

MEASUREMENT DEVELOPMENT OF GREEN BUSINESS PERFORMANCE: AN EVIDENCE FROM AUTOMOBILE MANUFACTURERS IN THAILAND

Suraporn Onputtha^{1*}
Chalernporn Siriwichai²

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Abstract

This study had objective to develop and confirm the measurement model of green business performance in automobile manufacturers in Thailand. The samples were of 400 employees who are working in automobile manufacturers. Purposive and proportion sampling method were used to distribute the questionnaire, which was developed as a research instrument. The data analysis employed second-order confirmatory analysis. The study indicates that green business performance in automobile manufacturers in Thailand consists of 3 dimensions with 19 indicators with model fit indices: p-value of 0.000, CMIN/df of 1.950, GFI of 0.956, AGFI of 0.911, RMSEA of 0.049, RMR of 0.009, CFI of 0.992, TLI of 0.985, and NFI of 0.983. Furthermore, environmental performance with 7 indicators has the most influential factor loading as of 0.954, then followed by social performance with 6 indicators with factor loading as of 0.953 and economic performance with 6 indicators with factor loading as of 0.873, respectively. The study result can be applied by the automotive manufacturers to measure and guide their sustainable business success.

Keyword: Confirmatory Factor Analysis, Green Business Performance,
Automobile Manufacturers

¹ Silpakorn University International College (SUIC), Silpakorn University, Thailand.
Email: onputtha_s@su.ac.th *First Author and Corresponding Author

² Silpakorn University International College (SUIC), Silpakorn University, Thailand.
Email: siriwichai_c@silpakorn.edu, siriwichai



Introduction

It is unavoidable to mention that nowadays many organizations especially in automobile manufacturing industry need to consider about green business performance since it can help companies to respond to the external business environment concerning industrial involvers, internationalization, technology innovation, governmental matters, and society that keeps forcing and driving the business to change business practices, especially in terms of environmental matters (Green et al., 2012). The study from Melewar (2003) and Melewar and Wooldridge (2001) advocated that industrial forces from the external parties including customers, competitor, and suppliers can promote environmental concerns and protection, which finally create the way the company needs to be distinguished from other competitors. In the meantime, Karimi and Rahim (2015) who indicated profoundly that being in international level can force the corporate to concern environmental matters. In addition, Malviya and Kant (2017) and Rashid et al., (2018) also found that green technology innovation force that refers to the supports of the technology and innovation in promoting and managing the environmentally friendly works, products, and services can assist the companies to promote and produce works, products, and services as well as Alhamali (2019), Malviya and Kant (2017) and Walker et al. (2008) found that the forces from society and community concerning and promoting environmental awareness and protection can force the companies to concern and react environmental matters. Lastly, the green governmental regulation and law from the governmental regulations and laws can also drive and force the companies to conform environmental relatedness (Chidchob & Pianthong, 2020; Huang et al., 2017; Jasmi & Fernando, 2018; Maditati et al., 2018).

Not only to respond to external forces and drivers, the adoption of green business performance into measuring the business management and operation is also being significantly interested. More importantly, the green business performance can also link the companies to gain competitive advantages and to reach the sustainable business success in terms of economic aspect covering what the companies receive in terms of financial perspectives (Green et al., 2012; Kafa et al., 2013; Zhu et al., 2008), environmental aspect covering what the environment is benefited (Banihashemi et al., 2019; Çankaya & Sezen, 2019) and social aspect covering what benefits the internal and external society receive (Çankaya & Sezen, 2019; Leonidou et al., 2017; Zampese et al., 2016).

