, R. (2022). Decarbonization pathways: the roles of foreign direct investments, governance, democracy, economic growth, and renewable energy transition. Environmental Science and Pollution Research, 1-16.

Hepburn, C., Qi, Y., Stern, N., Ward, B., Xie, C., &Zenghelis, D. (2021). Towards carbon neutrality and China's 14th Five-Year Plan: Clean energy transition, sustainable urban development, and investment priorities. Environmental Science and Ecotechnology, 8, 100130.

Li, B., &Haneklaus, N. (2022). The role of clean energy, fossil fuel consumption and trade openness for carbon neutrality in China. Energy Reports, 8, 1090-1098.

Liu, S. (2022). Combined Prediction of Clean Energy Consumption in China Based on the Nonlinear Programming Model. Mathematical Problems in Engineering, 2022.

Mikalef, P., &Krogstie, J. (2020). "Examining the interplay between big data analytics and contextual factors in driving process innovation capabilities. European Journal of Information Systems", 29(3), 260-287.

Ministry of Energy (2020). [Online]. Renewable and Alternative Energy Development Plan. [Retrieved October 13, 2020]. From http://www.eppo.go.th/index.php/th/plan-policy/tieb/aedp.

Moon, C. J. (2018). Contributions to the SDGs through Social and Eco entrepreneurship: new mindsets for sustainable solutions. Entrepreneurship and the Sustainable Development Goals.

Naldi, A., Herdiansyah, H., & Putri, L. S. (2021). Good Governance Role for a Sustainable Solid Waste Management in Rural Community. In IOP Conference Series: Earth and Environmental Science (Vol. 819, No. 1, p. 012033). IOP Publishing.

Nguyen, V. T., Santa Cruz, A., Guillou, S. S., ShiekhElsouk, M. N., &Thiebot, J. (2019). "Effects of the current direction on the energy production of a tidal farm: the case of Raz Blanchard (France)". Energies, 12(13), 2478.

Nowotny, J., Dodson, J., Fiechter, S., Gür, T. M., Kennedy, B., Macyk, W., & Rahman, K. A. (2018). Towards global sustainability: Education on environmentally clean energy technologies. Renewable and Sustainable Energy Reviews, 81, 2541-2551.

Pollution Control Department. (2019). [Online]. Situation of environmental quality and health impacts from air pollution. [Retrieved February 2, 2065]. From https://www.pcd.go.th/publication.

Ramirez, J. (2021). Governance in energy democracy for Sustainable Development Goals: Challenges and opportunities for partnerships at the Isthmus of Tehuantepec. Journal of International Business Policy, 4(1), 119-135.

Rockwell, S. (2019). "A resource-based framework for strategically managing identity". Journal of Organizational Change Management.

Sawmar, A. A., & Mohammed, M. O. (2021). Enhancing zakat compliance through good governance: a conceptual framework. ISRA International Journal of Islamic Finance.

Sivaram, V., Dabiri, J. O., & Hart, D. M. (2018). "The need for continued innovation in solar, wind, and energy storage." Joule, 2(9), 1639-1642.

Sturgeon, T. J. (2021). "Upgrading strategies for the digital economy". Global Strategy Journal, 11(1), 34-57.

Sudan, R. K., & Sharma, M. (2018). Human resources development (HRD): Theory and practice. New Century Publications.

ISSN 1533-9211

DOI 10.5281/zenodo.6827332

Suttiyotin, N. (2016). Theory of consciousness Building awareness and cultivatingconsciousness.Retrieved from http://nattawatt.blogspot.com/2016/12/consciousness.html. (In Thai)

Thanin Silcharu. (2020). Research and statistical data analysis with SPSS and AMOS.(18th edition). Nonthaburi:S.R.Printing Mass Products.

NarinTanpaiboon. (2561). Trend of the electric power generation business. Krungsri Bank Economic Report.

Unique NakPhuang. (2021). the process of raising awareness of people's resource management at live in Bung Boraphet Nakhon Sawan Province. Journal of Peace Studies, CU, 9(5), 2074-2087.

Wahyuni-TD, I. S., Haron, H., & Fernando, Y. (2021). The effects of good governance and fraud prevention on performance of the zakat institutions in Indonesia: a Sharīʿah forensic accounting perspective. International Journal of Islamic and Middle Eastern Finance and Management.

Wang, Shibo; Sun, Weihai; Zhang, Mingjing; Yan, Huiying; Hua, Guoxin; Li, Zhao; He, Ruowei; Zeng, Weidong; Lan, Zhang; Wu, Jihuai (2020). Strong electron acceptor additive based spiro-OMeTAD for high-performance and hysteresis-less planar perovskite solar cells. RSC Advances, 10(64), 38736–38745.

Wantanakomol, S. (2021). "The effect of guidelines on reducing logistics costs". Uncertain Supply Chain Management. Volume 9 Issue 3: 667-674.

Wattanakomol, S. and Silpcharu, T. (2022). Second-order confirmatory factor analysis of auto parts manufacturing industry management guidelines for sustainable success. Uncertain Supply Chain Management. Vol. 10 No 3. 905-912

Werner, J. M. (2021). Human resource development: Talent development. South-Western College.

Wright, P., Gerhart, B., Noe, R., & Hollenbeck, J. (2018). Fundamentals of human resource management. Management, 5(3), 27-36.

Zerbian, T., & de Luis Romero, E. (2021). The role of cities in good governance for food security: lessons from Madrid's urban food strategy. Territory, Politics, Governance, 1-19.