The influence of greening the suppliers on environmental and economic performance

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Abstract: The purpose of this study is to investigate the influence of greening the supplier, green purchasing capabilities and green innovation on firm's environmental performance, competitive advantage and economic performance. Data was collected from the respondents who are engaged in procurement related activities in different manufacturing industries whereas the researchers used partial least squares-structural equation modelling (PLS-SEM) for analysing the hypothesised relationships between the variables. Results has shown that greening the suppliers has positive impact on green innovation and green purchasing capabilities whereas green innovation and green purchasing capabilities have a positive impact on environmental, competitive advantage and financial performance accordingly. Since there are limited number of studies on greening the supplier in Pakistan therefore the findings will equally be helpful for future researchers and managers. In addition of providing the valuable information to sourcing professionals regarding their directions towards green supply chain, the present study recommended manufacturers to provide complete assistance to the suppliers in their green initiatives whereas their early collaboration in product development stages is highly recommended.

Keywords: greening the supplier; green purchasing capabilities; environmental performance; economic performance; competitive advantage; green innovation; Pakistan.

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1   Introduction

Environmental pollution is a rising problem worldwide, therefore organisations have started concentrating on improving their supply chain processes (Seuring, 2001; Khan et al., 2019a; Kumar et al., 2019). Moreover, different organisations are emphasising and attempting the implementation of green supply chain management (GSCM) (Ashton et al., 2017; Kirchoff et al., 2016). GSCM can be specified as integrating environmental and ecological orientation into supply chain management (SCM). With an addition of term 'green' into SCM, green thinking is integrated into all supply chain processes by introducing green supply chain practices such as green material management, green purchasing, green marketing, green distribution, green manufacturing, and green reverse logistics, whereas GSCM utilises best practices to limit waste and maximise the productivity with the least possible expense to the environment (Kumar et al., 2012; Ahmed et al., 2020; Singh et al., 2020).

According to Rao and Holt (2005), GSCM can improve the competitiveness and economic performance of the company. In the past, people thought about procurement as a business purpose with only financial considerations however in recent years, procurement professionals have been working to combine purchasing with environmental science and management (Ahmed et al., 2019a). Since competitive advantage of an

organisation can be increased by the incorporation and application of GSCM over its opponent (Sen, 2009; El-Kassar and Singh, 2019), therefore organisations can sustain the competitive advantage by taking the initiative to firstly implement the environmental sustainability and applied green purchasing practices (Barratt and Oke, 2007; Yu and Huo, 2019). One of the most important factor of competitiveness is innovation (Quinn, 2000). Similarly, green innovation is benefited for an organisation for not just reducing the adverse effects caused to the environment but by also maintaining the distinction from the competitors (Aboelmaged and Hashem, 2019). Organisations developing new green products and procedures appreciate more benefits than the organisations that simply change existing items and procedures (Kurapatskie and Darnall, 2013). Green innovation is accomplished by the lessening of waste and utilisation of non-hazardous and non-toxic materials (Aboelmaged and Hashem, 2019; Eltayeb et al., 2011).

On the other hand, the procurement role opens up an essential opportunity to integrate environmental point of view into all department of the company and helps reduce the environmental influence caused by commercial activities (Tiwari et al., 2019). According to Green et al. (1998) procurement in this manner is more powerful function than any other organisation functions, whereby purchasing capabilities can be a basis of competitive advantage (Barney, 2012). Green purchasing or environmentally preferable purchasing refers to the sourcing of products and services that mitigates the potential threat to the environment and human heath than the alternatives available in the market, which need to be implemented to all stages of SCM. Although some of the leading organisations have already implemented the environmental oriented practices especially in sourcing and purchasing in the pursuit of fulfilling their corporate social responsibility (CSR), however for mostly organisations it is still perceive as a novel idea and hence required proper planning and execution (Ahmed et al., 2020). Moreover, green purchasing can empower an association to balance financial related and environmental risks instead of assuming switch from its supplier, whereas supplier relationship play an essential role in the long-term performance of the focal company (Carter and Bélanger, 2005; Yu and Huo, 2019).

Incorporating green orientation into SCM becomes a strategic concern for companies for the satisfaction of all related SC stakeholders (Singh et al., 2020). Moreover, in addition of implementing GSCM practices in the pursuit of sustaining competitive advantage, there is an increase in environmental regulations for which organisations should also need to comply at all levels including international, national and regional (El-Kassar and Singh, 2019; Green et al., 2012). Therefore organisations need to provide assistance to suppliers in developing and improving their capabilities and performance, which results in an increased organisation productivity and quality improvement with maximum cost reduction (Wouters et al., 2007; Talluri et al., 2010; Ocampo et al., 2018; Najmi and Khan, 2017). Similarly suppliers are also found to frequently involve in green product innovation in order to provide new information and advanced material (Geffen and Rothenberg, 2000; Yu and Huo, 2019). Since suppliers play a very important role in the value chain of production as they indirectly determine the quality of the final product, therefore manufacturers should coordinate with the suppliers in developing their necessary skills through supplier development initiatives and programs (Yu and Huo, 2019). Nevertheless industries do not train and reward suppliers for adopting green

concepts (Massoud et al., 2010), therefore implementation of GSCM practices encounters several obstacles (Ahmed et al., 2018).

