

Impact of Green Supply Chain Management Practices on Performance of Manufacturing Companies in Jordan: A Moderating Role of Supply Chain Traceability

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Abstract

This study aims to measure the effect of GSCM practices on the performance of Jordanian manufacturing companies by investigating the moderating effect of supply chain traceability on the relationship between GSCM and organizational performance. This article follows a quantitative research design together with primary data collection through a survey questionnaire with the sample size considered in this study is 320 participants. For data analysis, Structural Equation Modeling (SEM) techniques are used, which include path assessment and Confirmatory Factor Analysis (CFA). The outcomes of this study confirm the significant effect of internal environment management, cooperation with customers, traceability, and eco-design on organisation performance. The findings also revealed a significant moderating impact of traceability on the relationship between eco-design and organisation performance, and on the association between internal environment management and organisation performance. The key limitation of this study has been associated with its limited scope, as this study was completely based on the manufacturing sector of Jordan. On the other hand, the absence of qualitative research design has been another major limitation of this study. The rising environmental concerns that revolve around the field of the supply chain is likely to increase the importance of GSCM practices. Hence, it is vital to investigate the impact that GSCM is likely to make on organisation performance.

Keywords

Green supply chain management (GSCM), organisation performance, supply chain traceability

1. Introduction

Due to the increased association with the environment, the adaptation of GSCM has gained massive attention of the recent investigations (Choi et al., 2019; Tsao, 2016; Jabbour & de Sousa Jabbour, 2016; Zhu et al., 2013). In addition to this, there is a pivotal role of SCM in terms of depicting the performance of the organisation (Bocquet et al., 2017; Teixeira et al., 2016). In contrast to this, the connotation of organisational performance with societal responsiveness is also regarded as a crucial concern in recent studies (Rezaee et al., 2017). This is due to the reason that sustainable development, eco-centralism, and quality of production are some of the most obvious filaments which are widely adopted by the market giants. This has also been because awareness of sustainability has been increasing among people all over the world. This generates the need for companies to cater to the increasing demand for sustainable products with the adoption of GSCM practices. It has also been argued in the study of Green et al., (2012) that due to the increased awareness of environmental sustainability, the companies need to adopt sustainable practices of supply chain management as to satisfy the demands of consumers. This links with the performance of the companies as the consumers are more attracted to the products that have been manufactured with the help of green supply chain management practices. However, the lack of product traceability affects the effective adoption of green supply chain management practices for the company.

On the other hand, the adoption of sustainable business development has also emerged to be another significant competitive factor among the modern businesses (Namagembe et al., 2019; Zhang et al., 2017). However, the impact of GDCM on organisational performance has been examined widely in the existing literature. However, there is a contradicting view that has been obtained from the existing literature pertaining to the association of GSCM with the performance of the companies. This has been due to the reason that the GSCM involve concentrated consequences related to finance which have a huge influence on the financial performance of the organisations (Rad & Nahavandi, 2018). For instance, the findings of Namagembe et al., (2019) suggested that the up-gradation of the traditional supply chain is required for the adaptation of GSCM. However, the negative impact of GSCM has been determined on the performance of the organisation in the short terms as the company has to deal with the cost-effective measures to implement and adopt the measures of GSCM. On the other hand, the GSCM is effective for the long term benefit of the organisation in terms of the cost. This is due to the reason that GSCM is based on the sustainable practices of designing the product, induction of material and product's end-of-life decisions. However, there are various circumstances for the companies towards the adoption of GSCM practices. These circumstances hinder companies to adopt and implement the practices of GSCM. In this manner, companies should realise the significance of GSCM practices in terms of improving the performance of companies.

Moreover, to the need of adopting GSCM practices in order to increase the performance of the organisation in long term, it is also essential for the companies to define the challenges associated with the adoption of GSCM practice. One of the major challenges associated with the adoption of GSCM practices is resistance from the shareholders. It has also been argued in the study of Wang et al., (2016) that the shareholders resist the adoption of CSR practices due to the increased cost of organisational practices in the short term. This is because, with the increase in expenses to adopt GSCM practices, the share of these shareholders is reduced from the profit. In this manner, it is essential for the companies to determine the significance of GSCM practices on the performance of the organisation while generating awareness among these shareholders regarding the long term benefits associated with it. Therefore, this study has aimed to determine the impact of GSCM practices on the performance of the organisation in the context of manufacturing firms in Jordan. In addition to this, the significant aspect of traceability has also been tested as the moderating variable among the relationship or association of GSCM with the organisational performance. In this manner, for the purpose of signifying the moderating role of traceability in the supply chain among the association of GSCM with the organisational performance, the quantitative approach has been adopted in this study.

