

ความสัมพันธ์เชิงสาเหตุของแรงผลักดันผู้มีส่วนได้ส่วนเสีย การจัดการห่วงโซ่อุปทาน  
สีเขียว ความสามารถในการแข่งขันและผลการดำเนินธุรกิจของอุตสาหกรรม  
ผลิตในประเทศไทยกับการทดสอบเชิงประจักษ์

The Causal Relationship of Stakeholders' Driving Force, Green Supply Chain  
Management, Competitiveness and Business Performance of Manufacturing  
Industry in Thailand, and its Empirical Testing

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## บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อ 1) ศึกษาระดับแรงผลักดันผู้มีส่วนได้ส่วนเสีย การจัดการห่วงโซ่อุปทานสีเขียว และ 2) ศึกษาอิทธิพลของแรงผลักดันผู้มีส่วนได้ส่วนเสีย การจัดการห่วงโซ่อุปทานสีเขียวที่มีต่อความสามารถในการแข่งขันและผลการดำเนินธุรกิจของอุตสาหกรรมผลิตในประเทศไทย กลุ่มตัวอย่างอุตสาหกรรมผลิตในประเทศไทย จำนวน 412 ตัวอย่าง สุ่มตัวอย่างแบบชั้นภูมิ ใช้แบบสอบถามเป็นเครื่องมือในการเก็บรวบรวมข้อมูล วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา และสถิติเชิงอนุมานโดยใช้เทคนิคการวิเคราะห์โมเดลสมการโครงสร้าง

ผลการวิจัยพบว่า แรงผลักดันผู้มีส่วนได้ส่วนเสีย การจัดการห่วงโซ่อุปทานสีเขียว ความสามารถในการแข่งขันและผลการดำเนินธุรกิจของอุตสาหกรรมผลิตในประเทศไทย ภาพรวมอยู่ในระดับมาก แรงผลักดันผู้มีส่วนได้ส่วนเสียมีอิทธิพลทางตรงและทางอ้อมต่อความสามารถในการแข่งขันและผลการดำเนินธุรกิจ โดยผ่านการจัดการห่วงโซ่อุปทานสีเขียวอย่างมีนัยสำคัญทางสถิติที่ระดับ .01 แบบจำลองสมการโครงสร้างของแรงผลักดันผู้มีส่วนได้ส่วนเสีย การจัดการห่วงโซ่อุปทานสีเขียว โดยปัจจัยเชิงสาเหตุดังกล่าว มีอิทธิพลต่อความสามารถในการแข่งขันและผลการดำเนินธุรกิจของอุตสาหกรรมผลิตในประเทศไทย มีความสอดคล้องกับข้อมูลเชิงประจักษ์โดยมีค่า  $\chi^2 = 31.61$ ,  $df = 35$ ,  $CMIN/df = 0.903$ ,  $CFI = 1.00$ ,  $GFI = 0.95$ ,  $RMSEA = 0.000$

คำสำคัญ: แรงผลักดันผู้มีส่วนได้ส่วนเสีย การจัดการห่วงโซ่อุปทานสีเขียว

## Abstract

The objectives of this research were to: 1) study the level of stakeholders' driving force; and green supply chain management; and 2) the influence of stakeholders' driving force and green supply chain management on the competitiveness and business performance of the manufacturing industry in Thailand. 421 manufacturers were selected through a stratified random sampling to participate in this study. A questionnaire was employed for data collection. The collected data were analyzed using descriptive statistics and inferential statistics with the application of structural equation model analysis.

The study found that the overall level of stakeholders' driving force, green supply chain management, competitiveness, and business performance of the manufacturing industry in Thailand was at a high level. The stakeholders' driving force has significant direct and indirect influences on the competitiveness and the business performance through green supply chain management at .01 of statistically level. According to the structural equation model analysis, the study showed that the casual



factors (stakeholders' driving force and green supply chain management) have influenced the competitiveness and business performance of the manufacturing industry in Thailand and the finding is consistent with empirical data ( $\chi^2 = 31.61$ ,  $df = 35$ ,  $CMIN/df = 0.903$ ,  $CFI = 1.00$ ,  $GFI = 0.95$ ,  $RMSEA = 0.000$ ).