In developing countries like Pakistan, the concept of GSCM is relatively new and its implementation is contradictory in the organisations (Massoud et al., 2010). On the one hand, social pressure is forcing industry to implement these practices (Ahmed et al., 2019b; Waris and Ahmed, 2020), as pollution in Pakistan has become a growing concern (Khan et al., 2019b; Najmi et al., 2019). On the other hand, organisations perceive implementing GSCM a cost bearing investment with least financial benefits (Ahmed et al., 2018). Moreover, there is a general fear of how these factors affect economic performance (Mumtaz et al., 2018). In Pakistan, the lack of research on GSCM and its impact on organisational performance could be the reason why only a small proportion of companies implement these practices (Mumtaz et al., 2018; Ahmed et al., 2020).

This research will support the manufacturing organisations in Pakistan in implementing GSCM. Also, this study's goal is to provide guidance and reference for future researches to conduct their studies. Many studies have analysed the adoption of GSCM however there are limited studies concerning the greening the supplier for implementing GSCM in Pakistan. Therefore, the aim of the present study is to explore the importance of greening the supplier in organisations in the developing countries in general and Pakistan in particular. Moreover, the findings of the present study will motivate organisations regarding GSCM practices and in shifting their traditional supply chains culture to green supply chains. Hence the present study addresses the following research questions.

RQ   To what extent greening the supplier improves organisational environmental and economic performance?

The remainder of the study is arranges as: the next section is the literature review which is composed of theoretical and empirical studies. Section 3 discusses the methodology followed by the analysis and estimations based on the partial least squares-structural equation modelling (PLS-SEM) (discussed in detail in Section 4) followed by the discussion and conclusion. Section 4 cover the analysis and Section 5 cover the conclusion.

2   Literature review

2.1   Theoretical background

In the present study, the resource-based view (RBV) has been employed as the theoretical foundations, which itself is a well-known theoretical view in terms of organisation performance in general and competitive advantage in particular (Barney, 1991). Moreover RBV is continuously justifying its popularity and presence by explaining the potential relationship between competitive advantage and organisational resources (Ahmed et al., 2019b). According to RBV, a firm can improve its performance and maintain the competitive advantage by efficiently utilising its available resources, capacities and capabilities (Corbett and Claridge, 2002). According to Barney (1991), an organisation's survival relies upon its capacity to make new assets, expand on its abilities stage, and transforming the existing capacities to a superior level in the pursuit of competitive advantage. Since organisation's capabilities and resources can eventually

improve the organisational performance (Ahmed et al., 2019c), therefore a firm need to continuously bring in the innovation by which the organisation not just protect the existing capabilities but can counter the competitors by the application of value-creating tactics and strategies (Wernerfelt, 1984; Peteraf, 1993; Barney, 1991; El-Kassar and Singh, 2019).

Moreover, RBV approach to competitive advantage resists that internal resources are more significant for an organisation than external factors in accomplishing and supporting competitive advantage. According to Barney (1991) firm resources have to be infrequent, appreciated, problematic to imitate, and difficult to alternate in directive to contribute to workable competitive advantage. Therefore, Hart (1995) termed environmental management as an important organisational strategy which can develop as a unique competence of the firm in the pursuit of organisational performance excellence.

2.2   Hypothesis development

Environmental concerns have bring attention of the manufacturers to take initiatives for the prevention of the using toxic materials and increasing the usage of environment friendly products, in order to comply to increasing environmental regulations and meeting the customer satisfaction level by addressing their concerns and demands for eco-friendly products and processes (Walton et al., 1998; Najmi et al., 2019; Singh et al., 2020). Therefore organisations are transforming towards green procurement that incorporates social, economic and most importantly environmental concerns and aspects (Bag, 2016). The other potential benefits from green procurement includes prevention of toxic materials, reduction in operational cost, mitigation of waste and enhanced customer satisfaction, whereas for green procurement greening of suppliers itself is crucial (Bai et al., 2010). Moreover, for green procument, a manufacturer need to collaborate with the suppliers for their green development which eventually strengthen the green purchasing capabilities of the manufacturers (Dou et al., 2014; Yu and Huo, 2019) and long-term relationships with suppliers (Chan and Kingsman, 2007; Rajagopal and Bernard, 1993). In addition to this, for greening of the suppliers, a long-term commitment is required from both suppliers and manufacturers as there is an investment of both financial and non-financial resources from both the parties (Yu and Huo, 2019; Lettice et al., 2010). Moreover, as large-scale manufactures have set certain environment parameters that a supplier need to comply with Rao (2002), therefore proper assistance, guidance and knowledge sharing is required from the manufacturers to the suppliers for their greening. Nevertheless, when a supplier is green, it will lead to an improvement in not just purchasing capabilities, but the collaboration and integration also complement the green innovation (Singh et al., 2020; Yu and Huo, 2019). Hence it has been proposed that:

H1   Greening the supplier has a significant impact on green purchasing capabilities.

