

Investigating Absorptive Capacity in Supply Chain Performance: Green Supply Chain Management Practices and Responsive Strategy

Imran Shafique¹
Tuquireer Hyder²

Abstract

This research aims to inspect the role of absorptive capacity in connecting green supply chain management (GSCM) practices, responsive strategy (RS) and supply chain performance (SCP) by utilising the information processing theory (IPT). Data was collected from 57 textile organisations in Pakistan and partial least square of structural equation modelling (PLS-SEM) is employed to analyse the hypothesised juxtaposition. The results disclose that absorptive capacity stimulated by GSCM practices and RS fully mediates the posited linkages, showing that absorptive capacity is an essential organisational aptitude that intends to produce novel products to

meet turbulent market expectations. The results recommend that employing the elements of absorptive capacity collectively could augment achievement. Therefore, managers may consider a holistic viewpoint, identifying that spending to establish procedures, developing employees and technology are important for achievement. The novelty of this study is to establish and clarify the role of absorptive capacity (information management) to convert practice (GSCM practices) and strategy (RS) into performance (SCP).

Keywords: *GSCM practices, RS, absorptive capacity, SCP*

¹ Department of Management Sciences, COMSATS University Islamabad, Lahore Campus.

² Department of Management Sciences, COMSATS University Islamabad, Lahore Campus.

Introduction

SC is hypothesised as an organisational network, which involves three unique flows namely product, knowledge/information, and capital (Ketchen, Crook, & Craighead, 2014). Information is the focus of this study. Though, information is not always to help management in decision-making (Van Knippenberg, Dahlander, Haas, & George, 2015), the aptitude of establishing understanding and employing knowledge is necessary (Hislop, Bosua, & Helms, 2018). Information processing is imperative since performance is not achieved through just information; however, performance is achieved via how successfully information is managed and employed in the decision-making process (Andersen, 2001; McAfee, 2003). Furthermore, information processing has elevated significantly since organisations are confronting augmented pressure to respond to the expectations of customers (Luo, Wu, Rosenberg, & Barnes, 2009). Most information required to augment performance is from external sources like suppliers and customers. Absorptive capacity has appeared as a significant notion in the domain of supply chain that apprehends the collection of an organisation's information processing initiatives (Saenz, Revilla, & Knoppen, 2014).

Absorptive capacity is referred to as the extent to which an organisation obtains, integrates, converts, and employs information to elevate performance (Zahra & Hayton, 2008). For instance, since the organisations started to engage their suppliers in their product development process (Petersen, Handfield, & Ragatz, 2005), absorptive capacity allows companies to attain higher responsiveness (Liao, Welsch, & Stoica, 2003) and to implement GSCM practices (Brdulak, 2019) via obtaining and pertaining information throughout the organisation (Choo, 1996). Being an imperative measure, absorptive capacity is a pivotal fact that supply chain management researchers have recognised as enabling an improved comprehension

(Rojo, Stevenson, Lloréns Montes, & Perez-Arostegui, 2018; Martinez-Sanchez & Lahoz-Leo, 2018). However absorptive capacity is considered to be a vital organisational trait for responsiveness and GSCM practices; limited empirical evidence is available about suitable structural relationships connecting the concept (Dobrzykowski, Leuschner, Hong, & Roh, 2015; Liao et al., 2003). In addition, limited research is available regarding how organisations establish absorptive capacity, or why few organisations exhibit this aptitude though others do not (Cohen & Levinthal, 2000). This research investigates absorptive capacity as a firm-level strategy that permits a firm to gather external information, circulate, and employ to develop worth (Galbraith, 1973, 1974). The conceptual framework of this study (Figure 1) clarifies the nexus among GSCM practices, RS, absorptive capacity and SCP.