**Keywords:** stakeholders' driving force, green supply chain management

**Paper Type:** Research

## 1. Introduction

A stakeholder means people who are affected by business operations both outside and inside the organization. Successful businesses must be able to create value for stakeholders. Therefore, the business organization will have to pay attention to stakeholders. At the same time, the expectations of stakeholders who want to reduce the environmental impact are many and increase gradually. As a result, the manufacturing industry needs to focus on adaptations and changes in the production process considered to the environment and social responsibility (Harini & Meenakshi, 2013). This requires the industry to have many dimensions of change, including economy, society, culture and environment (Altunta & Tuna, 2013). Nowadays, the flow of business competition, resource and energy crisis, and rapid changes in the environment and management make businesses have more intense competition. As a result, every organization seeks to apply the theoretical concepts to develop the management and operation of the organization to achieve efficiency and effectiveness as well as achieve the goals and vision of the organization for business survival that leads to sustainable development. Behnam, Sarkis, & Hoda (2015) mentioned that the concept of green supply chain management can be considered as an organization management tool which has started to play a role and is developing rapidly. Further, it is a practical guideline and is a modification of the organization's strategy. Innovations for the supply chain management process at every step are created starting from ordering, manufacturing, transportation, inventory management, storage, and distribution. These are important duties of logistics through the supply chain network from suppliers to end- consumers under the context of environmental awareness. Likewise, organizations have internal and external motivation for the application of green supply chain system (Youn, Yang, Hong, & Park, 2013). Therefore, the green supply chain management process is the key to driving Thailand's manufacturing industry to add

value to products and services as a management tool for successful businesses (Khan & Dong, 2017) and to develop competitiveness. At the same time, the green supply chain also helps to reduce the total cost of business and more importantly, helps to reduce global warming problems effectively. Further, it is also a preparation to develop the efficiency of Thailand's manufacturing industry in order to compete and operate the business sustainably. Based on such importance, the researcher is interested to conduct a study about the causal relationships of stakeholders' driving force and green supply chain management of the manufacturing industry in Thailand and the empirical testing of causal factors and its results. The results of this present study showed the importance of the stakeholders' driving on the causes and results of the green supply chain management. In addition, findings are also used to plan and formulate causal relationship patterns, policies, goals and strategies of the organization under changing business environment. This leads to a competitive advantage, responds to the needs of stakeholders, and leads to the good operational efficiency of the organization finally.

## 2. Research Objective

2.1 To study the levels of driving force stakeholders, green supply chain management, competitiveness, and business performance of manufacturing industries in Thailand.

2.2 To study the influences of driving force stakeholders, green supply chain management on competitiveness and business performance of manufacturing industries in Thailand.

## 3. Literature Review

3.1 *Concepts of Stakeholders' driving force, and green supply chain management*

Successful businesses must be able to create value for stakeholders since the stakeholders are the

beneficiaries and those affected by the business operations of the organization. Zhu & Sarkis (2007) mentioned that stakeholders' needs in term of environmental expectations have increased. Manufactures have been pressured to apply the green supply chain management. For example, the industry in China has increased awareness of the green supply chain operation because of the driving force generated by stakeholders. According to Chu, Yang, Lee, & Park (2017) the driving force from the state, customers, competitors, society has influenced on the green supply chain management and the performance of the manufacturing company. Shekari & Ghatari (2013) state that the important thing for green supply chain management is responsibility and support of senior executives. Executives' commitment to green supply chain management has helped to stimulate the reduction of environmental impacts and the motivation for better environmental performance which positively affects the organization image. As a result, it might be said that the driving force generated by the stakeholders consist of:

3.1.1 Customers and consumers: at present, customers and consumers are interested in green products and services which became the most significant pressure for starting to conduct environmentally friendly activities (Doonan, Lanoie, & Laplante, 2005). Further, Chan & Lau (2000) found that Intention to consume green products is the same behavior. Customers may be factors that enable the company to apply green supply chain management since the demand for environmentally friendly products has increased significantly.

3.1.2 Competitors: competitors are the driving force for the implementation of the green supply chain due to the leading competitors have the potential to apply environmental technology into the supply chain. This will be able to create more standards for the industry in environmental operations. This proactive operation also helps the organization to receive a return on competitive advantage (Walker, Sisto, & Bain, 2008). Similarly, Zhu, Sarkis, & Geng (2005) found that manufacturers in China are more aware of environmental issues as a result of pressure from competitors and marketing. Therefore, export-oriented manufacturers must comply with various environmental measures to maintain a competitive position in the market.

3.1.3 Raw material suppliers: Raw material suppliers are supporters and important participants in supply

chain activities. The inefficient raw material suppliers can affect the entire supply chain performance due to various activities in the supply chain are interrelated. Therefore, if wanting to have the same standards throughout the supply chain, it is necessary to have good partners or raw material suppliers. In addition, the standard of products should be the same to promote production and sustainable development.