H2   Greening the supplier has a significant impact on green innovation.

Precisely green innovation can be explained as the innovation and evolution that eventually reduces the adverse effects to the environment (Cai and Zhou, 2014). By the help of green innovation in both product and process, organisational responsiveness is improved towards environmental deterioration and compliance towards regulations, whereby efficiency of resources utilisation is improved which is necessary to optimise the

environmental benefits of the product lifecycle (Chiou et al., 2011; El-Kassar and Singh, 2019). By the help of green innovation, environmental degradation can be improved by the help of efficient energy consumption, recycling of waste, elimination of toxicity from the processes, and accordingly it prevents the pollution (Chen, 2008; Aboelmaged and Hashem, 2019; Chen et al., 2006). Moreover, proactive investments towards green innovation can improve organisational productivity (Chiou et al., 2011) whereas such proactive measures helps organisations in countering environmental risks by developing environmental capabilities (Aboelmaged and Hashem, 2019). Nevertheless by the help of green innovation, firms can proactively save potential costs which improves economic performance (Long et al., 2017; El-Kassar and Singh, 2019), whereby environmental performance is also improved (Seman et al., 2019). Thus following hypotheses are developed:

H3   Green innovation has a significant impact on environmental performance.

H4   Green innovation has a significant impact on economic performance.

Green purchasing processes are a major enabler of GSCM which also helps organisations in minimisation of the possible environmental impact due to consumption of their services and products (Yook et al., 2018; Yu and Huo, 2019). When a firm opt for green purchasing, they will purchase the products from the suppliers having GSCM practices (Yook et al., 2018), hence selection of supplier helps in reduction of adverse effects towards environment (Tseng and Chiu, 2013). Since, continuous innovation is necessary for the sustaining the competitiveness (Eisenhardt and Martin, 2000) especially when the product life cycle is short, therefore organisations need to update themselves as per the constant changes in the technology, which further complement the innovation in general and green innovation in particular, in the pursuit of competitive advantage (Chen et al., 2006; El-Kassar and Singh, 2019). Hence following hypotheses are proposed:

H5   Green innovation has a significant impact on competitive advantage.

H6   Green purchasing capabilities has a significant impact on competitive advantage.

Although companies perceive the phenomena of green purchasing as comparatively new, however there are organisations who are unknowingly fulfilling the environmental regulations while playing their part towards society thus fulfilling their CSR (Andersén et al., 2020). Firms not complying to environment regulations and ignoring it while purchasing will not only lose their market reputation (Hoejmose and Adrien-Kirby, 2012; Harland et al., 2005), but also eventually lose their competitiveness (Carter and Bélanger, 2005; Rao and Holt, 2005). Thus sustainable supply management has been developed as an important organisational capability for improving economic and environmental performance (Paulraj, 2011; Reuter et al., 2010). Moreover, by the help of sustainable sourcing programs, a firm can improve the suppliers' compliance towards environmental and social responsibility (Dabhilkar et al., 2016). Hence, green purchasing is a strategic purchasing which are more likely to improve buyer-supplier relationships, supplier evaluation systems and firms' financial performance (Yu and Huo, 2019; Andersén et al., 2020). Therefore it has been proposed that:

H7   Green purchasing capabilities has a significant impact on environmental performance.

H8   Green purchasing capabilities has a significant impact on economic performance.

Pollution and depletion of resources are putting pressure on manufacturers in developing countries to improve their environmental performance (Seman et al., 2019; Zhu et al., 2012). Moreover by successful implementation of GSCM, a company can improve its environmental performance (Seman et al., 2019), which add value to key business programs (Hansmann and Claudia, 2001), promote efficiency and improve competitiveness (Rao and Holt 2005). Similarly, lean production practices have also led to improved competitiveness (Sanchez and Perez, 2001). Improving environmental performance can also improve the image of companies, creating new business opportunities and strengthening the company's competitiveness (Chen, 2008; Seman et al., 2019). The following hypothesis is therefore proposed:

H9   Environmental performance has a significant impact on competitive advantage.

H10   Competitive advantage has a significant impact on economic performance.

