

SUSTAINABLE FIRM PERFORMANCE OF GREEN SUPPLY CHAIN
MANAGEMENT PRACTICE AT PETROCHEMICAL INDUSTRY

YUARY FARRADIA

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DEDICATION

With the grace of the Almighty ALLAH SWT,

I dedicate this thesis to my beloved best parent in my whole life (my mother Hj. E.Kesuma Pertiwi and my father H. Ir. Ruslan Effendy), my beloved best son in my whole life, Mohammad Rifal Aldifa Hidayah and my beloved best husband in my whole life, Prof. Dr. Ir. H. Mas Tri Djoko Sunarno, MS.



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ABSTRACT

Indonesia's petrochemical sector contributes to 3% of Indonesian Gross Domestic Products. One of the main problem in this industrial development is the green industry standard in line with the energy scarcity due to high demand on the energy within the industrial sector as well as availability of *naphtha* raw material. Therefore, to achieve the industry sustainability it is a need to have Green Supply Chain Management (GSCM) model toward petrochemical industry sustainability in line with the Green Industry Long Run Strategic Plan in Indonesia. This study aimed at exploring the relationship between internal and external GSCM practices on sustainable firm performance by having Green Marketing Mix (GMM) as mediator as well as external supply chain integration as moderator on the mediator (GMM) and developing the best model of the GSCM to be implemented in the local industry. The quantitative method involved a survey of 58 respondents among petrochemical olefin firms based in Banten Province, Indonesia. The data analysis using PLS SEM SmartPLS 3, revealed that the internal and external GSCM has no direct effect on sustainable performance but has a positive indirect effect on sustainability economic and social performance. GMM has a positive effect on both internal and external GSCM as well as sustainability economic, environment and social performance. The mediation effect results show that the GMM mediates the internal and external GSCM with sustainability economic and social performance. Hypotheses related to the moderated mediation interaction are rejected. Hence, it can be asserted that the sustainability firm performance of petrochemical industry in Indonesia is generated by mediator role of the GMM on the internal and external GSCM. The GSCM practice at local petrochemical industry has an indirect effect to the sustainability firm performance. The outcome of this study is the best-recommended model describe the relationship among the internal and external GSCM, GMM and sustainability firm performance. The implication of this research is providing insights on theory advancements and practical application at the specific segment of the petrochemical industry.



ABSTRAK

Sektor petrokimia Indonesia menyumbang kepada 3% Keluaran Dalam Negara Kasar Indonesia. Salah satu masalah utama yang dihadapi dalam pembangunan perindustrian petrokimia adalah berkaitan dengan piawaian industri hijau serta kekurangan *naphtha* sebagai bahan mentah sehingga menghasilkan kos tinggi produk yang tertakluk kepada import bahan mentah ini. Untuk mencapai kemampanan ekonomi industri, memerlukan model yang mengaitkan Pengurusan Rantaian Bekalan Hijau (*GSCM*) ke arah kemampanan industri petrokimia yang seiringan dengan Pelan Strategik Jangka Panjang Industri Hijau. Oleh itu, tujuan kajian ini meneroka hubungan antara amalan *GSCM* dalaman dan *GSCM* luaran terhadap prestasi firma yang mampan dengan mengambil kira campuran pemasaran hijau (*GMM*) sebagai *mediator* dan juga Integrasi rantaian bekalan luar (*ExSCI*) sebagai *moderator* bagi *mediator* (*GMM*), dan membangunkan model *GSCM* terbaik yang mungkin akan dilaksanakan dalam industri tempatan. Pengedaran soal selidik kepada 58 responden di kalangan firma petrokimia *olefin* yang berpusat di Wilayah Banten, Indonesia telah dijalankan. Analisis data telah menggunakan *PLS-SEM SmartPLS 3*, menunjukkan bahawa *GSCM* dalaman dan luaran tidak mempunyai kesan langsung terhadap kemampanan prestasi industri. *GSCM* dalaman dan luaran mempunyai kesan tidak langsung terhadap kemampanan prestasi ekonomi dan sosial. Berkaitan kesan *mediator*, hasil dapatan menunjukkan *GMM* mempunyai kesan positif terhadap kedua-dua *GSCM* dalaman dan luaran, begitu juga terhadap kemampanan prestasi ekonomi, persekitaran dan sosial. Hasil kesan perantaraan menunjukkan bahawa *GMM* mengantara *GSCM* dalaman dan luaran dengan kemampanan prestasi ekonomi dan sosial. Walau bagaimanapun, semua hipotesis berkaitan dengan interaksi perantaraan sederhana adalah ditolak. Secara kesimpulannya, kemampanan prestasi firma dalam sektor petrokimia di Indonesia digerakkan oleh peranan *mediator* (*GMM*) terhadap *GSCM* dalaman dan luaran. Amalan *GSCM* yang terdapat dalam industri petrokimia tempatan mempunyai kesan secara tidak langsung terhadap

