

Green supply chain practices in Indonesia's industries

Fransisca Dini Ariyanti

Industrial Engineering, Faculty of Engineering, Bina Nusantara University, Jakarta, Indonesia 11480

dini.ariyanti@binus.ac.id

Abstract. In recent time, commercial businesses meet the challenges of environmental problems from supply chain operations such as increased resource scarcity, consumer awareness, environmental laws and visibility of environmental impacts. Hence, there is increasing attention and research, among academics and practitioners in the environmental management of supply chain through Green Supply Chain Management, GSCM. Nevertheless, research on GSCM in Indonesia's industries is limited. In this study, 63 data sets that can be used are collected from various companies around Jakarta Indonesia where 32 companies have adopted Green Supply Chain, and 31 others have not yet. Questionnaires refined with the partial least square-structural equation PLS SEM modelling, resulted significant positive relationship between motivational factors and internal factors (green design, green procurement and green production); internal factors with Green Supply Chain Impact GSCI and external factor (recycle packaging) with GSCI, but the study found that motivational factor has no effect on external factor. For companies that have not implemented GSC, motivational factor has an effect on GSC implementation. Therefore, this research has relevance to all companies that want to improve the process of Green Supply Chain through driving factor, and internal factor so enhanced company performance efficiency.

Keys words: Green Supply Chain, Green procurement, Indonesia's National scale Industries, PLS-SEM

1. Introduction

Increased concern from multinational companies worldwide, lately directed to the management of green supply chains [1]. Attention from multinational companies worldwide, lately directed to the management of green supply chains. Global supplier networks are needed as a result of rising intensity of global competition to increase competitiveness that aims to reduce cost, rose economic growth and environmental sustainability [1]. The concept of Green Supply chain or "environmentally friendly supply chain" has increased among academics and industry researchers in the last decade. Many manufacturing industries apply the 'green' concept as the meaning of 'environmentally friendly' to managing their supply chain, which focuses on environmental issues. The concept of GSCM consists of Green Procurement, green manufacturing, green distribution & logistics [2]. "Closed loop" as defined by the supply chain management literature, from suppliers, to producers, to customers and reverse logistics, in brief, range from green purchases to integrated supply chains are defined of GSCM [3]. The policy to reduce environmental impacts and increase competitive advantage by creating a green supply chain network is the main strategies of many companies in meeting the demands of their stakeholders. Therefore, they adopt GSC. Lately, customers are increasingly aware



and prefer green products, which are more environmentally friendly [3]. The new ways to add value of the program's core business is to successfully manage environmental problems, thus opening new opportunities to win the competition. To achieve this goal, the methods are such as clean products, environmental management systems, green efficiency, and the application of green management practices [3].

The 'Green production' aims to saving raw material costs and total product costs, emphasized by "reuse, reduce and recycle (3R). Appropriately, industries competitiveness increased, due to efficient production. It requires integrated efforts from all members of the supply chain for process development, 'eco-products' and services that are environmentally friendly [4].

The implementation of green purchases is costly job in spite of it produces economic value such as reducing disposal costs, increasing the conservation of resources and increasing the image of the company, so that ultimately it has an impact on the competitiveness of the company. Green purchasing processes include selecting "green suppliers", purchasing eco-friendly products, establishing "green" criteria when evaluating suppliers, and evaluating 'green' aspects for second-tier suppliers [4].

There is a direct impact between the investment recoveries on environmental performance, but the investment recovery does not have a direct impact on the economic performance that has been hypothesized in USA's sample. While the sample in China did not find a positive relationship between investment recovery and environmental performance [4]

The initial study aim is GSCM implementation to manufacturing in Indonesia, specifically the around Jakarta area. Linkages between motivations with quality management systems (ISO or AMDAL (**Environmental Impact Analysis**)) a government policy, their effects on internal factors (green design, green procurement and green production, green logistic), external factors, and their relevance to environmentally friendly supply chain practices that ultimately affect supply chain performance (Green Supply Chain Impact).

2. Literature Review

2.1. Green Supply Chain

To meet industry standards and higher sustainability in a globally competitive environment, manufacturing companies today not only strive to have individual capacity but have overall efficiency in managing GSC [5]. Stated by Yan MR, et.al. 2016 that GSCM involves "integrating environmental thinking into supply chain management, including product design, material resources and selection, manufacturing processes, final product delivery to consumers and end-of-life product management After its useful life ". Precedent research, the important role of GSCM has been consistently proposed to meet sustainable development for industrial supply chain management practices [5].

