

# Does the Institutional Pressure in KSA Affect the Application of the Green Supply Chain Business Model?

**Sami Mohamed Al Haderi<sup>a</sup>, Mohammed RA Siam<sup>b</sup>,** <sup>a</sup>School of Business Taibah University, Yanbu Saudi Arabia Kingdom, <sup>b</sup>Mohammed R.A. Siam School of Business Management Sbm University Utara Malaysia Uum, Email: <sup>a</sup>salhaderi@taibahu.edu.sa, <sup>b</sup>r.a.siam@uum.edu.my

This research attempts to provide evidence that, with the effect of leadership and institutional pressures as moderators, the integration of TQM and supplier relationship management facilitates the achievement of environmental performance in firms. The literature has discussed how institutional pressures play a role in influencing the adoption of green supply chain practices. The area that requires understanding is how supplier relationship management, total quality management and leadership integration processes are affected by institutional pressures on the firm's environmental performance. Additionally, the institutional pressure is one of the key issues affecting the implementation of green supply chain management; therefore, the study has examined the moderating role of institutional pressure. Many scholars have studied different sectors, such as the manufacturing of electronic goods, gas and oil, automotive and components; however, we are not aware of any studies in the petrochemical sector, which is the one of the main carbon emission sources after deforestation, steel and refining of oil, transportation and cement. To undertake this research project, we obtained support from a major petrochemical industry company in Saudi Arabia, to examine its implementation of practices of green supply chain management. The findings of the study have provided support to the hypothesised results.

**Key words:** *TQM, leadership, green supply chain, environmental performance, Saudi Arabia.*

## Background

Increasing concerns for the protection of environment have resulted in a move towards green policies (Ali, Bentley, & Cao, 2016; Cortes, 2017). Today, green manufacturing is becoming standard rhetoric, used by one-third of specialists, researchers and manufacturers. Yet there is a need for companies and individuals directly involved in manufacturing the products to take more proactive, rather than reactive, approaches. Law, Lacy, Lipman and Jiang (2016) state that 35 per cent of total global consumption of electricity by the international manufacturing industry is responsible for 20 per cent of the world's CO<sub>2</sub> emissions, which are harmful for everything on the planet. This is the basis of the urgent need for green manufacturing.

Over the past few years, scholars and researchers have become more concerned about, and have paid greater attention to, manufacturing practices that are environment friendly. A lot of literature is available on the implementation of green manufacturing (Ali et al., 2019), but less attention has been paid to operational practices and leadership, and their effects on environmental performance (EP). To understand the part played by the main factors of green manufacturing (GM) in EP, only a few theories have utilised the theory-focused approach, including some studies on leadership (Ali et al., 2019), supplier relationship management (Ali et al., 2019), total quality management institutional theory and environmental performance.

To explain the effect of total quality management (TQM), supplier relationship management (SRM) and leadership on EP, the effect of institutional pressure must be considered. According to Dubey, Gunasekaran and Ali (2015), the effects of implementing green manufacturing practices can be moderated by institutional pressure. Given that it is rational that TQM, SRM and leadership with the moderation impact of IP can be important for EP, this will also be significant for the adoption of environment friendly practices in the petrochemical industry. While they have not yet been adopted, theoretically based experimental studies focusing on the post-adoption period environment show that friendly practices (EFP) are undoubtedly coming for the petrochemical industry.

This study makes three main contributions to the literature of green supply chain management (GSCM). With experimental authentication of a GSC model resulting from its hypotheses, the current study also examined the model from the perspective of organisational theory, specifically at the starting stage of institutional theory (Hazen, Skipper, Ezell & Boone, 2016). Recently, Glover, Champion, Daniels and Dainty (2014) examined sustainable practices in the supply chain of the dairy industry from an institutional theory viewpoint. Their study also provided an understanding of institutional pressure and its effects on implementing EP. Second, this study recognises the importance of the green supply chain model in the petrochemical industry. Third, by adopting environmentally friendly practices over a detailed examination of the manufacturing sector in the petrochemical industry, we have extended the previous research. Testing our projected model regarding the

petrochemical industry has two aspects. While many scholars have studied different sectors, such as manufacturing of electronic goods, gas and oil, and automotive components, we are not aware of any studies related to the petrochemical sector, which is the one of the main carbon emission source after deforestation, steel and refining of oil, transportation and cement. Second, to undertake this research project, we obtained support from a major petrochemical industry company in Saudi Arabia, to examine its implementation of practices of green supply chain management.

