The Green Capability, Product Return, Value Chain Costing and the Adoption of Closed Loop Supply Chain in the Automobile Industry of Indonesia

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Abstract- **The main objectives of the current study are to explore the nexus between green capability, product return, value chain costing, and the adoption of closed loop supply chain in the automobile industry of Indonesia. The role of product returns as a partial mediator in the CLSC adoption and recovery capability relationship indicates the absence of any direct relation among the two, thereby showing the significant role of manufacturer for encouraging towards product returns. Firms may be reluctant to invest in redeploying resources in the absence of adequate returns. The study has employed the SEM-PLS as a statistical tool to answer the research question. The findings of the study revealed the fact that the manufacturers in developing economies must understand the significant role of recovery capabilities in encouraging and influencing the CLSC system development and product returns, resulting in the reduction in ecological footprints. Presently, the Indonesian manufacturers are depending largely on traditional production methods with particular focus towards forward supply chain, having little or no consideration for recapturing, remanufacturing, and recycling of used items.**

Keywords: *Green capabilities, Supply Chain, accounting , Indonesia*

1. Background

Since the past few years, product returns and recovery management have been gaining increased attention among the manufacturers, with the realization that social, environmental and economic benefits can be obtained through these practices. Resultantly, several initiatives have been taken primarily to minimize cost and enhance profits [1]. Taking into consideration the product's post-use value and satisfying environmental regulations, product return programs were initiated and expanded by several organizations, to incorporate recovery practices, such as refurbishing, rework, remanufacturing, remarketing, and recycling. Therefore, shortening of product life, desire for reduction in costs of production, respond to end-of life product legislation and consumer preferences have given rise to the growth of product return programs. The environmentally safe practices and effective programs trigger the process of innovation, thereby helping firms to attain competitive advantage [2].

In developing economies, the increased usage of manufactured goods has surfaced the significance of ways for managing product returns. Since the past two decades, rapid environmental degradation and industrialization has put pressure upon the developing countries, especially Indonesian government to shift towards sustainable consumption and production, which has now been added to their Eleventh Indonesian Plan (2016–2020) as a key agenda. The agenda aims to promote the development of sustainable business models, predominantly to create demand side management, renewable energy, green markets, waste reduction, and low carbon emissions. These practices develop sustainability practices and eco-friendly businesses which largely reduce firms' reliance upon natural resources [3]. Therefore, the government has encouraged private sector manufacturers to take initiative for the effective implementation of waste management practices, in order to achieve these objectives through developing an industrial ecology system [4] for supporting the environmental sustainability.

The Automobile industry of Indonesia growing in a very rapid pace. After Thailand the Indonesia is largest producer of automobile and the largest consumer in ASEAN countries (see table 1)

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Table 1. Sale and production of automobile in three Asean countries

	Car production	Car Sale	Car production	Car Sale
	2016		**2017**	
Thailand	1944417	768788	1988823	870650
Indonesia	1177791	1062716	1216615	1079534
Malaysia	545253	580126	499639	576635

Indonesia is among the Asean countries which is moving to the self-sufficiency and even producing the surplus for export see figure 1

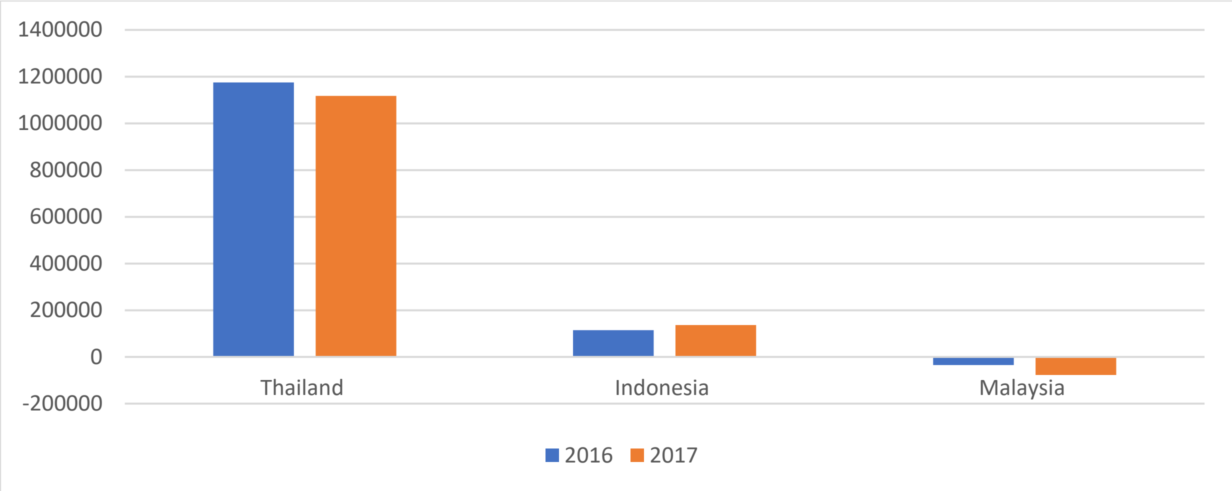

Figure 1. the difference in sale and production of automobile in three Asean countries
Source: Asean automotive federation.

