Journal of Infrastructure, Policy and Development (2023) Volume 7 Issue 2.
DOI: 10.24294/jipd.v7i2.2222

ORIGINAL ARTICLE

Factors influencing the implementation of green supply chain management: The case of Pakistan SMEs

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ABSTRACT

The implementation of green supply chain management (GSCM) in developing countries is represented by less advanced economic growth than in industrialized countries. It is reasonable to presume that different nations may have different constructs influencing GSCM adoption. Even though, there is a gap in the literature regarding the execution of GSCM in developing nations like Pakistan. This demonstrates the necessity and importance of undertaking empirical research on the variables influencing GSCM adoption from the perspective of Pakistan small and medium enterprises (SMEs). To close the gap in GSCM research, this study tries to pinpoint the variables influencing GSCM adoption among Pakistan SMEs. SPSS software version 23 is used to apply statistical techniques to the primarily obtained data. The survey form was administrated to 600 target respondents from all administrative levels. There were 210 complete and usable survey forms, showing a response rate of around 35%. First, the reliability of all questions is checked; second, we use multiple regression analysis to identify which factors are affecting the implementation of green supply chain management in Pakistani SMEs. The findings suggest that environmental factors and organizational factors have a great influence on managers' intention to adopt GSCM. Meanwhile, technological factors have no significant impact on managers' intentions to adopt GSCM.

KEYWORDS

green supply chain management; environmental factor; technological factor; organizational factor; managers intentions; Pakistan SMEs

ARTICLE INFO
Received: 8 June 2023
Accepted: 25 July 2023
Available online: 23 August 2023

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CITATION
Naqvi F, Isac N, Badshah W (2023). Factors influencing the implementation of green supply chain management: The case of Pakistan SMEs. *Journal of Infrastructure, Policy and Development* 7(2): 2222. doi: 10.24294/jipd.v7i2.2222

1. Introduction

Business organizations all over the world depend heavily on their supply chains. Every stage in the supply chain has the potential to result in wastage, erosion, and other ecological issues. Small and medium enterprises (SMEs) are responsible for a significant portion of environmental pollution globally and these pollution issues have local, national and international repercussions.

Environmental pollution is currently the biggest issue, and one type of pollution that requires immediate care is air pollution. Therefore, it is important for SMEs to implement green supply chains more efficiently in order to overcome environmental barriers in increasingly competitive markets and to improve financial performance. Numerous studies were done in the past to look at the pressures, methods, and implementation capacity of GSCM (Bai et al., 2012; Balasubramanian et al., 2020; Ferreira et al., 2016; Mathiyazhagan et al., 2018; Sarkis et al., 2011). Even though both developed and developing nations have studied GSCM, there is a gap in the literature regarding the execution of GSCM in developing nations like Pakistan (Choudhary and Sangwan, 2019; Mitra and Datta, 2014; Shibin et al., 2016). The primary cause of pollution in Pakistan is the discharge of toxins into the air from industrial operations (European Environment Agency, 2014). Pakistan also has sizable businesses that produce pollutants and may result in severe toxic waste if their discharges are not effectively monitored. This causes the ambient pollution levels to rise, which in turn degrades the quality of the air in many regions and negatively affects community wellbeing (European Environment Agency, 2014). To the finest of the authors' awareness, this research is a pioneering investigation of its sort of the variables influencing a corporation's choice to devise GSCM methods in the settings of Pakistani SMEs. To offer manufacturers implications on the actions that need to be made to promote the implementation of GSCM systems amongst Pakistani enterprises to a larger extent, the research will compare the findings with those reached by earlier studies. Therefore, this study will cover the knowledge vacuum and aid in the definition of the variables that affect managers' intentions to use GSCM in their organizations, especially in the Pakistani context. Although various research examined the adoption of GSCM in industrialized nations, these studies might not be applicable to developing nations like Pakistan due to social and financial differences. Welsh et al. (2006) claim that the implementation of GSCM in developing countries is represented by less advanced economic growth than in industrialized countries. This demonstrates the necessity and importance of undertaking empirical research on the variables influencing GSCM adoption from the perspective of Pakistani SMEs. In order to close the gap in GSCM research, this study tries to pinpoint the variables influencing GSCM adoption among Pakistani SMEs. Therefore, the main question this study addresses is: what are the factors that are influencing managers' decisions of implementing GSCM practices in Pakistani SMEs? Based on these considerations, we selected environmental, technological, and organizational factors, as they reflect the key external and internal factors that influence the adoption and implementation of GSCM practices. Furthermore, this study provides several noteworthy contributions to the field. Primarily, by developing a comprehensive framework that enables the analysis of the various factors that influence supply chain managers' intentions to adopt GSCM practices, this study fills a gap in the existing literature. To the authors' knowledge, the interactions between technological factors, organizational factors, environmental factors, and GSCM from the Pakistani perspective are examined for the first time in this study in Section 2. SPSS software version 23 is used (Section 3). First, the reliability of all questions is checked; second, we use multiple regression analysis to identify which factors are affecting the implementation of green supply chain management in Pakistani SMEs. The analysis is presented in Section 4 and the research hypothesis are clarified in Section 5. Finally, in Section 6, this study offers managerial and decision-making guidance on how to concentrate on the key concerns that will help small and medium enterprises in Pakistan to apply GSCM methods.