Based on the above discussion, we formulated the following research objectives for the current study:

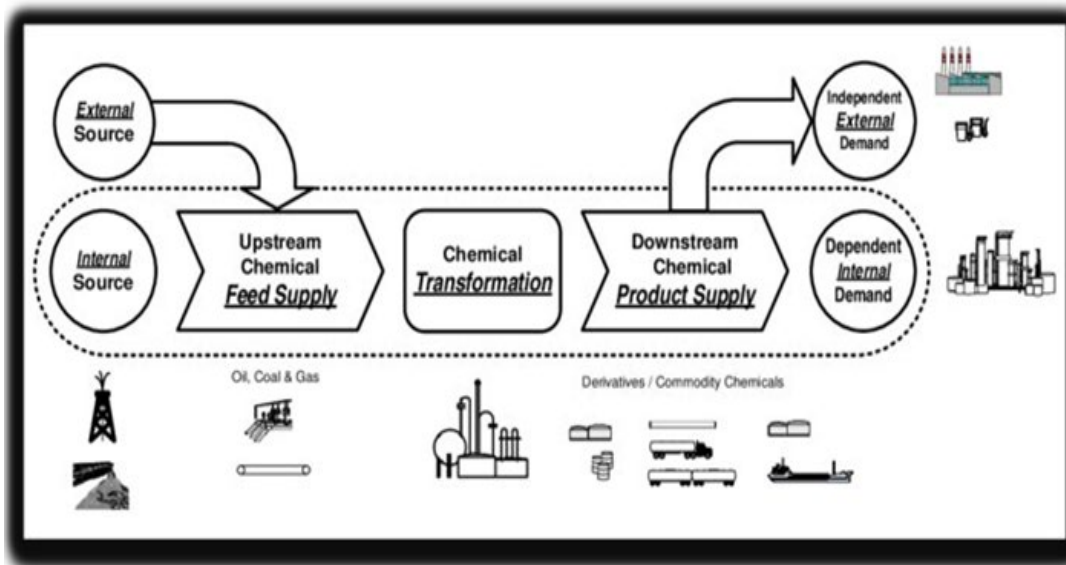
- 1 *Empirical validation of the theoretical framework proposed for this research:*  
A confirmatory factor analysis (CFA) was adopted for the empirical validation of the theoretical model proposed in this study. The CFA facilitates the researcher in assessing the validity of the underlying theoretical framework. Furthermore, instead of using structural equation modelling to test the proposed hypotheses of this research, a hierarchical regression analysis (HRA) was adopted.
- 2 As mentioned earlier, the main area of concern in this research was the petrochemical industry, which makes it a unique contribution to the literature. However, the suggestions of strategies that will bring improvements in environmental performance may be helpful for the petrochemical industry itself.
- 3 *Outlining directions for further research:* This research has some limitations that can be controlled; therefore, further research was carried out to extend the extant literature.

The next section outlines the theoretical foundation for this article.

### **Developing the Theoretical Framework and Formulating Hypotheses**

Supplier relationship management (SRM) is key to successfully achieving green purchasing. It requires firms to connect with other network suppliers and creates motivation among them to deliver non-hazardous and eco-friendly raw materials, by means such as instructing and training suppliers for ISO 14001:2004 adoption. Those firms that persuade suppliers to provide eco-friendly materials and frequently review suppliers' progress tend to successfully adopt green practices. Through supplier collaborations, eco-friendly products are sourced relatively quickly, compared with depending solely on the in-house R&D team. Transparency can be achieved through successful partnership practices, resulting in visibly reducing the costs of developing eco-friendly materials and minimising the risk of over-spending. A firm's inventory carrying cost can be saved by encouraging suppliers to keep their inventory at their

workplace and to issue open contracts or purchase orders, thereby enabling on-time material delivery to meet production demands. Dubey et al. (2015) analyse the way TQM initiatives are driven by leadership to achieve higher performance through collaboration in a SC network. This research aims to further analyse this model, considering the institutional pressures as a moderator (Taylor & Vachon, 2018). Figure 1 shows the theoretical framework of this research.