In lines with external forces and drivers as well as contributions to business success, it is necessary that there should be a study on green business performance. However, the recent studies on green business performance are broad and there are

few studies have limited to specific industry. In addition, there is less study on measurement development of green business performance related to automobile manufacturers industry in Thailand. Accordingly, this study has the objectives to confirm measurement model of green business performance. The area of the study is scoped to automobile manufacturers in Thailand since they have high significant impact on country's GDP as well as environmental issues (Thailand Board of Investment, 2017; Garcia-Machado & Martinez-Ávila, 2019). The result of this study can guide the industry to measure their green business performance which finally can enhance business competitiveness and sustainable outcomes toward organization, society, and natural environment (Chidchob, & Pianthong, 2020).

Objective

To develop and confirm measurement model of green business performance in automobile manufacturers in Thailand.

Literature Reviews

The concept of green business performance is derived from the notion of performance measurement. Performance is an interesting theme for academicians and organization managers because it has been used mostly in relation to management and strategic management (Connolly et al., 1980). Meanwhile understanding about performance measurement is being recognized widely, organizational performance is being developed. Organizational performance is designed to measure how successful the organization is. There are two concepts to measure whether the organization activities can achieve their satisfied performance: by using the idea of market-orientation or with financial terms (Yamin et al., 1999). Considering improving organizational performance within the organization is not enough, using the whole supply chain of the business from upstream to downstream then is recommended (Tan, 2002). Adopting the concept of organizational performance in the notion of supply chain management can help the organization both in short term and long term. An assessment of organizational performance for short-term includes an increase of productivity, inventory reduction, and cycle time and for long-term includes an increase in market share and profits for all members of the supply chain (Kannan et al., 2014). In addition, Holmberg (2000) supports that recent organizations have used financial metrics as a tool in order to evaluate their organization's behaviour. Any organizational initiative, including supply chain management, should ultimately lead to enhanced organizational performance. Kuei et al. (2015), Leonidou et al. (2017) and Banihashemi et al. (2019) both financial



and market criteria, including return on investment (ROI), market share, profit margin on sales, the growth of ROI, the growth of sales, the growth of market share, and overall competitive position to measure organization's performance.

Stanwick and Stanwick (1998) argued that the business performance should also include environmental aspect since every business is consuming natural resources as parts of products and service process. Indeed, the environmental performance refers to the outcomes derived from the organization benefitting ecology environmental systems and organization reputation by making on resources utilization, waste and pollution reduction, environmental accidents reduction, better environmental-friendly production and process, and recycling and reusing adoption (Banihashemi et al., 2019; Çankaya & Sezen, 2019; Fernando et al., 2019; Green et al., 2012; Zhu et al., 2007, 2008). In addition to environmental performance assessment, reputation of the company related to environmental improvement and protection can be set as one of environmental achievements (Leonidou et al., 2017; Rawashdeh, 2018). Nevertheless, Fernando et al. (2019) argued that not only giving such environmental improvement and protection as well as product and service quality can be important indicators for environmental performance, but also the transparency of organization's provided information related to environmental protection and prevention must be considered. Respectively, increase in environmental improvement, reputation, image, and quality associated with environmental concerns can be significantly used for measuring environmental performance.

Moreover, social performance referring to the corporate' management related to environmental concerns, protection, and management and it results contribute good things to the community and society can be also added to measure the success of the business. Indeed, social performance can consist of social participation and collaboration such as customers' participation and collaboration in environmental activities (Azevedo et al., 2011; Banihashemi et al., 2019; Green et al., 2012; Kuei et al., 2015; Lin, 2013; Zhu et al., 2007, 2008) and supplier's participation and collaboration (Banihashemi et al., 2019; Kuei et al., 2015). In addition, Kafa et al. (2013) advocated that the level of effort to raise consumer awareness of sustainability and the level of effort to motivate employees in the organization can be a part of green business performance in terms of social performance. However, Zampese et al. (2016) argued that social participation and collaboration should also include the participation and collaboration with governmental and non-governmental organization. Similarly, Banihashemi et al. (2019) and (Çankaya & Sezen, 2019) revealed that employees' participation, community participation, governmental and non-governmental organization's

participation can be used to measure social performance in terms of social participation and collaboration.