2. Review of literature

2.1. Green supply chain management

Environmental concerns is growing all over the world and people pay more attention to the coordinated and sustainable development of the economy and the environment (Dong et al., 2023). Requirements to provide eco-friendly products create a management strategy known as GSCM, has emerged in response to these pressures (Govindan et al., 2016; Zhu, Sarkis, et al., 2008). In addition to having a significant impact on internal supplier-customer relationships, the introduction of environmentally friendly technologies has caused companies in various areas across the globe to become increasingly concerned about environmental degradation, such as reducing energy costs (Ikram, Zhang, et al., 2021; Lin et al., 2020). As a long-term environmental commitment, most businesses have integrated green supply chain practices into their daily processes.

The amount of research on green supply chain management is growing as organizations and academics realize that managing environmental programs and operations does not stop at the corporate boundary (Zhu, Sarkis, and Geng, 2005). Green purchasing, integrated supply chains that reverse logistics, often known as "closing the loop" in supply chain management literature, and flow from supplier to manufacturer to the consumer have all been incorporated into the idea of GSCM.

2.2. Factors affecting intention to adopt GSCM in developing countries

Traditionally emerging markets have focused more on economic expansion than green growth. These markets spend less time and money on environmental issues, even though they face a more severe environmental crisis than developed countries. Many countries have introduced environmental regulations to reduce air and water pollution and waste disposal. Nevertheless, wealthier countries have more successful policies (Maignan and Ferrell, 2001; Kimber and Lipton, 2005). Lack of funding and understanding are other issues that hinder the adoption of environmentally sound practices (Dögl and Behnam, 2015).

In developing countries, GSCM is an emerging research field. In recent years, research has looked at this topic from different angles. Our research focuses on the factors that motivate companies to adopt GSCM practices and government regulations have a significant part in promoting the ecological behavior of these drivers (Zailani et al., 2012; Zhu, Geng, et al., 2011). Due to stringent environmental regulations in developing countries such as China, the manufacturing company is now implementing its GSCM project. One explanation might be the fact that GSCM practices in developing countries are more focused on reducing environmental degradation than on aggressively reducing waste and sources of pollution (Maignan and Ferrell, 2001; Zhu, Sarkis, and Lai, 2007).

Many companies in emerging markets act as suppliers to companies in wealthy countries. Emerging markets must therefore not only meet the requirements of their own stakeholders, but also those of customer countries with different regulatory frameworks and commercial ambitions. Additionally, consumers in developing countries have recently become more prescriptive and pay more attention to environmentally friendly items (Harris, 2006). While the importance of external factors for emerging markets has been emphasized above, research on internal factors is relatively understudied. This research examines the impact of both internal and external variables on Pakistan's plans to apply the GSCM method (Dögl and Behnam, 2015; Harris, 2006; Kimber and

Lipton, 2005). Among all these factors, we choose only a few factors that are critically important for the application of GSCM in Pakistani SMEs and we developed a hypothesis according to that.

2.2.1. Environmental factor (EF)

Supply chain management (SCM) has long been studied by researchers, but it wasn't until the early 2000s that the focus switched to GSCM. Environmental factors are considered when it comes to product design, material procurement, manufacturing processes, distribution of finished products to customers, and waste management. The supply chain's entire administration incorporates green activities (Srivastava, 2007; Vanalle et al., 2017). Researchers identified and ranked several parameters that influence green supply chain management adoption. The state was considered the most important category, followed by the market, suppliers, customers, internal factors, and finally environment (Asif et al., 2020; Diabat and Govindan, 2011; Wang, Mathiyazhagan, et al., 2015). According to Asif et al. (2020), government legislation, customer needs, and supplier performance are the three main reasons for adopting GSCM. The implementation of GSCM demands that the detrimental environmental effects of corporate activities be reduced or eliminated. Therefore, GSCM is praised a useful tool for enhancing the organizational environmental footprint as well as lowering ecological threats (Mangla et al., 2014). Adopting eco-friendly procedures in SCM also helps to improve the ecological competency of corporate organizations and their collaborators. The adoption of GSCM by managers at various companies is influenced by ecological competencies. Incorporating GSCM would also enable the managers of the manufacturing company to adhere to the general public norms for environmentally friendly preservation throughout the manufactured goods' lifetime (Hassan et al., 2016; Jum'a, Zimon, and Ikram, 2021; K. J. Wu et al., 2011). Environmental considerations are crucial to the creation, utilization, and growth of businesses that are dedicated to sustainability. Businesses are extra conscious of using eco-friendly procedures and practices to lessen their impact on the environment and boost sustainable output. Adopting GSCM principles reduces the negative effects on the environment, boosts output, and aids in striking a balance between economic and environmental sustainability (Laari et al., 2017).

The development of products and procedures is the first step toward environmental excellence (Kalyar et al., 2020; Tian et al., 2014). To guarantee that GSCM is adopted, the CEO and management must be dedicated to an environmentally sustainable plan. This includes metrics that support business efficiency and intent to implement green supply chain management to improve environmental performance (Khan, Chen, et al., 2019; Khan, Yu, et al., 2021; Martínez et al., 2022; Wang, Khan, et al., 2021). Environmental certifications like ISO 14001, EMAS, and ECO-Label are crucial because they represent the initial phase in a sustainable endeavor (Diabat and Govindan, 2011; Jum'a, Zimon, and Ikram, 2021). GSCM practices can reduce the negative ecological impact of business processes while preserving operational costs, excellence, and attractiveness. A company's usable productive resources are all used sustainably thanks to green supply networks (Golicic and Smith, 2013).