Source: Louw & Pienaar (2011).

**Figure 1.** Value chain of petrochemical

In a supply chain network, from top management to the supplier, manufacturer, distributors, transporters and retailers, there must be consistency among customer interests and their objectives – that is, setting their goals and objectives while considering the environmental factors. In the view of Prajogo, Oke and Olhager (2016), leadership is the base of the pyramid when developing a TQM model. Teoman and Ulengin (2018) recognise consistency as a TQM philosophy driver, since it fosters SC collaboration and facilitates the development of quality culture. Moreover, leadership acts as a key driving force to adopt GSCM initiatives. Dubey et al. (2015) outline the ways in which leadership contributes to successfully attaining environmental performance within a SC. Leadership takes into account the environmental goals and policy setting to deliver training and resources and promote performance improvement. In contrast to internal management control, leadership also involves the development of SC practices that are driven by customers' ever-changing needs and requirements, taking the long-term vision into consideration. Therefore, the following hypotheses are presented:

- H1:** TQM implementation is positively influenced by leadership.
- H2:** SRM implementation is positively influenced by leadership.

The collaborative relationship between the partnering firms in a network of SC brings higher coordination and a reduction in the bullwhip effect within the SC network (Dubey et al., 2015). According to Spiegler, Naim, Towill and Wikner (2016), the term ‘supply chain collaboration’ refers to shared efforts to accomplish common goals and objectives. Relationship management throughout the SC also assists organisations to adopt total quality management (TQM) (Al-Ali & Abu-Rumman, 2019) for achieving their green objectives, such as a decline in carbon emissions (Duarte & Cruz-Machado, 2017), and in the successful adoption of green practices within the SC (Chu, 2016; Fahimnia, Sarkis & Davarzani, 2015; Laari, Töyli, Solakivi & Ojala, 2016). The study is being carried out in the petrochemical industry of KSA. The basic value chain of the petrochemical industry is shown in the Figure 1 (above).

Thus SRM ensures supplier involvement in technological development and decision-making, and satisfying customer requirements, by engaging in supplier collaboration. In addition, it also involves proportionate profits, information and risk sharing. Therefore, the following hypothesis was formulated:

**H3:** SRM has a significant impact on the EPR.

TQM is an ideology by which an organisation provides services and quality products to customers. It refers to an ongoing improvement process for groups, individuals and firms. TQM comprises eight key concepts: all work is process, customer satisfaction, teamwork, internal customers are real, people make quality, measurement, prevention, and continuing improvement cycle. There are also four key principles (Dubey et al., 2015). Thus TQM is a systematic activity and a philosophy for enhancing the quality and value of those services and goods that a firm offers to its customers, by escalating the potential of all stakeholders. Several researchers (Hamdoun, Jabbour & Othman, 2018; Prajogo et al., 2016) have previously attempted to examine the contribution of TQM to firm performance to achieve reductions in recycling waste and carbon emissions, thereby meeting green objectives. In an empirical study, Siva et al. (2016) directed attention to the significance of quality management practices in firms’ environmental performance. TQM measures are used to assess a firm’s ability to reduce SC variability, and to enhance product quality and coordination throughout the SC. TQM develops a perspective among SC partnering firms, with the aim of minimising costs, led by avoiding over-production, defects and transport related wastages. Therefore, it is hypothesised that:

**H4:** SRM has a significant impact on the EPR.

In recent years, a growing contribution of institutional theory has been witnessed in the SCM and OM areas (Sauer & Seuring, 2018). Scott and Davis (2015) explain institutional theory as the external forces that bring motivation among firms to perform strategic actions. According

to these authors, the institutional theory firms are profit-seeking and understand the significance of social legitimacy. Wuttke, Rosenzweig and Heese (2019) suggest that institutional theory can take the form of (1) a social variant and (b) an economic variant. According to Liao (2018), the identified mechanisms for institutional theory are normative, coercive and mimetic, resulting in institutional isomorphism. The coercive mechanism comprises informal and formal pressures, which are placed on firms by society and on which they are dependent (Liao, 2018; Sauer & Seuring, 2018). According to Teixeira et al. (2016), GSCM acts as an environmental tool for gaining competitiveness and enhancing the environmental image of an organisation within a business arena. Therefore, the process of greening SC refers to the integration of environmental principles in the SC operations and design. The significance of integrating environmental principles in building eco-friendly and eco-efficient firms has been discussed previously, and an emphasis was placed on applying these underlying principles in a product's life-cycle.

The practising managers must understand the linkages among economic and environmental performance and GSCM practices for the successful adoption of GSCM. The regulatory and market pressures, which may take the form of environmental pressures, facilitate the growth of an organisation, since these pressures are assumed to have a great influence on green purchasing and eco-design. However, those manufacturers who encounter greater pressures are more likely to adopt investment recovery policies and green purchasing in their organisations (Taylor & Vachon, 2018). Furthermore, competitive pressures tend to inflate the benefits obtained after the adoption of GSCM practices, such as economic benefits. Tang, Walsh, Lerner, Fitza and Li (2018) attempted to investigate the moderating impact of green operations and environmental management on the performance of a manufacturing firm. However, the current study uses an institutional theory perspective.

The literature indicates that institutional pressures act as a driving force in the adoption of environmental management practices in organisations. For instance, a study conducted in Taiwan's textile industry examined the effects of GSCM drivers on GSCM practices, with institutional pressures as moderators. Therefore, this research assumes that institutional pressures act as moderators of the impact of the TQM and SRM relationship on the firm's environmental performance. However, there has been confusion regarding the mediating, controllable and moderating variables. This confusion can be resolved through critical review and proper understanding of these concepts. Our research therefore found sufficient literature supporting the use of institutional pressures as a moderator. León-Bravo, Caniato and Caridi (2019) attempted to establish which factors act as drivers in the TQM implementation. The effect of institutional pressures as moderators was studied with regard to the firms' intention to implement internet-based SC. In addition, another study also observed firms' supplier development program using the institutional theory perspective. The institutional pressures involve normative, coercive and mimetic pressures that act as drivers for adopting GSCM practices in an organisation. These pressures are generally measured from the perspectives of



market pressure, profit motive, brand consciousness and regulatory pressure, resulting in institutional isomorphism. Therefore, the following hypotheses are proposed:

**H5:** IP has significant impact on the EPR.

**H6:** IP moderates between TQM and EPR.

**H7:** IP moderates between SRM and EPR

## **Methodology**

### ***Questionnaire Design***

The development of a questionnaire plays a significant role in conducting a survey; therefore, we begin by reviewing five main concepts in the extensive literature: TQM, leadership, institutional pressures, environmental performance and relationship management. These concepts were studied in detail to discover key issues, and to develop a measuring instrument on the basis of what had been used in earlier research. Several researchers (Dubey et al., 2015; Liao, 2018; Sauer & Seuring, 2018; Taylor & Vachon, 2018) from the quality management field have used questionnaires to conduct empirical research. After reviewing the literature, a questionnaire was developed, comprising two sections. The first section contained questions regarding TQM, leadership, institutional pressures and relationship management among partnering firms. Section 1 involved 25 items, and aimed to measure the practitioners' perceptions, since these were the targeted respondents to this research. A five-point Likert scale was used to measure the responses, with 1 representing strongly disagree and 5 representing strongly agree.