2.2. Green Supply Chain Practices

Stated by Lee,V.H. et al, 2014, GSCM is an expansion of the supply chain, which is a set of inter-and intra-organizational environmental management practices that are useful for logistics management. It is designed to cover environmental issues when making decisions in every inbound logistics phase to manage the material up to the outbound logistics stage of consumer disposal and the concept of 'closed-loop' in reversed logistics[6].

There are five GSCM practices should implemented and integrated with one and other division or function, need the integration all of cross functions, those are eco-design (ED), green procurement (GP), Cooperation with customers (CC), internal environmental management (IEM), and investment recovery (IR) which used to measure GSCM. It is clear that ecological issues play a key role in each SCM circumstance, as far as conventional functional positions are required to work with ecological personnel [6].

The GSCM rehearse comprises of a progression of green supply chain expansion procedures, for example, green purchasing, green production and green logistics [7, 8]. Likewise, GSCM is a mix of ecological concern into SCM through the execution of assorted environmental solutions and practices

like eco design, life cycle analysis, eco procurement, eco logistic, ecological technologies, and integrated practices with SCM closed loop stake holder such as supplier, wholesalers, and clients [9]. Fundamentally, the utilization of GSCM practices moves the organizations function area as showed in Table 1. [2]

Table 1: The green supply chain management on business implications

Functions.	Impact
Green Supply Chain Management Practice Impact	<p>Green operation with profit target</p> <p>Minimize environmental negative impact since product design to disposal</p> <p>Consider save money in terms of utilization, procedures and disposal</p> <p>Implement green materials, green procedures and processes and limited the emissions.</p> <p>Efficient and effective production result by integrated lean manufacturing and green target</p> <p>Green manufacturing, green tools and green methods to meet “eco” market target</p> <p>Explore new sustainable of method and raw material to limited energy generation by Research and development function</p>
Green marketing Or Sales function	<p>Upgrade buyer consciousness of green product.</p> <p>Fulfilled buyer requirements for green product in a green way to guarantee business credibility.</p> <p>Make harmony of profit and green concern.</p> <p>Having good green certification to improve company competitive advantage</p> <p>Provide green communications to depict an earth amicable business</p>
Green logistics	<p>Increase eco fuel usage and greener method in transportation to minimize carbon emissions.</p> <p>Utilize biofuels as fuel options and greener innovations</p>
General Management or Human Resource Function	<p>Impart green business techniques to employee for viable objective achievement</p> <p>Utilize green work environment, corporate culture and reward frameworks to empower green activities</p> <p>Utilize specialists in green improvement to actualize ecologically systems.</p> <p>Plan business strategies to meet target green issues that fulfilled stakeholder desires</p> <p>Cultivate a green hierarchical culture through worker training and development</p>
Finance or information technology function	<p>Accentuate maintainability detailing in accordance with the triple-primary concern idea and inspecting framework</p> <p>Institute green accounting policies and use an integrated eco-information system</p> <p>Utilize innovation technologies to a paperless administrative condition.</p> <p>Get forward data about new green earth innovation.</p>

Sources: Mafini, C. and Muposhi, A.,2017

The main purpose of this research is to know whether motivation factor related to quality management system like ISO and government regulation such as AMDAL; influences internal factors, contain of green design, green procurement and green production, green logistic; external factors such as system recycle packaging, are relevant to the application of environmentally friendly supply chain practices that affect supply chain performance or Green Supply Chain Impact.

2.3. Partial Least Square – SEM (PLS SEM)

Techniques used by researchers are regression, correlation, factor analysis, cluster analysis and other multivariate statistics techniques. Statistical analysis that can analyze the relationship and interrelations between latent variables, and manifests called Structural Equation Modeling (SEM), which at the time its presence was first supported by a statistical computing tool called LISREL. SEM is known by its approach or covariance based with its software that is LISREL, but now there are other

software for calculation of SEM analysis. Because based on covariance, the concept diagram as above should be based on the concept / theory that thereafter want to be confirmed with the sample research so it needs many assumptions such as data distributed normally, large sample (ratio between observed variable with sample is 1:10. is perceived to inhibit researchers in conducting research, the emergence of PLS as Some text solution to the various weaknesses above. SEM with PLS is based on the variance that is not accommodated in Covarians-based SEM. Covarians based SEM has a special characteristic that is reflective-shaped indicator, while SEM-based variance (PLS) can reflective and formative indicators [10].