By juggling the sustainability of the economy and the environment, GSCM aids in reducing the negative environmental effects of production activities while still generating revenues for businesses. According to the research by Darnall et al. (2008), the implementation of the environmental management system helps the company implement ecological SCM policies and processes, suggesting that the EMS is a driving force behind GSCM. Academics highlighted that

environmental factors like customer factors, supplier, and government factors have a big impact on adopting GSCM (Arif et al., 2009; Darnall et al., 2008; De Sousa Jabbour et al., 2013).

Supplier factor

The suppliers either directly or indirectly provide goods, services, and components to manufacturing companies. To embrace GSCM processes, the supplier factor is crucial (Feng et al., 2020; Petrudi et al., 2021). Therefore, the work of Mumtaz et al. (2018) hypothesized that the execution of green supply chain management procedures had a substantial association with the supplier. As the supply partner is in charge of environmental requirements for material management and procedures, and procurement tactics, their involvement in GSCM implementation techniques is positively crucial. Suppliers are critical to enhancing the effectiveness of the GSCM (Kafa et al., 2013; Vanalle et al., 2017; Zhu and Xu, 2019). Thus, an organization and its suppliers working together to achieve ecological objectives and embrace GSCM will make it easier to apply GSCM methods for sustainable production (Petrudi et al., 2021; Zailani et al., 2012).

Governmental factor

Governmental laws and regulations are a major factor in GSCM implementation. The adoption of ecologically responsible behavior is influenced by pressure from governmental organizations. Numerous studies reach the conclusion that governmental laws have the greatest impact on how GSCM practices are adopted by the manufacturing sector (Campbell, 2007; Jones, 2010; Zailani et al., 2012).

According to research performed by Mathiyazhagan et al. (2018), at the bottom of the hierarchy, "National Environmental Regulations" and "Regional Environmental Regulations" are the two main drivers driving the implementation of GSCM. One of the most noticeable players in the adoption of environmental measures by businesses is the government. Government action will therefore help companies remove obstacles to environmental preservation (Delmas and Toffel, 2004; Darnall et al., 2008; Ikram, Zhou, et al., 2019; Wu, Ding, and Chen, 2012). Organizations can cut down on the usage of fossil fuels and greenhouse gas emissions thanks to government restrictions and legislation (Delmas and Toffel, 2004; Rehman et al., 2021; Vanalle et al., 2017).

Customer factor

The implementation of a green supply chain policy is primarily driven by external factors, such as customers. Customers have the greatest impact on environmental management practices (Walker et al., 2008; Wang, Wang, et al., 2018). Consequently, growing consumer awareness, the demand for green products has increased. An organization will take considerable measures to meet such needs and implement GSCM principles when consumers request and anticipate an environmentally sustainable product (Luthra et al., 2014; Jum'a, Ikram, et al., 2021).

Consumer pressure is also the 2nd most frequently mentioned source of pressure for putting an environmental administration plan into action, right after government pressure. Customers should also encourage ecologically responsible behaviors by training the people who work for them in the supply chain. An important variable that affects an organization's environmental responsiveness is the juxtaposition of the SCM final customer (Delmas and Toffel, 2004; Vanalle et al., 2017). Customers may influence corporations to adopt sustainable strategies by applying force to the

company, as they have the market strength to increase the adoption of green practices (Jayaram and Avittathur, 2015). The hypothesis that may be drawn from the foregoing assertions is as follows:

Hypothesis 1 (H1): *The intention to use GSCM is greatly influenced by environmental factor.*

2.2.2. Technological factor (TF)

Researchers emphasized that technological traits like flexibility, diversity and comparative advantage have a big impact on how quickly innovations spread (Lippert and Govindarajulu, 2006; Tseng et al., 2019). The three technological innovation traits identified by Rogers et al. (2008) were therefore taken into account when conducting this study. The expense of acquisition, adaptability, perceived benefits, court case, simplicity, usability, reliability, and facilitating conditions were among the technical innovation features that previous studies identified as having an effect on the diffusion of innovations (Jeyaraj et al., 2006). We took into account cost, complexity, and compatibility in this study because it has been shown that these factors are crucial for GSCM implementation in developing countries.

Cost factor

The economic aspect is crucial to the growth of businesses. Economists have developed economic performance to lower business expenses while also boosting revenue and output. The economic element influences the reduction of the manufacturing atmosphere in some states increases a company's profit and lowers its additional costs (Wang and Feng, 2019). Customer conduct worries about the labor market, hyperinflation, rate of interest, and financing are all typical economic factors that affect corporate growth. Through the use of GSCM, consumers and merchants can both enhance their environmental implementation and their financial performance, claimed in the research by Zhu and Feng (2016). The implementation of GSCM aids in reducing both the enterprise's production costs and environmental costs it is positively correlated with the performance of the business. When compared to businesses that aren't employing GSCM, the GSCM-using business is more profitable and offers more advantages. Businesses' productivity and general efficiency are greatly increased by their economic success (Wang and Feng, 2019; Bag et al., 2020). A good way to reduce costs and environmental issues is through a combination of SCM and green practices (Zhu, Sarkis, and Lai, 2012). Businesses can increase their profitability and competitiveness while earning a long-term market advantage by utilizing green supply chains. Therefore, businesses embrace green supply chain management because it enables them to leverage economic opportunities, achieve cost savings, attract investors, qualify for bank loans, and increase the likelihood of accessing financing opportunities. According to one theory, acquiring environmentally friendly goods will result in dramatically higher prices and decreased efficiency for the purchasing organization (Baumann-Pauly et al., 2013; Wang, Wang, et al., 2018). Additionally, starting an environmental program may require a large investment to achieve overall cost reductions throughout the supply chain. The huge initial expense involved executing several green approaches, such as green manufacturing, green packaging labeling, and green design. According to earlier research, life cycle and long-term cost analysis would facilitate the efficient management of an environmental program (Vanalle et al., 2017).

