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IMPACT OF GREEN SUPPLY CHAIN INTEGRATION ON SMEs TECHNOLOGICAL AND ECONOMIC PERFORMANCE

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ABSTRACT: The application and scope of studies on green technologies have been increasing especially with issues of climate change and environmental conservation taking a front burner globally. Green studies have been extended to cover the fields of logistics and supply management. This study investigated the influence of the green supply chain on small and medium enterprises (SMEs) innovation and economic performance, comparing, Slovakia, Hungary, and Thailand. The study was necessitated by the rise in public awareness regarding environmental conservation and health products. Primary data were collected from SMEs business owners in the three selected countries using online questionnaires. The findings of the study indicated that green customer integration was found to significantly and positively influence both technological performance and economic performance of all countries. The green internal integration was found to positively and significantly influence both technological performance and economic performance in all the countries. Green supplier integration has a positive and significant influence on both technological performance and economic performance of SMEs with the exceptional case of Thailand. The study recommended that the management of SMEs should ensure that green innovation is considered in the entire lifecycle of a product as well as a complete supply chain.

KEYWORDS: *Green supply chain, small and medium enterprises, technological performance, economic performance, supply chain management*
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1. INTRODUCTION

The need to move towards sustainability in production has necessitated the reduction of demand for fossil fuels and the revision of the current consumption, waste management, and energy

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generation. Integrating the frameworks of supply chain management to economic and environmental studies to address environmental awareness issues has been on the increase. Green Supply Chain Management (GSCM) involves integrating environmental aspects in the supply chain management processes, including product designing, sourcing of materials, and the manufacturing and delivery of the final products to the consumers (Mafini & Loury-Okoumba, 2018; Sarkis, Zhu, & Lai, 2011). Under the green supply chain processes, the environmental impacts of products are evaluated throughout their life cycle from production to disposal.

The integration of green designs in supply chain processes was initially proposed in 1996 by the Manufacturers' Research Association of Michigan State University. The integration aims to optimize manufacturing resources based on their environmental impacts. The process of environmental control under the green supply chain management is carried out from the initial point of the raw materials procurement and followed up by the environmental production regulations in the designing and the development stages aimed at reducing environmental damage during production (Fahimnia, Sarkis & Davarzani, 2015; Maditati et al., 2018; Pakurár et al, 2019).

Integrating green supply chain management in the production processes comes with various benefits for the environment and the organizations. For instance, steps towards a green supply chain are vital in minimizing pollution and energy that adversely affects the environment. By reducing wastes during production, organizations can minimize the levels of pollution to the environment while improving their profit margins (Govindan et al., 2016; Lam et al., 2015). The other benefits of integrating green supply management in the organizational production processes include improvements in continuity of supply and protecting organizations against reputational damage. Green supply chain management also helps attract potential new partners for firms and win more businesses.

The integration of green supply chain management (GSCM) in organizational production leads to significant environmental and operational performance effects that consequently affect the overall business performance. Abdallah and Al-Ghwayeen (2019) infer that a green supply chain positively affects both environmental and operational performance, whose total effects result in significant positive business performance. The relationship between the green supply chain and business performance is indirect and goes through the organization's environmental performance and operational performance. For example, Khan (2018) states that the green supply chain processes, including green transportation and green distribution, have a positive and significant effect on organizational performance. Organizations aiming to improve their business performance thus integrate the green practices in their distribution and transportation operations to enhance the overall operational performance in the organization (Al-Sheyadi et al., 2019).

Green supply chain processes help in improving organizational competitive advantage and consequently positively improving the overall business performance. With the increased competition in the global market, organizations continue to look for modern strategies to improve their competitive advantage in the global markets. Environmental sustainability continues to play a significant role in promoting business performance. Organizations hoping to increase their competitive advantage thus need to improve their environmental impacts through their production processes. Organizations can achieve competitive advantage through green supply chains by reducing operational costs to address the environmental aspects in production. Reducing costs help in increasing the organizational competitive advantage and consequently helps in improving business performance. Similarly, green supply chain management impacts business performance through protection against reputational damage (Muma et al., 2014; Marhamati & Azizi, 2017; Saad, 2019; Popp et al., 2019). Ensuring sustainability through green supply chain management helps enhance the lives throughout the supply chain and helps in reducing any unnecessary reputational risks and consequently improving business performance.

The significance of integrating green supply chain processes in business continues to increase and helps organizations to become more competitive. While the use of effective and efficient supply chain management is vital for the survival of any business, small and medium-sized businesses (SMEs) often lack the resources to succeed on a global scale. However, the advancements in technology have created opportunities for SMEs to operate on the global level. Thus, for SMEs to operate effectively on a global scale, they need to be aware and be responsive to environmental issues affecting their business process.

SMEs can use technology to ensure sustainable business practices. Yardpaga (2014) is of the view that the use of information technology is vital in supporting SMEs to adopt green supply chain management practices in Thailand. However, effective adoption of the green supply chain practices in SME businesses is often hindered by the employees' lack of understanding and proper organizational design. Similarly, Mishra, Choudhury and Rao (2019) articulate that the small size of SMEs and the lack of human resources lead to difficulties in achieving performance. The inadequacy in environmental strategies, environmental awareness, and management techniques hinders SMEs' adoption of green supply chain management (GSCM) practices.

According to Malá et al. (2017), the application of green supply chain management in Hungary SMEs was determined by the reduction in costs. Many of the SMEs implementing green supply chain management in Hungary believe that enterprises require full or partial implementation of green logistics activities. However, many of the SMEs implementing green logistics lacked corporate documentation on their application.

Establishing a green supply chain in small and medium enterprises also has the impact of improving organizational performance. In Slovakia, SMEs often integrate green innovations in their supply chains to increase their competitive advantage (Denisa & Zdenka, 2015). Eco-innovation in the supply chains is vital in reducing the environment's negative impacts while positively impacting business performance.

2. LITERATURE REVIEW

Integration of supply chain management involves the seamless exchange of information and communication between the stakeholders throughout the supply chain processes in the product's lifetime. The green supply chain integration (GSCI) thus involves the strategic and integrative approaches used in the attainment of green supply chain performance (Govindan et al., 2014; Suryanto et al., 2018; Scur & Barbosa, 2017). The green supply chain integration takes various forms to achieve efficiency in organizational performance, including customer integration, internal operations integration, and supplier integration.