Under developing economies, the implementation of sustainability policies does not suggest the prevention of emissions and waste, rather suggest effective solutions for the disposal of the used materials. Currently, Indonesia has not made any proactive effort for the recycling or recovering of the end-of-life products and just keep on returning of those products having some residual value. Currently employed system for waste treatment in Indonesia is unsustainable, posing serious threats to the environmental protection, such as landfills and illegal dumping causing adverse impact on the environment and human health. Developing countries like Indonesia having similar environmental challenges must establish and accept closed-loop supply chains (CLSC) and clean production systems for the effective management of the reverse and forward flow of materials.

With the growing reach of product returns, the Indonesian firms must identify possible solutions in the CLSC's reverse logistic segment, which considers the quality, timing, variety and quantity of product returns. Several previous researches have revealed the significance of profitability, reverse logistics, increased retention & customer service, sustainability & competitive advantage and greater product returns which had inspired and encouraged firms towards CLSC adoption. However, uncertainties in volumes, quality and timing could adversely affect such efforts and the returns on SC. Thus, the adoption of closed-loop supply chain could be encountered with certain operational challenges manifested by these uncertainties, which makes it essential to consider and initiate the corresponding actions and strategy formulation by the manufacturers [5].

The present study considered three theories, i.e. Natural Resource Based View, the Resource Based View, and the Institutional Theory. These theories were considered to observe if product returns act as a mediator to the green capabilities' influence on the CLSC adoption. It provides important implications in the infrastructural development, which helps in the production of environment friendly goods and minimizing the use of materials. In the context of developing countries, it has gained considerable importance since these economies are encountered with various challenges, such as increasing consumption, propensity, investing in production activities with greater sensitivity, and restoring economic growth. Understanding certain CLSC dynamics helps in alleviating the challenges related to investment led growth of infrastructure, particularly in the case of developing countries. The remaining part of the article is arranged as: the next section includes the literature description regarding closed loop SCs and green capabilities, followed by the presentation of supported theoretical framework for the formulation of research model and research methodology. The final section provides the results and future implications, and the discussion regarding the future research directions and limitations of present study.

2. Literature Review

2.1. Green Capabilities

Within the supply chain, the green capabilities are associated with integration, environmental management, relationships, and internal functional flows (such as logistics, information, and finance) which are essential for a firm to achieve competitive advantage. Dimensions of green capabilities, i.e. green packing, manufacturing, marketing, supply, environmental participation, and eco-design can significantly contribute to improve the performance of a firm. All these dimensions have stimulated the idea that such green capabilities act as catalysts for incorporating green practices, such as adopting CLSC and product return management.

Integration capability comprises of external and internal integration capability, where external integration capability shows coordination within the organization, whereas internal integration capability concerns with the firm's ability to combine the reverse logistics and forward supply chain, within an organization [6]. Contrarily, manufacturing capability considers the enhancement of process flows, new manufacturing technology and energy usage, and reduction of material and production costs. According to Sarkis [7] the manufacturing capability also covers the adoption of industrial ecology systems, having the ability to transform waste and product returns to usable components and recycled materials.

2.2. Product Returns

Product returns take place resulting from the situations like end-of-use, warranty, repair, end-of-life or commercial returns. End-of-use returns take place when the existing good or equipment is upgraded by the customer as a result of technological advancements. In case of commercial returns, the products are generally returned to retailers after the certain purchase time or based on the return policy entitled by the store. End-of-life returns refer to the outdated goods which have completed its tenure. The reverse logistics systems are required to take up returns, including reverse flow packaging and reverse flow products. The organizational perspective shows that the reverse flow products aim to retrieve costs by refurbishing, remanufacturing, or recycling of logistics practices. It is the return quality which determines the volume of product returns [8], although most items are of adequate quality that can further be resale. However, under closed-loop supply chain, the return strategy which ensures the smooth running of reverse logistics has the potential to significantly contribute to the environmental, social and economic sustainability of a firm, by decline in the use of raw materials.