Accordingly, green business performance can consist of 3 dimensions including economic performance, environment performance, and social performance.

Research Methodology

Population and samples

Population in this study are about 100,000 employees who are working in the automobile manufacturers in Thailand (Thailand Board of Investment, 2017). In obtaining the sample size, the researchers used the sampling computation from Krejcie and Morgan (1970), the sample size was of 380 persons. By increasing data enrichment for structural equation modeling to investigate the hypotheses, the study collected about 400 samples.

Research tools and data collection

The questionnaire was drafted by reviewing related literatures and previous researches and validated by 7 experts in the related fields, and tested with Cronbach's alpha for reliability investigation. Back translation technique was also employed in questionnaire design process (Maneesriwongul & Dixon, 2004). Finally, it consisted of 8 questions from personal information including gender, age, marital status, education level, monthly income, work experience, position, and department and 19 questions from green business performance covering 3 aspects: economic, environmental and social performance. The respondents were asked to rate their opinion ranging from 1 referring to strongly disagree to 5 referring to strongly agree toward the developed questions. The data were collected from 400 employees who are working in the automobile manufacturers in Thailand and know about the company performance. Purposive sampling method was used to identify the study area and proportional sampling method was used to allocate the number of sampled employees who were selected to be distributed the questionnaires.

Measures Development, Content Validity, Reliability, Convergence, and Discrimination

The measurement of green business performance has been developed from previous studies related to business performance. In this study, the green business performance consists of 20 questions under the theme of economic performance, environmental performance, and social performance. For economic performance, there are 7 questions; for examples, "the company's energy usage decreases", "the company's revenues increase" and "the company's market share increases". For environmental performance, there are 6 questions; for examples, "technology and



resources are effectively utilized”, “environmental accidents and risks are reduced” and “reputation, image, and quality of the company is improved”. For social performance, there are 6 questions; for examples, “employees, customers, community, suppliers, and governmental agencies are satisfied with the process of the company”, “the company has better relationship with employees, customers, community, suppliers and governmental agencies” and “employees, customers, community, suppliers, and governmental agencies participate in expressing ideas and making a decision on activities that benefit the society”.

For content validity test, the researchers employed the score of content validity index (CVI): content validity index for item (I-CVI) and content validity index for scale (S-CVI), provided by 7 experts from international business management, sustainability, marketing, and logistics and supply chain management in order to present the appropriateness and representativeness of measurements, items and constructs (Shrotryia & Dhanda, 2019; Yusoff, 2019). From the study, score of content validity index between 0.71 - 1.00 which are higher than 0.70 as recommendation (Halek et al., 2017; Rodrigues et al., 2017)

For reliability test, the researchers employed Cronbach’ alpha to test the reliability of the questionnaire and questions. The score of Corrected Item-Total Correlation in each question should be greater than 0.20 (Faleye, 2008). Meanwhile, the Cronbach the Cronbach Alpha Coefficient of each dimension should be greater 0.70 (Hajiar, 2014). From 30 set of pilot test questionnaires, the result showed that economic performance, environmental performance, and social performance contained Cronbach Alpha Coefficient higher than 0.70 as recommendation.

For convergence and discrimination test, the study employed standardized factor loading (FL), which it should be higher than 0.50 (Hajiar, 2014); squared multiple correlation (SMC), which it should be higher than 0.50 (Aykan & Nalçacı, 2018; Hair Jr et al., 2016); construct reliability (CR), which it should be higher than 0.50 (Dilekli & Tezci, 2019); average variance extracted (AVE), which it should be higher than 0.50 (Hair Jr et al., 2016) and correlation coefficient, which it should not be higher than 0.95 (Henseler et al., 2015).