Figure 1   Conceptual framework
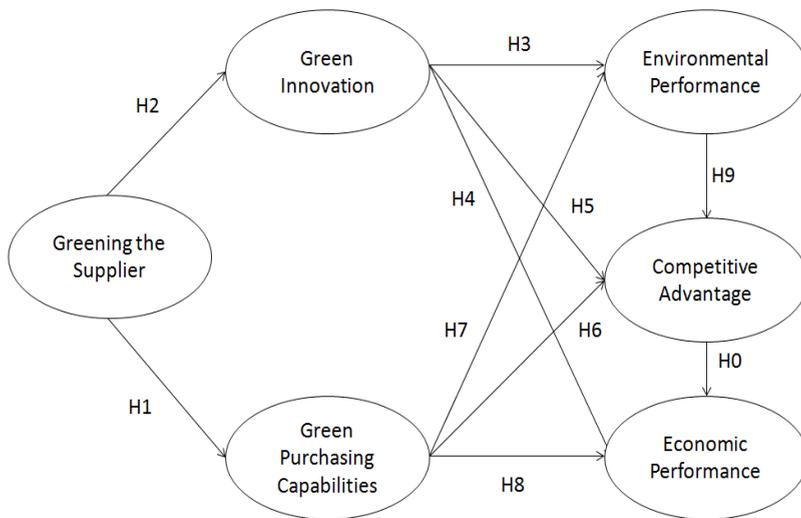
3   Research methodology

The present study employs quantitative approach which is normally used for explanatory research. Moreover, the research follows the guidelines of the co-relational design which is common in the research studying relationships among various variables or constructs. Moreover, in this design, the future prediction in dependent variables by the help of independent variables can be estimated through involvement of inferential statistics. Furthermore by employing survey methodology, the data is collected through self-administered questionnaire which is developed on the basis of adapted scales measured on five-point likert scale ranging from 1 for strongly disagree to 5 for strongly agree. The sources of the measuring items are summarised in Table 1.

Table 1   Sources of the adapted measuring items

Measures		Sources
Greening the supplier	• Selecting suppliers or subcontractors based on environmental criteria.	Rao (2002) and Rao and Holt (2005)
	• Requiring suppliers or subcontractors to obtain a third-party certification of environmental management system (EMS) such as ISO14000.	
	• Providing environmental awareness seminars and training sessions for suppliers.	
	• Providing environmental technical advice to suppliers and subcontractors to help them to meet environmental criteria.	
	• Inviting suppliers to join in the early product design and development.	
Green innovation	• Using less or non-polluting/toxic materials (i.e., using environmentally friendly material).	Chen et al. (2006) and Chen (2008)
	• Designing or improving environmentally friendly packaging (e.g., use less paper and plastic materials) for existing and new products.	
	• Use of cleaner or renewable technology to make savings (such as energy, water, waste).	
	• Redesign of production and operation processes to improve environmental efficiency.	
Green purchasing capabilities	• Knowledge and/or know-how related to the green purchasing are accumulated in a systematic way.	Yook et al. (2018)
	• In-house databases are actively used for green purchasing processes.	
	• Purchasing technologies are continuously improved by training and education.	
	• Environmental/technical advice is provided to suppliers and contractors.	
	• Financial and human resources are available for green purchasing activities.	
Environmental performance	• Improvement of environmental compliance.	Yook et al. (2018)
	• Reduction of energy and water consumption.	
	• Decrease in frequency of environmental accidents.	
	• Minimise the use of potentially hazardous substances.	
	• Reduction of carbon emissions.	
Competitive advantage	• Customer satisfaction in relation to product design and development.	Rao (2002) and Rao and Holt (2005)
	• Product design and innovation skill.	
	• Quality of product and service.	
	• Production cost.	

Table 1 Sources of the adapted measuring items (continued)

Measures		Sources
Economic performance	• Improve process efficiency and productivity.	Yook et al. (2018)
	• Increase of profit margin on sales.	
	• Reduction of operations and environmental cost.	
	• Improve the overall product quality.	
	• Decrease cost for materials purchasing.	

Table 2 Demographic profiles of the respondents

Demographic items	Frequency	Percentile
Designation		
Officers	26	13%
Executive	74	36%
Asst. managers	56	27%
Managers	51	25%
Firm size		
200–300	18	9%
301–400	47	23%
401–500	122	59%
500 above	20	10%
Working experience		
1–5 years	58	28%
6–10 years	87	42%
11–15 years	39	19%
15 above	23	11%
Industry		
Food processing	15	7%
Auto industry	29	14%
Pharmaceutical	22	11%
Oil and gas industry	37	18%
Textile industry	83	40%
Others	21	10%

Source: Author estimations

This study possesses the purposive sampling technique. Different manufacturing organisations have been selected from different areas of Karachi, Pakistan which is an economic hub of the country. Questionnaire offered only those respondents who are in the procurement department and who are involved in the decision making of purchasing in the organisation. The data comprised of 207 participants having demographic profiles summarised in Table 2.