Supplier integration involves partnering an organization with suppliers in the sharing of information and knowledge aimed at improving business performance. Under supplier integration, the suppliers often get involved in the activities traditionally performed by retailers to enhance business competitiveness, reduce costs and improve business performance. Emmett (2010) elucidates that green supplier integration impacts business performance by affecting social capital accumulation, which in turn affects the impact on economic and environmental performance and consequently business performance. Various types of social capital affect business and environmental performance. For instance, structural capital mediates the impacts of green supplier integration on both economic and environmental performance.

Similarly, the concept of green supplier integration impacts innovation in small and medium enterprises (SMEs). Highlighting these, Setyadi (2019) observed that supplier involvement helps in the integration of product development. Integrated product development (IPD) involves business frameworks that help organizations to achieve their innovation goals. Many SMEs utilizing the green supplier integration model often receive assistance from the suppliers towards the attainment of their innovation goals. Increased SMEs innovation leads to improved business performance.

Internal integration in the supply chain management involves the coordination and integration logistics within the organization that culminates with the provision of the end products to the customers. Therefore, green internal integration involves the extent to which the organization conducts its environmental management activities within the organization. Integrating environmental management in the internal organizational processes has various impacts on business performance. Du et al.(2018) infer that internal information sharing and logistics networks lead to a significant positive impact on business performance. For instance, information sharing makes the decision-makers increasingly aware of the various available resources that could be exploited to avoid wastes and protect the environment.

Also, green internal integration positively impacts SMEs' innovation. Song (2017) clarify that green internal integration influences green product innovation in SMEs and impacts the SMEs' competitive advantage. The demand for sustainable products continues to increase among consumers. The green internal integration offers the SMEs an opportunity to constantly follow the demand trends in the market and maintain tight logistics networks among the supply chain partners.

Green customer integration supply chain management involves the extent to which the customers are integrated into the sustainable product development process throughout the supply chain processes. The green customer integration process also indicates the extent to which the organization is linked with its customers. The process of green customer integration can be divided into two categories including; green customer process integration and green customer information integration. Sustainable customer integration has significant effects on business performance and innovation. For instance, Abidin et al. (2015) infers that the impact of green customer integration on product innovations is hinged on the quality of information sharing.

The practice of green supply chain management plays a significant role in improving sustainability performance in organizations. The concept of sustainability in business continues to grow and has the effect of boosting business performance and increasing business profitability through reduced operational costs, improved innovative strategies, and improved business reputation (Dubey, Gunasekaran & Ali, 2015; Green et al., 2012). The green supply chain practices effects business in various ways, including;

Technological capabilities in organizations are among the core capabilities that help firms develop and sell quality products and services to consumers. Similarly, technology helps business organizations effectively communicate with their customers and consequently create a strong brand image. Effective technological performance in organizations is based on organizational innovations. Green supply chain affects technological innovation performance in organizations through knowledge sharing (Wu, 2013). The sharing of information is vital in organizational innovation; for instance, where the technological innovation information held by the organizational personnel is analyzed, shared, and discussed, the organization can improve on its innovative capabilities.

Similarly, green supply chain management through information sharing impacts organizational, technological performance by reducing costs. Technological innovations in the supply chain play a vital role in increasing the speeds of delivery as well as interacting with the customers to keep them informed about product delivery (Mendoza-Fong, 2018). In furtherance, Garengo (2013) articulates that the technological innovation performance in organizations is influenced by environmental management practices, green supply chain integration, and supply chain knowledge sharing. SMEs hoping to improve their technical performance need to implement their green supply chain to increase their performance as well as improve knowledge sharing.

The supply chain management practices in businesses play the vital role of reducing operational costs and ensuring quick delivery of products to the customers to avoid operational costs. The aspect of sustainability continues to influence business performances through the creation of long-term value on organizational operations. The green supply chain management practices impact the organization's economic performances by taking into consideration the ecological, social, and economic environments that the businesses operate. Rao (2005) argues that a green supply chain is essential in reducing environmental pollution and production costs which in turn help in spurring economic growth.

Green supply chain management (GSCM) positively impacts economic performance in organizations by improving the competitive advantage. Economic performance in organizations involves the firms' success through the production of benefits to the owners, efficient use of resources, and product innovation (Çankaya & Sezen, 2019; Shang et al., 2010). Small and Medium-sized Enterprises (SMEs) gain improved economic performance through the utilization of green supply chains' efficiency-based strategies. Green innovations throughout the supply chain help the organizations to reduce wastes and operational costs while maintaining the production of sustainable products helps them occupy positions that their competitors cannot successfully copy, leading to improved competitive advantage and consequently improved economic performance.

From the evaluation of the literature review presented above, a proposed conceptual framework was developed along with the study hypotheses.

H1: Green supplier integration is positively related to technological performance
H2: Green supplier integration is positively related to economic performance
H3: Green internal integration is positively related to technological performance
H4: Green internal integration is positively related to economic performance
H5: Green customer integration is positively related to technological performance
H6: Green customer integration is positively related to economic performance

3. METHODOLOGY

The data for this research was collected from Small and Medium-scale Enterprises (SMEs) operating in each of the three selected countries, Hungary, Slovakia, and Thailand. For ease of data collection and access, research representatives were selected in each of the countries to help coordinate the process of data collection. The data was collected by inviting the SMEs managers and owners to fill an online questionnaire. The questionnaire contained two major sections - the cover letter and the question section. The cover letter section explained the objectives of the study in the spirit of transparency and openness, and the question section contained the research questions to be answered by the respondents. 1000 SMEs in each sampled country were requested to participate in the study. The link to the online questionnaire was sent to the respondent SME managers to elicit their responses. After cleaning the received data, 355, 444, and 432 responses were successfully received as valid responses for Thailand, Slovakia, and Hungary respectively. This amounted to 35.5%, 44.4%, and 43.2% response rates for Thailand, Slovakia, and Hungary respectively.

All the measures used in the study were adopted from previous studies. An extensive search in literature was conducted to develop valid measures for the research constructs. The developed questionnaire was evaluated by conducting a pilot study with a few respondents who were not included in the study sample. The study used a seven-point Likert scale to capture the responses of the respondents. Before conducting the actual data analysis, the proposed study model was evaluated for fitness. The model evaluation was conducted through descriptive statistics, to evaluate the demographic characteristics of the respondents. Reliability and validity of the model were conducted using techniques such as average variance extracted, Cronbach's Alpha, Convergent Reliability, and Confirmatory Factor Analysis. The hypotheses of the study were evaluated using PLS-SEM using the Smart-PLS software.