Data analysis

Researchers analyzed the data derived from samples by using descriptive statistics including frequency, percentage, mean and standard deviation and structural equation modeling (SEM) to study the effect of independent variables on dependence variables. All basic requirements before using the SEM including skew, kurtosis, and percentage of coefficient of variation (%CV) were required and tested (Brown, 1998;

Larson, 2006; Marshall & Jonker, 2010). Furthermore, second order confirmatory model analysis (CFA) with model fit indices including relative chi-square ($C_{min}/df < 5$), Chi-square probability Level ($p\text{-value} > 0.05$), goodness of fit index ($GFI > 0.80$), adjusted goodness of fit ($AGFI > 0.80$), root mean square residual ($RMR < 0.80$), root mean square error of approximation ($RMRSEA < 0.80$), Tucker Lewis Index ($TLI > 0.80$), comparative fit index ($CFI > 0.80$), normed fit index ($NFI > 0.80$) were employed to tested the fitness of good model (Arbuckle, 2011).

Research Results

Personal information of the Respondents

The study summarizes that most of the respondents are male (256 persons or 66.3%), age between 21 - 30 years old (187 persons or 46.8%), are married (212 persons or 53.0%), graduate from Bachelor's degree (251 persons or 62.7%); monthly earn between 15,001 - 25,000 baht (145 persons or 36.3%), work for between 1 - 5 years (127 persons or 31.8%), work as operational staff (204 persons or 51.0%), work in Production Department (191 persons or 47.8%).

Employees' Opinion towards Green Business Performance

In relations to green business performance, the study finds that the respondents have opinion in strongly agreeable level towards Environmental Performance (EnP) and Social Performance (SP) with mean score as of 4.293 and 4.284 and standard deviation as of 0.611 and 0.658, respectively. In the meantime, the respondents have opinion in agreeable level towards Economic Performance (EP) with mean score as of 4.135 and standard deviation as of 0.673.

Analysis of skew, kurtosis, and percentage of coefficient of variation

From the study, the finding indicated that economic performance (EP1, 2, 3, 4, 5, 6, 7) has, Skewness value from -0.390 to -0.530, Kurtosis value from -0.168 to 0.654, and %CV value from 16.500 to 19.187. Another dimension, environmental performance (EnP1, 2, 3, 4, 5, 6), has Skewness value from -0.975 to -0.602, Kurtosis value from 0.335 to 1.856, and %CV value from 14.909 to 16.449. Furthermore, social performance (SP1, 2, 3, 4, 5, 6) has Skewness value from -0.611 to -0.987, Kurtosis value from -0.142 to 2.014, and %CV value from 15.513 to 17.390. Consequently, the data has systematical distribution and good shape since the skewness and kurtosis is in between -3 and +3 and percent of coefficient of variation (%CV) is under 30 percent as recommendation (Brown, 1998; Larson, 2006; Marshall, & Jonker, 2010).

Confirmatory Factor Analysis of Green Business Performance



The second-order confirmatory factor analysis was employed to study the green business performance containing with 3 dimensions with 19 items (EP1, 2, 3, 4, 5, 6, 7; EnP1, 2, 3, 4, 5, 6; and SP1, 2, 3, 4, 5, 6). Here, there were two investigated models: initial and adjusted model. From the study, it was found that the initial model had some unacceptable model-fit values: p-value of 0.000, CMIN/df of 7.991, GFI of 0.756, AGFI of 0.689, RMSEA of 0.132, TLI of 0.887, and NFI of 0.889. Due to the occurrence of some unacceptable values, the model modification was performed. After the conduction of model modification by correlating possibly correlated items, dropping standardized factor loading (FL) or dropping squared multiple correlation (SMC), the adjusted model consequently gained better model-fit indices: CMIN/df of 1.950, GFI of 0.956, AGFI of 0.911, RMSEA of 0.049, RMR of 0.009, CFI of 0.992, TLI of 0.985, and NFI of 0.983. However, there was one model-fit index indicating unaccepted level (p-value of 0.000 less than 0.05). Even though p-value is lower than 0.05, some researchers can accept it (Hu, & Bentler, 1999; Anwar, Rehman, & Shah, 2018). As a result, the adjusted model, therefore, remained 3 dimensions with 19 items (EP1, 2, 3, 4, 5, 6, 7; EnP1, 2, 3, 4, 5, 6; and SP1, 2, 3, 4, 5, 6).