2.4. *Smart PLS*

This research was analyzed by Smart PLS statistical software or Smart Partial Least Square approach. The decision reason is since PLS has the capability to handle limited samples, in spite of the model structure is complex [6, 11]. Due to assess the legitimacy and dependability, we initially tried the estimation show before continuing to get to the basic model [6]. The advantages of Smart PLS are first, to assess the relationship between variables, either same latent variable or with variable indicator, or manifest. Secondly, the PLS's capability to process data both for formative or reflective SEM models. Thirdly, formative SEM model's characteristics contain latent or construct variables compose by indicator variables where arrows lead from the construct variable to the indicator variable. Fourthly, the reflective SEM model is a SEM model in which the construct variable is a reflection of the indicator variable, so the arrows lead from the indicator variable to the latent variable. Aftermath by statistic, there will be no error value on the indicator variable.

3. Research Methodology

3.1. *A. Motivational factor by Quality Assurance System and Certification*

According to Jabbour, et.al, 2014, extracted from various studies, the relationship between the quality assurance systems such as ISO 9000, ISO 14000, AMDAL governmental regulation, have been the driving force for the practice of "environmentally friendly" by the company [11].

H0 / H1a: The Motivation Factor does not affect the Internal Factors in the Green Supply Chain Management Rating.

H1 / H1b: Motivation Factors Influencing Internal Factors in Green Supply Chain Management Assessment

3.2. *B. Internal Factor*

According to Mafini C. et.al, 2017 and VH Lee, et.al. 2014 the application of GSCM practices shifts the functional areas of the organization, as in Table 1, so that internal factors apply "green" practices beginning with design (Green Design), purchasing (Green Procurement), production operational function (Green Production / manufacturing) up to Green Logistic (moving goods, data, money) [2,6]

H1a: Motivation Factors do not affect the Internal Factors in the Green Supply Chain Management Rating.

H1b: Motivation Factors Influencing Internal Factors in Green Supply Chain Management Assessment.

3.3. *C. External factor*

According to (V.H. Lee, et.al. 2014), the cooperation with the Customer and the "Eco Design" referred to is the design of the product until its waste can be recycled where the cooperation with external parties, including customers [6].

H2a: Motivation Factors do not affect External Factors in the Green Supply Chain Management Rating.

H2b: Motivation Factors Affect External Factors in Green Supply Chain Management Assessment

3.4. D. Green Supply Chain Impact

According to Mafini C. et.al, 2017 and V.H. Lee, et.al. 2014 the application of GSCM practices shifts the functional areas of the organization, as in Table 1, so that the application of Green supply Chain affects the functioning of sales, financial function and innovation [2,6]

H3a: Motivational Factor does not affect External Factor in GSCM Assessment.

H3b: Motivational Factor affects External Factor in GSCM Assessment.

H4a: Motivational Factor does not affect Internal Factor in GSCM Assessment.

H4b: Motivational Factor affects Internal Factor in GSCM Assessment.

3.5. Company size as control variable

Company size is measured using two categories: companies that have implemented GSCM (multinational and National) and Companies that have not implemented GSCM (small medium enterprises, start-up, services). The hypothetical model constructed in this study, following a hypothetical model of research by [11] Jabbour et al., 2014, Where, the study was conducted in Brazil, a country formerly categorized as a developing country, now known as a member of BRICS, become a developed country with potential "emerging market" in Latin America. Similar conditions for **Indonesia**, Indonesia was categorized as a developing country in the past, where today, much progress has been made with good economic and financial growth, Indonesia has become one of Asia's potential future "emerging markets"

3.6. The scope of research

The scope of this study, which is limited to the framework proposed by the research object, is national and multinational industries, with products in the form of services and goods, located in JABODETABEK (*Jakarta Bogor Depok Tangerang Bekasi*) region. There are approximately 100 questionnaires have been distributed, with a total of 63 qualified questionnaires have been filled in by the respondents (companies managers whom BINUS student's internship superiors); the result is 32 companies that have implemented GSCM (Japan famous automotive, Indonesia power, Oil & Margarine, National Energy Co, Knitting factory, Five Star Hotel, etc.) and 31 companies that have not implemented GSCM yet (such as small medium enterprise, start-up, services).