4. RESULTS

The major objective of this section was to test the study hypotheses, which were geared towards answering the study problem. The hypotheses of the study were evaluated using the Structural Equation Model (SEM). However, before running the model, the proposed model was evaluated for its suitability and fitness. Since the study was carried for three countries, the evaluation of the model and test of hypotheses was carried out independently for each county. The results are discussed in the following section:

4.1 Result Analysis for Thailand

The study evaluated the proposed model for Thailand using several metrics. These include checking the factor loadings, validity analysis (average variance extracted (AVE)), reliability analysis (Cronbach's alpha and composite reliability), as well as discriminant validity.

Table 1. Evaluation of Proposed Model – Thailand

Latent Variables	Observed Variables	Validity Analysis		Reliability Analysis		
		Factor loadings	Average Variance Extracted (AVE)	Cronbach's Alpha	rho_A	Composite Reliability
Economic performance	EP1	0.759	0.662	0.829	0.83	0.887
	EP2	0.832				
	EP3	0.844				
	EP4	0.818				
Green customer integration	GCI1	0.84	0.635	0.808	0.809	0.874
	GCI2	0.791				
	GCI3	0.809				
	GCI4	0.745				
Green internal integration	GII1	0.81	0.664	0.831	0.832	0.888
	GII2	0.804				
	GII3	0.826				

	GII4	0.819				
Green supplier integration	GSI1	0.823	0.705	0.861	0.861	0.905
	GSI2	0.854				
	GSI3	0.847				
	GSI4	0.835				
Technological performance	TP1	0.816	0.642	0.814	0.816	0.877
	TP2	0.789				
	TP3	0.804				
	TP4	0.795				

For reliability analysis, Cronbach's Alpha and composite reliability were applied. These were used to assess the inter-item consistency of the measurement variables. According to Hair, Ringle and Sarstedt (2011), the Composite Reliability (CR) and Cronbach's Alpha values should be greater than 0.7. They indicated that the reliability is considered excellent is >0.9, adequate if >0.8, and adequate if >0.7. For these results, CR ranged between 0.874 and 0.905, while Cronbach's Alpha ranged between 0.808 and 0.861. These results indicated that all the reliability values were above the required threshold of 0.7, confirming the reliability of the constructs. Convergent Validity of the study was conducted to evaluate the degree to which two measures of the same concept are correlated. It was assessed using CR, average variance extracted (AVE), and factor loadings. Acceding to Hair et al. (2011), AVE and factor loadings should be above 0.5. From the results presented in Table 1, AVE ranged between 0.635 and 0.705, and factor loadings ranged between 0.745 and 0.854. These results meet the required thresholds, hence confirming the convergent validity. The Discriminant Validity was determined using Fornell-Larcker's criterion. According to the criterion, the square root of Average Variance Extracted (AVE) is compared against the correlations of the other constructs (Fornell & Larcker, 1981). Each latent variable should be larger than the Latent Variable Correlations (LVC). As presented by the results in Table 2, the criterion was met confirming the Discriminant Validity of the study variables.

Table 2. Discriminant Validity - Thailand

	AVE	Economic performance	Green customer integration	Green internal integration	Green supplier integration	Technical performance
Economic performance	0.662	0.81				
Green customer integration	0.635	0.71	0.797			
Green internal integration	0.664	0.66	0.762	0.815		
Green supplier integration	0.705	0.63	0.67	0.778	0.84	
Technological performance	0.642	0.69	0.76	0.67	0.567	0.801

To evaluate the hypotheses, the PLS-SEM analysis was conducted, to investigate the relationship between the variables of the study. The results are presented in Table 3.

Table 3. Evaluation of Hypothesis for Thailand

	Paths	β	Sample Mean	Std. Dev	T-stat	P Values
H1	Green supplier integration -> Technological performance	-0.001	0.001	0.057	0.021	0.983
H2	Green supplier integration -> Economic performance	0.2	0.202	0.071	2.803	0.005
H3	Green internal integration -> Technological performance	0.22	0.22	0.067	3.248	0.001
H4	Green internal integration -> Economic performance	0.16	0.159	0.064	2.456	0.014
H5	Green customer integration -> Technological performance	0.59	0.593	0.052	11.51	0.000
H6	Green customer integration -> Economic performance	0.45	0.448	0.065	6.915	0.000

The results indicate that the path coefficients between green supplier integration and technological performance (H1) are insignificant (β = -0.001, p = 0.983), hence rejecting hypothesis 1. The path coefficients between green supplier integration and economic performance (H2) are significant and positive (β = 0.20, p = 0.005), supporting the second hypothesis. The path coefficients between green internal integration and Technological performance (H3), was positive and significant (β = 0.22, p = 0.001), as well as that between green internal integration and economic performance (H4) (β = 0.16, p = 0.014) which supported the two hypotheses. The research also revealed that the path coefficients between green customer integration and technological performance (H5) were positive and significant (β = 0.59, p = 0.000), as well as that between green customer integration and economic performance (H6) (β = 0.45, p = 0.000) which supported hypotheses five and six.