The developed conceptual framework is analysed employing data from manufacturing organisations. The findings demonstrate two fundamental contributions about GSCM practices, RS, absorptive capacity and SCP. First, absorptive capacity is revealed to be enhanced by an organisation's GSCM practices and RS. Second, absorptive capacity fully mediates the nexus between GSCM practices and SCP, and between RS and SCP, illustrating that absorptive capacity is an essential ability to organisations which intends to provide novel offerings to the customers. The rest of the article is organised as follows. The next part explains the constructs and develops the hypotheses. This part subsequently includes the details of methodology and findings. The final part presents discussion on findings with theoretical and practical implications, limitations, and direction for future studies.

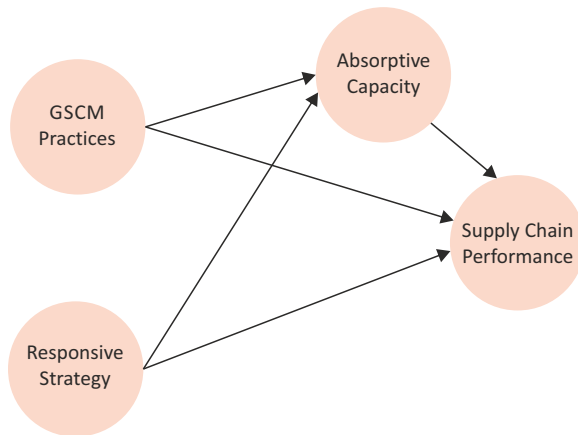


Figure 1: Conceptual Framework

Theory and Literature Review

GSCM practices and SCP

Over the last few decades, there has been serious awareness among people about environmental issues. Environmental advocates are making policies and strategies for survival of the environment (Chuang & Huang, 2018). Many international organisations are implementing policies and strategies for environment sustainability (Xie & Breen, 2012). Today's environment is facing severe problems due to extra use of chloroform carbons and nuclear products. Supply chain management is considered as turning raw material into final goods and transferred to customers. Consequently, GSCM notion emerged in the 1990s decade. It comprises taking proactive steps for environment protection. These steps are recycling of products and reverse logistics, and innovation for environmental sustainability (Zhu & Sarkis, 2004). Basically, GSCM is consolidation of environmental management in supply chain management (Sabat & Krishnamoorthy, 2018).

GSCM practices have focused on societal welfare, ethical production of products and reduction of those activities which have an adverse impact on the environment. GSCM also focuses on societal issues like ensuring proper working environment to suppliers (Walker & Jones, 2012). GSCM practices not only

affect sustainability of the environment, but also augment the SCP (Katiyar et al., 2018). For example, use of raw material and energy efficiently, low waste refinement of products during a product life cycle promote the SCP (Klassen & Whybark, 1999; Sharma & Vredenburg, 1998). Nowadays, customers are more sensitive about environment and society than before (Pathak, 2017). By paying attention to environment and society, organisations can increase their market performance (Hillman & Keim, 2001). Environmental constraints, corporate social responsibility, increasing environmental awareness among stakeholders and global warming are the reasons due to which GSCM practices are needed. Therefore, organisations are more conscious about the environment and this planet than ever before. In multinational organisations, even suppliers are very conscious about GSCM practices. Hence, organisations performing GSCM practices have improved the alignment of their operations with the suppliers. Associated financial advantage also contributes to organisations' SCP. Suppliers also prefer to work with those organisations which consider environment as a crucial element because these organisations earn repute in the market and in result, customers' retention, loyalty, and attraction will be increased. However, suppliers' reputation will be promoted, which can enhance their customers as well (Xie & Haugland, 2016). In addition, government regulations about environment sustainability can be followed by adopting GSCM practices. Environmental considerations influence operational performance positively, which ultimately improves SCP of the organisations. However, it is proposed that:

H1: GSCM practices have a positive link with SCP

GSCM practices and absorptive capacity

The idea of absorptive capacity was initially presented by Cohen and Levinthal (1989; 1990). It is a general competence of individuals, group of individuals and organisation for recognising the worth of new information. Absorptive capacity has two main

components: first, capacity to obtain knowledge from outside-organisation; second, capacity to constructive utilisation of that information (Cohen & Levinthal, 1990). Due to mass customisation and cost cutting competition, need for environment sustainability increased which encourages organisations to work for environmental sustainability. Proper alignment with stakeholders like suppliers, regulatory bodies, and customers etc., knowledge acquisition can be further strengthened. The implementation of GSCM practices can enhance the capacity of the organisation to fulfil the demand of its stakeholders.