In section 2 of the questionnaire, questions regarding environmental performance were included. This section involved six items, and aimed to measure the perceptions of the respondents (environmental managers). A five-point Likert scale was used to measure the responses, with 1 representing strongly disagree and 5 representing strongly agree.

### ***Measures***

In order to avoid scale proliferation, the measures for current research were extracted from the relevant existing literature. Therefore, multi-item measures were chosen for the constructs of the theoretical framework proposed in this research, particularly to minimise measurement errors, enhance validity and reliability, and ensure greater variability between the survey respondents (Graf, Mayer & Landwehr, 2018). All study constructs were operationalised by adding at least three measuring items and by performing confirmatory factor analysis (Chuang, Shen & Judge, 2016).

Before finalising the questionnaire, a pre-test was carried out for the included items to confirm content validity, using the services of six experts from academia and industry. All the

experts' suggestions were incorporated, followed by the necessary modifications to the questionnaire, since most of the suggestions were related to the wordings and a few items about the association with partners. However, the constructs were not disclosed to the survey respondents, in order to avoid respondent bias. The tabulated form was chosen to present the constructs, respective measures and supporting literature (Table 1).

**Table 1:** Outer loading

	EPR	IP	LS	SRM	TQM
EPR1	<b>0.938</b>				
EPR2	<b>0.906</b>				
EPR3	<b>0.895</b>				
IP1		<b>0.923</b>			
IP2		<b>0.896</b>			
IP3		<b>0.931</b>			
IP5		<b>0.893</b>			
IP6		<b>0.877</b>			
LS2			<b>0.889</b>		
LS3			<b>0.892</b>		
LS4			<b>0.878</b>		
LS5			<b>0.916</b>		
LS6			<b>0.877</b>		
LS7			<b>0.879</b>		
SRM1				<b>0.909</b>	
SRM2				<b>0.904</b>	
SRM3				<b>0.874</b>	
SRM4				<b>0.883</b>	
SRM5				<b>0.827</b>	
SRM6				<b>0.870</b>	
SRM7				<b>0.854</b>	
TQM1					<b>0.841</b>
TQM2					<b>0.905</b>
TQM3					<b>0.893</b>
TQM4					<b>0.911</b>
TQM5					<b>0.861</b>
TQM6					<b>0.821</b>
TQM7					<b>0.870</b>
TQM8					<b>0.881</b>
TQM9					<b>0.875</b>
LS1			<b>0.887</b>		



In the research framework of this study, a five-point Likert scale was adopted to capture indicators as independent variables. In addition, control variables were employed to determine the extraneous effects – for example, by incorporating a dummy variable for firm size (Gunasekaran et al., 2017). The nature of the study was not considered in this research since the study focuses on the petrochemical equipment and petrochemical industry.