4   Data analysis

For examining the hypothesised relationships, the present study employs PLS-SEM. PLS-SEM is preferred over conventional SEM because of generating more robust results especially in the situations where data is not normal and model is complex (Hair et al., 2016). Moreover, the PLS-SEM was employed through SmartPLS 3.2.7 (Ringle et al., 2015). In accordance with the recommendations by Hair et al. (2016), the application of PLS-SEM is done through two stage approach which involves evaluating the measurement (outer) model and structural (inner) model as applied in other similar recent studies (see Huma et al., 2019; Irfan et al., 2019; Ahmed et al., 2019d).

Table 3   Factor loading significance

Constructs	Items	Loadings	T-values	P-values
CA	CA1	0.778	15.572	0.000
	CA3	0.747	13.848	0.000
	CA4	0.768	22.186	0.000
EC	EC1	0.698	12.696	0.000
	EC2	0.708	11.735	0.000
	EC3	0.806	18.778	0.000
	EC5	0.75	16.516	0.000
EP	EP1	0.809	21.704	0.000
	EP3	0.63	8.603	0.000
	EP5	0.857	34.577	0.000
GI	GI1	0.853	34.724	0.000
	GI2	0.84	30.133	0.000
	GI4	0.675	11.115	0.000
GS	GS1	0.843	32.119	0.000
	GS2	0.683	12.194	0.000
	GS5	0.786	20.411	0.000
PS	PS3	0.79	22.888	0.000
	PS4	0.811	29.399	0.000
	PS5	0.833	27.833	0.000

Source: Author estimations

4.1   The measurement (outer) model

In the present study, the outer model is assessed through evaluation of content validity, convergent validity and discriminant validity which is further discussed as follows.

4.1.1   The content validity

Content validity is evaluated by assessing the values of the factor loadings whereby a measuring items should be loading to their respective factor highly and significantly while comparing with the other constructs (Chin, 1998; Hair et al., 2016). Moreover,

loadings which were found to be less than 0.7 and are loaded on the other constructs are eliminated from the model accordingly. The assessment of content validity through factors loadings are summarised in Tables 3 and 4, whereby most of the factor loadings meet the aforementioned criteria.

Table 4 Convergent validity

Constructs	Items	Loadings	CR	AVE
CA	CA1	0.778	0.836	0.560
	CA3	0.747		
	CA4	0.768		
EC	EC1	0.698	0.799	0.571
	EC2	0.708		
	EC3	0.806		
	EC5	0.750		
EP	EP1	0.809	0.813	0.596
	EP3	0.630		
	EP5	0.857		
GI	GI1	0.853	0.834	0.629
	GI2	0.840		
	GI4	0.675		
GS	GS1	0.843	0.816	0.599
	GS2	0.683		
	GS5	0.786		
PS	PS3	0.790	0.852	0.658
	PS4	0.811		
	PS5	0.833		

Source: Authors estimations

4.1.2 Convergent validity

The convergent validity is said to be established when the measuring items of all the constructs converge together to form a construct (Mehmood and Najmi, 2017). In the present study, it was examined by the help of three criteria that includes higher factor loadings, composite reliability and average variance extracted (AVE), whereby factor loadings and composite reliability should be greater than 0.7 (Najmi and Ahmed, 2018) and AVE should exceeds the value of 0.5 (Fornell and Larcker, 1981). Table 4 summarised the results of the evaluation of the convergent validity.

4.1.3 Discriminant validity

Discriminant validity can be explained as the measure by which all the items of a construct or factor are differentiated by other constructs or factors within the model (Mehmood and Najmi, 2017). The discriminant validity was measured by three methods. Firstly, by looking at the values of the cross loadings, according to which an item should

be loaded higher on its respective construct and the difference between its loadings from the loadings in other constructs should be more than 0.1 (Gefen and Straub, 2005). Table 5 summarised the results of the cross loadings. Secondly by Fornell-Larcker (1981) method whereby the square root of the AVE should exceeds the values of the inter construct correlations. As shown in Table 6, the diagonal line represents the square root of the AVE which are greater than the other in the rows and columns that represents the inter construct correlations.

