Does the Institutional Pressure in KSA Affects the Application of Green Supply Chain Business Model

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Abstract- **In the present research, we attempt to provide evidence that having the effect of leadership and institutional pressures role as a moderator, the integration of TQM and supplier relationship management facilitate companies in achieving environmental performance. The literature [1] has well discussed how institutional pressures play their role in influencing the green supply chain practices adoption. The area which requires understanding is that how supplier relationship management, total quality management and leadership integration process are affected through institutional pressures on the firm's environmental performance. Additionally, the institutional pressure is one of the key issues which are effecting the green supply chain mamagmnegt impnnetaion, therefore the study has examined the moderating role of instiurioal pressure. Many scholars have made the studies on different sectors like manufacturing of electronic goods, gas and oil, automotive and components, whereas according to our knowledge we haven't find any studies regarding petrochemical sector, which is the one of the main carbon emission source after deforestation, steel and refining of oil, transportation and cement. Secondly for undertaking a research project we got support from one of the petrochemical industry on Saudi Arabia , with respect to petrochemical and its handwork for the practices of green supply chain mamagmnegt. The findings of the study have provided support to the hypotehsied results.**

Keywords: *TQM, Leadership, Green supply chain, Enviroenmetal performance, Saudi Arabia*

1. Background

The increasing concerns for the protection of environment moved into green policies now [1, 2]. Now a days green manufacturing is becoming mutual waffle which one third of Specialists, researchers and manufacturers are using. May be its unavoidable. There is a need of taking some proactive approaches as compare to reactive for the companies and especially persons who are directly involved manufacturing the products. Law, et al. [3] presented a report according to which 35 % of total worldwide consumption of electricity consumed by the international manufacturing industry and also responsible for the emission of CO2 by 20 percent of the world, which is harmful for all creations on earth. The reason of this argument is the consideration on the way to green manufacturing.

In past few years scholars and researchers are more concerned and have great attention on the manufacturing practices which are environment friendly. There is a lot of literature available on the implementations of green manufacturing [4], but less attention has been given to operational practices, leadership and their effects on environmental performance (EP). For understanding the part of main factors of Green manufacturing (GM) in EP only few theories have utilized theory-focused approach. Here are some studies on leadership [4], supplier relationship management [4], total quality management institutional theory and environmental performance.

For explaining the effect of total quality management (TQM), supplier relationship management (SRM) and leadership on EP with the effect of institutional pressure. According to the results of Dubey, et al. [5], for the supply chain management he has purposed a excellence business model we also stated that the effects of implementing green manufacturing practices can be moderated additionally with institutional pressure. Whereas it is rational to undertake that TQM, SRM and leadership with moderation impact of IP can be important for EP, and consequently it will be significant for the adoption of environment friendly practice of petrochemical industry. We also stated that the adoption is not developed yet theoretical based experimental studies by focusing on the post adoption period environment friendly practices (EFP) are undoubtedly termed for petrochemical industry. This study will make three main contributions in the literature of green supply chain management (GSCM), With experimental authentication of a hypothetically resulting GSC model, the current study also examined the model under organizational theory specifically at the stating stage of institutional theory [6]. Recently Glover, et al. [7], examined sustainable practices in supply chain of dairy with institutional theory point of view. The study of Glover, et al. [7] also provided stimulating understanding of pressure of institutes, and its effects on implementing the EP. Secondly current study will also recognize the importance of green supply chain model in petrochemical industry, thirdly by adopting the environment friendly practices over detailed examination of manufacturing sector in petrochemical industry we have extended the previous research. There are two aspects for testing our projected model regarding petrochemical industry. Many scholars have made the studies on different sectors like manufacturing of electronic goods, gas and oil,

automotive and components, whereas according to our knowledge we haven't find any studies regarding **petrochemical sector,** which is the one of the main carbon emission source after deforestation, steel and refining of oil, transportation and cement. Secondly for undertaking a research project we got support from one of the petrochemical industry on Saudi Arabia , with respect to petrochemical and its handwork for the practices of GSCM.

Based on above discussion we have the following research objective for the current study.

i) Empirical validation of the theoretical framework proposed for this research

A confirmatory factor analysis (CFA) is adopted for the empirical validation of the theoretical model proposed in this study. The CFA facilitates the researcher in assessing the validity of underlying theoretical framework. Furthermore, instead of using structural equation modeling for testing the proposed hypotheses of this research, a hierarchical regression analysis (HRA) is adopted.

ii) To give suggestions to the petrochemical industry, which can potentially aspire firms towards GSCM implementation.