2. Literature Review

Due to the direct association with environmental benefits, the concept of GSCM has gained much attention from the authors and industrialists (Babazadeh et al., 2017; Zhu et al., 2013). In addition to this, the end-of-life management of the product, delivery of the product, packaging of the product, product design and the material which is used for the manufacturing of the product are all included in the element of the supply chain (Cousins et al., 2019; Golpira et al., 2017; Moussa et al., 2017). In association with this, the affiliation among the GSCM and the organisational performance has been investigated by various analysts in the past few years. In this manner, it has been indicated by most of the studies that there is a positive relationship among the adoption of GSCM practices and the organisational performance (Tsao, 2016; Teixeira et al., 2016; Zhu et al., 2013). However, this relationship is opposed in various studies which emphasise on the fact that the acceptance of GSCM practices can increase the cost of the company which exerts a negative impact on the performance of the organisation in the industry. It has been argued in the study of Carnevale et al. (1990) that GSCM practices can adversely affect the performance of the company. In this manner, for the purpose of distinguishing the mixed approaches based on GSCM practices and organisational performance, several moderating variables have been included by different studies. Therefore, it is essential for the companies to increase their emphasis over the sustainable practices which can help in terms of improving and enhancing the above aspects of the SCM.

In contrast to this, the adoption of GSCM practices can increase the interest of the consumers towards the product or brand. This is due to the reason that the awareness of environmental sustainability has been increased among consumers. It has also been argued in the study of Forbes et al., (2009) that consumers have increased demand for sustainable products with increased awareness regarding environmental sustainability. This is due to the reason that consumers can only support the cause of CSR by purchasing the products that are manufactured through sustainable practices. This generates the need for companies to adopt the GSCM practices which can help them in order to attract more consumers towards the brand or product. The findings of Zhu et al., (2013) revealed that eco-centric practices influence the performance of the organisations significantly. However, the eco-centric supply chain does not influence the economic development of the region. Moreover, with reference to the companies operating in the manufacturing sector of UK, the study of Golpıra et al., (2017) identified that there is a huge significance of sustainability of the environment in terms of shaping the practices of the supply chain. This is due to the reason that the practices of supply chain management according to the environment sustainability can help in terms of reducing the impact of harmful products from the environment. In addition to this, the global carbon footprint can also be reduced due to the low emission of harmful chemicals and gasses.

Considering the findings of all these studies, the impact of green supply chain management practices is yet to be tested in the context of the manufacturing sector of Jordan. However, the carbon emission in the region has been low however, the increased awareness among the people and increased operations of the manufacturing firms remain the threat for sustainability of the environment. It has been also argued in the study of Gerged et al., (2018) that the issue of environmental sustainability has been low in Africa due to the low involvement of manufacturing firms. However, with the rapid increase of globalisation, the country needs to determine the ways in which the environment can be preserved while having no negative impact on the companies. On the other hand, the adoption of GSCM practices can have an influence on the performance of the organisation. This is due to the reason that the acceptance of GSCM practices will attract consumers towards the product or brand. In this manner, the sales of the company are increased which eventually increases the performance of the organisation in the industry. This has also been stated in the study of Green et al., (2012) that the performance of the organisation is influenced positively by the adoption of green supply chain management practices. Therefore, the association among both the variables has been tested in this study and for this purpose, the hypothesis has also been developed which is provided below:

H₁: Organisational performance is positively influenced by the adoption of GSCM practices