Table 5   Cross loadings

Constructs	CA	EC	EP	GI	GS	PS
CA2	*0.778*	0.510	0.553	0.474	0.443	0.519
CA3	*0.747*	0.424	0.358	0.453	0.379	0.430
CA4	*0.768*	0.446	0.421	0.470	0.341	0.434
CA5	*0.698*	0.328	0.436	0.477	0.329	0.366
EC1	0.443	*0.708*	0.318	0.43	0.362	0.431
EC2	0.395	*0.806*	0.408	0.546	0.615	0.534
EC3	0.474	*0.750*	0.444	0.511	0.470	0.522
EP1	0.452	0.470	*0.809*	0.406	0.450	0.395
EP2	0.421	0.276	*0.630*	0.290	0.366	0.405
EP3	0.502	0.445	*0.857*	0.451	0.463	0.505
GI2	0.498	0.590	0.443	*0.853*	0.563	0.615
GI3	0.443	0.584	0.411	*0.840*	0.561	0.626
GI4	0.570	0.370	0.333	*0.675*	0.325	0.389
GS3	0.471	0.583	0.535	0.57	*0.843*	0.509
GS4	0.352	0.380	0.340	0.423	*0.683*	0.494
GS5	0.332	0.522	0.400	0.436	*0.786*	0.507
PS3	0.434	0.526	0.362	0.513	0.488	*0.790*
PS4	0.494	0.537	0.57	0.565	0.587	*0.811*
PS5	0.503	0.541	0.431	0.613	0.497	*0.833*

Source: Authors estimations

Table 6   Fornell-Larcker criterion

Constructs	CA	EC	EP	GI	GS	PS
CA	*0.748*					
EC	0.577	*0.756*				
EP	0.597	0.520	*0.772*			
GI	0.625	0.659	0.502	*0.793*		
GS	0.502	0.645	0.556	0.621	*0.774*	
PS	0.590	0.659	0.568	0.696	0.650	*0.811*

Source: Authors estimations

The third method which was used for examining discriminant validity is heterotrait-monotrait ratio of correlations. It is the most renowned approach to evaluate the discriminant validity. According to Henseler et al. (2015) value of HTMT correlation should be less than 1 (shown in Table 7).

Table 7 Heterotrait-monotrait ratio (HTMT)

Constructs	CA	EC	EP	GI	GS	PS
CA						
EC	0.842					
EP	0.855	0.808				
GI	0.886	0.979	0.738			
GS	0.709	0.990	0.843	0.893		
PS	0.786	0.965	0.806	0.951	0.927	

Source: Authors estimations

4.2 Structural model (inner model)

4.2.1 Predictive relevance of the model

The predictive power of the model shown the predictive accuracy and relevancy of the model which is used as the quality criteria for evaluating structural model. In the present study, it was examined by the help of R-square and Q-square (it is used as a measure for cross-validated redundancy). According to Cohen (1988), R-square values exceeding 0.26 are considered as substantial which in present study are found to be greater than 0.26. Secondly for Q-square (Stone, 1974) which should be greater than 0, blindfolding analysis was performed in the SmartPLS. The outcome provide enough support for the predictive accuracy of the model studied. Table 8 summarised the outcome values of R-square and Q-square.

4.2.2 Hypotheses testing

As mentioned earlier, PLS-SEM is used to examine the proposed hypotheses. With the help of bootstrapping with the re-sampling procedure of 5,000 samples (Hair et al., 2016), the proposed hypotheses are tested. The findings reported that there is a significant relationship between greening the supplier and green purchasing capabilities ($P < 0.001$) thus the result is significant and proves that the hypothesis is supported. Secondly greening the supplier has significant relationship with green innovation ($P < 0.001$) which is less than the bench mark of 0.05 thus this finding is also significant. More importantly, the path association between green innovation and environmental performance is also significant as their P-value is 0.047 so H3 is supported. The relationship between green innovation and financial performance is also significant ($P < 0.05$) so we accepted the hypothesis. To study the Hypothesis 5: greening innovation has a significant impact on competitive advantage ($P < 0.000$) which is less than the bench mark of 0.05 thus this finding is also significant. There is significant relationship between green purchasing and environmental performance. Also green purchasing capabilities has a significant impact on economic performance ($P < 0.000$) so the H7 hypothesis is supported. There is significant relationship between green purchasing capabilities and competitive advantage and the associations between environmental performance and competitive advantage also significant and proves that the hypothesis has been supported ($P < 0.000$) thus the result is accepted. Finally, the associations between competitive advantage and economic performance are also significant. The findings are summarised in Table 9.

Table 8   Predictive relevance of the model

Constructs	R-square	Q-square
CA	0.509	0.255
EC	0.532	0.275
EP	0.345	0.187
GI	0.386	0.222
PS	0.422	0.257

Source: Authors estimations

Table 9   Hypotheses testing

Hypotheses	Regression path	Estimates	Standard deviation	T-statistics	P-values	Status
H1	GS -> PS	0.650	0.049	13.317	0.000	Supported
H2	GS -> GI	0.621	0.071	8.807	0.000	Supported
H3	GI -> EP	0.207	0.104	1.985	0.047	Supported
H4	GI -> EC	0.310	0.107	2.906	0.004	Supported
H5	GI -> CA	0.347	0.088	3.958	0.000	Supported
H6	PS -> CA	0.160	0.077	2.071	0.038	Supported
H7	PS -> EP	0.424	0.084	5.038	0.000	Supported
H8	PS -> EC	0.333	0.086	3.856	0.000	Supported
H9	EP -> CA	0.332	0.069	4.782	0.000	Supported
H10	CA -> EC	0.187	0.082	2.285	0.022	Supported