After the model adjustment, the following indicators including standardized factor loading (FL), t-value, squared multiple correlation (SMC), Cronbach's Alpha (α), construct reliability (CR), and average variance extracted (AVE). The detail is shown below table.

Table 1: Confirmatory Factor Analysis of Green Business Performance

Indicators	FL	t-value	Error	SMC	p-value
First-Order Confirmatory Factor Analysis					
Economic Performance ($\alpha = 0.965$, CR = 0.964, AVE = 0.792)					
EP1	0.859	25.773	0.263	0.737	0.000
EP2	0.841	23.898	0.292	0.708	0.000
EP3	0.923	25.953	0.148	0.852	0.000
EP4	0.926	26.073	0.142	0.858	0.000
EP5	0.927	26.264	0.141	0.859	0.000
EP6	0.893	28.693	0.203	0.797	0.000
EP7	0.910	N/A	0.264	0.736	N/A
Environmental Performance ($\alpha = 0.953$, CR = 0.955, AVE = 0.781)					
EnP1	0.901	24.908	0.188	0.812	0.000
EnP2	0.873	29.187	0.238	0.762	0.000
EnP3	0.914	25.648	0.164	0.836	0.000

Table 1: Confirmatory Factor Analysis of Green Business Performance (Cont.)

Indicators	FL	t-value	Error	SMC	p-value
First-Order Confirmatory Factor Analysis					
Environmental Performance ($\alpha = 0.953$, CR = 0.955, AVE = 0.781)					
EnP4	0.856	23.109	0.268	0.732	0.000
EnP5	0.905	25.788	0.180	0.820	0.000
EnP6	0.851	N/A	0.277	0.723	N/A
Social Performance ($\alpha = 0.971$, CR = 0.967, AVE = 0.831)					
SP1	0.911	28.105	0.169	0.831	0.000
SP2	0.921	27.842	0.152	0.848	0.000
SP3	0.900	29.127	0.107	0.893	0.000
SP4	0.897	35.970	0.195	0.805	0.000
SP5	0.911	35.494	0.170	0.830	0.000
SP6	0.881	N/A	0.224	0.776	N/A
Second-Order Confirmatory Factor Analysis					
EP	0.873	N/A	0.092	0.908	N/A
EnP	0.954	18.789	0.090	0.910	0.000
SP	0.953	19.220	0.239	0.761	0.000

Note: The path of SP, EP7, EnP6, and SP6 was set to 1 (not estimated)

From the Table 1, the research indicated that standardized factor loading (FL) ranged from 0.841 to 0.927, which is higher than 0.50 (Hajjar, 2014); t-value ranged from 23.109 to 35.970, which is higher than 1.96 (Raines-Eudy, 2000); squared multiple correlation (SMC) ranged from 0.708 to 0.893, which is higher than 0.50 (Aykan & Nalçacı, 2018; Hair Jr et al., 2016); Cronbach's Alpha (α) was from 0.953 to 0.971, which is higher than 0.70 (Hair Jr et al., 2016); construct reliability (CR) was from 0.955 to 0.967, which is higher than 0.50 (Dilekli & Tezci, 2019); and average variance extracted (AVE) was from 0.708 to 0.893, which is higher than 0.50 (Hair Jr et al., 2016). Accordingly, the measurement model of green business performance contains with 3 dimensions with 19 items (EP1, 2, 3, 4, 5, 6, 7; EnP1, 2, 3, 4, 5, 6; and SP1, 2, 3, 4, 5, 6). The adjusted model is shown below.