On the other hand, another aspect which has been tested in this study is related to the moderating role of supply chain traceability. In the contemporary market place, the use of traceability has allowed the companies in order to increase the integration with the suppliers. It has also been argued in the study of Galvez et al., (2018) that the traceability is an innovative concept which helps to ensure the transparency of operations and transactions among the company and the suppliers. In this manner, with the adoption of traceability, the companies can enhance the practices of supply chain management. The study of Cousins et al., (2019) stated that there is a negative moderation of supply chain traceability among the GSCM practices of companies operating on the manufacturing industry of UK along with the environmental performance. In contrast to this, it has been argued in the study of Jabbour & de Sousa Jabbour (2016) that traceability in the supply chain helps the companies in terms of increasing the interaction with the consumers and suppliers. In addition to this, the manufacturing companies with several channels are supported comprehensively with the traceability of the supply chain. This has been argued in the study of Suryanto et al., (2018) that there is a huge role of traceability in terms of controlling the risk associated with misleading suppliers. In this manner, it was determined that the risk of misleading suppliers is yet the controllable factor with the induction of supply chain traceability practices. Therefore, the moderation of traceability of the supply chain has been identified on the relationship between GSCM and organisational performance. This hypothesis has been developed and presented below:

H₂: Supply chain traceability moderates the relationship of GSCM and organisational performance

3. Theoretical Underpinning

Since the study is associates with the adoption of GSCM practices, therefore, the institutional theory has been adopted. It has been argued in the study of Bitektine et al., (2018) that three unusual pressures are reflected by the institutional theory which influences the decision making of companies. These pressures include normative, mimetic and coercive pressures. In this manner, the normative pressure is related to enforcing the organisation towards real action. This includes the pressure from external stakeholders which have invested in the company. On the other hand, the mimetic pressure is associated with the fact when the organisation begin to imitate the practices of successful competitors in the industry. This requires the organisation to adopt several measures which are designed by the leading competitors. Moreover, the coercive pressure in the institutional theory relates to the power of governing bodies in the organisation. This includes the pressure of regulating bodies and government on the actions of the companies. This relates to the acceptance of GSCM practices by the companies for the purpose of increasing the performance of the company in the industry.

4. Conceptual Model

Figure 1 below illustrates the conceptual framework of the study in which the association of variables that are adopted has been determined. Based on Figure 1 below, it can be identified that the adoption of green supply chain management practices is measure with the help of eco-design, internal environment management and cooperation with the customers. These four variables are treated as the independent variables of the study. On the other hand, the dependent variable of the study includes the organisational performance. This shows how the adoption of green supply chain management practices can impact the performance of the organisation in the industry. In addition to this, the moderating variable is also included in the framework. This moderating variable is the traceability of the supply chain management. This depicts how the traceability of the supply chain moderates the relationship among the adoption of green supply chain management practices and performance of the organization, the framework is provided below:

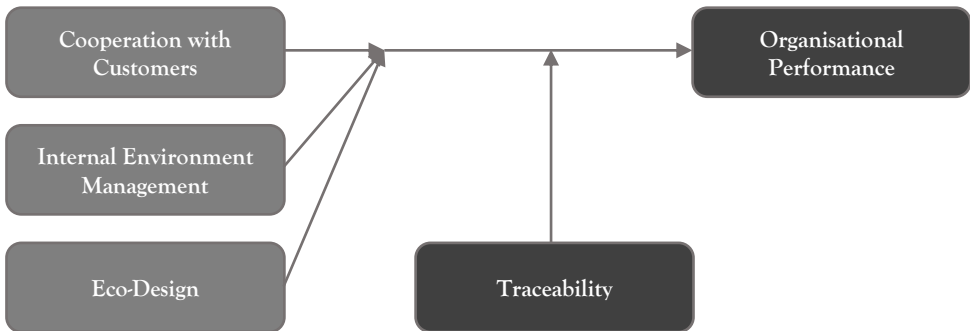


Figure 1: Conceptual Framework of the Study

5. Research Method and Design

5.1. Data Collection Process

The sample size for this study has also been determined with the assistance of the sample size formula as presented from the findings of Ryan (2013). This formula for the estimation of sample size is provided below.