Complexity

GSCM is a significant issue that impacts the firms' environmental operations. When innovation

becomes challenging to comprehend and challenging to use, Lin and Ho (2009) highlight the complexity of innovation. To eliminate complexity, researchers advised gathering more information and concise ideas about green innovation (Lin and Ho, 2011). This study emphasized how Chinese SMEs learned about environmental issues and green innovation. Another researcher endorsed the finding that there is an inverse association between complexity and the adoption of innovation. To get over the complexity, a lot of work is needed to spread technical knowledge and master new skills (Ming-Horng, 2011). In recent years, the GSCM has had a significant impact in producing solid economic and environmental performance at various levels of the sector (Rao and Holt, 2005; Shashi et al., 2020). Green manufacturing and environment-sustainable logistics implementation, which are all green supply chain management elements, are shown to have a direct impact on the organization's financial success from a financial perspective. GSCM helps businesses present themselves and their products to customers as environmentally conscientious (Diabat and Govindan, 2011; Tippayawong et al., 2015).

Compatibility

The compatibility of adapted technology is another technological trait that exhibits a consistently substantial link with innovation adoption. If a new technology is compatible with the current work role obligations and organizational standards, organizations will accept it. Researchers found that compatibility has a large and advantageous impact on the uptake of innovations (Hameed et al., 2012; Lin et al., 2020). A marketing plan is frequently a key component of an enterprise's overall performance. Customers, sustainable production, and consumption are significantly impacted by marketing elements like pricing, distribution, promotion, and adaptation. The assessment of the connection between marketing struggles and an organization's performance is known as "marketing performance measurement". According to the research by Abdeljawed and Amraoui (2021), a plan to broaden the apparel market was a substantial connection between GSCM and the marketing approach. The marketing element and GSCM adoption both significantly improved the performance of the business and promoted sustainable production and consumption (Abdeljawed and Amraoui, 2021; Martínez et al., 2022). For green buildings, both commercial and residential construction, the government offers tax benefits (Arif et al., 2009). Additionally, a green office block's lower structure and maintenance expenses increase the asset's worth in light of the rising cost of energy. Additionally, energy-efficient building consumes less water and electricity from the power grid, allowing for the expansion of nearby facilities creating a successful supply chain that is both financial and environmentally is the major objective of GSCM implementation (Jum'a, Ikram, et al., 2021). From the above assertions, we formulate the second hypothesis.

Hypothesis 2 (H2): *The intention to use GSCM is greatly influenced by the technological factor.*

2.2.3. Organizational factor (OF)

Numerous scholars underlined that organizational support, firm size, and the caliber of human resources all serve as good indicators of organizational characteristics. We included top management support and human resource quality as indicators of organizational features in this study since they have been shown to have a wider impact in earlier studies (Russell and Hoag, 2004; Piaralal et al., 2015).

Quality of human resource

When a corporation has skilled human resources who have access to cutting-edge training facilities and higher education, the likelihood that the company will adopt technology increases. To hasten the successful application of GSCM, personal purpose at all management levels is required (Luthra et al., 2014). Internal green management strategies at the administrative level evaluate the extent of corporate involvement in ecological security initiatives obligations of different shareholders (Lai and Wong, 2012). The internal aspects of eco-friendly governance also cover practices like environmental auditing, monitoring, administration of transmission and general ecological sustainability, training, and endorsement for departments (Ikram, Zhou, et al., 2019; Shaw et al., 2010). The internal green organization is progressively identified as a systemic and all-encompassing approach to obtaining better environmental results (Zhu, Sarkis, and Lai, 2008; Masudin, 2019).

Top management support

The intention to embrace technical systems is influenced by organizational support. Collaboration between many divisions and departments is necessary for the diffusion of green practices. Therefore, senior management must support and encourage a fruitful dispersion. According to researchers, senior management support is important for a new innovation to be adopted since it will offer the resources needed for the innovation to spread. This suggests that senior management support is still another crucial element of SMEs in Pakistan adopting GSCM methods (Rahman et al., 2014). In line with these assertions, we established the following hypothesis:

Hypothesis 3 (H3): *The intention to implement GSCM is highly influenced by organizational factors.*

2.3. Conceptual framework

Lin et al. (2020) proposed this research framework (**Figure 1**). This research starts by looking into the most frequent aspects that affect managers' intentions of implementing GSCM to measure the impact of technological factors, environmental factors, and organizational factors on the execution of GSCM.

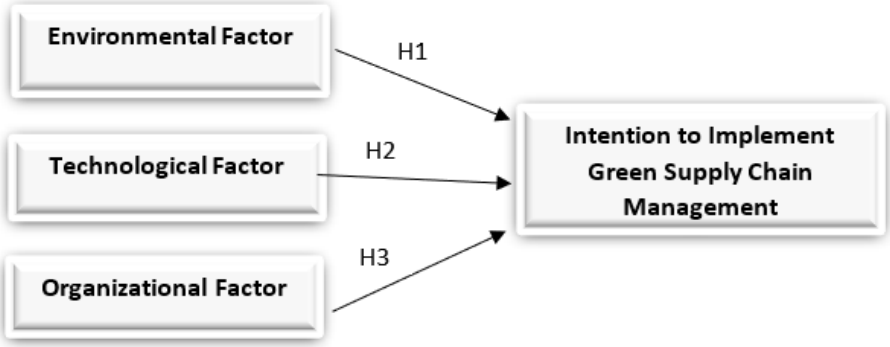

Figure 1. Conceptual framework.