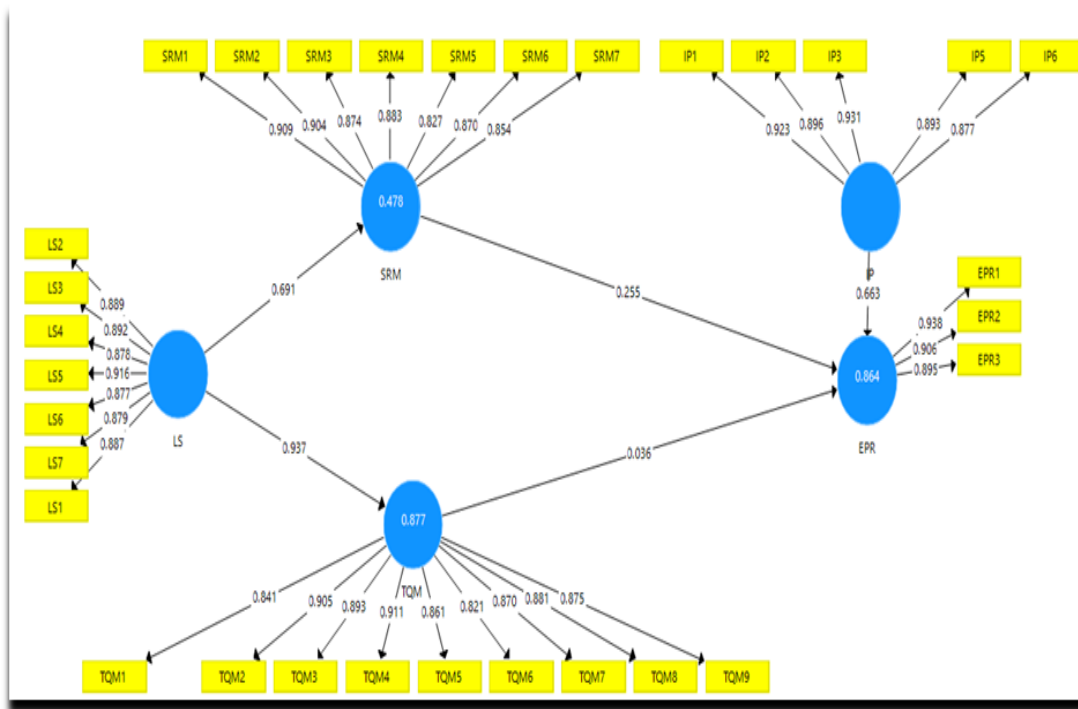
### ***Sampling***

Over 3500 petrochemical goods manufacturers operate in Saudi Arabia; they are licensed and have adopted green practices, according to the Ministry of Petroleum Saudi Arabia. For data collection, firms' senior managers were selected as the targeted respondents. The sample size for this study was estimated using Hafeez and Farooq's (2016) formula, which came out as 358 at 95 per cent level of confidence. However, some of the recent research conducted in the area of SCM and OM indicates that a sample size of 150 is sufficient for testing the proposed research hypotheses (Hair, Hult, Ringle & Sarstedt, 2016).

The present research aims to empirically analyse the relationships among SRM, the environmental performance of green SCs, TQM and leadership. The impact of IP was further examined as a moderator in the EP and SRM linkage, and EP and TQM linkage, having controllable effects for firm size. This study will refine and strengthen the integration of the TQM and SRM in a GSCM network and the institutional theory application in the SCM and OM areas, thereby addressing the need for research as recommended in previous research (Sauer & Seuring, 2018). Our study thus provides assistance in empirically testing the Tizroo, Esmacili, Khaksar, Šaparauskas and Mozaffari (2017) model, for sustainable SC and the Dubey et al. (2015) business excellence model for supply chain management, which are of great importance. Furthermore, this study also attempted to develop a clear understanding of the possible relationship between GSCM theory and institutional theory.

### **Results**

According to Hair, Matthews, Matthews and Sarstedt (2017), there are two stages involved in PLS analysis for reporting the outcomes: the first is a measurement model (MM) assessment and the other is a structural model (SM) assessment. We have used the PLS-SEM for achieving the objectives of current study. PLS-SEM is a second-generation technique, which is robust, and also a new technique because it integrates models into equational structure and with immediate operation, thus providing results by creating a relationship between all intervening and direct singularities.



**Figure 2.** Outer model

In accordance with Hair et al.'s (2017) study for the assessment of the measurement model, the main criteria for the evaluation of measurement model are internal consistency, discriminant validity and reliability. Researchers reflected outer loadings of indicators and average variance extracted (AVE) for evaluating the convergent validity of reflected constructs. According to Hair et al. (2017), for the outer loadings recommended values are greater than or equal to 0.5 and preferable greater than or equal to 0.70. the AVE values should be greater than 0.50 and CR values should be greater than 0.70. Hair et al. (2017) have suggested a method according to which the PLS approach is a common indicator of second-order constructs. The results of convergent validity are shown in Table 2; these surpass the recommended values showing the acceptable convergent validity.