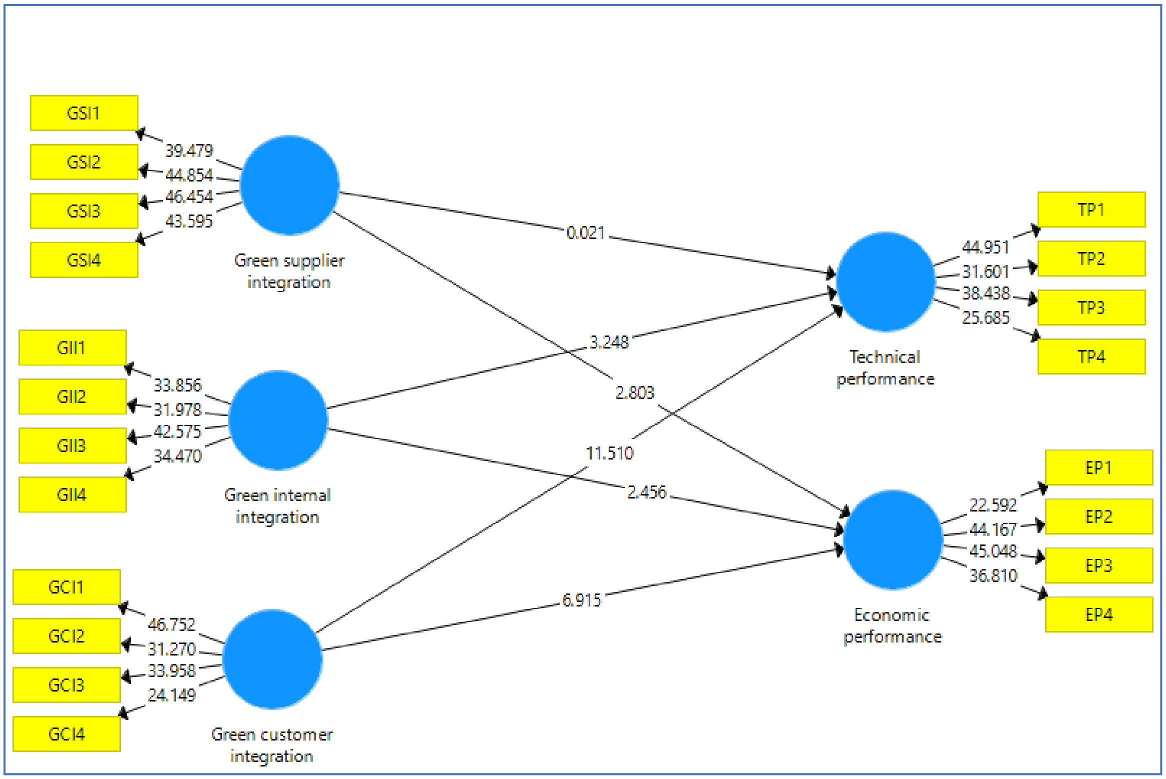

Figure 2: Evaluation of Hypothesis in Thailand

4.2 Result Analysis for Slovakia

The proposed model for Slovakia was evaluated using several metrics. These include checking the factor loadings, validity analysis (average variance extracted (AVE)), reliability analysis (Cronbach's alpha and composite reliability), as well as discriminant validity.

Table 4. Evaluation of Proposed Model - Slovakia

Latent Variables	Observed Variables	Validity Analysis		Reliability Analysis		
		Factor Loadings	Average Variance Extracted (AVE)	Cronbach's Alpha	rho_A	Composite Reliability
Economic performance	EP1	0.819	0.666	0.833	0.834	0.888
	EP2	0.82				
	EP3	0.808				
	EP4	0.816				
Green customer integration	GCI1	0.799	0.677	0.841	0.845	0.893
	GCI2	0.862				
	GCI3	0.824				
	GCI4	0.804				
	GII1	0.759	0.624	0.8	0.802	0.869

Green internal integration	GII2	0.818					
	GII3	0.801					
	GII4	0.781					
Green supplier integration	GSI1	0.81	0.617		0.792	0.792	0.865
	GSI2	0.803					
	GSI3	0.812					
	GSI4	0.713					
Technological performance	TP1	0.807	0.651		0.821	0.822	0.882
	TP2	0.788					
	TP3	0.829					
	TP4	0.803					

For reliability analysis, Cronbach's Alpha and Composite Reliability were applied to assess the inter-item consistency of the measurement variables. According to Hair et al. (2011), the composite reliability (CR) and Cronbach's Alpha values should be greater than 0.7. They indicated that the reliability is considered excellent is >0.9, adequate if >0.8, and adequate if >0.7. For these results, CR ranged between 0.865 and 0.893, while Cronbach's alpha ranged between 0.792 and 0.841. These results indicated that all the reliability values were above the required threshold of 0.7, confirming the reliability of the constructs.

Convergent validity of the study was conducted to evaluate the degree to which two measures of the same concept are correlated. It was assessed using CR, average variance extracted (AVE), and factor loadings. Hair et al. (2011) inform that AVE and factor loadings should be above 0.5. From the results presented in Table 4, AVE ranged between 0.617 and 0.677, and factor loadings ranged between 0.712 and 0.862. These results meet the required thresholds hence confirming the convergent validity.

The Discriminant Validity was evaluated using Fornell-Larcker's criterion. According to the criterion, the square root of Average Variance Extracted (AVE) is compared against the correlations of the other constructs (Fornell & Larcker, 1981). Each latent variable should be larger than the Latent Variable Correlations (LVC). As presented by the results in Table 5, the criterion has been met confirming the discriminant validity of the study variables.

Table 5. Discriminant Validity - Slovakia

	AVE	Economic performance	Green customer integration	Green internal integration	Green supplier integration	Technical performance
Economic performance	0.666	0.816				
Green customer integration	0.677	0.608	0.823			
Green internal integration	0.624	0.632	0.55	0.79		
Green supplier integration	0.617	0.756	0.679	0.627	0.786	
Technical performance	0.617	0.691	0.764	0.626	0.76	0.807

To evaluate the hypotheses, the PLS-SEM analysis was conducted, to investigate the relationship between the variables of the study. The results are presented in Table 6.

Table 6. Evaluation of Hypothesis for Slovakia

		β	Sample Mean	Std. Dev	T-stat	P Values
H1	Green supplier integration -> Technological performance	0.373	0.371	0.042	8.882	0.000
H2	Green supplier integration -> Economic performance	0.527	0.526	0.051	10.397	0.000
H3	Green internal integration -> Technological performance	0.16	0.161	0.035	4.547	0.000
H4	Green internal integration -> Economic performance	0.235	0.234	0.048	4.867	0.000
H5	Green customer integration -> Technological performance	0.423	0.423	0.038	11.055	0.000
H6	Green customer integration -> Economic performance	0.121	0.122	0.049	2.436	0.015

The results show that all the path coefficients for Slovakia were significant. The path coefficients between green supplier integration and technological performance (H1) were positive and significant (β = 0.373, p = 0.000), hence rejecting hypothesis 1. The path coefficients between green supplier integration and economic performance (H2) are significant and positive (β = 0.527, p = 0.000), supporting the second hypothesis. The path coefficients between green internal integration and Technological performance (H3), was positive and significant (β = 0.16, p = 0.000), as well as that between green internal integration and economic performance (H4) (β = 0.235, p = 0.000) which supported the two hypotheses. The research also revealed that the path coefficients between green customer integration and technological performance (H5) were positive and significant (β = 0.423, p = 0.000), as well as that between green customer integration and economic performance (H6) (β = 0.121, p = 0.015) which supported hypothesis five and six. Figure 3 presents the evaluation of the hypotheses for Slovakia.