3. Methodology

3.1. Data collection method

The sampling technique chosen for this investigation was non-probabilistic, which sought to select participants who had the best knowledge of the role and management of supply chain networks in their organization. Based on the literature review and suggestions from experts, managers at all administrative levels were chosen as respondents for the current study. A questionnaire was applied to 600 target participants by reaching directly through the professional network known as LinkedIn. There were 210 complete and usable questionnaires, showing a response rate of approximately 35%. The questionnaire-based survey method was chosen for this study because it captures causal links between components and hence yields generalizable statements about the research setting. Furthermore, surveys can clearly define correlations between variables in a sample, precisely capture the norm, and spot extreme information (Gable, 2017; Pinsonneault and Kraemer, 1993). For explanatory and predictive theory, survey research is strongly advised in order to increase trust in the results' generalizability (Straub et al., 2004). To gather data for testing the research framework, a modified version of the questionnaire created by Lin et al. (2020) was employed in the study. The model's constructs were all evaluated using a 5-point Likert scale (strongly disagree–strongly agree). Data collection and model validation was done using a cross-sectional survey.

3.2. Data analyses method

The research was conducted using SPSS 23. The methods for integrating the data for the aforementioned research include transcription, splitting the information into meaningful units, and using these units to comprehend and describe the current issue and interpret them into final findings. First, the reliability of all questions is checked; second, we use multiple regression analysis to identify which factors are affecting the implementation of green supply chain management in Pakistani SMEs. Compared with other methods such as Amos which is a powerful software package for structural equation modeling, multiple regression analysis is a statistical method used to model the relationship between a dependent variable and one or more independent variables. We chose this model due to the advantages that is providing as: it allows for the analysis of complex relationships between variables; it can provide insight into the direction and strength of relationships between variables, and it can be used to make predictions and to test hypotheses. A disadvantage is that it is unsuitable for analyzing categorical dependent variables or nonlinear relationships.

Dependent variable: Intention to adopt green supply chain management (IGSCM)

Independent variables:

Environmental factors (EF): customer factor, supplier factor, and government factor.

Customer factor: Zhu, Sarkis, and Lai (2013) found that customers' environmental requirements and preferences were a significant factor in Chinese manufacturers' adoption of GSCM practices.

Supplier factor: Zhu, Geng, et al. (2011) found that suppliers' environmental performance was positively associated with firms' adoption of environmental practices, and that supplier cooperation and communication were critical factors in promoting GSCM adoption.

Government factor: Government regulations and policies can also influence organizations' adoption of GSCM practices. A study by Chen and Paulraj (2004) found that government regulations and incentives were a significant factor in manufacturers' adoption of environmental management practices.

Organizational factors (OF): top management support, and quality of human resources.

Top management support: Zhu, Geng, et al. (2011) found that top management support was positively associated with Chinese manufacturers' adoption of GSCM practices.

Quality of human resources: Zaid et al. (2018) found that HRM practices positively influence GSCM practices and environmental performance, which in turn positively affect operational and financial performance.

Technological factors (TF): adoption cost, complexity, and compatibility.

Adoption cost: da Silva et al. (2023) found that high adoption costs were a significant barrier to Brazilian firms' adoption of GSCM practices.

Complexity: Seuring (2013) found that the complexity of integrating sustainability into supply chain management was a significant challenge for firms and a comprehensive and integrated approach is needed.

Compatibility: Klassen and Whybark (1999) found that the compatibility of environmental management with existing quality management systems was an important factor in firms' adoption of environmental management practices.

We can conclude that all these three factors are likely to influence an organization's intention to adopt GSCM.

3.3. Analysis

3.3.1. Respondent profile

Table 1 describes the demographic characteristics of the respondents. The data show that most of the respondents were male. The most dominant age group is the 25–32 age group, which constitutes 35.8% of the total number of participants. More than 58% of the total participants have a postgraduate education level. The most dominant level of responsibility is the mid-management level, which accounts for more than 57.71% of the total number of participants.

3.3.2. Reliability analyses

In this part of the study, statistical techniques were applied to the primarily collected data using Jamovi software, and extracted results were interpreted to test the constructed hypothesis for the research. First, the reliability of all questions was checked. The reliability of responses is measured using Cronbach's alpha test, which is a degree of inner reliability that shows how closely items are associated as a set then; all hypotheses were tested. To evaluate the scales' reliability (internal consistency), Cronbach's alpha coefficient of each scale was calculated as suggested by Flynn et al. (1990). As can be seen in **Table 2**, the Cronbach's alpha coefficients for technological factors (TF), environmental factors (EF), and organizational factors (OF) are as follows: 0.528, 0.613,

Table 1. Demographic characteristics of respondents.

Gender	Male	208	99.0%
	Female	02	1.0%
Age	18–24	25	11.9%
	25–32	86	41.0%
	33–40	57	27.1%
	41–50	33	15.7%
	Above 50	9	4.3 %
Education level	Intermediate	5	2.4%
	Undergraduate	9	4.3%
	Graduate	85	40.5%
	Postgraduate	111	52.9%
Responsibility level	Operational management	27	12.85%
	Middle management	115	54.76%
	Top management	68	32.38%

Table 2. Reliability analysis.