3.7. Model Structural

The structural model of this study is based on Jabbour's model [11] and have been modified to meet research needs. The formation of outer model made based on construction consists of structural model using existing variable those are Motivation Factor as driver, Internal Factor as direct influence, External Factor as indirect influence, and GSCI as impact. This construct will be used as a reference to calculate the value contained in the questionnaire, to create a construct, a variable connected to some of the indicators contained in the dimension that gives effect to these variables, the next step is to create the deep model, by making the relationship between the variables that have been made in the process of forming an outer model, the model in used to determine the relationship between variables. Each of these indicators is measured using a 5-point Likert scale ranging from 1 (Strongly disagree) and 5 (Strongly Agree). Table 2 contains the variable that consists of dimensions and indicators in the study:

Table 2. The Components of Structural Model

Variables	Dimensions	Indicators	Variables	Dimensions	Indicators
Motivational Factor	Internal Green	IG-A to IG-D		Green Procurement	GP-A to GP-G
External Factor	Recycle Packaging	RP-A to RP-J	Internal Factor	Green Design	GD-A to GD-H
GSC Impact	Green Supply	GSCI-A to		Green Internal Production	GIP-A to GIP-E

Chain Impact GSCI-O

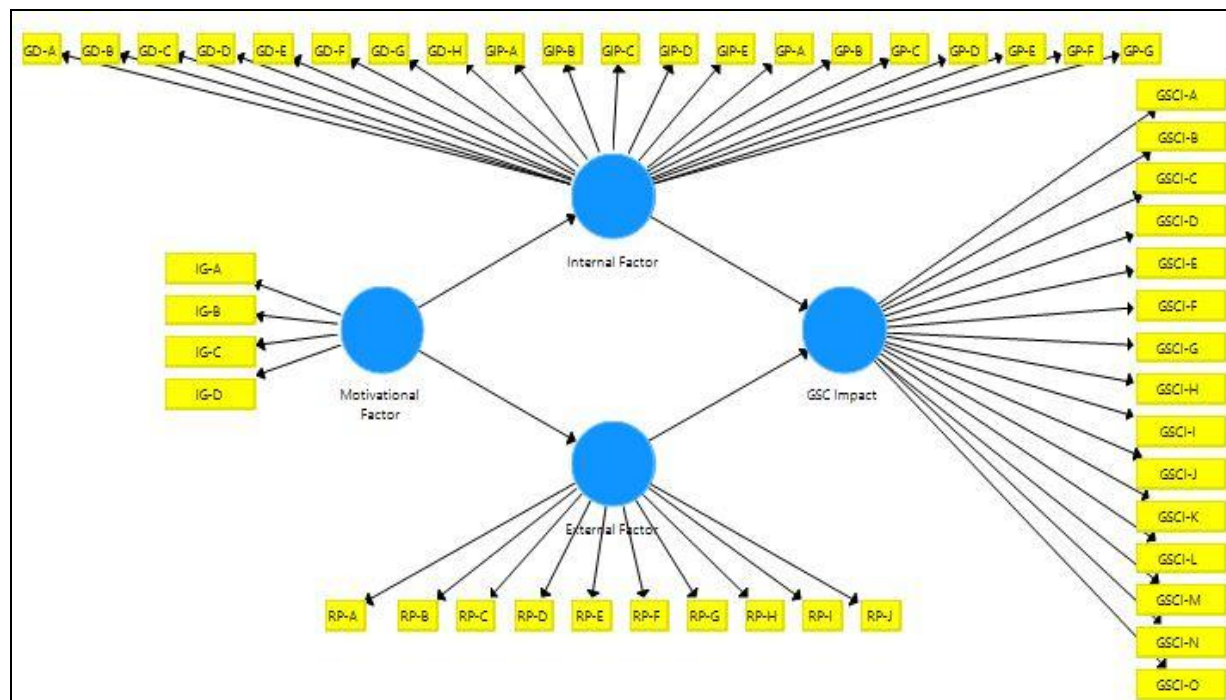


Fig. 1. Structural Model

4. Result and Analysis

4.1. Companies that have implemented GSC – Green Supply Chain

Table 3: PLS SEM value Path Coefficient on Companies had implemented Green Supply Chain

Factor	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Values
External -> GSC Impact	0.484	0.503	0.182	2.660	0.008
Internal -> GSC Impact	0.382	0.401	0.172	2.218	0.027
Motivational -> External	0.127	0.141	0.217	0.585	0.905
Motivational -> Internal	0.786	0.802	0.065	12.009	0