3.1.4 Society: due to the deterioration of the environment over the past decade, people are increasingly aware of environmental issues. It is resulted in the need to buy products from companies that are environmentally friendly. Public motivations cause most companies or business organizations to review environmental operations within the supply chain. This is an accession to a new group of customers who want a company that is a good example in term of environment. This is similar to the study of Setthasakko (2009) who found that industrial pollution affects communities. Therefore, the manufacturer must show more responsibility for their won operations to maintain the image of the manufacturer.

3.1.5 Support of executives: executives or leaders are those who are responsible for the environmental issues of the organization. At different levels, the selection of green supply chain management is different for implementation (Vachon & Klassen, 2007). The important things for green supply chain management are the responsibility, support of the team, support of the senior executives, and the organizational culture that support environmentally friendly practices. Further, executives may have to use green supply chains for moral reasons.

### 3.2 Concepts of green supply chain management

The supply chain is dynamic and involves the flow of data, products, and funds from the beginning to the end of the product life cycle. Zhu & Cote (2004) mentioned that the green supply chain is a process that involves the organization internally and externally starting from raw materials importing, manufacturing, delivering products to customers or consumers through delivering organizations, manufacturers, distributors. Every process requires a consideration of environmental impacts (Hervani, Helms, & Sarkis, 2005; Rehman & Shrivastava, 2011). According to the study of Kankanit & Busba (2015), the important factors affecting the green supply chain management in the Thai electronics and electrical appliance industry are government regulations and support from the organization's executive.

This is similar to the study conducted by Thiranan (2013) that green manufacturing technology performance indicators had significantly affected the ratio of operating expenses to gross incomes owing to an assessment of green supply chain management competencies for the Thai electronics industry. Moreover, Khan & Dong (2017) conducted a study related to effects of green supply chain management on business performance of the manufacturing industry in Pakistan and found that green purchasing, green manufacturing, and green designing are factors that have a positive effect on business performance. Green manufacturing design reflects the ability to use the resource in each step by planning for a cost-effective use of resources based on the principle of reduce, reuse, and recycle where the reverse logistics cost is about 4-9 % of the total logistics cost (Dekker, Fleischmann, Inderfurth, & Wassenhove, 2010). In sum, the green supply chain management consist of:

3.2.1 Green procurement: it is a process or steps of raw material purchasing or a raw material selection process from raw material suppliers. This also means a collaboration among raw materials suppliers or business partners to procure the appropriate raw materials to replace raw materials that may be harmful to the environment (Yen & Yen, 2012). It is also a process to find raw materials that can reduce the waste generated from production throughout the product cycle. This causes the green product market that encourages manufacturers to pay attention to products that have an impact on the environment. In addition, Rao & Holt (2005) explained that green procurement will allow manufacturers to participate in the environmental management of raw material suppliers to ensure that the production process of raw material and raw materials are environmentally friendly.

3.2.2 Green designing: the main goal of green designing is to create eco-friendly products or to use raw materials that are environmentally friendly together with product life cycle assessment (Khiewnavawongsa, 2014). A product design must focus on reducing the use of raw materials. A reduction of the amount of materials or raw materials used in production will result in lower energy consumption rates. The principle of Reuse-Recycle-Recovery is employed in a product designing process as well as avoiding the use of dangerous materials in the production process. Therefore, the organization must supervise the

process of product designing to be as efficient as possible. Further, the product design is also a supporting factor helping to reduce the environmental impact caused by the production process.

3.2.3 Green Manufacturing: It is meant to the production process (starting from the beginning to the end of the process) that is environmentally friendly and no chemicals and materials that are harmful to the environment through the production process that is environmentally friendly such as cleaner technology. Ninlawan, Seksan, Tossapol, & Pilada (2010) said that the use of cleaner technology in the production process can reduce the amount of waste caused by fuel use. This is an important supporting factor that reduces the impact on the environment caused by the production process. Further, it can significantly reduce costs for environmental management.

3.2.4 Green delivery: Green delivery means to the environmentally friendly delivery of products where the packaging used and transportation methods must be environmentally friendly. For examples, choosing the appropriate type of transportation, choosing the appropriate vehicle and fuel, choosing the type of fuel that minimizes environmental damage, and choosing a carrier. Further, green delivery also requires additional supporting technology for environmentally friendly shipments to reduce costs and the impact on the environment at the lowest cost

### 3.3 Competitiveness and Business performance

The organizational performance usually measures from a return of assets, a sales growth, a success of new product, and a market share (Cameron & Green, 2015). The business performance indicates the total operating status of the business. Therefore, capabilities regarding to green supply chain management are not only enable a business to meet the needs of stakeholders, it also helps to improve and increase business performance and business competitiveness (Flynn, Huo, & Zhao, 2010). According to Ricky, Hongwei, Hing, & William (2012), a purchasing operation and a green production have significantly influenced environmental performance and can help to positively increase business performance. Similarly, Nelson & Ana Beatriz Lopes de (2014) found that organizational learning, purchasing operation, clean manufacturing process, and reuse process that take into account environmental impacts are factors supporting for positive business performance of the manufacturing industries. Owing to Ming,