2.2. Closed-loop supply chain (CLSC)

According to Wells and Seitz [9], CLSC comprises of a forward and reverse supply chain, which reincorporate the recovered product into the forward supply chain, resulting in the creation of a continuous loop. The major CLSC activities suggested by Blackburn, et al. [10] are:

- Acquiring product to recover used goods from the end-users
- Carrying out reverse logistics for transferring used items to the disposal point
- Examination and disposal of utilized goods for reusing option, which determines the residual value of the used item
- Exploiting best options to reuse items, through repairing, reusing, recycling, disposal or remanufacture, and
- Re-promoting items by exploiting and creating refurbished goods markets.

Every kind of returns, ranging from discarded to the end-of-life products come under a closed-loop supply chain. However, according to Turki, et al. [11] manufacturers can reap benefits from end-of-use and defective products in terms of returns which can both be environmental and economical in nature. These returns take place during any stage of forward SC, such as manufacturing, purchasing, delivery, and consumption. Besides meeting secondary market demand and sustained and operational CLSC, significant volume of product returns is also is needed. The literature has extensively suggested reverse logistics as a key element in product returns, excessive stock, or product recovery management in a closed-loop supply chain.

2.3. Value Chain Costing

Value chain costing is based on the value chain analysis proposed by Porter, as discussed in Section 3. According to the value chain analysis, competitive advantage can be derived from:

i) A cost-leadership strategy or equivalent customer value having lesser cost, or

ii) A differentiation strategy or improved customer value having equivalent cost.

Since chain of activities take place among the design and distribution of a product, the value chain analysis considers that in what ways a) costs can be cut, b) customer value be improved, and c) product differentiation could occur in a firm's value chain segment. One of the important aspect of lean thinking is the value stream mapping, which refers to the assessing of required material and information flow to make these goods and services, available to the consumers, having a vision to discover potential opportunities to improve market lead time. Value chain costing is derived from the conventional cost analysis, which accounts for the cost savings and benefits that are enrooted in the customer and supplier's linkage to the firm. It refers to an activity-based costing approach, which assign costs to the required activities, such as procurement, design, production, distribution, service, or making a product or for providing a service.

2.4. Research Hypotheses

Since reverse supply chain is a complex operation, therefore firms are required to develop recover capabilities on the remanufacturing, reworking, refurbishing, and repairing sites [12]. The volume of returns also depends on the technical expertise in reverse operations. A firm tries to recover its capabilities through essential technological acquisition, skilled workers, and recovery equipment to exercise the processing of waste activities, thereby influencing the product returns volume. Therefore, suggests the following hypothesis.

H1. Volume of product returns is positively affected by recovery capability.

Firms which incorporate internal operations and strategies can more effectively handle the product returns as compared to the ones who do not integrate these functions. A firms' effectiveness can be observed by assessing the ability of a firm to manage product returns, irrespective of the timing, volume, quality, and type of these returns. The external capabilities of a firm are also influenced by the product returns volume, as the reverse logistic system acts as a key component in encouraging consumers towards product returns [13]. Disintegrating departmental silos under reverse supply chain plays a crucial role to assist the flow of product returns. Thus, following hypothesis is proposed:

H2. The volume of product returns is positively affected by integration capability.

Under closed-loop supply chain, firms must possess manufacturing capability to effectively handle the large volume of product returns. Such as, the production process must have the ability to effectively respond against the uncertain product returns' volume and timing, and recover materials, disassemble products, fulfil demand, and bring together the material needs. In the forward supply chain, a capable or highly flexible manufacturing system should provide support to the product returns by doing no compromise with the overall CLSC's production goals, thereby leading to following hypothesis:

H3. The product returns' volume is positively affected by manufacturing capability.

In case of end-of-life product recovery, thirteen capabilities were identified by Miemczyk [14], which are grouped as technical, revenue improving and routine capabilities. Where routine capability is the ability of affecting a firm's institutional structure by selling and affecting the present as well as future regulations. Contrarily, the technical recovery capability involves technology, management, and assessment aspects of SC, whereas, revenue recover capability refers to the cost reduction practices, including revenue sharing obtained by selling the retrieved parts; and customer sales programs. Such revenue recovery capabilities play a significant role in product recovery operations, involving reduction in reverse costs of SC and ensuring enough end-of-life product supply [14]. Under CLSC, the product recovery operations can also be supported by inspection mechanisms, reverse logistics infrastructure, and recovery technology. Another important element of recovery activity is the remanufacturing, which entails for distinct recovery capabilities resulting from forward SC. Therefore, we hypothesize as follows:

H4. The extent of adopting closed-loop supply chain is positively affected by recovery capability.