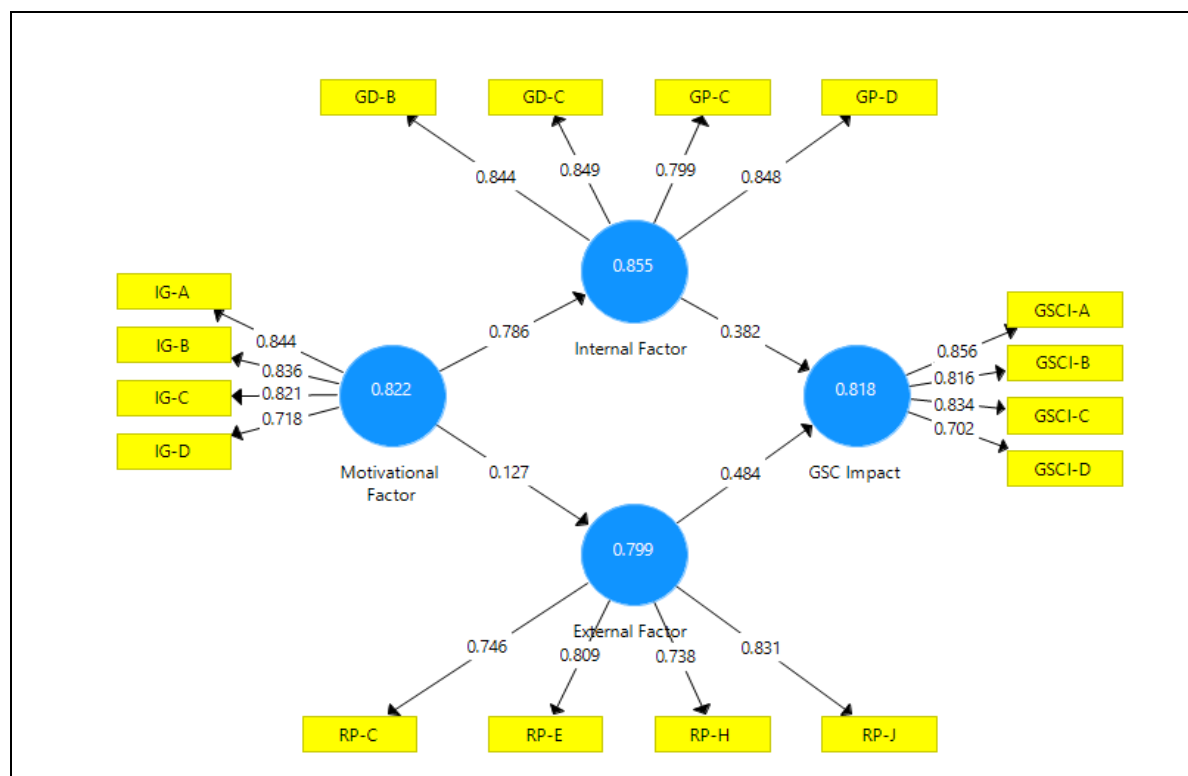


Figure 2 The Result of Outer Loading

The value of Path Coefficient obtained is 0.484, it gives positive influences from External Factor for GSC Impact variable. The value of T-statistics is 2.660, the value is greater than t table that is equal to 1.96 and the results show that H1b is accepted.

The value of Path Coefficient obtained is 0.382, it gives negative influences from Internal Factor for GSC Impact variable. The value of T-statistics is 2.218, the value is greater than t table that is equal to 1.96 and the results show that H2b is accepted.

The value of Path Coefficient obtained is 0.127, it gives positive influences from Motivational Factor for External Factor variable. The value of T-statistics is 0.585, the value is lower than t table that is equal to 1.96 and the results show that H3a is accepted.

The value of Path Coefficient obtained is 0.786, it gives positive influences from Motivational Factor for Internal Factor variable. The value of T-statistics is 12.009, t table that is equal to 1.96 and the results show that H4b is accepted.