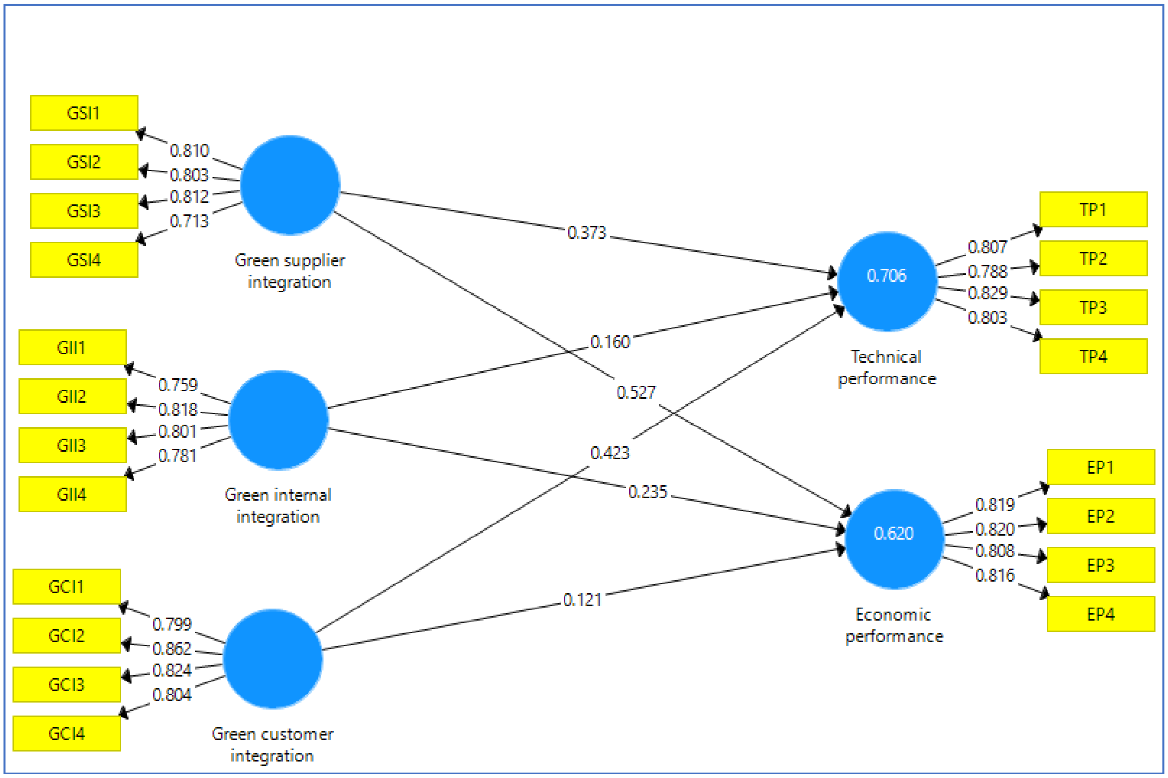

Figure 3: Evaluation of Hypothesis for Slovakia

4.2 Result Analysis for Hungary

The study evaluated the proposed model for Hungary using several metrics. These include checking the factor loadings, validity analysis (AVE), reliability analysis (Cronbach's Alpha and CR), and Discriminant Validity.

Table 7. Evaluation of Proposed Model - Hungary

Latent Variables	Observed Variables	Reliability Analysis		Validity Analysis		
		Factor Loadings	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Economic performance	EP1	0.834	0.862	0.866	0.906	0.707
	EP2	0.858				
	EP3	0.814				
	EP4	0.855				
Green customer integration	GCI1	0.846	0.839	0.845	0.893	0.676
	GCI2	0.827				
	GCI3	0.856				
	GCI4	0.755				
	GII1	0.741	0.783	0.788	0.86	0.606

Green internal integration	GII2	0.796				
	GII3	0.833				
	GII4	0.74				
Green supplier integration	GSI1	0.846	0.88	0.88	0.917	0.735
	GSI2	0.856				
	GSI3	0.868				
	GSI4	0.858				
Technological performance	TP1	0.83	0.835	0.836	0.89	0.671
	TP2	0.832				
	TP3	0.874				
	TP4	0.735				

For reliability analysis, Cronbach's alpha and composite reliability were applied. These were used to assess the inter-item consistency of the measurement variables. Hair et al. (2011) elaborates the composite reliability (CR) and Cronbach's alpha values should be greater than 0.7. They indicated that the reliability is considered excellent is >0.9, adequate if >0.8, and adequate if >0.7. For these results, CR ranged between 0.86 and 0.917, while Cronbach's alpha ranged between 0.783 and 0.88. These results indicated that all the reliability values were above the required threshold of 0.7, confirming the reliability of the constructs.

Convergent validity of the study was conducted to evaluate the degree to which two measures of the same concept are correlated. It was assessed using CR, average variance extracted (AVE), and factor loadings. Acceding to Hair et al. (2011), AVE and factor loadings should be above 0.5. From the results presented in Table 7, AVE ranged between 0.635 and 0.735 and factor loadings ranged between 0.741 and 0.874. These results meet the required thresholds, hence confirming the convergent validity.

The discriminant validity was carried out using Fornell-Larcker's criterion (Fornell & Larcker, 1981). Each latent variable should be larger than the Latent Variable Correlations (LVC). As presented by the results in Table 8, the criterion has been met confirming the discriminant validity of the study variables.

Table 8. Discriminant Validity

	AVE	Economic performance	Green customer integration	Green internal integration	Green supplier integration	Technical performance
Economic performance	0.707	0.841				
Green customer integration	0.676	0.671	0.822			
Green internal integration	0.606	0.64	0.758	0.779		
Green supplier integration	0.735	0.798	0.63	0.623	0.857	
Technical performance	0.671	0.779	0.782	0.711	0.68	0.819

To evaluate the hypotheses, the PLS-SEM analysis was conducted, to investigate the relationship between the variables of the study. The results are presented in Table 9.