Due to the quantitative nature of this study, the numerical data has been gathered with the use of primary sources of information. In this regard, the data has been gathered from the employees and managers working in the manufacturing sector of Jordan. Therefore, this data has been gathered through an online survey while several respondents were approached physically. Moreover, for the purpose of selecting the adequate sample size, the researcher has determined the sample size with the help of the formula presented in the study of Ryan (2013). In this regard, the formula for the estimation of sample size is given below:

$$n = \frac{z^2 \times p \times q}{e^2}$$
$$n = \frac{(1.96)^2 \times 0.5 \times (0.5)}{(0.05)^2} = 384$$

In the above formula, the confidence interval is provided which is denoted by 'z' and has the standard score of 95% which is calculated as 1.96. On the other hand, the portion which represents the population of this study is denoted by 'p'. In addition to this, the portion of the population which has not been included in this study is denoted by 'q'. The value for both the q and p is considered to be 0.5. Moreover, the error is denoted by 'e' which is calculated to be at 5% while the CI is 95%. After calculating, 384 is the adequate sample size which must be adequate for the purpose of conducting this study. Pertaining to this fact, the researcher has distributed the questionnaires among 390 people.

5.2. Sample Size and Sampling Technique

In relation to the sampling technique, the purposive sampling has been adopted in this study by the researcher in order to draw the sample from the population of this study. The purposive sampling according to Daniel (2011) is the type of non-probability sampling in which the respondents are selected on the basis of purpose of the study. Since this study has determined the impact of GSCM practices on the organisational performance of manufacturing firms in Jordan, therefore, the employees and managers from the manufacturing sector of Jordan have been approached. Therefore, the researcher has adopted the purposive sampling in this study. Moreover, based on the obtained responses, the response rate has also been calculated by the researcher. This calculation of the response rate is presented below:

$$\text{Response Rate} = \frac{\text{Number of respondents responded}}{\text{Total Number of Questionnaire distributed}} \times 100$$
$$\text{Response Rate} = \frac{320}{390} \times 100 = 82.05\%$$

5.3. Research Instrument

Since, this study has tested the moderating effect and has adopted the quantitative design, in this manner, the researcher has adopted the closed-ended survey questionnaire as the research instrument of this study. This instrument includes 5 main variables which were measured through the 5 points Likert scale ranging from strongly disagree to strongly agree. Therefore, the moderating, dependent and independent variables are quantified on the numeric codes from 1 to 5. On the other hand, the reliability of the instrument which has been adopted has also been tested in this study.

5.4. Data Analysis Technique

For the purpose of answering the research questions, the researcher has used the SEM modelling for the purpose of analysing the data which is done with the assistance of SmartPLS. It has been argued in the investigation of Hoyle (2012) that SEM modelling technique is adopted for the purpose of assessing the structural associations and is widely adopted by the researchers along with the regression and Confirmatory Factor Analysis (CFA). This has also been suggested from the findings of Brown (2015) that Cronbach's Alpha and composite reliability are the two aspects used to check the reliability in CFA to compute the internal consistency. Furthermore, the researcher has also carried out the AVE to guarantee the convergent validity on the basis of which the association of latent constructs are determined. Lastly, the discriminant validity has also been used for the determination of assessing the dissimilarities in the latent constructs (Civelek, 2018).

6. Results

6.1. Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is viewed as one of most powerful statistical technique and important measurement aspect of SEM, which emphasise on modelling the association among indicators, core latent variables and manifest (Afthanorhan, 2013). According to Kyriazos (2018), CFA is a widely used statistical technique to analyse the reliability of latent constructs, their discriminant validity and convergent validity. The analysis of CFA also involves the factor's validity assessment through the use of factor loading. As per the study of Fan et al., (2016), factor loading is also recognised as outer loading, the value of which should need to be more than 0.6 to ensure the validity of each construct. In this regard, all the values of factor loading presented in Table 1 are above 0.6, which confirms the validity of each construct. Apart from that, in order to test the reliability of all the variables of this study, the values of Cronbach's Alpha and composite reliability are also highlighted in table 1. As per the study of Gagnon et al., (2017), Cronbach's alpha is one of the most prominent technique to examine internal consistency or reliability of test items or set of scales. Similarly, composite reliability is another tool to measure internal consistency in the scale items. According to Choa & Chun (2018), for both the constructs including composite reliability and Cronbach's Alpha, the most appropriate threshold is 0.7. Therefore, the same criteria have been followed in this study to measure the reliability of each construct. In this regard, the value of each construct is found to have more than 0.7, which proves the reliability of all the latent constructs.