According to scholar, the integrated supply chains must effectively manage dynamic environment, which tend to influence the process of recycling and product returns. Firm-based capabilities, such as possessing inter-departmental communication, acquiring expert knowledge, and environmental management system usage inspire organizations towards incorporating green activities. According to Miemczyk, et al. [15] in terms of knowledgeable employees and skills sharing, the integration capability plays an essential role while establishing and adopting the processes of closed-loop supply chain. These capabilities involve customer-supplier collaboration, technological adoption, and innovation [16] thereby helping firms to adopt the practices of environmental management. However, it receives more importance when suppliers and manufacturers collaborate for establishing the CLSC operations [17].

H5. The extent of adopting CLSC is positively affected by integration capability.

Adopting environmentally safe approaches is an integral part of process capability, such as fuel-saving transportation, energy efficient equipment usage, using eco-friendly components or raw materials for manufacturing high quality and low cost products. Putting differently, author suggested that manufacturers must possess such capabilities that could support and embrace their green objectives. Firms who are possessed with these manufacturing capabilities exhibit advanced CLSC arrangement as compared to firms which are less focused towards environmental protection. Manufacturing capability refers to an ability of a firm to transform end-of-use products into remanufactured or new products, as well as bringing back the recyclable parts into the CLSC system. Green design, clean production, lean manufacturing, and reusing, and remanufacturing facilitate firms towards environmental sustainability and waste reduction [18]. Thus, following hypothesis is suggested

H6. The extent of adopting CLSC is positively affected by manufacturing capability.

The CLSC's reverse supply chain component tends to be influenced by the volume of product returns. It implies that greater amount of product returns provides the basis for CLSC adoption. Thus, concluded that besides the issues of sales, recovery and marketing, scarcity of used products has been proved to be a major obstacle in the CLSC adoption. Therefore, the hypothesis is stated as:

H7. The extent of CLSC adoption is positively influenced by the extent of product returns.

Firms that majorly concerned about reverse and forward supply chains are more likely to be successful in their supply chain operations and adoption of CLSC or remanufacturing activities, as compared to those firms which focus on just forward supply chain. Firms can achieve responsive and efficient recovery process and product return by proactively managing the volume, timing, and quality of product returns, thus leading to the adoption of higher CLSC. Firms have been facing supply challenges due to quality and volume diversity of end-of-life returns, making it difficult for firms to perform CLSC activities [15]. The inability of dealing with returns create hindrance in the firm's recovery capability and in satisfying the demand for recycled and recyclable products. Therefore, hypothesis is stated as:

H8. The association among the extent of CLSC adoption and recovery capability is mediated by the timing, quality and volume of the product returns.

Warranty and commercial returns were found to be market driven, whereas, end-of-life and end-of-use product returns are assumed to be driven by market regulations [12]. Resultantly, most businesses acquire warranty and commercial returns for their products during early life of the products, but the returns for EoL and EoU products are mostly received at the last stage or end of product' life. Firms must use sound integration capability for effective handling of product returns and CLSC adoption to enhance the products' recovery value [12]. Sound integration capability also involves a long-term cooperation among the SC partners, for maintaining networks and developing SC processes to achieve mutual closed-loop supply chain benefits [15]. Therefore, greater product returns are likely to inflate the integration capability's impact on the CLSC adoption, therefore the hypothesis is stated as:

H9. The CLSC adoption and integration capability association is mediated by the timing, quality and volume of the product returns.

Under CLSC, firms are required to make investments in waste reduction, advanced production technologies, encouraging the recovered material and parts usage, reduction in energy consumption and improved work conditions to enhance the manufacturing capability. Several firms have been successfully using the clean production, lean manufacturing, remanufacturing and green design, by particularly emphasizing on reducing waste material [18]. Therefore, volume and variety of product returns greatly contribute to the successful adoption of CLSC. Thus, in order to obtain high product returns, firms must develop and enhance their manufacturing capabilities. Therefore, we hypothesize as:

H10. The association among the extent of CLSC adoption and manufacturing capability is mediated by the timing, quality, and volume of product returns.

While performing value chain costing, it must be considered that there could be significant data problems, which would not be precisely answered, however, debate regarding quantitative awareness about external competitiveness and costing process could bring significant benefits. There exists a close association among open book accounting and value-chain costing, since open book accounting tend to improve the available benefits of value-chain costing. The product return has significant impact on the product return and over all supply chain performance. Thus, the study has; proposed the following hypothesis:

H11: The value chain costing moderates the relationship between product return and the extent of CLSC adoption.

3. Methodology

The present study used a primary research method. Since the population size for this study is 7347, therefore a sample size of 367 was chosen following the Krejcie and Morgan [19] table for determining sample size. For the purpose of sample collection, purposive sampling technique was employed due to difficulties arising from random sampling method. Therefore, self-administered questionnaires were distributed to the participants of soft skill training and the ones who were selected by the universities. From around 450 distributed questionnaires to the 10 public universities' academic staff in Thailand, 345 questionnaires were obtained. However, a few questionnaires with un-responded items were excluded from the study. Thus, indicating a 76% response rate, which is above 30% as recommended [20].