kemampuan prestasi firma. Dapatan daripada kajian ini menghasilkan cadangan sebuah model terbaik yang menghuraikan hubungan diantara *GSCM* dalaman dan luaran, *GMM* dan kemampuan prestasi firma. Implikasi kajian ini adalah memberi lebih pemahaman terhadap perkembangan teori dan praktikal bagi segmen tertentu dalam industri pertokimia.



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LIST OF ABBREVIATIONS

| | |
|---------|--|
| AVE | Average Variance Extracted |
| CB-SEM | Covariance-based Structural Equation Modelling |
| CR | Composite Reliability |
| EB | Ethyl Benzene |
| EDC | Ethylene Dichloride |
| EG | Ethylene Glycol |
| ESCI | External Supply Chain Integration |
| EO | Ethylene Oxide |
| EMS | Environmental Management System |
| GDP | Gross Domestic Product |
| GMM | Green Marketing Mix |
| GP | Green Purchasing |
| GSCM | Green Supply Chain Management |
| HOC | Higher-Order Component |
| HTMT | Heterotrait-Monotrait Ratio |
| IEM | Internal Environment Management |
| ISO | International Standards Organization |
| LOC | Lower-Order-Component |
| MOE | Ministry of Environment |
| MOEF | Ministry of the Environment and Forestry |
| PE | Polyethylene |
| PP | Polypropylene |
| PLS-SEM | Partial Least Square-Structural Equation Modelling |
| RDT | Resource Dependence Theory |
| RVB | Resource-based View |
| SEM | Structural Equation Modelling |
| SPSS | Statistical Package for Social Sciences |
| SIH | Standard Industri Hijau |



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|------|-------------------------------------|
| SM | Styrene Monomer |
| TBL | Triple Bottom Line |
| UK | United Kingdom |
| USA | United States of America |
| UTHM | Universiti Tun Hussein Onn Malaysia |
| VCM | Vinyl Chloride Monomer |
| VIF | Variance Inflation Factor |



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CHAPTER 1

INTRODUCTION

1.1 Background of the study

Sustainability is one of the most significant performance objectives for any industry and becomes an important concept, covering aspects of economic, environmental and social responsibility. With the development of environmental awareness and sustainability, a single performance indicator no longer dominates market value instead of the triple bottom line (TBL) framework integrate economic, environmental, and social performance (Chung *et al.*, 2016). It is, therefore, sustainability is the goal or endpoint of a process called sustainable development (Diesendorf, 2000).

Sustainable development is the pathway to sustainability (WCED, 1987) because sustainable development comprises various types of economic and social development, which protect and enhance natural environment, social equity and human well-being as well. Applying sustainable development in an industry has made remarkable progress in establishing environmental and social sustainability towards operations management and the supply chain. Every industry requires sustainable development, including petrochemical industry. Achievement sustainable development in the petrochemical industry will figure out its contribution to nation economic development. Sustainability is an inherent part of the petrochemical business strategy along with the business growth. The petrochemical industry,



therefore, must consider and be aware to aspects of social and environmental as a primary priority (Chandra Asri Sustainability Report, 2018).