Due to industrial revolution, environment is destructed (Lucas Jr, 2018). For example, depletion of the ozone layer, greenhouse effect, and melting of ice on mountains are the results of industrial activities. Environmental pollution has not only damaged human health, but also all other living beings on earth. All these issues have forced industrialists to think about their activities and there is need to take some steps to find solutions for protection of the environment. Therefore, organisations must have knowledge of GSCM practices to devise strategies to counter this challenge.

Suppliers are among major stakeholders because they not only provide raw material, but also knowledge about market trends, customer demands, and regulations. SC managers always try to maintain a balance between acquisition, refinement, and exploitation of knowledge for the best interests of the organisation (Blome, Schoenherr, & Rexhausen, 2013). Knowledge refinement refers to chasing pertinent and valuable information; however, exploitation is defined as the efficient use of that knowledge (Im & Rai, 2008). Absorptive capacity of a firm explains why one organisation is more successful as compared to others (Lane, Koka, & Pathak, 2006). Organisations use absorptive capacity to consolidate with the environment to find new knowledge (Meinlschmidt,

Foerstl, & Kirchoff, 2016). This stage shows organisations' willingness to meet their stakeholders' demand with respect to sustainability (Lee, Padmanabhan, & Whang, 2004). In line with this backdrop, it is posited:

H2: GSCM practices have a positive relationship with absorptive capacity.

Responsive strategy and SCP

Customer demand has changed in the twenty-first century. There are a variety of choices in customer demand. Moreover, customer demand has evolved with the passage of time. Markets have been changing rapidly from predictable to unpredictable, which necessitates the emergence of RS. Simply, we can say that varying demand of the customer has created the thirst for RS. RS means continuous readiness to change (Goldman, Nagel, & Preiss, 1995). Undoubtedly, customers require changes in products and services; consequently, organisations need to change their SC operations. Organisations have to cope with the challenges of customer demand like low price, best quality, and delivery in a very short time period. In order to counter these challenges, RS is indispensable.

Success of any organisation depends upon the extent of agility existing in its operations and how effectively it links to get information about its customers' demands. Therefore, responsive SC depends upon the ability to sense what the end customer wants. Organisations try to give value to their customers' suggestions and further gather information from their suppliers. Quick response in SC is extremely necessary for organisations to run their operations according to changing customer demands (Bernardes & Hanna, 2009; Moradlou, Backhouse, & Ranganathan, 2017).

The process of improvements in SC operations like managing inventory, services to customers, and logistics mainly depend on RS (Qi, Zhao, & Sheu, 2011). RS helps to meet changes in short term customer

demand (Lee, 2002). The main purpose to share information with suppliers is to promote SCP. SCP can be delineated as how efficiently and effectively organisations' activities help to accomplish goals. SCP is the operational excellence to deliver leading customer experience (Simchi-Levi, Kaminsky, & Simchi-Levi, 2003). Responsive SC is a key to success for every organisation (Christopher & Gattorna, 2005; Fisher 1997). It helps to reduce cost and improve productivity (Grossmann, 2005), consequently enhances SCP.

Organisations follow RS to run their operations according to the demand in markets and have diverse product lines. It is obvious that innovative organisations continuously adopt latest technology. Latest technology has high efficiency as compared to old technology. On the other hand, usage of latest machines to run its operations automatically enhances overall employees' aptitude and performance.