Subsequently, the study analyzed the research hypotheses proposed on the basis of research questions. Afterwards, the instruments of the study were assessed by determining the structural and the measurement models through Smart PLS, commonly known as the second-generation multivariate data analysis. For the purpose of data analysis, PLS-SEM was employed following the recommendation of Cassel, et al. [21]. According to them, PLS-SEM approach is appropriate in case of model complexity. Since there are four constructs with second order and around 99 indicators involved in this study, therefore PLS-SEM is a suitable technique for this study. In addition, the nature of the construct items are reflective and formative, which could not be handled properly by other software [22]. The PLS-SEM is also recommended when the theoretical framework is not fully established [23, 24]. PLS-SEM also considers the measurement error and is also used by high indexed journals.

The items of green capabilities are adopted form the studies of Metta and Badurdeen [25] and Hartmann and Germain [26], the item of product return and closed loop supply chain adoption is adopted from the study of Shaharudin, et al. [27] and the value based account is adopted from the study of Ittner, et al. [28].

4. Results

The association among the variables was determined using a PLS-SEM, afterwards, the study carried out data analysis involving the structural and the measurement model [29]. The measurement model is assessed through PLS to confirm the supporting theory, analyzing existing nature of association between the variables and to make prediction, as the partial least square is expected to explain all the measured variance in the study. The measurement model shows the relationship between unobserved variables and the observed variables [22]. While observing the measurement model, the study also performed the confirmatory factor analysis (CFA) for measuring the validity and reliability of the constructs and items, respectively. Furthermore, the composite reliability and average variance extracted (AVE) were also computed. The value for composite reliability should exhibit greater than 0.70 value, and the AVE must be greater or equal to 0.50 value [30]. According to Nunnally and Bernstein [31] the recommended range for Cronbach alpha is greater or equal to 0.70. The convergent validity of the construct is established if the outer loadings for the model exhibit significant $t>1.96$, at 5% significance level. After confirming the reliability and validity of the measurement model, the structural model is determined.