Source: Author estimations
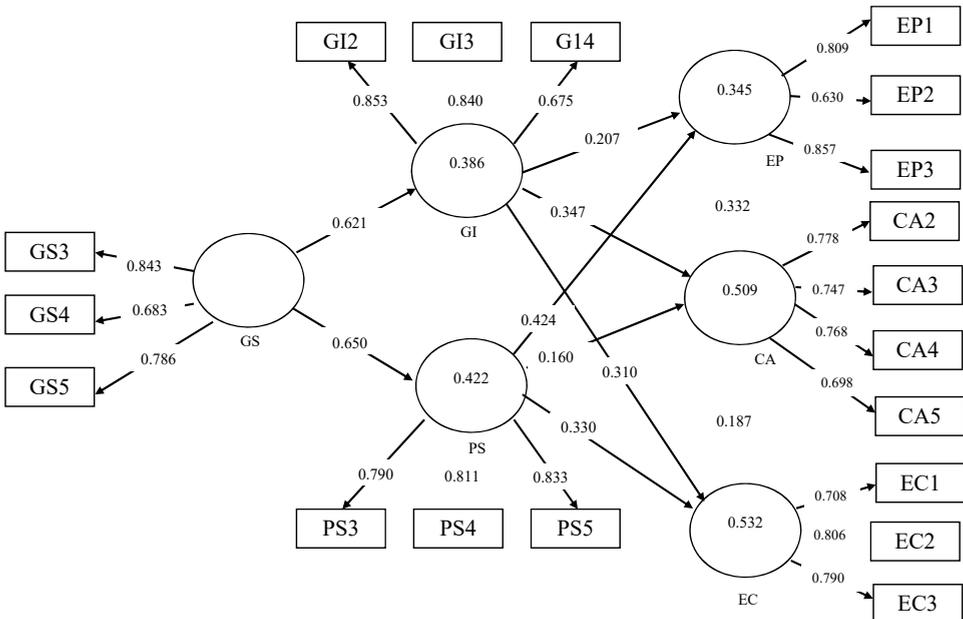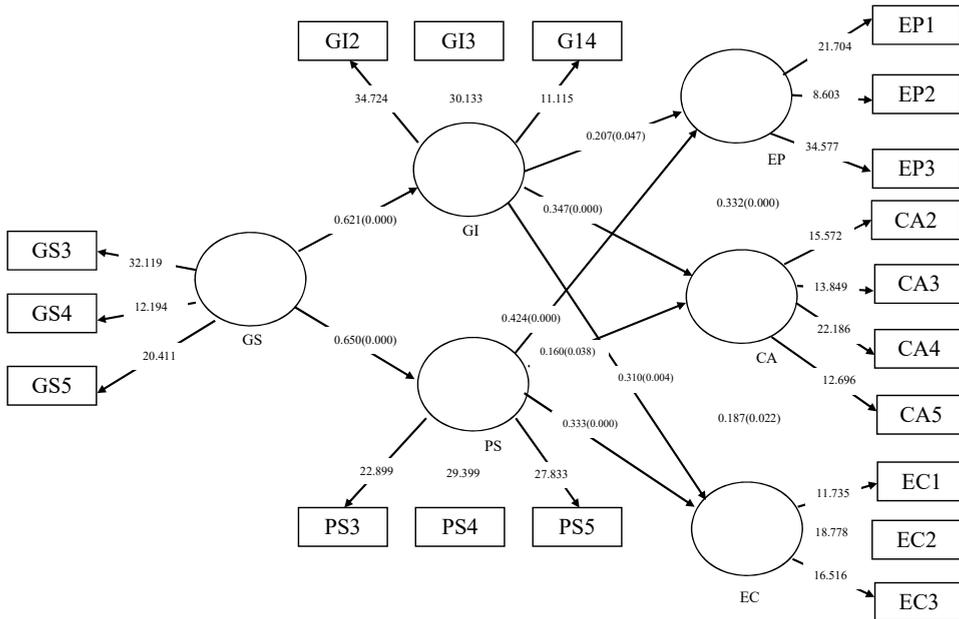
Figure 2   Algorithm

Figure 3 Bootstrapping

5 Conclusions and recommendations

5.1 Conclusions

In developing countries like Pakistan the aim of most manufacturers is to improve their financial situation and avoid financial risks, but due to the current environmental conditions on the planet, environmental stability has become a very important aspect to consider (Ahmed et al., 2018). Moreover, there is a lack of collaboration between the organisation and suppliers. Organisational relationships with suppliers are the very core of SCM. In developing countries, the majority of suppliers are smaller in scale, hence they generally require assistance or aid for development.