Having good and strong relations with suppliers will also increase SCP. Suppliers are one of the most important sources to meet customers' demands. Using two-way communication, the manufacturer shares information about customers' demand and the supplier provides material according to demand. On the other hand, suppliers also provide information about market trends to the organisation and ultimately SCP increases. To respond to the increasing environmental uncertainty, it is necessary for manufacturers to increase flexible manufacturing technologies to achieve reasonable benefit (Sim, Gorman, Greenes, Haynes, Kaplan, Lehmann, & Tang, 2001). As the products mostly have short life cycles, therefore, RS is essential to introduce new products (Qi et al., 2011). RS influences the SCP through practice of strategic supplier partnership. Likewise, organisations which make strategic relations with suppliers accomplish process integration, ideas sharing, identification of new market opportunity, and

creating knowledge about products' raw material (Saeed, Malhota, & Grover, 2011). Hence, it is postulated:

H3: RS has a positive association with supply chain performance

RS and absorptive capacity

Absorptive capacity is stated as the process of obtaining, absorbing, and utilising the knowledge (Cohen & Levinthal, 1990). Absorptive capacity in the SC perspective denotes to the process of collecting knowledge from customers and suppliers, absorbing and applying that knowledge into operations (Cohen & Levinthal, 1990). Absorptive capacity of any organisation is not only affected by the outside information means; it is also affected by inside process wherein knowledge is transferred to other sub-units (Hult, Ketchen & Slater, 2004). Organisations can sense customers' demands by knowledge acquisition process and comprehend production plans and schedule the deliveries (Lau, Tang, & Yam, 2010). Consequently, this responsive way affects the absorptive capacity of the organisation by obtaining knowledge from customers and suppliers and reducing the SC uncertainty.

RS indicates risk of failure and uncertainty for organisations (Fisher, 1997; Lee, 2002). To overcome uncertainty and risk of failure, organisations need to have outside-organisation information (Haas, 2010). The nexus of RS and SCP can be established successfully via acquiring and utilising the outside-firm information (Dobrzykowski et al., 2015). Generally, absorptive capacity is used to attain and adapt information for specific objectives like to develop new products proactively by understanding the changing demand of customers. However, it is also necessitated to restructure the SC for conversion and implication of knowledge (Dobrzykowski et al., 2015). Therefore, it is supposed that:

H4: RS has a positive nexus with absorptive capacity.

Mediation of absorptive capacity

IPT is an intellectual approach to sense how human minds transform sensational information. According to IPT, human mind acts as a computer processor. As a computer processor receives information via software and produces the desired output, the human mind receives stimuli from external information and performs actions after processing.

The stakeholders' pressure and regulations shift the production and operational practices of the organisations which are best for environmental sustainability (Moyeen, 2018). Therefore, required practices (GSCM practices) and strategy (RS) for successful mass customisation and to win cost cutting rivalry improves knowledge acquisition and utilisation which consequently elevate overall SCP (Jha & Karn, 2018). However, implementing the GSCM practices can enhance the capacity of an organisation to fulfil the demand of its stakeholders. As per IPT, organisations through absorptive capacity, assimilate, analyse and utilise the information to sense the customers' preferences and respond to them accordingly. This responsiveness, eventually, affects SCP positively. Hence, RS is significant to affect absorptive capacity and in turn, enhance SCP because quick and positive response to stakeholders will help to absorb highly significant information. Similarly, the organisations which prefer to respond to their customers and suppliers at priority and in a constructive way will increase their knowledge acquisition. Additionally, customers and suppliers also show responsiveness if their suggestions are considered important. Knowledge acquisition, assimilation, and utilisation through RS bring effectiveness and efficiency in the operations of the organisation, which consequently augment the overall SCP.

H5a: Absorptive capacity mediates the nexus of GSCM practices and SCP

H5b: Absorptive capacity mediates the nexus of RS and SCP

Research Methodology

Sample and Procedure

To analyse the proposed conceptual framework, the textile sector of Pakistan was selected. The textile industry has been selected for research because of two reasons. First, this sector contributes significantly towards GDP, employment and exports as compared to any other sector of Pakistan. Secondly, GSCM practices are important for environmental sustainability and there is serious need to exercise GSCM practices in this industry. Six cities (Lahore, Pattoki, Kasur, Faisalabad, Sheikhpura, and Multan) of province Punjab were selected for data collection. These cities have major portion of textile organisations.