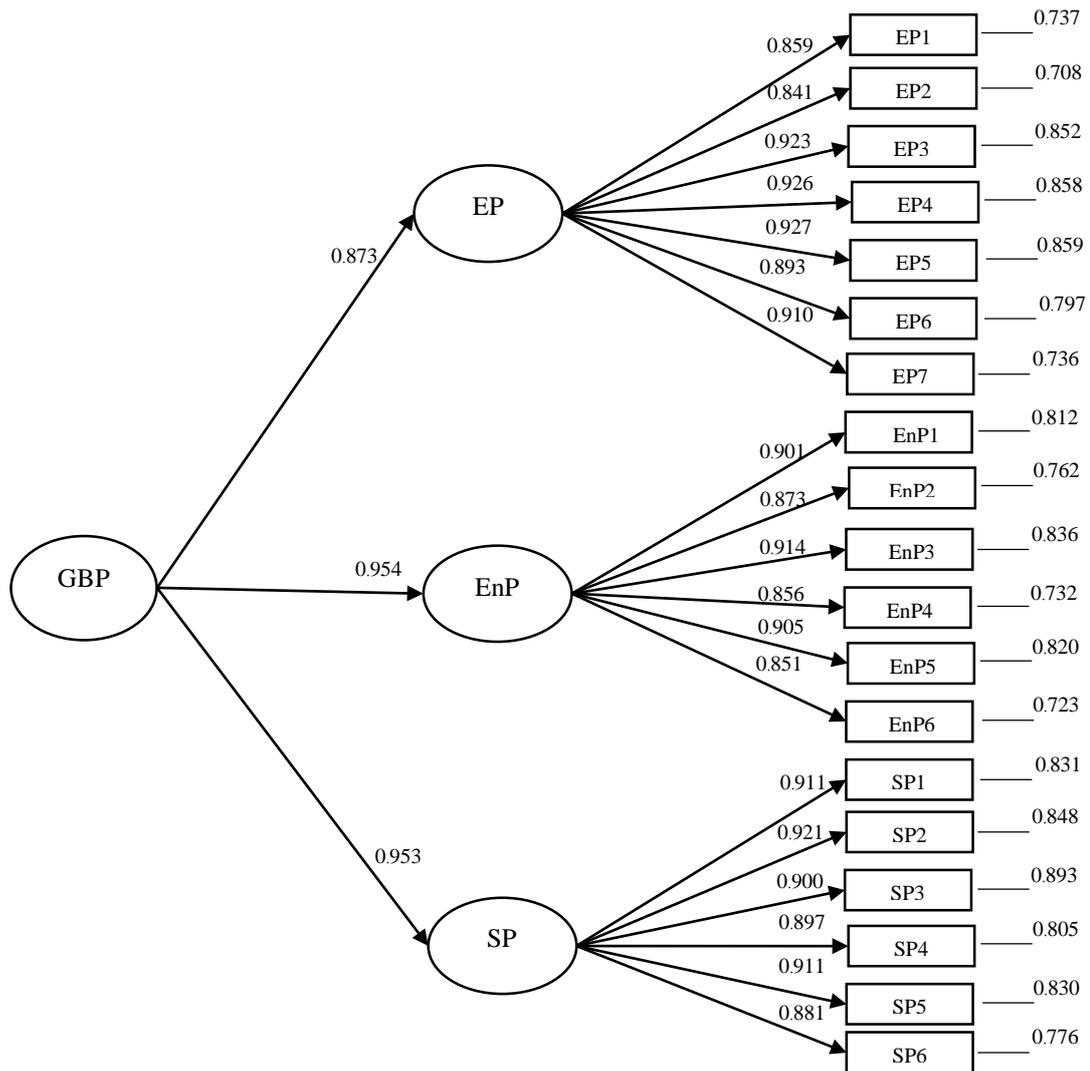


Figure 1: 2nd Order Confirmatory Factor Analysis of Green Business Performance

Note: Green Business Performance (GBP), Economic Performance (EP), Environmental Performance (EnP), and Social Performance (SP)