Lastly, to measure the relatedness of all the latent constructs with each other, the researcher has conducted AVE test. According to Ghadi et al. (2012), the value of AVE should be more than 0.5 to ensure the validity of all the constructs. Based

on this criterion, all the values of AVE highlighted in Table 1 are found to be over 0.5, which confirms the convergent validity of all the latent constructs.

Table 1: Reliability Testing and Convergent Validity

Latent Constructs	Indicators	Factor Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Cooperation with Customers	CWC1	0.930	0.781	0.838	0.636
	CWC2	0.679			
	CWC3	0.763			
Eco-Design	EDS1	0.960	0.772	0.887	0.797
	EDS2	0.819			
Internal Environment Management	IEM1	0.943	0.852	0.931	0.870
	IEM2	0.922			
Organisational Performance	OPER1	0.772	0.852	0.900	0.693
	OPER2	0.843			
	OPER3	0.871			
	OPER4	0.841			
Traceability	TRC1	0.845	0.890	0.922	0.748
	TRC2	0.851			
	TRC3	0.883			
	TRC4	0.881			

6.2. Discriminant Validity

Discriminant validity is another important measure of CFA, which is commonly used to test whether the measurements or concepts that are not supposed to be associated are actually dissimilar (Cheung & Wang, 2017). In accordance with the study of Imran et al. (2017), HTMT is one of the most appropriate ratios in SME that is used to measure discriminant validity. The same study identifies 0.85 as the threshold of HTMT ratio, thus the same criteria have been followed in this research. The findings highlighted in Table 2 depicts that all the constructs are different from each other, as all the values are highlighted as below 0.85, and the highest value is 0.550. Hence, there is enough evidence that all the constructs are different from each other and can be used for the path assessment in SEM modelling.

Table 2: Discriminant Validity

	Cooperation with Customers	Eco-Design	Internal Environment Management	Organisational Performance
Eco-Design	0.096			
Internal Environment Management	0.474	0.465		
Organisational Performance	0.353	0.363	0.550	
Traceability	0.157	0.275	0.352	0.577

6.3. Model Assessment

Table 3 outlines the outcomes related to the model's quality assessment, in which the value of R-square shows the percentage of variance on the dependent variable of this study. The outcomes highlighted in table 3 shows that the variance in eco-design, internal environment management, and traceability as an independent and moderating variable of the study explains 46.1% of the variance in the overall organisational performance. Apart from that, in order to determine the predictive relevance, the value of Q-square is presented in table 3, in which the value above 0 confirms the relevance of the model for predictions. The value of Q-square highlighted in table 3 is 0.239, which confirms the predictive relevance of the model.

Table 3: Model Assessment

	R Square	R Square Adjusted	Q-square
Organisational Performance	46.1%	44.9%	0.293

6.4. Path Assessment

The findings presented in the preceding section was associated with the assessment of the measurement model, which ensures validity and reliability of all the constructs. This section pertains to the path assessment, in which the association among the different study variables have been examined. As per the outcomes presented in table 4, there is found to be a significant association between cooperation with customers and organisational performance, as p-value falls well below 0.05. This implies that manufacturing companies in Jordan through enhancing cooperation with customers can enhance the overall performance of the organisation. Moreover, the variable of eco-design and internal environment management are also found to have a significant influence on organisational performance, as the p-value of both variables is highlighted as below 0.05. Similarly, with respect to the direct influence of traceability on organisational performance, the p-value highlighted as 0.000, which implies that traceability makes a significant impact on organisational performance.

The below-presented table 4 also outlines the results related to the moderating effect of traceability on the association between different GSCM practices and organisational performance. In this regard, as per the findings highlighted in table 4, it has been revealed that traceability significantly moderates the association between eco-design and organisational performance. Similarly, the moderating impact of traceability on the relationship among internal environment management and organisational performance is also found as significant. In contrast, the variable of traceability is found to have an insignificant moderating impact on the association between cooperation with customers and organisational performance.