	Cronbach's alpha	No. of items
Adoption cost	0.528	3
Complexity	0.613	3
Compatibility	0.721	3
Quality of human resources	0.783	3
Top management support	0.758	3
Customer pressure	0.691	2
Supplier factor	0.816	3
Governmental support	0.898	3
Intention to adopt GSCM	0.844	6

0.721, 0.783, 0.758, 0.691, 0.816, 0.898, and 0.844, respectively. While the coefficients for adoption cost and complexity (0.528 and 0.613, respectively) fall below the recommended threshold of 0.70 for reliability, the rest of coefficients meet the desired level of reliability, which is higher than the recommended 0.70 (Nunnally, 1975). According to these results, it can be said that all the scales used in the study are sufficiently reliable. Thus, further statistical tests can be performed. Before hypothesis testing, it is required to compute the construct values of a latent variable using the average score of the items related to that construct.

3.3.3. Regression analysis of factors impacting overall supply chain performance

A modification of simple linear regression is multiple regression. When we need to forecast the value of a criterion variable based on the values of two or more other predictor variables, we utilize this technique.

To assess how well a regression model fits the data, **Table 4** provides the R, R^2, modified R^2, and the standard error of the estimator.

Table 3. Variables entered/removed[a].

Model	Variables entered	Variables removed	Method
1	EF, TF, OF[b]	.	Enter

a. Dependent variable: IGSCM.
b. All requested variables entered.

Table 4. Model summary[b].

Model	*R*	R^2	Adjusted R^2	Std. error of the estimate	Durbin-Watson
1	0.671[a]	0.450	0.442	0.742512632638665	2.084

a. Predictors: (Constant), EF, TF, OF.
b. Dependent variable: IGSCM.

Explanation

R-value is represented by column "*R*", the multiple correlation coefficient. This multiple correlation coefficient is called the Pearson correlation coefficient which is a scalar among theoretical and true results of the dependent variable in a linear regression system that has an intercept. In a statistical way, the coefficient of multiple correlations is a value of how close a given variable can be forecast by use of a linear function of further variables set. It is the relation between the variable's data and the finest estimation calculated linearly from the prognostic variables.

Multiple correlation coefficient results are between 0 and 1. Some benchmarks and evidence for interpreting the value of *R* are:

$R = 0$: When $R = 0$, there is no linear relationship between the independent variables and the dependent variable. This means that the independent variables do not explain any of the variation in the dependent variable.

$R = 0.2$ to 0.4: A small to moderate correlation. This indicates that the independent variables explain a small to moderate proportion of the variation in the dependent variable.

$R = 0.4$ to 0.7: A moderate to strong correlation. This indicates that the independent variables explain a moderate to strong proportion of the variation in the dependent variable.

$R = 0.7$ to 1: A very strong correlation. This indicates that the independent variables explain a very large proportion of the variation in the dependent variable.

In this research, *R* is found to be 0.671 which is a positive result, indicating a moderate to strong correlation between the independent variables and the dependent variable, and suggesting that our model has good predictive power.

The coefficient of determination (R^2 column) shows the R^2 value. R^2 is the main result of regression analysis. It is read as the mathematical value of the proportion of the change in the criterion variable which is estimated from the predictor variable. The square of correlation (*R*) between the predicted dependent variable value and the true dependent variable value is called the coefficient of determination R^2. It also ranges from 0 to 1. A value of R^2 equivalent to 0 indicates the predictor variable cannot be forecast from the criterion variable, while a value of R^2 equal to 1 suggests that the criterion variable can be correctly foretold from the predictor variable, and the value of R^2 equals 0.10 shows 10% of the variance in *Y* is predictable from *X* and so on. Some benchmarks and evidence for interpreting the value of R^2 are:

R^2 = 0: When R^2 = 0, the independent variable(s) cannot predict the dependent variable. This means that none of the variance in the dependent variable can be explained by the independent variable(s).

R^2 = 0.1 to 0.3: A small amount of variance in the dependent variable can be explained by the independent variable(s). This means that the independent variable(s) have a weak effect on the dependent variable.

R^2 = 0.3 to 0.5: A moderate amount of variance in the dependent variable can be explained by the independent variable(s). This means that the independent variable(s) have a moderate effect on the dependent variable.

R^2 = 0.5 to 1: A large amount of variance in the dependent variable can be explained by the independent variable(s). This means that the independent variable(s) have a strong effect on the dependent variable.

In our case, an R^2 of 0.450 is a positive result, indicating that the independent variables in our study are moderately effective in explaining the variance in the dependent variable.

Table 5 shows whether the overall model is a fit or not, as the significance is less than 0.05 which means the model is significant overall. Looking at **Table 5**, we see that the *F* value was 56.53 and it was significant (Sig. = 0.000). Therefore, our conceptual model was significant enough to determine the outcome.

Table 5. ANOVA[a].

Model		Sum of squares	df	Mean square	*F*	Sig.
1	Regression	93.499	3	31.166	56.530	0.000[b]
	Residual	114.124	207	0.551		
	Total	207.623	210			

a. Dependent variable: IGSCM.
b. Predictors: (Constant), EF, TF, OF.

3.3.4. Hypothesis testing

Table 6 shows the results of our hypothesis, and their interpretations are discussed below.

Table 6. Coefficients[a].