Table 9. Evaluation of Hypothesis for Hungary

	Paths	β	Sample Mean	Std. Dev	T-stat	P Values
H1	Green supplier integration -> Technological performance	0.267	0.267	0.047	5.654	0.000
H2	Green supplier integration -> Economic performance	0.597	0.599	0.038	15.733	0.000
H3	Green internal integration -> Technological performance	0.188	0.194	0.046	4.099	0.000
H4	Green internal integration -> Economic performance	0.104	0.107	0.048	2.177	0.03
H5	Green customer integration -> Technological performance	0.472	0.466	0.046	10.155	0.000
H6	Green customer integration -> Economic performance	0.216	0.212	0.048	4.497	0.000

The results shows that all the path coefficients for Hungary were significant (see Figure 4). The path coefficients between green supplier integration and technological performance (H1) was positive and significant ($\beta = 0.267$ $p = 0.000$), hence rejecting hypothesis 1. The path coefficients between green supplier integration and economic performance (H2) is significant and positive ($\beta = 0.597$, $p = 0.000$), supporting the second hypothesis. The path coefficients between green internal integration and Technological performance (H3), was positive and significant ($\beta = 0.188$, $p = 0.03$), as well as that between green internal integration and economic performance (H4) ($\beta = 0.104$, $p = 0.000$) which supported the two hypotheses. The research also revealed that the path coefficients between green customer integration and technological performance (H5), was positive and significant ($\beta = 0.472$, $p = 0.000$), as well as that between green customer integration and economic performance (H6) ($\beta = 0.216$, $p = 0.000$) which supported hypothesis five and six.

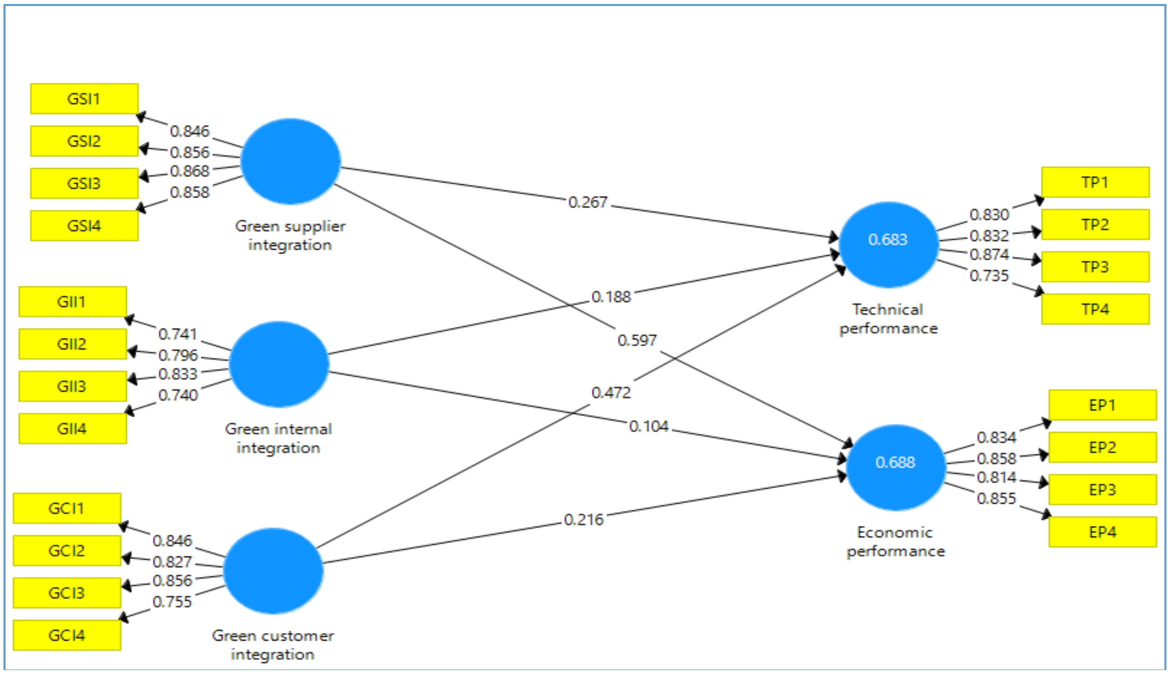

Figure 4: Evaluation of Hypothesis for Hungary

5. DISCUSSIONS

This research was conducted with the objective of comparing the results for three countries, Thailand, Slovakia, and Hungary. It is therefore important to summarize the findings in a Table 10 that compares these three countries.

Table 10. Summary of Hypothesis

	Paths	Thailand		Slovakia		Hungary	
		β	Accept?	β	Accept?	β	Accept?
H1	Green supplier integration -> Technological performance	-0.001	No	0.373***	Yes	0.267***	Yes
H2	Green supplier integration -> Economic performance	0.2***	Yes	0.527***	Yes	0.597***	Yes
H3	Green internal integration -> Technological performance	0.22***	Yes	0.16***	Yes	0.188***	Yes
H4	Green internal integration -> Economic performance	0.16**	Yes	0.235***	Yes	0.104**	Yes
H5	Green customer integration -> Technological performance	0.59***	Yes	0.423***	Yes	0.472***	Yes
H6	Green customer integration -> Economic performance	0.45***	No	0.121**	Yes	0.216	Yes

The findings of this study indicate that green supplier integration has a positive and significant influence on both the technological performance and economic performance of SMEs. These results are only exceptional for the case of Thailand, where green supplier integration did not significantly influence technological performance. These findings are similar to the studies conducted by De Giovanni (2012) which adopted a collaborative approach suggesting a positive relationship between external collaboration and internal performance. In this case, green supplier integration is considered a buy-in technology from the external environment.

The green internal integration was found to positively and significantly influence both technological performance and economic performance in all the countries. These results echo the views of Cohen and Levinthal (1990) who argued that firms and particular SMEs should integrate internally as a means of augmenting intra-organizational practices. The success of a firm is attached to the absorptive capacity, which is its ability to explore, assimilate, as well as apply valuable knowledge.

Green customer integration was found to significantly and positively influence both technological performance and economic performance of all countries. Customer integration is an external integration, which, according to Verghese and Lewis (2007), is critical in serving a firm with information and facilitating knowledge sharing, joint development, and collaboration among the concerned members. These findings are similar to those of Carvalho and Barbieri (2012) emphasized the need of having external customer supply chain integration, as it plays a central role in fostering innovation and growth.