Lim, Ming-Lang, Kim & Tat (2017), a capability and knowledge concerning supply chain management is a key of business success and competitive advantage. Further, adding new value to product through knowledge management process and green supply chain management is the driving force for product innovation that can meet the increasing needs of customers in eco-friendly products (Gunsel, Siachou & Acar, 2011). In addition, the study of Chen (2008) revealed that innovation of green product has a positive effect on competitive advantage and business performance where a business can introduce new products and services created from recycling to save energy. Therefore, it might be said that competitiveness and business performance consists of:

3.3.1 Trust in delivery: this means sending the finished work in one unit to another agency through transportation and finally deliver to customers that is the purpose of delivery. Each unit must try to find a way or way of working within the unit that be able to produce the work to another unit on time. On-time delivery will create confidence and create satisfaction for customers.

3.3.2 Cost reduction: it means to create a competitive advantage by focusing on building the Economic of Scope. In other words, it is the ability to reduce costs by sharing resources of various business units and cost reduction strategies. These are techniques used to manage resources in the organization's operations to be economical and effective. The capital here is not only mean to money, but it also means to resources, products, knowledge and social capital for efficiency and sustainability

3.3.3 Product quality: the quality of the product means the operation that is efficient and meets the requirements and creates satisfaction for the customer. In addition, it also means to appropriate operating costs that generate competitive advantage. Customers are satisfied and willing to pay the price to buy that satisfaction. The quality of the product can be considered from the 8 important features: performance, characteristics, reliability, defining consistency, durability, serviceability, aesthetics, and recognition of quality or reputation of the product.

3.3.4 Economic operation: it is the first priority for the industry to operate in the supply chain. Economic

operations have provided economic gains and returns that includes results from the implementation of environmentally friendly activities. Economic operations focus on the effectiveness of using various input factors in the production process and is divided into two aspects: positive economic operations and negative economic operations.

3.3.5 Environmental operation: this means the production process which will have the process of converting raw materials to final products until delivery to the customer. However, due to changes and more interests in the production process that has environmental impact, there is a development on an environmental management strategy for the supply chain system. Normally, environmental impacts from production operations can be classified as follows: all forms of waste, energy consumption, and resource usage.

3.3.6 Organizational operation: it is an operation that reflects the significance of measuring the success of an organization. For examples, the success of a new product reflects the ability of the organization to respond to environmental changes, the result of the ability to operate the organization for a period of time considering from profits and sales, sales growth rate, and achieving objectives.

### 3.4 Conceptual framework

The researcher studied the concept of driving forces of external and internal stakeholders which considered as a stakeholders' driving force. The theories and conceptual frameworks of Walker, Sisto, & Bain (2008); Rehman & Shrivastava, (2011); Gabzdylova, Raffensperger, & Castka (2009); Bhool & Narwal (2013) Concept of green supply chain management. The theories and conceptual frameworks of Bhateja, Babbar, Singh, & Sachdeva (2011); Zhu, sarkis, & Geng (2005); Zhu & Cote (2004); Zhu, sarkis, & Lai (2013) Concept of competitiveness. The theories and conceptual frameworks of Li & Lin (2006); Sambasivan, Bah, & Jo-Ann (2013) Kuei, Madu, Chow, & Chen (2015) Concept of business performance. The theories and conceptual frameworks of Shang, Lu, & Li (2010); Eltayeb, Tarig, Zailani, & Ramayah (2011) were employed by the researcher to develop a conceptual framework that shows the relationship between variables as shown in Figure 1.