**Table 2:** Reliability

	Cronbach's alpha	rho_A	CR	(AVE)
EPR	0.900	0.901	0.938	0.834
IP	0.944	0.945	0.957	0.817
LS	0.955	0.956	0.963	0.789
SRM	0.949	0.949	0.958	0.765
TQM	0.961	0.962	0.967	0.763

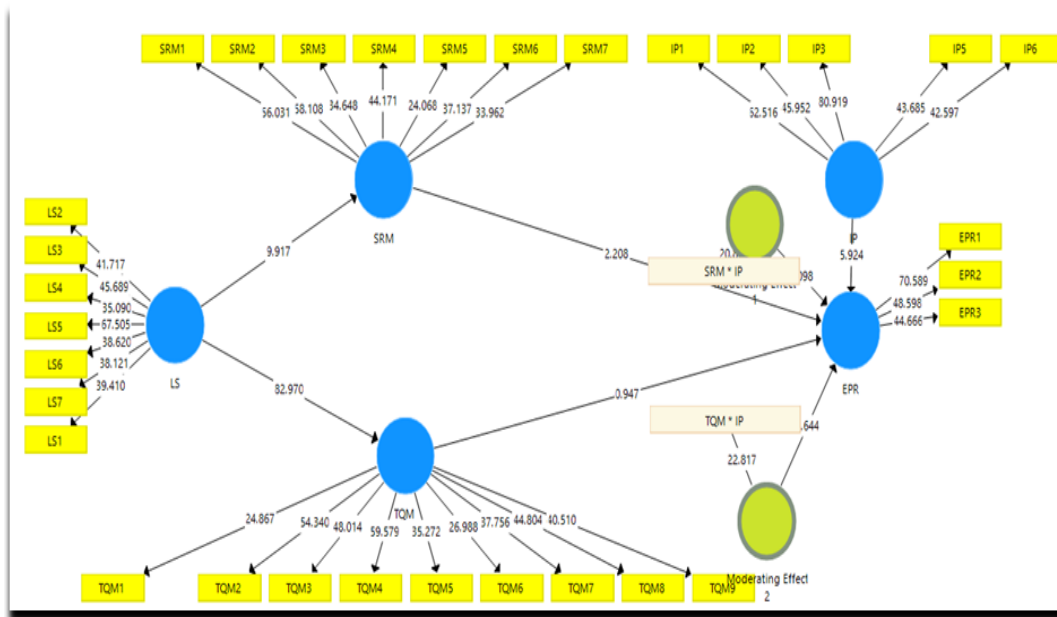
For the examination of measurement model, the second criteria is discriminant validity (DV). There are many ways to calculate DV. The Tzempelikos and Gounaris (2017) criterion is most commonly suggested. It associates the relationships of latent variables with the square

root of AVE. The AVE value should be greater than with square root of the constructs and relationship with other constructs. According to Hair Jr et al. (2016), this method is known as the most conservative option for the assessment of DV. Fornell-Larcker criterion results are shown in Table 3.

**Table 3: Validity**

	EPR	IP	LS	SRM	TQM
EPR	0.913				
IP	0.724	0.904			
LS	0.775	0.701	0.888		
SRM	0.888	0.716	0.691	0.875	
TQM	0.706	0.744	0.737	0.693	0.874

For the valuation of PLS-SEM results, significance of path coefficient,  $R^2$  value and for the size, the evaluation criteria are suggested by Hair et al. (2017). Hypothesised relevance ( $Q^2$ ) and values of the  $f^2$  effect sizes give the quality for the estimation of the PLS path model. Bootstrapping results are shown in Figure 3 and Table 4.



**Figure 3. Inner model**

After checking the validity and reliability of the instrument, the next step is to estimate the structured association among variables. The PLS structural model will analyse the direct and indirect effects of variables. SM also can be seen below. According to Hair et al. (2014), for the assessment of path coefficients we have applied bootstrapping procedure over a number of 5000 bootstrap samples and a sample size of 331. Hair et al. (2014) also state the dependence and condition of association in the SM.