4.2. Companies had not implemented GSC

Table 4: PLS SEM value Path Coefficient on Companies not implemented Green Supply Chain

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Values
Motivational -> Internal	0.511	0.575	0.162	3.15	0.002

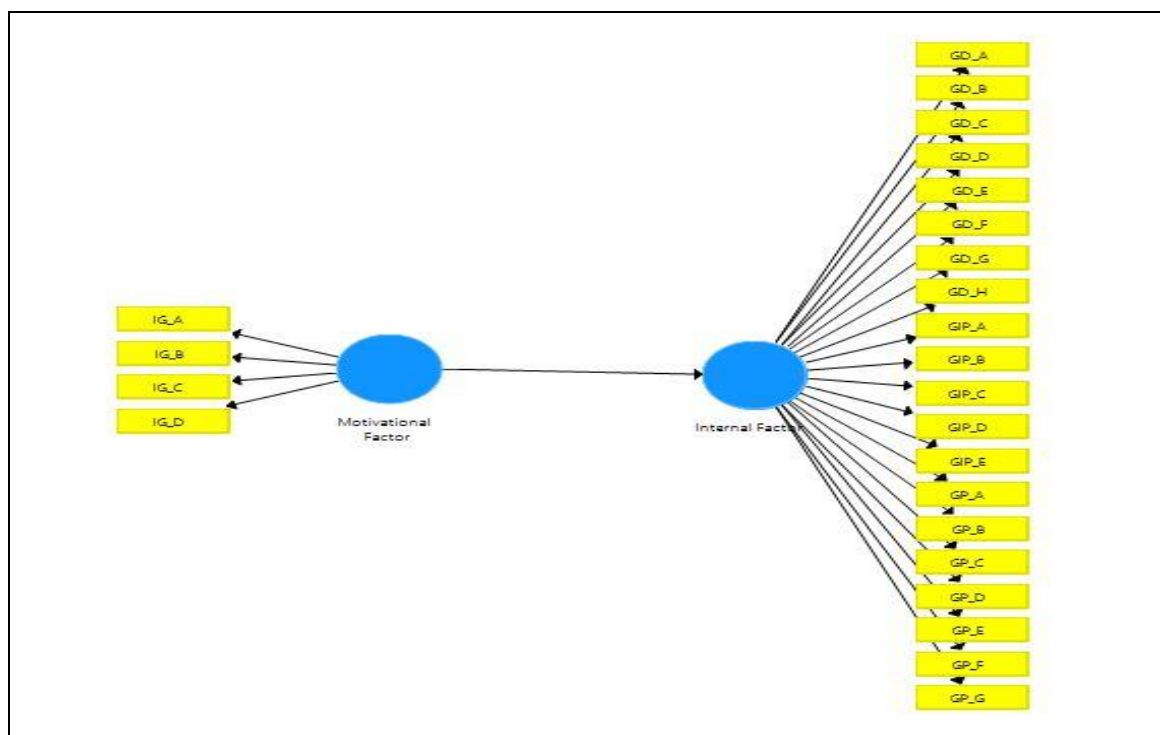


Fig. 3 Structure modelling – indirect influence

The value of Path Coefficient obtained is 0.511, it gives positive influences from Motivational Factor for Internal Factor variable. The value of T -statistics is 3.15 that is getting the value significant because the value is greater than t table that is equal to 1.96 and the results show that H1 is accepted.

5. Conclusion

The result of this research for companies have been implemented GSCM show, significant positive relationship between: motivational factors and internal factors (green design, green procurement and green production); internal factors with Green Supply Chain Impact GSCI and external factor (recycle packaging) with GSCI, but the study found that motivational factor has no effect on external factor. For companies that have not implemented GSC, motivational factor has an effect on GSC implementation.

Our main results show that this research hypothesis is valid. Thus, the quality assurance system and government regulation are important motivators for companies to apply GSCM practices internally and externally that have an impact on the company's performance to be more efficient.

6. Limitation and future research

This investigation has a few confinements, outstandingly the information gathered from Jakarta territory as capital city, in view of overview as opposed to from a countrywide database, and the quantity of tests was along these lines limited to the planned example measure for PLS-SEM, despite the fact that an entirely controlled example estimate is important in a review examine and the example size of this exploration meets the prerequisites of both capital city look into and the multivariate examination strategies. Future studies on the implementation of "Green Supply Chain Management" in small and medium entrepreneur in Indonesia

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Biography

Fransisca Dini Ariyanti is a lecturer in the Industrial Engineering Department at Bina Nusantara University, Jakarta, Indonesia. She earned her Bachelor of Chemical Engineering from Diponegoro University, Indonesia and Master of Industrial Engineering from University of Indonesia, Indonesia. She has taught supply chain-related courses and published conference and journal papers. Her research interests include supply chain management, performance management, and quality management.