Table 4: Path Assessment

Path	Path Coefficient	T Statistics	P Values
Cooperation with Customers -> Organisational Performance	0.235***	4.979	0.000
Eco-Design -> Organisational Performance	0.107**	2.294	0.022
Internal Environment Management -> Organisational Performance	0.204***	4.110	0.000
TRC*CWC -> Organisational Performance	-0.020	0.318	0.750
TRC*EDS -> Organisational Performance	0.215***	3.565	0.000
TRC*IEM -> Organisational Performance	-0.145**	2.380	0.017
Traceability -> Organisational Performance	0.377***	7.737	0.000

***: significant at 1%; **: significant at 5%

7. Discussion

In earlier section, the overall outcomes of the study were presented; however, this section is about the discussion on the major findings of the study. The core objective of the study has been to determine the impact of some of the common GSCM practices on organisation performance. Apart from that, the researcher also aims to assess the moderating effect of traceability on the association between GSCM practices and organisational performance. The results confirmatory factor analysis has been significant, which confirms the reliability and convergent validity of all the constructs. Hence, no construct has been dropped from the analysis of path assessment. On the other hand, with respect to the results of path assessment, findings of this study confirm the significant impact of cooperation with customers on organisational performance. This is also found to be validated from the study of Jabbour & de Sousa Jabbour (2016), according to which cooperation with customers catalyses organisation response towards environment management, which also plays a huge role in improving overall organisational performance. Similarly, the findings of this study also revealed the significant impact of eco-design, internal environment management, and traceability on organisation performance. This is also validated with previous researches, in which the same patterns of association between the variables have been found (Khan & Qianli, 2017; Zaid et al., 2018; Cousins et al., 2019).

With respect to the results pertaining to moderating impact, the findings of this study revealed the significant moderating effect of traceability on the association among eco-design and organisational performance and also on the association between internal environment management and organisational performance. In contrast, with regards to associations between cooperation with customers and organisation performance, the moderating impact of traceability is found to be insignificant.

8. Conclusion

The in-depth analysis of results and overall discussion presented in this study signifies the importance of GSCM practices for enhancing the performance of manufacturing companies operating in Jordan. The main research goal was to inquire about the influence of GSCM on organisation performance in the context of Jordanian manufacturing companies. In this regard, the researcher has identified three major determinants of GSCM, the impact of which have been investigated on organisation performance. These three factors include eco-design, cooperation with customers, and internal environment management. On the other hand, the researcher also aimed to determine the moderating impact of traceability on the association between GSCM on organisation performance. In order to accomplish the main objectives of this study, the researcher has followed the primary quantitative method and employed SEM technique to analyse collected data. The results of the study revealed the significant impact of cooperation with customers, eco-design, internal environment management, and traceability on organisation performance. Lastly, outcomes of the study also revealed the significant moderating impact of traceability on the association between eco-design and organisation performance, and on the relationship among internal environment management and organisation performance.

9. Recommendations

Following recommendations are proposed to the manufacturing companies of Jordan on the basis of the overall findings of this study:

- Establishing eco-design should be the top priority of organisations to achieve goals related to GSCM. In this manner, it has been recommended to the companies to bring efficiency in the transportation system, as long-distance transportation of goods makes the major contribution in increasing gas emission. For that purpose, organisations can use alternative fuels and develops localised manufacturing and supplier associations.
- Companies are also advised to improve their reverse logistic system by addressing the way they handle products after achieving the main purpose. Therefore, companies need to improve the system of reusing and recycling in order to enhance GSCM.

It has also been recommended to the companies to must optimise their product design by taking all the important aspects into consideration like its

probable impact on the product life cycle, resources, and environment without affecting efficiency, quality and functionality of the product.

10. Limitations and Future Research

One of the major limitations of this study has been associated with the selected methodology, as this study was completely based on quantitative analysis, which means that in-depth investigation of human perception, motivations, behaviour, and opinions about the research topic has been missing from this study. Therefore, the absence of qualitative data in this study has been one of the key limitations, as the incorporation of qualitative method could have provided more strong and conclusive findings. In this regard, future researchers are advised to carry out the same study by incorporating mixed research design, in which researcher can gather the information through a survey questionnaire, and also through conducting interviews from the most relevant sources. Apart from that, the narrow scope of this research has been another important limitation, as this study was entirely based on the manufacturing companies of Jordan, thus the overall outcomes of this research cannot be applied to another other region or sector. Hence, in future, the same study can be carried with a broader research scope by increasing the scope of the study to more industries and regions.

11. References

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