For data collection, senior SC managers and/or senior procurement managers were contacted with a blend of self-contacts approach. This approach is helpful for data collection in a collectivist society like Pakistan (Bouckenoghe, Zafar, & Raja, 2015; Shafique, Kalyar, & Ahmad, 2018). Eighty questionnaires were distributed to the above mentioned managers of 80 organisations. Sixty-three questionnaires were received with nearly 79% response rate. However, six questionnaires were incomplete and excluded from the final sample. Therefore, 57 questionnaires were considered as the final sample and used for further analysis.

Measures

We used validated constructs to measure the variables of this study. GSCM practices are measured using 14-item scale adapted from Zhu, Sarkis and Lai (2008). The sample item is "we design our products to avoid or reduce the use of hazardous products and their manufacturing process". RS is measured employing 4-item scale adapted from Sabherwal and Chan, (2001). The sample item is "our supply chain aims to respond effectively changing requirements of design". Seven-item scale developed by Tsanos, Zografos and Harrison (2014) is employed to assess SCP through SC efficiency and effectiveness. The sample item includes "our

supply chain does handle difficult nonstandard orders". Fourteen-item scale is adapted from Flatten, Engelen, Zahra and Brettel (2001) to measure the absorptive capacity. Sample item is "the search for relevant information concerning our industry is every day business in our company". The respondents were required to report the response on the 5-point Likert scale ranging from '1' for "strongly disagree" to '5' for "strongly agree".

Data Analysis

The nexus among variables as depicted in Figure 1 are investigated employing PLS-SEM. A number of reasons are available to choose PLS-SEM over covariance based SEM. First, PLS-SEM fulfils the proportion requirement of low sample-size (1:10) for path estimation (Hair, Hult, Ringle, & Sarstedt, 2016). Second, PLS-SEM is a suitable analytical method for exploratory research (Hair, Ringle, & Sarstedt, 2011). Third, PLS-SEM is preferably developed for forecasting objective (Hair, 2017). Finally, PLS-SEM does not require rigorous multivariate normality assumptions. WarpPLS 5.0 software is employed to run PLS-SEM.

Assessment of Measurement model

Cronbach's alpha and composite reliability (CR) are employed to check the reliability of the measurement model. The values of Cronbach's alpha and CR meet the suggested cut off points of 0.70 (Nunnally & Bernstein, 1994); therefore, it is confirmed that measurement model is largely reliable.

Construct validity is achieved using convergent validity and discriminant validity. Convergent validity represents the extent to which measurement items of a latent construct should be linked to each other (Hair et al., 2011). Convergent validity can be ensured on condition that all the items of a latent construct must be loaded significantly on that construct. Therefore, convergent validity is checked by factor loadings, average variance extracted (AVE) and CR. The recommended values of factor loading and AVE are ≥ 0.50 (Hair, Sarstedt, Ringle, & Mena, 2012). Table 1

includes the values of factor loadings, AVE, and CR which reveal that measurement model meets the criteria of convergent validity. Discriminant validity represents the extent to which the latent constructs are exclusively divergent from each other (Churchill, 1979; Hair, Ringle, & Sarstedt, 2013). Discriminant validity is checked by comparing the square root of AVE of a latent construct with the relevant correlation given that the value of square root of AVE must be higher than correlation value (Fornell & Larcker, 1981; Gefen, Straub, & Boudreau, 2000; Kling, 2001). Table 2 reveals that the values of square root of AVE are presented in the diagonal in parentheses are greater than the values of respective correlational factor.

In addition, it is necessary to investigate the common method bias (CMB) in data since the data on GSCM practices, RS, absorptive capacity, and SCP was gathered from the same respondents. Although procedural remedies like respondents' anonymity are followed to prevent from CMB (MacKenzie, & Podsakoff, 2012), but further we analyse the CMB through full collinearity variance inflation factor (Kock, 2015). As Table 1 indicates, the values of full collinearity VIFs are within the acceptable range (≤ 3.3) which exhibits that both CMB and multicollinearity do not exist in the data (Kock & Lynn, 2012).