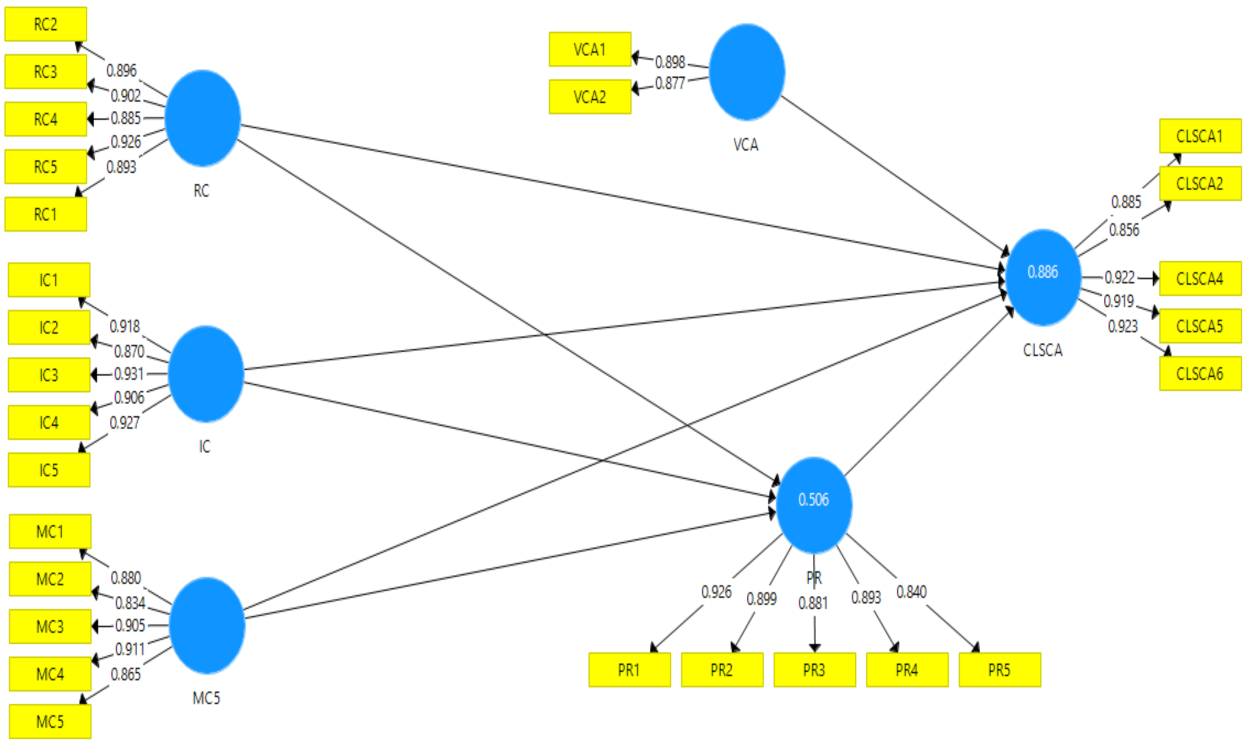

Figure 1. Measurement Model

Reliability of an indicator refers that how much variance in indicator can be explained by latent constructs. It ranges from 0-1. For each measuring construct, the outer loadings are observed to assess the reliability of the indicators [32]. While standardizing the latent variables and indicators, the indicator reliability tends to equalize the square of the indicator loadings. Any reflective indicators having less than 0.40 loadings are recommended to be excluded from the model [22, 32]. Although, two namely CLSCA 3 and CLSCA7 of the measurement model are excluded, since all other items exhibited loadings within the recommended range.

Table 1. Outer loading

	CLSCA	IC	MC5	PR	RC	VCA
CLSCA1	0.885					
CLSCA2	0.856					
CLSCA4	0.922					
CLSCA5	0.919					
CLSCA6	0.923					
IC1		0.918				
IC2		0.870				
IC3		0.931				
IC4		0.906				
IC5		0.927				
MC1			0.880			
MC2			0.834			
MC3			0.905			
MC4			0.911			
MC5			0.865			
PR1				0.926		

PR2				**0.899**		
PR3				**0.881**		
PR4				**0.893**		
PR5				**0.840**		
RC2					**0.896**	
RC3					**0.902**	
RC4					**0.885**	
RC5					**0.926**	
VCA1						**0.898**
VCA2						**0.877**
RC1					**0.893**	

After carrying out indicator's unidimensional test, the internal consistency reliability of the model was analyzed. Instead of using Cronbach alpha, the PLS-SEM incorporates composite reliability test to estimate the reliability of variables, on the basis of the indicators' inter-correlations. Prioritizing items based on their individual reliability in PLS-SEM, accompanying with Cronbach alpha's limitations, therefore assuming equal indicator loadings for all indicators. The Cronbach alpha shows sensitivity for number of indicators, and also underestimates the internal consistency of the constructs, making it essential to introduce alternative measure for assessing the reliability. Thus, composite reliability (ρ_c) is the appropriate alternative to this. Composite reliability estimates the degree of each indicator to share greater variance and coincide with the indicators of other variables. The convergent validity shows whether an item of the construct estimates what it is actually assumed to estimate. It is measured through Fornell and Larcker [33], which is the sum of each construct's square loadings divided by the total number of indicators. Therefore, when the value of AVE is equal to 0.50 or above, convergent validity is established, thus indicating that on average, more than half of indicators' variance is explained by the construct. However, if the value lies below 0.5, it indicates that on average, the indicators' variance cannot be explained by the constructs, because of errors [22, 34]. The convergent validity values are presented in Table… which shows the adequate convergent validity, since the range of AVE turned out to be 0.610-0.814, thereby satisfying the threshold level, i.e. AVE >0.50 [35].

Table 2. Reliability

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
CLSCA	**0.942**	**0.943**	**0.956**	**0.812**
IC	**0.948**	**0.952**	**0.960**	**0.829**
MC5	**0.926**	**0.930**	**0.944**	**0.773**
PR	**0.933**	**0.934**	**0.949**	**0.789**
RC	**0.942**	**0.944**	**0.955**	**0.811**
VCA	**0.731**	**0.735**	**0.881**	**0.788**

Discriminant validity is the extent that the measurement concepts are unrelated or different from other measurement concept, following the empirical standards. However, an established discriminant validity indicates that a construct is recognizably different as compared to the other model constructs. In a reflective measurement model, discriminant validity is measured using two methods, namely cross-loading method, and Fornell and Larcker [33]. According to the cross-loadings method, for a particular construct, the indicators' loading must be higher than its cross-loadings for the other constructs of the same model. However, if the cross-loadings for any construct is greater as compared to the loadings of the actual construct, then it shown that discriminant validity is not achieved and is violated for that construct. Whereas, the criterion proposed by Fornell and Larcker [33] refers as a conservative technique for analyzing discriminant validity, which compares and examines the AVE's square roots for each latent construct against the correlations of latent constructs with other constructs. The AVE's square root values must be higher in comparison with its correlations among other variables [22], otherwise the discriminant validity will not be achieved for reflective models.