As mentioned earlier, the main area of concern in this research is the petrochemical industry, which makes it a unique contribution in the literature. However, the given suggestions may prove to be helpful for the petrochemical industry in outlining strategies to bring improvement in the environmental performance.

iii) Outlining directions for further research

This research has some limitations that can be controlled; therefore, further research was carried out, in order to extend the extant literature. This paper is presented as follows: the next section involves the theoretical foundation of this paper.

2. Developing theoretical framework and hypotheses formulation

The supplier relationship management (SRM) is a key to successfully achieve green purchasing. It requires firms to connect along with other network suppliers and creates motivation among them to deliver non-hazardous and eco-friendly raw materials, such as instructing and training suppliers for ISO 14001:2004 adoption. Therefore, those firms which persuade suppliers to provide eco-friendly materials and frequently review suppliers' progress tend to successfully adopt green practices. Through supplier collaborations, eco-friendly products would be achieved relatively faster as compared to when solely depending upon in-house R&D team. Transparency can be achieved with the successful partnership practices, resulting in visible costs for developing eco-friendly materials and minimizes the risk of over-spending. A firms' 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 the on-time material delivery for production demand. Dubey, et al. [5] presented their work 'Business excellence model for SCM' in a seminar. In this paper they analyzed that how TQM initiatives are driven by leadership, to achieve higher performance through collaboration in a SC network. Therefore, the present research aims to further analyze this model considering the institutional pressures as moderator [8]. As result, Figure 1 shows a theoretical framework of this research. The current study is being carried

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, i.e. setting their goals and objectives keeping into consideration the environmental factors. In view of Prajogo, et al. [9], leadership is the pyramid base while developing a TQM model. It has also been recognized by researchers Teoman and Ulengin [10] as a TQM philosophy driver, since it fosters SC collaboration and facilitates in developing quality culture. Moreover, leadership acts as a key driving force to adopt GSCM initiatives. In a research by Dubey, et al. [5], they outlined that in what ways leadership contributes in successfully attaining environmental performance, within a SC. Leadership takes into account the environmental goals and policy setting, in order to deliver training and resources and promoting performance improvement. In contrast to internal management control, leadership also involves the development of SC practices which are driven by customer's ever-changing needs and requirements, keeping the long-term vision into consideration. Therefore, the following hypothesis is 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 reduction in bull-whip effect within the SC network [5]. According to Spiegler, et al. [11], the term supply chain collaboration referred as the shared efforts for accomplishing common goals and objectives. Relationship management throughout the SC also assists organizations in adopting TQM [12], for achieving their green objectives, such as decline in carbon emissions [13], and in the successful green practices adoption within the SC

[14-16]. 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.

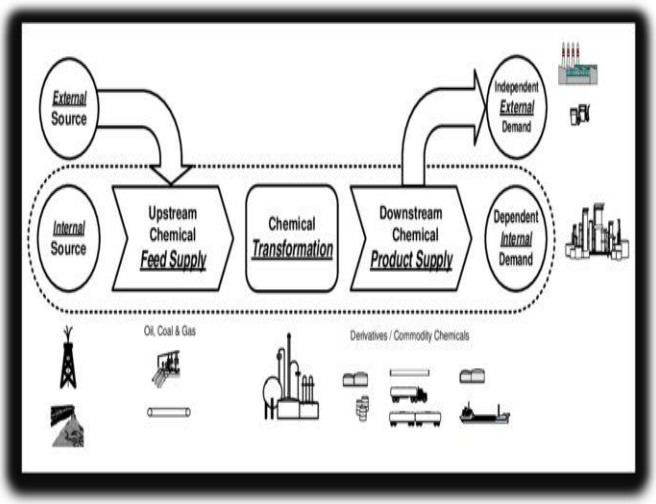

Figure 1. Value chain of petrochemical Louw, & Pienaar (2011)

Thus, SRM ensures the 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, we propose hypothesis as:

H3:SRM has significant impact on the EPR

Total quality management, an ideology by which an organization provides services and quality products to the customers. Therefore, TQM refers to an ongoing improvement process for the groups, individuals, and firms. TQM comprises of eight key concepts namely, all work is process, customer satisfaction, teamwork, internal customers are real, people make quality, measurement, prevention, and continuing improvement cycle and the four key principles[5]. Thus, TQM can be concluded as 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 all stakeholders' potential. Several researchers [9, 17] in past have attempted to examine the TQM's contribution in firm performance to achieve reduction in recycling waste, and carbon emissions, thereby meeting green objectives. In an empirical study, Siva, et al. [18] directed the attention towards the significance of quality management practices in the firms' environmental performance. Therefore, TQM measures are used to assess the firm's ability to reduce SC variability, and to enhance product quality and coordination throughout the SC. TQM enables to develop a perspective among the SC partnering firms, with an aim to minimize costs led by avoiding overproduction, defects and transport related wastages. Therefore, it is hypothesized that:

H4:SRM has significant impact on the EPR

In recent years, an increasing contribution of institutional theory has been witnessed in the SCM and OM areas [19]. Scott and Davis [20] explained institutional theory as the external forces which bring motivation among firms to perform strategic actions. According to author, the institutional theory firms are profit-seeking and understands the significance of social legitimacy. Wuttke, et al. [21] suggested that institutional theory can take the form of a) social variant and b) an economic variant. Thus, according to Liao [22], the identified mechanisms for institutional theory are normative, coercive, and mimetic, resulting in institutional isomorphism. The coercive mechanism comprises of informal and formal pressures, that are placed on firms by the society and to which they are dependent upon [19, 22]. According to Teixeira, et al. [23], GSCM acts as an environmental tool for gaining competitiveness and enhancing the environmental image of an organization 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 have been discussed earlier as well as an emphasis was also placed on applying these underlying principles in a products' lifecycle.

The practicing managers must understand the linkage among economic and environmental performance and GSCM practices for the successful adoption of GSCM. The regulatory and market pressures, that may take the form of environmental pressures facilitate in the growth of an organization, since these pressures are assumed to have a great influence on green purchasing and eco-design. However, those manufacturers who are encountered with greater pressures are more likely to adopt investment recovery policies and green purchasing in their organization [8]. Furthermore, competitive pressures also tend to inflate the benefits obtained after the adoption of GSCM practices, such as economic benefits. A study Tang, et al. [24] attempted to investigate the moderating impact of green operations and environmental management on the performance of a manufacturing firm. However, the current study is conducted using an institutional theory perspective. Literature indicate that institutional pressures act as driving forces in the adoption of environmental management practices in organizations. For instance, a study that was conducted in Taiwan's textile industry has studied the effects of GSCM drivers on the GSCM practices, with institutional pressures as moderators. Therefore, this research assumes that institutional pressures act as moderator in the TQM and SRM relationship impact on the firm's environmental performance. Thus, it can be argued that what are the reasons for not taking institutional pressures as a mediator. However, there has been confusion among the researchers regarding the mediating, controllable and moderating

variables. Therefore, this confusion can be resolved through critical review and proper understanding about these concepts. Thus, enough literature is available for our research which supports that the use of institutional pressures as a moderator. León-Bravo, et al. [25] have attempted to examine that which factors act as drivers in the TQM implementation. The effect of institutional pressures as moderators were studied on the firms' intention for implementing internet-based SC. In addition, another study also observed the firms' supplier development program in terms of institutional theory perspective. The institutional pressures involve normative, coercive, and mimetic pressures that act as drivers for adopting GSCM practices in an organization. These pressures are generally measured in the market pressure, profit motive, brand consciousness, and regulatory pressure's perspective, resulting in institutional isomorphism. Thus, on the basis of aforementioned discussion, following hypothesis is proposed:

H5: IP has significant impact on the EPR
H6: IP moderates between TQM and EPR
H7: IP moderates between SRM and EPR

3. Methodology

3.1 Questionnaire design

Developing a questionnaire plays a significant role in conducting a survey, therefore, we begin by reviewing five main concepts in the extensive literature, namely 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 have been used in earlier researches. Several researchers [5, 8, 19, 22] from quality management field, have used questionnaires as an instrument for conducting an empirical research. After reviewing the literature, a questionnaire was developed, comprising of two sections:

In the first section, the questions regarding TQM, leadership, institutional pressures, and relationship management among partnering firms were added. Section 1 involves 25 items. This section aims to measure the practitioners' perceptions, since these are the targeted respondents of this research. Five-point Likert scale was used for measuring the responses, where 1 represents strongly disagree and 5represents strongly agree.

In section 2 of the questionnaire, questions regarding environmental performance were included. This section involves six items. This section aims to measure the respondent's (environmental managers) perceptions. Five-point Likert scale was used to measure the responses, where 1 represents strongly disagree, and 5 represents strongly agree.