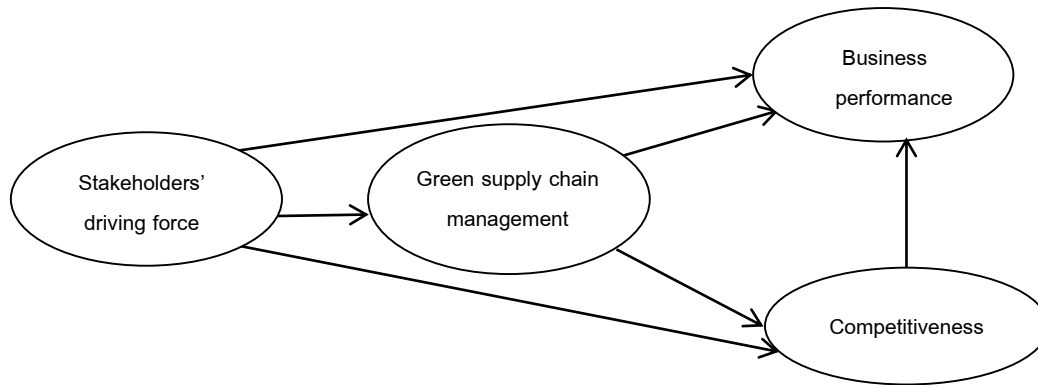


Figure 1. A Conceptual Framework

#### 4. Research Methodology

##### 4.1 Population and sample

The population used in this study were registered manufacturing industry and members of the Federation of Thai Industries (856 companies). Organizations from 7 groups in manufacturing industry were selected since the 7 manufacturing industrial groups are linked in a supply chain system according to their basic raw materials. The sample determination was based on the concept of Kline (2011) who states that a structural equation analysis is a technique that requires a large number of samples. The sample size should

be 200 or more, or 10-20 times of observed variables (Schumacker & Lomax, 2010). The sample design of this study was designed to prevent data collection errors; therefore, the sample size was set to 2 times or about 400 samples or more. The researcher conducted a random sampling using a stratified random sampling method where a sampling divided the population into sub-groups according to type of industry. Members of the same group will have similar characteristics, but there will be differences between groups. The number of samples was determined in proportion according to the proportions that appear in the population which is called a proportion stratified sampling. Therefore, a number of samples of each industry are shown in Table 1

**Table 1** Allocation of sample size of each stratum based on a proportion of each industrial group.

| Stratum                                                  | Number of population | Number of samples (organization) |
|----------------------------------------------------------|----------------------|----------------------------------|
| Auto Parts Industry                                      | 257                  | 120                              |
| Electricals, Electronics, and Telecommunication Industry | 200                  | 94                               |
| Plastic Industry                                         | 178                  | 84                               |
| Steel Industry                                           | 107                  | 50                               |
| Rubber Products Industry                                 | 92                   | 43                               |
| Foundry Industry                                         | 41                   | 20                               |
| Aluminium Industry                                       | 22                   | 10                               |
| Total                                                    | 856                  | 421                              |

##### 4.2 Research Tools

4.2.1 A questionnaire was used for data collection. A questionnaire is divided into 6 parts: 1) Part 1 is asking general information of the respondent and information about the

organization; 2) Part 2 is asking information about driving force stakeholders; 3) Part 3 is asking information about green supply chain management; 4) Part 4 is asking information about competitiveness; 5) Part 5 is asking information about

business performance of manufacturing industry; and 6) Part 6 is open-ended questions that ask the respondents for suggestions or recommendations.

4.2.2 The IOC (Index of Item Objective Congruence) technique was applied to verify a content validity of research instrument by 5 experts. All questioned-items had the IOC value  $\geq 0.60$  which meant the content validity of research instrument was accepted. The Cronbach's Coefficient Alpha was employed to verify a reliability of research instrument and the total reliability of a questionnaire was equal to 0.91. When the findings were compared with the criteria of Kline (2011), it shown that the questionnaire has a very good level of reliability. Further, when considering to the observed variables, it was found that the Cronbach's coefficient was between 0.90-0.92 which was considered as a very good level as well. 421 sets of a questionnaire were distributed to executives and heads of the organization via mail and e-mail for data collection. There was 412 of completed returned questionnaire accounting for 97.86 percent.

#### 4.3 Data analysis

4.3.1 Descriptive statistics (e.g. mean, standard deviation, skewness, and kurtosis) was applied in data analysis to determine the level of variables and the distribution of data.

4.3.2 Inferential statistics including a confirmatory factor analysis (CFA) and a structural equation model (SEM) were employed to verify the goodness of fit of the hypothesis model and the empirical data by using standard statistics to test for models' acceptance. For examples, a verification of the goodness of fit of the hypothesis model and the empirical data through an analysis of covariance of estimation, a study of fit indices or indices developed based on a Chi-square test including indices such as Chi-square, df, GFI, AGFI, CFI, SRMR and RMSEA (Diamantopoulos & Sigauw, 2000; Hair, et al., 2010; Schumacker & Lomax, 2010)

### 5. Finding

The results of basic statistical analysis of latent variables and observed variables and the level analysis results of stakeholders' driving force, green supply chain management, competitiveness, and business performance are present on Table 2.