Since this study followed Barron and Kenny (1986) for mediation, they provided three conditions. First, the exogenous variable (GSCM practices & RS) should have significant nexus with endogenous variable (SCP). Second, exogenous variable (GSCM practices & RS) should have significant relationship with mediator (absorptive capacity). Third, mediator (absorptive capacity) should have significant link with endogenous variable (SCP) and while estimating the mediation, if the direct effect of exogenous variable (GSCM practices & RS) with endogenous variable (SCP) effect remains significant i.e. partial mediation and if the direct effect of exogenous variable (GSCM practices & RS) with endogenous variable (SCP) effect becomes insignificant, i.e. full mediation.

Table 1: Measurement Model Evaluation

Items	GSCMP	AC	RS	SCP	Items	GSCMP	AC	RS	SCP
ED2	0.811				AC14		0.548		
ED3	0.611				RS1			0.769	
ED4	0.681				RS2			0.805	
IR2	0.711				RS3			0.751	
AC1		0.751			SCP1				0.671
AC2		0.584			SCP2				0.533
AC6		0.643			SCP3				0.552
AC8		0.598			SCP4				0.657
AC9		0.626			SCP6				0.56
AC10		0.639			SCP7				0.627
AC11		0.577			Cronbach's α	0.762	0.768	0.826	0.746
AC12		0.646			CR	0.798	0.819	0.858	0.772
AC13		0.519			AVE	0.500	0.601	0.380	0.363

Table 2: Mean, Standard Deviation, and Correlations

Variables	Mean	SD	1	2	3	4
1. GSCMP	3.419	1.432	(0.707)			
2. RS	3.604	0.849	0.356***	(0.616)		
3. AC	4.384	1.638	0.505***	0.505***	(0.775)	
4. SCP	3.416	1.199	0.228***	0.366***	0.433***	(0.602)

*** $p < 0.001$

Assessment of structural model

Before estimating the hypotheses, the goodness of model fit needs to be checked. WarpPLS 5.0 package provides fit indices namely: average path coefficient (APC), average R-squared (ARS), average adjusted R-squared (AARS), average block VIF (AVIF), average full collinearity VIF (AFVIF), and Tenenhaus GoF (GoF). According to Kock (2012), p-values must be less than 0.05. The values of APC (0.289, $p < 0.001$), ARS (0.407, $p < 0.001$), and AARS (0.388, $p < 0.001$) exhibit the goodness of model fit (Kock, 2012). Furthermore, the values of AVIF (1.275) and AFVIF (1.603) are within the acceptable range (< 3.3 -ideally), therefore, denote that multicollinearity is not the problem in this research (Hair et al., 2014). Tenenhaus GoF index evaluates inner-structural and outer measurement models in PLS-SEM (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005).

The value of TenenhausGoF (0.28) is within the acceptable range (0.36) (Wetzels, Odekerken-Schroder, & van Oppen, 2009).

The findings as displayed in Table 3 demonstrate that GSCM practices and absorptive capacity significantly and positively affect the SCP. Hence, RS does not have direct significant juxtaposition with SCP. However, absorptive capacity has significant and positive direct association with SCP. Furthermore, absorptive capacity mediates the connection between GSCM practices and SCP as well as RS and SCP. As depicted in Table 3, the direct effect of GSCM practices and RS has become insignificant while estimating mediating effect; therefore, absorptive capacity fully mediates the said nexus.