Model		Unstandardized coefficients		Standardized coefficients	*t*	Sig.	Collinearity statistics	
		B	Std. error	Beta			Tolerance	VIF
1	(Constant)	0.187	0.334		0.562	0.575		
	TF	0.026	0.106	0.015	0.250	0.803	0.718	1.393
	OF	0.676	0.080	0.532	8.456	0.000	0.670	1.492
	EF	0.296	0.097	0.201	3.062	0.002	0.618	1.619

a. Dependent variable: IGSCM.

4. Findings

The hypothesis was tested using multiple regression analysis. In this analysis, the dependent variable is IGSCM, and the independent variables are environmental factors, technological factors, and organizational factors corresponding to hypotheses H1, H2, and H3 which assert that intentions to adopt GSCM is influenced by environmental, technological and organizational factors, respectively. The beta values indicate the strength and direction of the relationships between the independent and dependent variables, while the *t*-values and *p*-values indicate the statistical significance of these relationships.

For H1, the research results indicate a significant positive relationship between environmental factors and managers' intention to implement GSCM. The beta value of 0.201 indicates that a one-unit increase in environmental factors is associated with a 0.201-unit increase in managers' intention to implement GSCM. The *t*-value of 3.062 is greater than 1.96, which indicates that the relationship is statistically significant. The *p*-value of 0.002 is less than 0.05, which indicates that the results are significant and we can accept H1.

Hypothesis H2, on the other hand, was rejected because the research results indicate that there is no significant relationship between technological factors and managers' intention to implement GSCM. The beta value of 0.015 indicates that there is a weak positive relationship between technological factors and managers' intention to implement GSCM, but the *t*-value of 0.250 is less than 1.96, which indicates that the relationship is not statistically significant. The *p*-value of 0.803 is greater than 0.05, which indicates that the results are not significant and we can reject H2.

For H3, the research results indicate a significant positive relationship between organizational factors and managers' intention to implement GSCM. The beta value of 0.532 indicates that a one-unit increase in organizational factors is associated with a 0.532-unit increase in managers' intention to implement GSCM. The *t*-value of 8.456 is greater than 1.96, which indicates that the relationship is statistically significant. The *p*-value of 0.000 is less than 0.05, which indicates that the results are significant and we can accept H3.

5. Discussion

According to the research's findings, hypothesis H1, which asserted that environmental considerations have no appreciable influence on SMEs' intentions to adopt GSCM, is unsupported. The outcome is in line with the findings of (Alam, Khatibi, et al., 2008). Companies are hesitant to the adoption of modern tech sophisticated in nature. This might have an impact on how GSCM methods are adopted by SMEs in Pakistan, but our findings do not indicate that technology has a substantial impact.

Many sectors in Pakistan have worked to make their supply chains more environmentally friendly. Although one of the key obstacles to technology adoption has been identified as cost. However, other studies believe that this barrier may actually inspire adopters to implement new technologies in their company in order to achieve budget-efficient manufacturing (Lin and Ho, 2009; Rogers et al., 2008). However, our findings indicate that the cost of adaptation has no discernible influence on managers' intentions to use green supply chain strategies. According to the findings of

our study, Pakistani SMEs' intentions to use GSCM are positively and significantly influenced by relative advantage. Our findings were also corroborated by earlier research on innovation uptake (Alam, Ali, and Mohd, 2011; Ho et al., 2014).

The research backs up hypothesis H2. The outcome supports a strong correlation between the level of personal excellence and Pakistani SMEs' intentions to embrace GSCM. Similar findings were obtained in investigation made by Lin and Ho (2011). The organization's complicated green practices procedures call for cross-disciplinary cooperation and a considerable overhaul of the way things are now done. To close the knowledge gap, a corporation must offer substantial training to its staff. Specialized training is also necessary to comprehend the innovation's underlying principles. As a result, it's critical to have skilled personnel when implementing GSCM among Pakistan's SMEs. The factor that would have the greatest impact on whether GSCM will be adopted would be senior management backing. The adoption of new technologies is greatly influenced by top management backing. Owners or managers are the top management in SMEs and have a big say in how decisions are made. This conclusion that senior management is the primary role player in helping SMEs in Pakistan implement GSCM is supported by additional studies (Jeyaraj et al., 2006)

The research backs up hypothesis H3. According to the Pakistani context, environmental uncertainty is a strong predictor of SMEs' intentions to use GSCM in Pakistan. The outcome is in line with what Ho et al. (2014) found. In the regression model, the government support regression coefficient is also statistically significant. The Pakistani government has made significant efforts to encourage businesses to implement green technology in their manufacturing and supply chain processes, which may be the cause. Finally, it is discovered that the two key factors influencing SMEs in Pakistan's intention to adopt GSCM are supplier pressure and consumer pressure. According to an additional study, the proliferation of technology is fueled by the supplier and consumer pressure (Ho et al., 2014). In fact, the same findings have also been supported by researchers like Sharma and Henriques (2005).

As a result, it can be concluded that organizational factors and environmental factors are the most significant factors influencing managers' intention to execute GSCM in Pakistani SMEs, whereas the technological factors are not the significant factors influencing managers' intention because the *p*-value for both was more than 0.05.

Based on the identification of technological factors, organizational factors, and environmental factors as instrumental in managers' decisions to adopt GSCM, there are several policies that could be drawn to promote the adoption of sustainable supply chain practices:

Technology policies: Governments and industry associations could develop policies to encourage the development and adoption of sustainable technologies in supply chains, such as renewable energy sources, energy-efficient equipment, and low-emission transportation. These policies could include tax incentives, grants, and subsidies to encourage businesses to invest in sustainable technologies.