Table 3. Discriminant validity

	CLSCA	IC	MC5	PR	RC	VCA
CLSCA	0.931					
IC	0.685	0.921				
MC5	0.736	0.915	0.929			
PR	0.927	0.649	0.696	0.888		
RC	0.680	0.882	0.906	0.692	0.901	
VCA	0.656	0.504	0.506	0.695	0.642	0.887

According to Hair, et al. [22], the structural model estimates the relationship between the constructs involved in a proposed model. It provides a useful interdependence between the constructs, such as the structural model shows the nature of association among the latent constructs. The existing relation among the constructs of the proposed model was then tested using structural equation modeling. However, the structural model involves the exogenous and a set of endogenous variables. The study estimated this model by observing the significance and the relevance of the structural relationships in the proposed model, the collinearity issues.

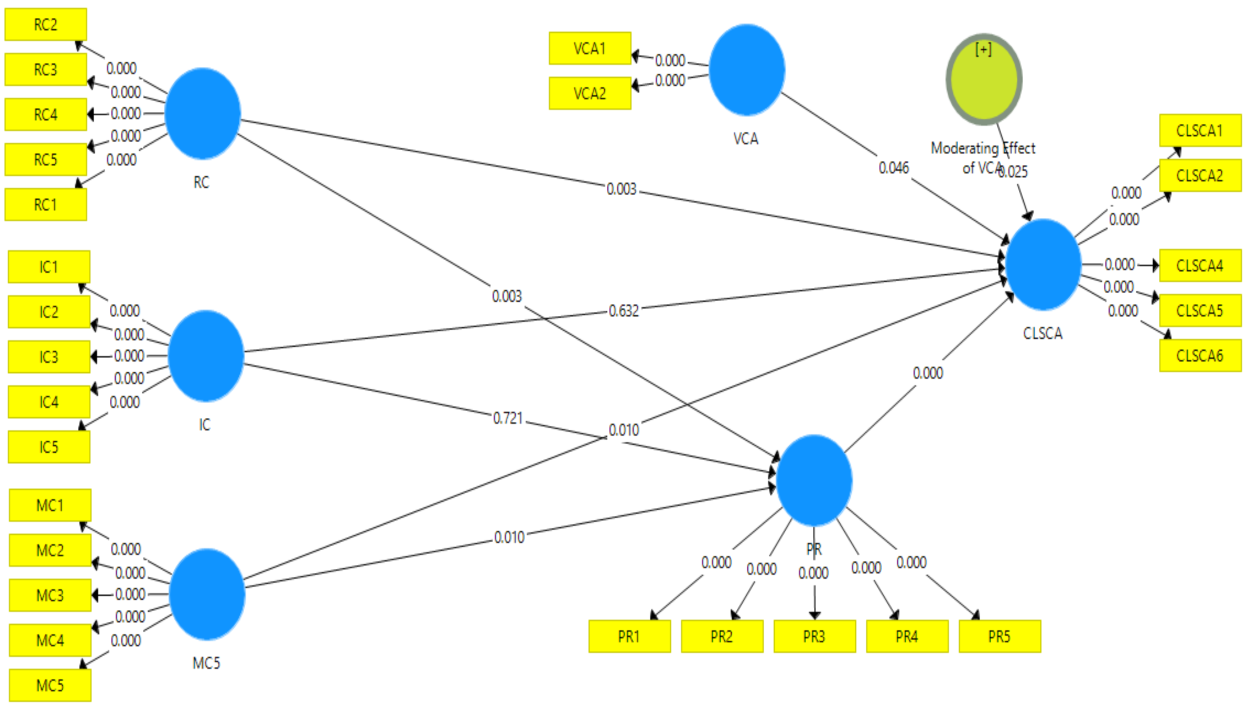

Figure 3. Structural Model

Following Chin [36], a bootstrapping technique was used to obtain standard errors and t-statistics, since this technique provides non-parametric approach to check the validity of PLS estimates, thereby allowing to examine the significance of the models' path coefficients.

Table 4. Regression Results (Direct and Moderation)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
IC -> CLSCA	0.014	0.023	0.130	0.111	**0.912**
IC -> PR	0.038	0.035	0.108	0.357	**0.721**
MC5 -> CLSCA	0.613	0.605	0.155	3.963	**0.000**
MC5 -> PR	0.412	0.405	0.160	3.577	**0.010**
Moderating Effect of VCA -	0.058	0.063	0.026	3.241	**0.025**

> CLSCA					
PR -> CLSCA	0.819	0.809	0.045	3.057	**0.000**
RC -> CLSCA	0.081	0.078	0.107	0.757	**0.449**
RC -> PR	0.352	0.356	0.117	3.000	**0.003**
VCA -> CLSCA	0.081	0.085	0.041	3.997	**0.046**

The all direct and moderating except the three-hypothesis explaining the relationship between integration capability and closed loop supply chain adoption, between integration capability and product return, and between recovery capability and closed loop supply chain adoption. The results of the mediation of product return are examined in the following table. The two hypotheses are accepted significantly while the PR fails to mediate the relationship between integration capability and closed loop supply chain adaption.