The results about the economic performance of SMEs and the green supply chain integration produced some interesting insights, all the aspects of green supply chain integration (supplier, customer, and internal) positively and significantly influence the economic performance of SMEs. An improvement in the three dimensions leads to a better SMEs' economic performance. These findings are in line with the previous literature Zhu and Sarkis (2007), Green et al. (2012), and Schmidt et al. (2017), who indicated that integrating green suppliers in the supply chain is economical and less costly. Their research indicates that these integrations are critical in helping to share risks and costs. It is important to consider that upstream parties are less powerful compared to the downstream parties. Hence there is a possibility that the upstream parties bear a greater share of the cost. Therefore, adopting and implementing the green integration with suppliers brings about better economic performance of the firms.

6. CONCLUSION

This study makes important theoretical contributions towards the green supply chain management existing knowledge in several ways. First, this study made comprehensive research regarding the aspects of technological performance and economic performance of SMEs, and how they are influenced by different metrics of supply chain integration. Despite the fact this area has not extensively been researched, the study compared the findings of three developing countries – Slovakia, Thailand, and Hungary. Secondly, this research proved that SMEs could improve their performance technologically and economically by facilitating internal and external integration.

This study also has important implications regarding the green supply chain management practices by the small and medium enterprises (SMEs) as well as the government policies. The first practical implication is that green supply chain integration by SMEs could bear positive results, regardless of the region in which the business is operating. There are high chances for SMEs to benefit both technologically and economically, by going green through integration externally (both customers and suppliers) and internal integration (internal green integration). From the practical perspective, SMEs management should ensure that green innovation is considered in the entire lifecycle of a product. At the early stages of its design, green aspects such as environmental goals and environmental audits should be considered. As well, internal integration should also be considered through the removal of functional barriers and enhancement of organizational knowledge sharing. The internal and external integration could enhance technological performance by ensuring compliance with the set environmental and green standards set towards maintaining the spirit of the green revolution. The study proves to both the SMEs, government, and other stakeholders that they should consider adopting both internal and external green supply chains because it is effective.

Due to the growing environmental awareness of the public, there has been a growing need for businesses to consider integrating green practices in their operations. One of the most comprehensive ways of achieving this is through adopting green supply chain management practices. For SMEs, this is critical to consider as they grow towards achieving their growth. With respect to this, this study investigated the influence of the green supply chain on SMEs' innovation and economic performance by comparing the results obtained in Hungary, Slovakia, and Thailand. Several conclusions are evident from the study. First, green supply chain integration could have positive results in terms of the technological and economic performance of SMEs. Second, the green innovation should be implemented on the complete supply chain including the green supplier integration, green customer integration as well as internal integration. Additionally, all stakeholders including SMEs, government, and non-governmental organizations should consider investing in an integrated green supply chain, for the better performance of their business in the going concern. Despite the important findings, this study suffered some limitations. The study relied on the data collected on SMEs, which scale of operation could be considered limited. Therefore, future research could consider collecting data from the complete business perspective. The data was only collected from respondents, which could result in the problem of common method bias. It is recommended that future studies could collect their data from multiple sources

REFERENCES

Abdallah, A. B., & Al-Ghwayeen, W. S. 2019. Green supply chain management and business performance: The mediating roles of environmental and operational performances. *Business Process Management Journal*, 26(2): 489-512. https://doi.org/10.1108/BPMJ-03-2018-0091

Abidin, R., Abdullah, R., Hassan, M. G., & Che Sobry, S. 2015. Environmental sustainability performance: the influence of supplier and customer integration. *The Social Sciences*, 11(11): 2673 – 2678. 10.36478/sscience.2016.2673.2678

Al-Sheyadi A., Muyldermans, L., & Kauppi, K. 2019. The complementarity of green supply chain management practices and the impact on environmental performance. *Journal of Environmental Management*, 242: 186-198. doi: 10.1016/j.jenvman.2019.04.078.

Çankaya, S. Y., & Sezen, B. 2019. Effects of green supply chain management practices on sustainability performance. *Journal of Manufacturing Technology Management*, 30(1): 98-121. https://doi.org/10.1108/JMTM-03-2018-0099

Carvalho, A.P.D., & Barbieri, J.C. 2012. Innovation and sustainability in the supply chain of a cosmetics company: a case study. *Journal of Technology Management & Innovation*, 7(2): 144-155.

Cohen, W.M., & Levinthal, D.A. 1990. Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1): 128-152.

De Giovanni, P. 2012. Do internal and external environmental management contribute to the triple bottom line? *International Journal of Operations & Production Management*, 32(3): 265-290.

Denisa, M., & Zdenka, M. 2015. Perception of implementation processes of green logistics in SMEs in Slovakia. *Procedia Economics and Finance*, 26: 139–143.

Du, L., Zhang, Z., & Feng, T. 2018. Linking green customer and supplier integration with green innovation performance: The role of internal integration. *Business Strategy and the Environment*, 27(8): 1583-1595.

Dubey, R., Gunasekaran, A., & Ali, S. S. 2015. Exploring the relationship between leadership, operational practices, institutional pressures and environmental performance: A framework for green supply chain. *International Journal of Production Economics*, 160: 120-132. https://doi.org/10.1016/j.ijpe.2014.10.001

Emmett, S., & Sood, V. 2010. Green supply chains: An action manifesto, John Wiley & Sons, Hoboken, New Jersey.

Fahimnia, B., Sarkis, J., & Davarzani, H. 2015. Green supply chain management: A review and bibliometric analysis. *International Journal of Production Economics*, 162: 101-114. https://doi.org/10.1016/j.ijpe.2015.01.003

Fornell, C. & Larcker, D. F. 1981. Evaluating structural equation models with unobservable variables and measurement Error. *Journal of Marketing Research*, 18(1): 39–50.

Garengo, P., & Panizzolo, R. 2013. Supplier involvement in integrated product development: evidence from a group of Italian SMEs. *Production Planning & Control,* 24(2-3): 158-171.