Environmental issues that are developing lately are climate change and being environmentally friendly. According to Kearney (2010), petrochemical industry contributes to a growing problem or leaders in mitigating a global environmental crisis. It means that petrochemical industry has to change from conventional environment management to the more extensive approach of reducing pollution through handling extraction raw material, transportation, manufacturing, product use, recycling and disposal (Matos and Hall, 2007). Consequently, Green Supply Chain Management (GSCM) proposed a novel managerial action to create sustainability in manufacturing activities through their environmental minimizing impact and enhancing ecology efficiency is necessary (Pietro, 2012).

GSCM refers to all phases of supply chain management that needs to adhere to the environmental protection requirements (Wu, 2013; Zhu & Sarkis, 2007). Roespinoedji *et al.* (2019) study in the effect of GSCM practices in Indonesian manufacturing small and medium enterprises concluded that both green manufacturing and green purchasing has positive relationship with operational performance. In the study of petrochemical industry conducted by Khaksar *et al.* (2015) determined the important GSCM drivers as internal environmental management, environmental regulations, green purchasing, cleaner production, recovery, eco-design and pollution, reverse logistic, green supplier, return on investment and green innovation and cooperation with customers. The firm within the petrochemical industry has committed to provide satisfaction to its customers by presenting better-quality service through the implementation of its working at risk controlled environment program. Moreover, environmental and sustainability create an urgent attention at almost research discipline such as sustainable marketing (Gordon *et al.*, 2011), sustainable consumption (Tseng *et al.*, 2013) and sustainable marketing strategy (Kumar *et al.*, 2013). In line with the business development, company's marketing division, therefore, tasks to work even more professionally to strengthen the company's position to face the challenges in globalization era.

Earlier study on green marketing reveals that green marketing and management is a strategic issue (Siegel, 2009), because of not only being green makes a firm "good", but also being green pays (Ambec & Lanoie, 2008; Russo & Fouts, 1997). Green marketing strategic influences significantly on improving the



quality of the environment as well as the corporate profitability (Setiaji, 2014). Hasan & Ali (2017) studying on the relationship between green marketing strategies and performance outcomes for business sustainability, found that green marketing mix (GMM) consisting of green product, green price, green promotion, and green distribution has significantly and positively affected on the organizational performance of ISO 14001 EMS firms in Malaysia. It means that GMM strategy is the best communication tool for consumers in determining the choice of eco-friendly products. GMM provides benefit to both consumers and the environment. In Indonesia, most of petrochemical firms put high effort on sales, both in domestic and export markets. The firms never stop putting efforts to improve their competitiveness and make innovation in marketing their petrochemical product. According to marketing concept, promotion of product of petrochemical is necessary although its business uses model of business to business (B2B) for export and import as well.

In business, there is strong relationship between supplier and buyer. According to Kumar & Rahman (2015), buyer-supplier relationship is very useful for developing a sustainable supply chain. The combination of supply chain integration and complexity management is the enabler key for firm to synchronize crossing its customers, products, suppliers, and employees as well as supply chain strategies and operations. Hence, the integrated supply chain between customers and suppliers possess a relationship to the GSCM practice.

In Indonesia, the GSCM is in line with the government plan. The Indonesia Government puts high effort on the integrated petrochemical industry development by strengthening research and development toward green industry to create more potential market and to achieve the sustainability as well (Indonesia Development Regulation No. 14, 2015). Regarding to the environment sustainability, the Government of Indonesia during 2015–2019 focuses on reducing greenhouse gas emissions and strengthening national energy security. Indonesia Ministry of Industry Report (2015) stated that one of the main problem faced in national industrial development was the green industry standard in line with energy scarcity due to high demanding on the energy within the industry sector. Therefore, the Indonesia's Industry Ministry has enacted a new regulation to set sustainability requirement and layout the incentive for businesses to help the country lower its carbon emissions by 29% by 2030 (Jakarta Globe, 2017).

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