Greening the supplier plays important role to achieve financial and environmental benefits (Yu and Huo, 2019). Greening the supplier is a new concept in developing countries like Pakistan. Nevertheless, in the industrial institutions the fear of financial uncertainty is the main reason to be worried about implementing these methods. Organisations can neither be green nor are socially responsible if they will not take action to develop their suppliers. According to Krause (1999), supplier development programs can eventually enhanced to more cooperative, long-term, and strategic relationships.

The model has shown that green innovation and green purchasing capabilities have a positive impact on environmental and financial performance as found in the similar studies (for instance Singh et al., 2020; Yook et al., 2018; Yu and Huo, 2019). As a result of this study we have a better understanding of how development helps in improving organisation's financial and environmental performance. These relationships cannot lead

to environmental reforms only, but the improvement in cost and quality in other supply chain operations.

Moreover considering innovation, it was found to be an important determinant of competitive advantage, by which firms can increase the entry barriers thus reduces the potential threat from the competitors. In addition to this, through green innovation an organisation can reduce pollution, preventing waste that are hazardous and toxic in nature, improving environmental compliance, strengthening the responsiveness to the market pressures thus enhancing the product quality and sustaining the competitive advantage.

In addition to this, investing in green procurement enables companies to increase competitive advantage. The results suggest that green innovation and green purchasing capabilities both directly impact on competitive advantage. Green purchasing capabilities effectively achieves competitive advantage whereas green product innovation is able to grasp opportunities or to lead in the market.

Conventionally it was assumed that green purchasing leads to higher procurement costs because of the premium prices of eco-friendly raw materials which jeopardises the organisations' competitiveness, however the present study counter that narrative in accordance with the previous studies which reported that potential investment in transformation towards green purchasing improves the economic performance (Beske et al., 2014). Vachon and Klassen (2008) said that supplier development guides improvement to many organisational capabilities, reduction, recycling, product and process design and waste management.

Finally, the findings of the present study suggests that in order to improve environmental performance organisational investment in resources in needed which eventually improve economic performance and competitiveness. Moreover, since competitive advantage cannot be easily copied by competitors, therefore it will provide greater returns to shareholders. Lastly this research provides comprehensive procedure and thorough idea that how the relationship amongst greening the supplier, green innovation, green purchasing capabilities, competitive advantage, environmental performance and financial performance can be measured. The manufacturers can be facilitated through this research.

5.2   *Managerial implications*

Green supply management in general and greening the supplier in particular are being ignored by the environmental researchers and practitioners. Therefore the present study have urged on the greening of the suppliers by not just forcing them to invest and take initiatives on their own, but by developing an innovation oriented long-term relationships where manufacturers and their suppliers share information in the pursuit of green innovation for optimising the existing supply chain processes with the least possible cost to the environment. This will not only help to the suppliers in their efforts towards green initiatives but such green innovation also help the managers for the sustainable competitive advantage.

Moreover, the manufacturers should provide assistance to their suppliers by providing trainings, sharing technical expertise and most importantly by involve them in the earlier stages of the product development where the most environmental oriented decisions can be planned and executed. Precisely, while designing the product and discussing the processes of that product design, collaborative decision making which will include the

feedback from both suppliers and manufacturers will accordingly compliment the organisations future environmental sustainability. Thus involving the suppliers for eradication of waste and possible toxic materials which could adversely affect the economic and environmental performance of an organisation, can be countered at the earlier stage of product designing which eventually improve the supply chain processes and hence strengthen the manufacturers' objectives towards environmental sustainability.

Nevertheless companies should not perceive the environmental initiatives as the cost and should stop thinking about the return of the investments made in GSCM processes and practices, as it will help directly in sustaining competitive advantage and then indirectly leads to greater economic and environmental benefits. Moreover, study recommends that the organisation should fund well the training programs that they administer to their suppliers which will indeed lead to better performance. Finally, the study has clearly shown that supplier development plays a crucial and vital role on the organisation performance and it leads to very good benefits thus the study recommends that the manufacturing firms should work closely with their suppliers. They must develop long-term relationships with them, so that they can end up having collaborative relationships which in turns leads to a win-win situation (Yu and Huo, 2019).

5.3   Future recommendations

This study has an important contribution to research and some key managerial implications; it has some limitations that it is from the perspective of the buying firm; whereas suppliers' environmental performance has not been considered. Secondly, the main limitation of this research is the focus on a small sample of organisations in Pakistan, but the lack of empirical research in the country is also one of the main strengths of this study. Lastly, the factors contributing in the collaborative green initiatives between buyers and suppliers need further exploration.

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