Govindan, K., Muduli, K., Devika, K., & Barve, A. 2016. Investigation of the influential strength of factors on adoption of green supply chain management practices: An Indian mining scenario. *Resources, Conservation and Recycling*, 107: 185-194. https://doi.org/10.1016/j.resconrec.2015.05.022

Govindan, K., Kaliyan, M., Kannan, D., & Haq, A. N. 2014. Barriers analysis for green supply chain management implementation in Indian industries using analytic hierarchy process. *International Journal of Production Economics*, 147: 555-568. https://doi.org/10.1016/j.ijpe.2013.08.018

Green, K.W. Jr, Zelbst, P.J., Meacham, J., & Bhadauria, V.S. 2012. Green supply chain management practices: impact on performance. *Supply Chain Management – An International Journal*, 17(3): 290-305.

Hair, J.F., Ringle, C.M., & Sarstedt, M. 2011. PLS-SEM: Indeed a silver bullet. *The Journal of Marketing Theory and Practice*, 19(2): 139–152.

Khan, S. A. R., Zhang, Y., Golpîra, H., & Dong, Q. 2018. The impact of green supply chain practices in business performance: Evidence from Pakistani FMCG firms. *Journal of Advanced Manufacturing Systems*, 17(02): 267-275.

Lam, H. L., How, B.S. & Hong, B.H. 2015. Green supply chain toward sustainable industry development. In *Assessing and measuring environmental impact and sustainability*, Jiří J Klemeš (ed.): pp. 409-449.

Maditati, D. R., Munim, Z.H., Schramm, H., Kummer S. 2018. A review of green supply chain management: From bibliometric analysis to a conceptual framework and future research directions. *Resources, Conservation and Recycling*, 139: 150-162.

Mafini, C., & Loury-Okoumba, W. V. 2018. Extending green supply chain management activities to manufacturing small and medium enterprises in a developing economy. *South African Journal of Economic and Management Sciences*, 21(1): 12. https://doi.org/10.4102/sajems.v21i1.1996

Marhamati, A., & Azizi, I. 2017. The Impact of Green Supply Chain Management on Firm Competitiveness. *International Journal of Supply Chain Management*, 6(4): 215-223.

Malá, D. S., Sedliačiková, M., Kaščáková, A., Benčiková, D., Vavrová, K., and Bikár, M. 2017. Green logistics in Slovak small and medium wood-processing enterprises. *BioResources*, 12(3): 5155-5173.

Mendoza-Fong, J. R., García-Alcaraz, J.L., Jiménez Macías, E., Ibarra Hernández, N.L., Díaz-Reza, J.R., & Blanco Fernández, J. 2018. Role of information and communication technology in green supply chain implementation and companies' performance. *Sustainability*, 10(6): 1793. https://doi.org/10.3390/su10061793

Mishra, M. K., Choudhury, D., & Rao, K.S.V.G. 2019. Impact of SMEs green supply chain practice adoption on SMEs firm and environmental performance. *Theoretical Economics Letters*, 9(6): 1901-1919.

Muma, B. O., Nyaoga, R. B., Matwere, R. B., & Nyambega, E. 2014. Green supply chain management and environmental performance among tea processing firms in Kericho County-Kenya. *International Journal of Economics, Finance and Management Sciences*, 2(5): 270-276. https://doi.org/10.11648/j.ijefm.20140205.11

Pakurár, M., Haddad, H., Popp, J., Khan, T., & Oláh, J. 2019. Supply chain integration, organizational performance and balanced scorecard: An empirical study of the banking sector in Jordan. *Journal of International Studies*, 12(2): 129–146. https://doi.org/10.14254/2071-8330.2019/12-2/8

Popp, J., Oláh, J., Kiss, A., Temesi, Á., Fogarassy, C., & Lakner, Z. 2019. The socio-economic force field of the creation of short food supply chains in Europe. *Journal of Food and Nutrition Research*, 58(1): 31–41.

Rao, P., & Holt, D. 2005. Do green supply chains lead to competitiveness and economic performance? International *Journal of Operations & Production Management*, 25(9): 898-916. https://doi.org/10.1108/01443570510613956

Schmidt, C.G., Foerstl, K., & Schaltenbrand, B. 2017. The supply chain position paradox: green practices and firm performance. *Journal of Supply Chain Management*, 53(1): 3-25.

Saad, M., & Siddiqui, D. A. 2019. The Impact of Green Supply Chain Management on Firm Performance: A Case of Manufacturing Industry of Karachi. *Social Science and Humanities Journal*, 10(5): 993-1005.

Sarkis, J. Z., Zhu, Q., & Lai, K. 2011. An organizational theoretic review of green supply chain management literature. *International journal of production economics, 130(1): 1-15.*

Scur, G., & Barbosa, M. E. 2017. Green supply chain management practices: Multiple case studies in the Brazilian home appliance industry. *Journal of Cleaner Production*, 141: 1293-1302. https://doi.org/10.1016/j.jclepro.2016.09.158

Setyadi, A. 2019. Does green supply chain integration contribute towards sustainable performance? Uncertain *Supply Chain Management*, 7(2): 121-132.

Shang, K.C., Lu, C.S., Li ,S. 2010. A taxonomy of green supply chain management capability among electronics-related manufacturing firms in Taiwan. *Journal of Environmental Manage*ement, 91(5): 1218-1226. doi: 10.1016/j.jenvman.2010.01.016.

Song, Y., Cai, J., & Feng, T. 2017. The influence of green supply chain integration on firm performance: A contingency and configuration perspective. *Sustainability*, 9(5): 763.

Suryanto, T. H., Haseeb, M., & Hartani, N.H. 2018. The correlates of developing green supply chain management practices: Firms level analysis in Malaysia. *International Journal of Supply Chain Management*, 7(5): 316.

Verghese, K., & Lewis, H. 2007. Environmental innovation in industrial packaging: A supply chain approach. *International Journal of Production Research*, 45(18): 4381-4401.

Wu, G. C. 2013. The influence of green supply chain integration and environmental uncertainty on green innovation in Taiwan's IT industry. Supply Chain Management, 18(5): 539-552. https://doi.org/10.1108/SCM-06-2012-0201

Yardpaga, T. 2014. Supply Chain Management Practices in Thai SMEs: Antecedents and Outcomes. Faculty of Business, Plymouth University, 01 Research Theses Main Collection. Retrieved from http://hdl.handle.net/10026.1/3110

Zhu, Q., & Sarkis, J. 2007. The moderating effects of institutional pressures on emergent green supply chain practices and performance. *International Journal of Production Research*, 45(18): 4333-4355.