**Table 2** Analysis Results of latent variables

| Latent variable                     | $\bar{x}$ | S.D. | Meaning |
|-------------------------------------|-----------|------|---------|
| Stakeholder's driving force (SH)    | 4.12      | 0.68 | High    |
| Green supply chain management (GSM) | 4.29      | 0.73 | High    |
| Competitiveness (COM)               | 4.31      | 0.70 | Highest |
| Business performance (BP)           | 4.51      | 0.69 | High    |

Table 2 shows that, averagely, stakeholders' driving force, green supply chain management, and business performance are factors of a high level while the competitiveness factor is at the highest level.

When analyzing the level of observed variables in each dimension, it was found that the support from executives (sh5) is at the highest level ( $\bar{x} = 4.43$ ) in term of stakeholders' driving force. For the green supply chain management factor, the green delivery (gsm4) is at the highest level ( $\bar{x} = 4.23$ ). For, the competitiveness factor, the cost reduction (com2) is at the highest level ( $\bar{x} = 4.34$ ). Finally, the environment (bp2) is at the highest level ( $\bar{x} = 4.55$ ) owing to the business

performance factor. The standard deviation (S.D.) is during 0.61 to 0.96 and the data is distributed near the average. Skewness is during -0.28 to -0.85 and variables have a slightly left skewed distributions. The Kurtosis is during -0.59 to 0.75 and variables have a slightly kurtosis. However, the skewness and kurtosis values differ slightly from zero which is an accepted criterion. Variables' distribution is close to a normal curve and it could be said that observed variables have a normal distribution. Therefore, these observed variables are appropriate for a structural equation model analysis as shown in Table 3.

**Table 3** Results of Basic Statistical Analysis of Observed Variables

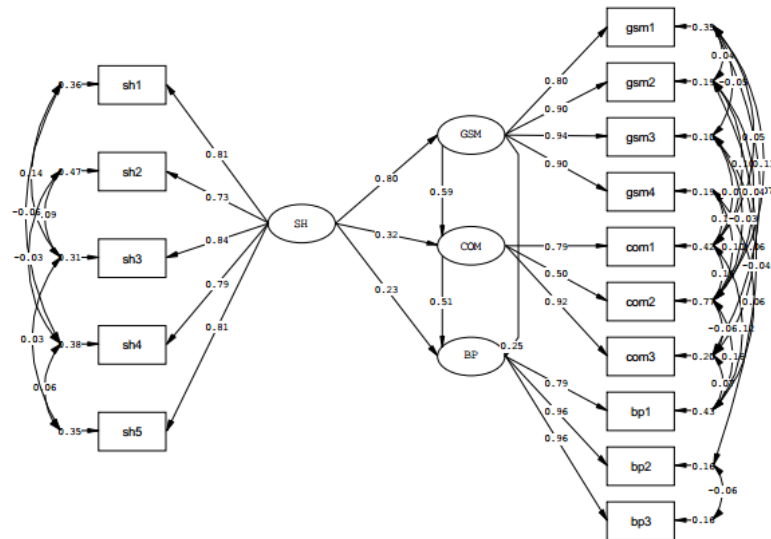
| Observed Variables            | $\bar{X}$ | S.D. | SK    | KU    | Meaning |
|-------------------------------|-----------|------|-------|-------|---------|
| Customer and consumer (sh1)   | 4.32      | 0.85 | -0.63 | 0.61  | high    |
| Competitor (sh2)              | 4.35      | 0.81 | -0.54 | 0.70  | high    |
| Raw material suppliers (sh3)  | 4.16      | 0.96 | -0.32 | 0.39  | high    |
| Society (sh4)                 | 4.08      | 0.94 | -0.44 | 0.23  | high    |
| Support of executives (sh5)   | 4.43      | 0.94 | -0.85 | 0.55  | high    |
| Green procurement (gsm1)      | 4.21      | 0.77 | -0.58 | -0.13 | high    |
| Green designing (gsm2)        | 3.98      | 0.72 | -0.63 | 0.75  | high    |
| Green manufacturing (gsm3)    | 4.09      | 0.70 | -0.65 | 0.29  | high    |
| Green delivery (gsm4)         | 4.23      | 0.69 | -0.61 | -0.25 | high    |
| Trust in delivery (com1)      | 4.33      | 0.65 | -0.54 | -0.10 | high    |
| Cost reduction (com2)         | 4.34      | 0.68 | -0.31 | -0.55 | high    |
| Product quality (com3)        | 4.19      | 0.61 | -0.28 | -0.49 | high    |
| Economic operation (bp1)      | 4.51      | 0.66 | -0.36 | -0.59 | highest |
| Environmental operation (bp2) | 4.55      | 0.65 | -0.75 | 0.05  | highest |
| Organization operation (bp3)  | 4.48      | 0.68 | -0.73 | 0.15  | high    |

The results of the validation of the causal relationship model of factors related to stakeholders' driving force and green supply chain management on competitiveness and business performance of the manufacturing industry in Thailand are presented in Table 4.