**Table 4:** Direct and moderating results

	(O)	(M)	(STDEV)	T statistics	P values
<b>IP -&gt; EPR</b>	0.660	0.660	0.111	5.924	<b>0.000</b>
<b>LS -&gt; SRM</b>	0.691	0.692	0.070	9.917	<b>0.000</b>
<b>LS -&gt; TQM</b>	0.937	0.937	0.011	82.970	<b>0.000</b>
<b>Moderating effect 1 -&gt; EPR</b>	-0.003	-0.002	0.029	3.098	<b>0.000</b>
<b>Moderating effect 2 -&gt; EPR</b>	0.013	0.012	0.021	4.644	<b>0.000</b>
<b>SRM -&gt; EPR</b>	0.258	0.256	0.117	2.208	<b>0.014</b>
<b>TQM -&gt; EPR</b>	0.040	0.042	0.043	0.947	<b>0.172</b>

In the structural model for the assessment of PLS-SEM, the main criterion is  $R^2$ . Sarstedt et al. (2014) recommend the  $R^2$  value for the illustration of proportional variation in independent variable that can be defined by another expected variable. The context of the current study shows the acceptable level for  $R^2$ . In accordance with Hair et al. (2014), the minimum acceptable value for  $R^2$  is 0.10. According to Shah and Rahim (2019),  $R^2$  of 0.19 is weak,  $R^2 = 0.67$  shows a moderate level and  $R^2 = 0.67$  is a significant value. The values of  $R^2$  for the endogenous latent variables are shown in Table 5.

**Table 5:**  $R^2$

	$R^2$
<b>EPR</b>	0.864
<b>SRM</b>	0.478
<b>TQM</b>	0.877

This research has aimed to provide evidence that, with leadership and institutional pressure as moderators, the integration of TQM and supplier relationship management facilitate companies to achieve improved environmental performance. The literature (e.g. Taylor & Vachon, 2018) has discussed how institutional pressures play a role in influencing the adoption of GSCM practices. The area that requires understanding is how supplier relationship management, TQM and the leadership integration process are affected by institutional pressures on the firm's environmental performance.

The research revealed three key aspects that explain the contribution of this study to GSCM. First, the main area of concern in this research is the implementation of post-GSCM practices in terms of the SC network. This extends on research by Dubey et al. (2015) and Vanichchinchai (2019). The findings also support the findings of Wiengarten, Humphreys, Gimenez and McIvor (2016).

Second, this research integrated institutional pressures and the leadership effects on operational practices to enhance environmental performance and restore the previously

assumed independent effects. The previous literature signifies that concepts such as institutional pressures, operational practices and top management have been discussed together only rarely. The present study supports the findings of Dubey et al. (2015). This research is an extension of the environmental SC leadership theory.

Third, the model proposed in this study has been empirically tested by utilising the information gathered from the petrochemical industry. In addition, the study produced an interesting revelation. The results show that all institutional pressures integrated in this study exhibited single factor loadings, and these lower factor loadings (0.05) resulted in the release of items of mimetic pressures. With respect to petrochemical industry, significant normative and regulatory pressures were found compared with the mimetic pressures. This is the first study conducted in the petrochemical industry to analyse TQM and SRM integration in the green supply chain network. This study has therefore contributed significantly to the GSCM literature by pointing to the need for a comprehensive understanding regarding distinct associations among response alternatives (such as TQM), performance outcomes (such as environmental performance) and competencies (such as strategic relationship management or leadership).

### ***Practical Implications***

Several findings of this research provide guidance and future implications for SCM practitioners. This empirical research provided evidence that the integration of TQM and SRM actually benefits firms, under the effects of leadership in the green supply chain network. This study therefore offers certain quality management and SC sustainability insights for managers. The outcomes also strengthen the managers' idea of integrating SCM and TQM to achieve better environmental performance for SC sustainability. In addition, the findings facilitate managers' debate regarding SRM and TQM for better coordination and quality. However, if a firm's strategic relationship management is integrated with the firm's guiding philosophy, such as TQM, this may result in enhanced environmental performance through waste reduction and harmful gaseous emissions throughout the SC.

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