Table 5. Mediation result

	Original Sample (O)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**
IC -> PR -> CLSCA	0.032	0.029	0.088	0.360	**0.719**
MC5 -> PR -> CLSCA	0.338	0.328	0.131	3.580	**0.010**
RC -> PR -> CLSCA	0.289	0.287	0.094	3.061	**0.002**

In view of Ringle, et al. [37], PLS-SEM can predict well and most studies use R^2 value for model estimation to assess the model's predictability to explain the variance in endogenous variable. The coefficient of determination or R^2 shows the combined effects of a set of exogenous variables on the model's endogenous variable. In addition, it also measures the regression function or goodness of fit by using items obtained through empirical analysis, ranging from 0-1. The R^2 value is usually assessed as 0.19, 0.33, and 0.67 as weak, moderate, and substantial variation in endogenous variables, respectively [36]. However, the acceptance and rejection of R^2 differs, based on the nature of the study. Thus, the higher R^2 represents that greater proportion of endogenous variance is explained by one or more exogenous variables [22].

Table 6. R-square

	R Square
CLSCA	0.886
PR	0.506

5. Discussion

The role of product returns as a partial mediator in the CLSC adoption and recovery capability relationship indicates the absence of any direct relation among the two, thereby showing the significant role of manufacturer for encouraging towards product returns. Firms may be reluctant to invest in redeploying resources in the absence of adequate returns. As in case of institutional theory, it also shows that how market regulations encourage firms to adopt CLSC, such as take back laws that are imposed to improve product returns. Responsiveness towards environmental concerns have given rise to investment and regulation in recovery infrastructure, as in developed economies. However, Indonesian economy has imposed only some of these regulations. Most organizations voluntarily take part in such take back programs [38], however it is the multinational firms which incorporate these take back programs as their corporate social responsibility initiatives. On the other hand, the peer pressure and government also compel firms towards putting considerable efforts for CLSC adoption. Product return rates tend to be gradually influenced and changed with social attitudes and norms. Although, greater product returns tend to improve CLSC adoption and recovery capability of a firm. Besides the direct effect, the partial mediation of product returns also indicates that integration capability has indirect effects on the CLSC adoption. Having such capability enable firms to adopt warranty, return and other policies such as manufacture, product design, and quality processes that possess the ability to affect the timing and volume of returns. The absence of any mediating role of product return volume in the CLSC adoption and manufacturing capability relationship suggests that CLSC adoption is directly influenced with the manufacturing capability. Indonesian manufacturers get no incentive for investing in manufacturing capabilities to ensure effective handling of product returns. Thus, Indonesian manufacturers will continue producing new products and relying on new components, without any consideration of recapturing, recycling and remanufacturing of used items.

6. Conclusion

The present study is based on the RBV and NRBV theories, assuming that firm could achieve competitive advantage through its integration, manufacturing, and recovery capabilities. Together with effective efforts for achieving higher product returns, these capabilities provide the basis for CLSC adoption, thereby leading to greater competitive benefits. Furthermore, since firms are responsible for developing such capabilities, according to Institutional theory, the external factors, such as regulations also contribute in enhancing the volume of returned products and components. The developing countries, such as Indonesia has been facing the challenge of insufficient institutional infrastructure for product recovery, which impedes the expansion in volume of recovered products, required to undertake necessary investments for developing recovery capability. Since the adoption of CLSC arise from investing in integration and manufacturing capability, reframing societal norms via environmental leadership could result in opportunity development. Moreover, the increase in consumer demand builds pressure upon developing countries to adopt sound environmental practices for managing product returns and end-of-life products disposal. However, the literature indicates that implementing green strategies brings several economic benefits. Therefore, manufacturers in developing economies must understand the significant role of recovery capabilities in encouraging and influencing the CLSC system development and product returns, resulting in the reduction in ecological footprints. Presently, the Indonesian manufacturers are depending largely on traditional production methods with particular focus towards forward supply chain, having little or no consideration for recapturing, remanufacturing, and recycling of used items. However, adopting these activities could minimize their resource needs, less impact on environment, and develop new sources that could increase customer value. In addition, Indonesian manufacturers get no incentives to make investment for developing new capabilities, which could enable effective handling of product returns and CLSC adoption, resulting in improved firm competitiveness.

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