**Table 4** Results of the Fitness Analysis of the Developed Structural Equation Model with the Empirical Data

| Index      | Measurement criteria | Result  | Analysis result     |
|------------|----------------------|---------|---------------------|
| Chi-square | $p > 0.05$           | 0.63271 | Passed the criteria |
| CMIN/df    | $< 5.0$              | 0.903   | Passed the criteria |
| GIF        | $\geq 0.95$          | 0.95    | Passed the criteria |
| AGFI       | $\geq 0.90$          | 0.97    | Passed the criteria |
| CFI        | $\geq 0.95$          | 1.00    | Passed the criteria |
| SRMR       | $< 0.05$             | 0.014   | Passed the criteria |
| RMSEA      | $< 0.05$             | 0.000   | Passed the criteria |

Table 4 shows that the developed structural equation model is consistent with the empirical data and its effect values are presented in Figure 2.



Chi-Square=31.61, df=35, P-value=0.63271, RMSEA=0.000

**Figure 2** A Structural Causal Relationship Equation Model

**Table 5** Analysis of the effects of variables on a causal relationship model of key factors in terms of stakeholders driving force, green supply chain management that influence competitiveness and business performance of the manufacturing industry in Thailand.

| Effect             | Cause variable |      |       |      |      |      |      |      |      | R <sup>2</sup> | Effect variable |
|--------------------|----------------|------|-------|------|------|------|------|------|------|----------------|-----------------|
|                    | SH             |      |       | GSM  |      |      | COM  |      |      |                |                 |
|                    | β              | SE   | t     | β    | SE   | t    | β    | SE   | t    |                |                 |
| DE                 | 0.80           | 0.06 | 14.46 | -    | -    | -    | -    | -    | -    | 0.64           | GSM             |
| IE                 | -              | -    | -     | -    | -    | -    | -    | -    | -    |                |                 |
| TE                 | 0.80           | 0.06 | 14.46 | -    | -    | -    | -    | -    | -    |                |                 |
| DE                 | 0.32           | 0.06 | 5.23  | 0.59 | 0.07 | 8.09 | -    | -    | -    | 0.79           | COM             |
| IE                 | 0.47           | 0.06 | 8.09  | -    | -    | -    | -    | -    | -    |                |                 |
| TE                 | 0.79           | 0.05 | 14.32 | 0.59 | 0.07 | 8.09 | -    | -    | -    |                |                 |
| DE                 | 0.23           | 0.05 | 4.41  | 0.25 | 0.06 | 4.52 | 0.51 | 0.08 | 6.52 | 0.93           | BP              |
| IE                 | 0.60           | 0.06 | 9.99  | 0.30 | 0.05 | 5.49 | -    | -    | -    |                |                 |
| TE                 | 0.83           | 0.05 | 15.13 | 0.55 | 0.06 | 9.77 | 0.51 | 0.08 | 6.52 |                |                 |
| Correlation Matrix |                |      |       |      |      |      |      |      |      |                |                 |
| Latent variable    |                | SH   |       | GSM  |      | COM  |      | BP   |      |                |                 |
| SH                 |                | 1.00 |       |      |      |      |      |      |      |                |                 |
| GSM                |                | 0.82 |       | 1.00 |      |      |      |      |      |                |                 |
| COM                |                | 0.82 |       | 0.76 |      | 1.00 |      |      |      |                |                 |
| BP                 |                | 0.85 |       | 0.79 |      | 0.88 |      | 1.00 |      |                |                 |

p < 0.01

From Table 5, it was found that the stakeholders' driving force (SH) has direct influences on the green supply chain management (GSM), competitiveness (COM), and business performance (BP) with influence sizes equal to 0.80,

0.32, 0.23, respectively. At the same time, the stakeholders' driving force (SH) has indirect influences on the competitiveness (COM) and business performance (BP) through green supply chain management with the influence

sizes of 0.47, 0.60 respectively at .01 of statistical significant level. Further, the study found that the green supply chain management (GSM) has direct influences on competitiveness (COM) and business performance (BP) with the influence sizes of 0.59, 0.25 respectively at .01 of statistical significant level. At the same time, green supply chain management (GSM) has indirect influences on business performance (BP) with the influence size of 0.30. In addition, competitiveness (COM) also has direct influences on business performance with the influence sizes of 0.51, at .01 of statistical significant level.