3.2 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 minimize measurement errors, enhance validity and reliability, and ensure greater variability between the survey respondents [26]. All the study constructs were operationalized by adding at least three measuring items and by performing confirmatory factor analysis [27].

Before finalizing the questionnaire, a pretest was carried out for the included items to confirm content validity, using the services of six experts from the academia and industry. All the experts' suggestions were incorporated, followed by the necessary modifications in 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, which will be discussed in the data gathering section. Tabulated form is chosen to present the constructs, respective measures, and the supported literature (see Table 1). 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 also employed for determining the extraneous effects, i.e. by incorporating dummy variable for the firm size [28]. The nature of the study was not considered in this research since our study focuses upon the petrochemical equipment and petrochemical industry.

3.3 Sampling

In Saudi Arabia , over 3500 petrochemical goods manufacturers are operating, which are licensed and have adopted green practices, according to the ministry of petroleum Saudi Arabia. For data collection, firm's senior managers were selected as the targeted respondents. The sample size for this study was estimated using Hafeez and Farooq [29] formula, which came out as 358 at 95% level of confidence. However, some of the recent researches that were conducted in the area of SCM and OM have indicated that 150 sample size is sufficient Hair Jr, et al. [30] for testing of the proposed research hypotheses.

Therefore, the present research aims to empirically analyze the relationships among SRM, green SC's environmental performance, 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 of firm size. This study will refine and strengthen the TQM and SRM's integration 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 researches [19]. Our study thus provides assistance in empirically testing the

Tizroo, et al. [31] model, for sustainable SC and the Dubey, et al. [5] Business Excellence Model for Supply Chain Management, which are presently are of great importance. Furthermore, this study also attempted to have a clear understanding about the possible relationship among GSCM theory and institutional theory.

4. Results

According to Hair, et al. [32] for reporting the outcomes there are two stages involved in PLS analysis: the first one is measurement model (MM) assessment and the other one is structural model (SM) assessment. We have used the PLS-SEM for achieving the objectives of current study , PLS-SEM is second generation technique, which is robust and a new technique because it integrate models into equational structure and with immediate operation provide results by creating a relationship with all intervening and direct singularities

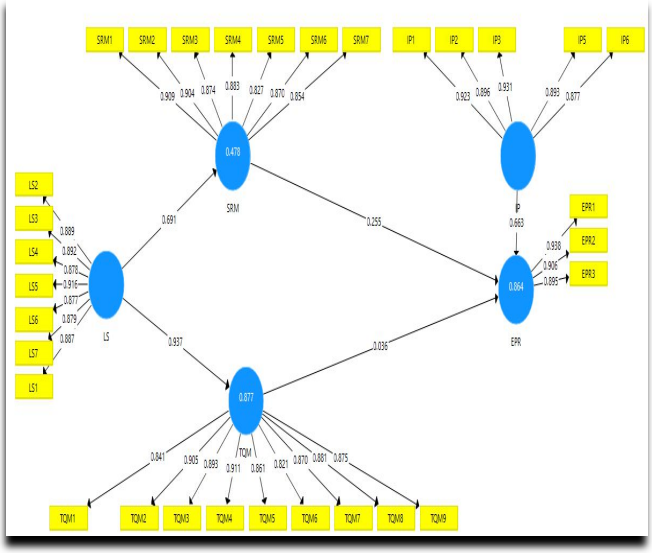

Figure 2. Outer model

Table 1. Outer loading

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

As per study of Hair, et al. [32] for the assessment of 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. [32], 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. [32] have suggested the method according to which PLS approach is common indicator for second order constructs. Results of convergent validity are shown in Table **2** which are surpasses the recommended values which shows 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 for calculating the discriminant validity. The Tzempelikos and Gounaris [33] criterion most suggested for calculation of DV. Which 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 the Hair Jr, et al. [30] for the assessment of DV this method is known as the most conservative

criteria. Fornell-Larcker criterion results are shown in the **table 3,** which are attained.

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 the Hair, et al. [32]. Hypothesized relevance (Q^2) and values of the f^2 effect sizes gives the quality for the estimation of PLS path model. Bootstrapping results are shown in Table 4 and Figure 3.