Discussion

In relations to green business performance, the study finds that the respondents have opinion in satisfactorily agreeable level towards environmental performance, social performance and economic performance. This is because when the companies adopt the environment focus and management by communicating, promoting, and managing all factors from internal and external perspectives from employees, suppliers, customers, and other related involvers can lead the company reach the satisfactory level of business performance. This includes the case from automobile manufacturers in Thailand. The business performance that has been studied in this research includes economic aspect referring to financial perspectives, environmental aspect referring to environmental benefit, and social aspect referring to society benefit, which its result is consistent

with the study from many researches (Banihashemi et al., 2019; Çankaya & Sezen, 2019; Chienwattanasook & Jernsittiparsert, 2019; Green et al., 2012; Kafa et al., 2013; Leonidou et al., 2017; Ngriatedema & Li, 2014; Zampese et al., 2016; Zhu et al., 2008).

In terms of environmental performance, the respondents advocate that the companies can gain better ecology environmental systems, organization reputation, resources utilization, waste and pollution reduction, and environmental accidents reduction. The study result is consistent with the study conducted by Çankaya and Sezen (2019) who found that environmental performance can include Improvement of an enterprise's environmental situation, Reduction in air emission, and Decrease of consumption for hazardous/harmful/toxic materials. Similarly, Banihashemi et al. (2019) who found that the environmental performance can include reduction in energy and resources, firm's environmental image, and land and biodiversity maximization. In addition, the study is also consistent with the study conducted by Fernando et al. (2019) who studied about green growth in technology firms through the connections between environmental innovation and sustainable business performance and the study done by Rawashdeh, (2018) who studied about organizational environmental performance in Jordanian health service organizations.

In terms of social performance, the respondents in automobile manufacturers in Thailand also gain better social performance from adopting green practices in the companies. They receive social satisfaction, social relationship, social participation, social collaboration, social life quality, and social services to both internal and external society including employees, customers, suppliers, community and governmental agency. The study is consistent with the study done by Mutingi et al. (2014) who found that organizational performance can include increase in green image, which there was an increase in customer goodwill due to greening activities. Moreover, the study also has similar result from the study done by Çankaya and Sezen (2019), Banihashemi et al. (2019) and Fernando et al. (2019) who revealed received social performance can be such as improvement in relations with community stakeholders, customer health and safety, stakeholders' participation, employment stability, customer satisfaction and loyalty, and community relations.

Recommendations

Recommendation from the Study

For practical implications, the study can also contribute to guide the company managers and executives in automotive manufacturers in Thailand to utilize the confirmed model of green business performance consisting of economic performance, environmental performance, and social performance to measure the companies' success. For measuring economic performance, the company managers and executives can use cost reduction,



revenues and profits increase, market share and sales growth and increase in competitive advantages. For measuring environmental performance, the company managers and executives can use resources maximization, reduction in pollution and waste, reduction in accidents and risks, reputation increase, green process improvement and green adoption capacity. For measuring social performance, the company managers and executives can use social satisfaction, social relationship, social participation, social collaboration, social life quality and social services. For theoretical implications, the scholars can be confirmed about green business performance consisting of economic performance, environmental performance, and social performance.

Recommendation for Future Study

Firstly, according to the study limited to quantitative research to develop the model, the next research perhaps extends to employ qualitative approach such using as in-depth interview to gain more insights. In addition, the mixed method that gathers the data from both in-depth interview and self-reported questionnaire can also be considered. This can help future researches capture deeper points. Secondly, this the study attempts to focus on automotive industry area, specifying on automotive manufacturing type; therefore, the result of study may be only generalized within the limited frontier. As a result, the future research can extend to other industries and compare the related findings.

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