## 6. Discussion

Generally, the stakeholders' driving force and green supply chain management have influenced the competitiveness and business performance of the manufacturing industry in Thailand at a high level. However, the business performance is at the highest level. This means that the stakeholders' driving force according to the operations of the organization and the various green supply chain management activities has an impact on business operations in a better direction. Similarly, Esfahbodi, Zhang, Watson, & Zhang (2016); Sunil, Dixit, & Abid (2016) found that the pressure to drive the green supply chain management activities arising from organizations' operations and stakeholders causes better business operations that leads to customers' acceptance and competitive advantage. This finding is also consistent with the study of Chu, Yang, Lee, & Park (2017); Shekari & Ghatari (2013), and Walker, Sisto, & Bain (2008) who found that the driving force that occurs both inside and outside the organization (e.g. executives, staffs, laws, customers, competitors, and etc.) has influenced the green supply chain management and affects the competitiveness and the business performance of the organization.

The stakeholders' driving force and the green supply chain management have influenced the competitiveness and the business performance of the manufacturing industry in Thailand. Every factor has both direct and indirect effects on the competitiveness and the business performance and the 2 factors are interrelated. This is similar to various studies of Chu, Yang, Lee, & Park (2017); Khan & Dong (2017); Ming Ming, Lim, Kim, & Tat (2017) who found that the stakeholders' driving force is important for businesses to take into account whether government regulations, consumers, competitors, and

society. As a result, the business focuses on creating balance by defining the operational guidelines of the organization that focus on good performance and caring for the environmental impact. When considering each factor, the findings can be discussed as followings.

The stakeholders' driving force factor consisting of customers and consumers, competitors, raw material distributors, society, and support of executives is a factor that rarely affects the competitiveness and the business performance. However, it is also the factor that causes the competitiveness and the business performance and also requires the green supply chain management as a mediator variable. This is similar to Kankanit & Busba (2015) that government regulations and support from the executives of the organization are important factors for the green supply chain management and the positive business operations. Sunil, Dixit, & Abid (2016) mentioned that customer needs are key drivers for the organization's operations and the organization must work together with environmental suppliers in order to ensure the efficient environmental operation. Further, Lin, Tan, & Geng (2013) stated that the customer needs on the green innovations are a factor that makes businesses turn to eco-friendly activities and social responsibility (Toke, Gupta, & Dandekar, 2012) in order to make a difference from competitors and maintain market share which makes manufacturers have better business performance. In addition, Shekari & Ghatari (2013); Blome, Hollos, & Paulra (2014); Youn, Yang, Hong, & Park (2013) found that the commitment and support of executives in environmental operations will affect the operations of the organization since the executives play an important role in formulating policies, visions, missions, principles and strategies for all departments and employees of the organization to be implemented.

The green supply chain management factor including green procurement, green designing, green manufacturing, and green delivery is the factor that has a direct effect on the competitiveness and an indirect effect on the business performance of the manufacturing industry in Thailand. Organizations with a green supply chain management will have a positive impact on competitiveness. In other words, all processes and activities of green supply chain management will be efficiently operated in an environmentally friendly manner. In addition, this does not only help to reduce environmental impacts, but it can also reduce the operating costs, the use of raw materials, and the energy

consumption. As a result, businesses can create competitive advantage and have a better business performance. This is similar to findings of many researchers (e.g. Lee, Kim, & Choi (2012) and Chang & Fong (2010) who found that environmental friendly management makes the business more competitive. Further, Amah & Ahiauzu (2013) mentioned that green procurement has a statistically significant influence on the business performance of the organization which is similar to Khan & Dong (2017) and Kirkwook & Longley (2012) who reported that green procurement and green manufacturing have the positive effects on the competitiveness and the business performance. Green designing reflects the ability to use the resource in each step by planning for a cost-effective use of resources based on the principle of reduce, reuse, and recycle that helps to increase the efficiency of eco-friendly operations of the organization and resulted in a better business performance finally.

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## 7. Recommendations

### 7.1 Recommendations for the application of research findings

7.1.1 The manufacturing industry should pay attention to the total environmental- friendly management process starting from upstream to downstream. This is because of it helps to reduce the problem of global warming and the cost of business operations. The results of this study support other industrial sectors that has not yet implemented the green supply chain management to see the influences that are driving forces to a return gains from operations. The organization administrators should support environmental activities by training employees about the environmentally friendly production processes in order to increase knowledge and understanding of employees.

### 7.2 Further research recommendations

7.2.1 The future study should have a comparison of different groups of manufacturing industries, especially those that participate in the green industry project.

7.2.2 There should be a study of the performance indicators of the green supply chain process which including the costs of green supply chain management

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