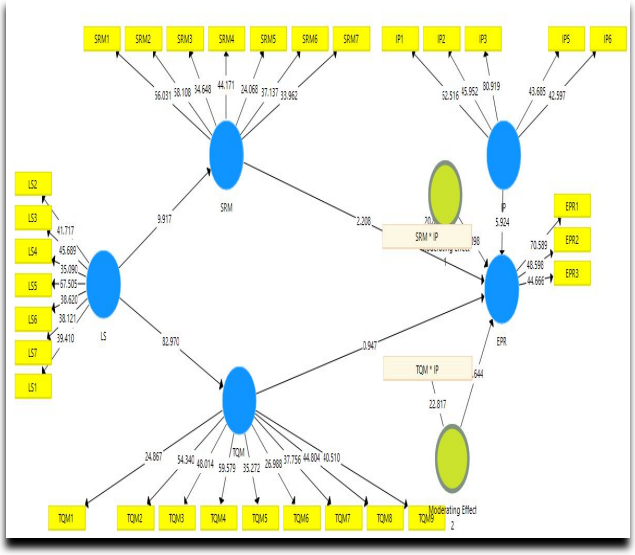

Figure 3. Inner model

After checking the validity and reliability of instrument the next step is to estimate the structured association among variables. PLS structural model will analyze the direct and indirect effects of variables SM also can be seen below. According to the Hair, et al. [34] for the assessment of path coefficients we have applied bootstrapping procedure over number of 5000 bootstrap samples and 331 sample size. Hair, et al. [34] also stated the dependence and condition of association in the SM.

Table 4. Direct and Moderating results

	(O)	(M)	(STDEV)	T Statistics	P Values
IP -> EPR	0.660	0.660	0.111	5.924	**0.000**
LS -> SRM	0.691	0.692	0.070	9.917	**0.000**
LS -> TQM	0.937	0.937	0.011	82.970	**0.000**
Moderating Effect 1 -> EPR	-0.003	-0.002	0.029	3.098	**0.000**
Moderating Effect 2 -> EPR	0.013	0.012	0.021	4.644	**0.000**
SRM -> EPR	0.258	0.256	0.117	2.208	**0.014**
TQM -> EPR	0.040	0.042	0.043	0.947	**0.172**

In structural model for the assessment of PLS-SEM the main criterion is R-square. Sarstedt et al (2014) have recommended the R-square value for the illustration of proportional variation in independent variable that can be defined by another expected variable. However, the context of current study shows the acceptable level for R-square. As per the study of Hair, et al. [34] the minimum acceptable value for R square is 0.10. According to Shah and Rahim [35] if R- square is 0.19 is weak, and if R2= 0.67 shows the moderate and if R2= 0.67 is significant value. The values of R-square for the endogenous latent variables are mentioned in Table 5.

Table 5. R-square

	R Square
EPR	0.864
SRM	0.478
TQM	0.877

5.

Through present research, we attempt to provide evidence that having the effect of leadership and institutional pressures role as a moderator, the integration of TQM and supplier relationship management facilitate companies in achieving environmental performance. The literature [8] has well discussed how institutional pressures play their role in influencing the GSCM practices adoption. The area which requires understanding is that how supplier relationship management, total quality management and leadership integration process are affected through institutional pressures on the firm's environmental performance.

The current research presents three key aspects which explain the contribution of this study to GSCM. These aspects are firstly, the main area of concern in this research is the post GSCM practices implementation, in terms of SC network. This is the extension of past works by Dubey, et al. [5] and Vanichchinchai [36]. The findings also supported Wiengarten, et al. [37] study.

Secondly, this research also integrated the institutional pressures and the leadership effects on operational practices, for enhancing environmental performance and restoring the previously assumed independent effects. The

existing literature signifies that the concepts such as institutional pressures, operational practices, and top management have been discussed together only rarely. The present study supports Dubey, et al. [5] findings. This research is an extension of the environmental SC leadership theory.

Thirdly, the model proposed in this study has been empirically tested by utilizing the information gathered from petrochemical industry. In addition, an interesting revelation was provided by this research. The results have shown that all institutional pressures integrated in this study exhibited single factor loadings and these lower factor loadings (0.05) resulted in the release of the items of mimetic pressures. With respect to petrochemical industry, significant normative and regulatory pressures were found as compared to the mimetic pressures. Therefore, this is the first study which was conducted in the petrochemical industry to analyze TQM and SRM integration in the network of green supply chain. Thus, this study significantly contributed to the GSCM literature by directing towards the need for a comprehensive understanding regarding distinct associations among response alternatives (such as, total quality management), performance outcomes (such as environmental performance), and competencies (such as, strategic relationship management or leadership).

5.1 Practical Implications

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

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