Table 3: Direct, Indirect, and Total Effects

Path	Direct Effects	Indirect Effects	Total Effects
GSCMP→SCP	0.289***	---	0.289***
RS →SCP	-0.024	---	-0.024
GSCM→AC	0.380***	---	0.380***
RS →AC	0.487***	---	0.487***
GSCM→AC→SCP	0.069	0.220***	0.289***
RS→AC→SCP	-0.024	0.282***	0.258***

***= $p < 0.001$

Discussion

The central goal of this study is to establish and clarify the absorptive capacity's role to convert practice (GSCM practices) and strategy (RS) into performance (SCP). Therefore, current research contributes to the two major areas of literature. First, GSCM practices and RS have positive influence on absorptive capacity. Second, absorptive capacity is positively linked to the SCP and fully mediates the juxtaposition between GSCM practices and SCP as well as RS and SCP. The following part presents both conceptual and practical implications, limitations, and recommendations for further studies.

Theoretical Implications

This research provides scholarly comprehension of absorptive capacity in the context of IPT model (Galbraith, 1973, 1974). Since SC involves in the management of products, information, and financial swaps, this study bestows to an improved comprehension of information movements (Wong, Lai, Cheng, & Lun, 2015). However, extensive research has been conducted on product flows; it necessitates conducting more research on the techniques of information management in SC (Dobrzykowski et al., 2015). Absorptive capacity is driven by tactical antecedents that enhance ambiguity (Raymond, Paré, & Maillet, 2015). GSCM practices and RS inspires absorptive capacity that consequently mediates the

connection between practices-strategy and performance (SCP). Absorptive capacity is perhaps even more vital nowadays than earlier considered when the notions were initiated (Ferrerias-Méndez, Newell, Fernández-Mesa, & Alegre, 2015; Rafique, Hameed, & Agha, 2018). The enhanced importance of information processing requirements could also imitate contests in decision-making in the development of big data (Gandomi & Haider, 2015).

Earlier research recognised but did not investigate prospective reasons of the difference which happens in organisations' aptitudes to establish absorptive capacity (Tortoriello, 2015; Tzokas, Kim, Akbar, & Al-Dajani, 2015). This study discovers these potential reasons by investigating the nexus between strategy-practice and absorptive capacity, developing a contention based upon Skinner's (1974) idea of emphasis. The findings demonstrate that when an organisation emphasises on practices and responsiveness, it establishes greater degrees of absorptive capacity via lucidity, experience, deliberation, and job similarity (Childerhouse, Aitken, & Towill, 2002). Emphasis allows organisations to discourage the diseconomy of scales in their SCs which arise when trying to mix the two plans by following a responsive technique (Fuller, O'Connor, & Rawlinson, 1993) and green practice (Kezang, Lama, & Dorji, 2017). The green practices and hybrid RS could lead an organisation to fight to yield absorptive capacity that

was displayed previously in the conceptual framework to be a mediator in converting strategy and practice into SCP. This result strengthens vital trade-off choices that managers require to take between quality and cost to handle functional products, and pace and range to yield novel products (Fisher, 1997). The results illustrate that these compromising dilemmas (trade-offs) effect information processing producers and actions, and not SCP, provided that GSCM practices and RS do not emerge to directly influence SCP. It supports to the contention of Qi, Boyer, & Zhao (2009) by recognising the issues to apply RS and GSCM practices; however, investigating its positive impacts on consequences directly.

Managerial Implications

The findings of the complete mediation model offer significant practical understandings for managers. Responsiveness and GSCM practices are revealed to need a multidimensional aptitude in the organisation i.e. absorptive capacity. This highlights the human-behavioural perspectives engaged to attain responsiveness (customer intimacy) and application of GSCM via SC information gaining, integration of making new products, conversion, and practical implementation. The results recommend that employing the elements of absorptive capacity collectively could augment achievement. Therefore, managers may consider a holistic viewpoint, identifying that spending to establish procedures, developing employees and technology are important for achievement. Practically, executives would be sufficiently assisted to well assimilate their firms in technologies and design endeavours. To convert their SCs, practitioners should practice supplier development plans, establish and amplify customer and supplier integration and reconsider their distribution approach. Information employment for GSCM practices and RS ought to indicate a better transfer rapidity, and declines to obtain and produce cycle times. Eventually, via these activates, executives

could identify the absorptive capacity abilities of the firm when struggling for green practices and responsiveness to get improved SCP in kinds of efficiency and effectiveness.