Organizational policies: Companies could develop policies to encourage the adoption of GSCM practices, such as setting sustainability targets and incorporating sustainability metrics into performance evaluations. Companies could also provide training and education to employees to raise awareness of the benefits of GSCM and to develop the necessary skills to implement

sustainable practices.

Environmental policies: Governments could develop policies to promote sustainable practices in supply chains, such as setting environmental regulations and standards for businesses to meet. This could include policies to promote sustainable sourcing of materials, reduce waste and emissions, and protect natural resources.

Overall, by implementing policies that promote the adoption of GSCM practices, businesses and governments can improve the sustainability and resilience of supply chains, reduce environmental impacts, and enhance the competitiveness of businesses in a rapidly changing global economy.

6. Conclusion

This research objective was to determine the factors which are influencing administrators' intentions to adopt GSCM in Pakistani SMEs. In this research, empirical approach is used, and research framework and hypothesized relationships were developed with the help of a summary and synthesis of past research.

This study develops a framework that demonstrates in what way we can implement green supply chain management practices in our company to create a green climate all around. Our analysis sheds light on the influence of the three most important factors, i.e., organizational, environmental, and technological factors on managers' intention to implement green supply chain practices, even though numerous studies emphasize the significance of environmental, technical, and organizational factors in a green supply chain context. Data were gathered from various industries, but mainly from small and medium-sized businesses to empirically evaluate the model, which is a major strength of the current study. Overall, the study advances knowledge of the digital economy's strategic execution and is expected to pave the way for new lines of inquiry into the practices and policies of academia and industry. A survey was utilized to gather responses and a sample size of 210 was collected from supply chain professionals including procurement managers, supply chain managers, inventory managers, warehouse managers, etc. It is discovered that organizational factors and environmental factors have a very significant impact on managers' intentions to adopt GSCM practices; but, as per the results of our study, we found that there isn't any significant impact of technological factors on administrators' intent to implement GSCM.

6.1. Theoretical and practical implications

With the help of this paper, a theoretical vacuum in the study of supply chain management is filled, and a framework for understanding GSCM's broad adoption by SMEs in Karachi, Pakistan, is provided. The synthesis presented in this work broadens our comprehension of the area and enhances the body of knowledge on sustainable supply chains. It emphasizes once more the significance of utilizing a diversity of techniques when doing GSCM research. This study encourages further investigation and draws more scholarly critique to strengthen the hypotheses that are already offered.

This study's findings have significant ramifications not only for the management of Pakistani SMEs (SMEDA) but also for other emerging markets, administration decision-makers, and vendors that are extremely keen on the green drive. SME manufacturers and solution providers who

prioritize going green should think about the comparative benefit and difficulty of procedures, and the marketability of the structure in question. Through a range of training activities, the management of SMEs must focus the proper emphasis on staff development. It is also important to consider other environmental ideas that may influence management's sustainable project, which was a major forecaster in our study. To assess the significant economic and environmental problems driving this contemporary atmosphere of business competition, regulators must determine the pertinent rules that may be used to further aid in green supply chain management's adoption by small and medium businesses.

Last but not least, this research will help companies implement GSCM or green initiatives, both of which will lead to the development of new products for their future markets. Considering the components of the invention of which their employees are probably ignorant would help firms ensure that the adoption of their policies will go more effectively, according to the study's findings.

Additionally, this study has management ramifications that can inspire academics to investigate more potential structures in their upcoming studies. Additionally, practitioners—particularly Pakistani SMEs—may find the study useful. A change in one element might have an impact on other factors, and supply chain management is a broad, complicated endeavor that describes interconnectedness and interdependencies across a network. It is advised that practitioners pay attention to these two factors as well, as the findings clearly show that administrative and environmental considerations have a substantial impact on GSCM implementation intention. Given the instant alterations in technology, businesses need to be adaptable and strong separate bodies in order to continue to exist in unstable environments.

6.2. Limitation and further research direction

The study has a few restrictions that need to be investigated further in further studies. The first emphasis of this study was on determining whether Karachi-based SMEs intended to adopt GSCM procedures. SME locations in Pakistan can be explored in more detail. Second, only manufacturing companies were contacted for data collection for this study. It would be useful to comprehend the GSCM's intended implementation in various industrial and commercial sectors across the country. Finally, in our analysis, we only suggested 8 criteria. There can be additional elements that influence the implementation of GSCM. More factors in a GSCM adoption model can be taken into account in the future study, such as the contribution of supply chain partners to GSCM adoption. This work adopts a fresh theoretical perspective, and it is advised that future research conduct in-depth literature investigations. It will be fascinating to validate the theory and support the proposed theoretical framework through case studies or empirical research. Consequently, it is suggested that additional research use a qualitative research methodology to validate the discovered components that significantly affect Pakistani SMEs' intentions to implement GSCM.

Author contributions

Conceptualization, FN and NI; methodology, FN; software, FN; validation, FN, NI and WB; formal analysis, FN; investigation, FN; resources, FN and NI; data curation, FN; writing—original draft preparation, FN; writing—review and editing, NI; visualization, WB; supervision, NI; project administration, NI. All authors have read and agreed to the published version of the manuscript.

Acknowledgments

We would like to thank the participants who took part in this study and made this research possible.

Conflict of interest

The authors declare no conflict of interest.

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