Furthermore, managers are better assisted to identify the vitality of the compromised choices (trade-offs) they take considering the significances for price, quality, rapidity, and range to provide useful and novel products to the marketplace. It is attractive to drop into the deception of endeavouring to function on the SC limitation, targeting to provide on all four performance characteristics employing the RS (Qi et al., 2009) and green practice (de Sousa Jabbour, de Oliveira Frascareli, & Jabbour, 2015). The findings offer direction that the application related issues of this hybrid technique reveal themselves in lesser extents of absorptive capacity, particularly the effective implementation of information. Consequently, there is a deep emphasis to offer a stricter limit of useful products with uncommon new product overviews; on the other hand, an extensive variety of novel products with regular novel product overviews are both operational techniques, which result in absorptive capacity and better SCP. A bestriding of these two approaches is exhibited to cause deprived information processing in the organisation which eventually lessens efficiency and effectiveness.

Lastly, the findings would also be deliberated considering the widespread media regarding Supply Chain Analytics (see for instance: Pettey, 2015). Though analytics are expected to advantage organisations which spend in it, the organisational design characteristics apprehended in absorptive capacity are vital to enhancing the worth of their spending. Such spending could consequently be thought of as a section of the overall development of an organisation's information processing aptitude.

Limitations

Although this research contributes to the literature, results ought to be taken within the limitations of this study. Although sound technical steps have been followed to alleviate common method bias and employed usually followed analytical experiments to analyse its existence, the point is that the data were gathered at a single point of time through a survey technique from the participants, which implies that bias might exist. As stated earlier, we admit that absorptive capacity could have factors besides GSCM practices and RS. Thus, we expect various thought-provoking researchers discovering the foundation of absorptive capacity. Similarly the absorptive capacity should be analysed by operationalisation of the four dimensions as first-order absorptive capacity elements. Hence, we think that this research is yet a development to past studies (Azadegan, 2011; Saenz et al., 2014).

Recommendations for Further Studies

Keeping in mind the exploratory nature of this research, it offers subsequent recommendations for further research focused on absorptive capacity. The conception of absorptive capacity has been researched from an organisational-level and cross-sectional; nonetheless we persuade researchers and scholars to continue further research techniques that take an additional behavioural aspect; for example, social network investigation or tests. Although we had little preliminary evidence strengthening the idea that

green practices and responsiveness have augmented over time, therefore enhancing the necessity for further amplified absorptive capacity, this prospective influence ought to analyse officially. Longitudinal research normally offers for intensive comprehension of a conception and promotes the generalisability of the findings (Moretti, 2004). Owing to the dataset's restrictions employed in this study, it would be remarkable to develop and authenticate a novel measure that is more broadly appropriate in the perspective of SC. Similarly, the examination of how dissimilar kinds of knowledge are analysed would be valuable (Deligianni, Voudouris, & Lioukas, 2015). Finally, it is vital to identify that we have to ponder the challenge of SCP in a particular way. Further research ought to examine overall SCP and firm performance considering the financial and non-financial indicators.

It is remarkable to fragment the first-order construct into second-order construct to investigate the linkages among the attainment, integration, conversion, and utilisation of measures. The degree to which organisations, even within a same industry, utilise each element of absorptive capacity (e.g., leather) can vary (Dobrzykowski, 2012). A profound study can assist to comprehend how these elements and the link among these elements vary in different SC perspectives. Likely instances might be developing economies against developed economies, national culture, industry divisions, and SC approaches (Dobrzykowski, Saboorideilami, Hong & Kim, 2014).

References

- Andersen, T. J. (2001). Information technology, strategic decision making approaches and organizational performance in different industrial settings. *The Journal of Strategic Information Systems*, 10(2), 101-119.
- Azadegan, A. (2011). Benefiting from supplier operational innovativeness: The influence of supplier evaluations and absorptive capacity. *Journal of Supply Chain Management*, 47(2), 49–64.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, 51(6), 1173-1182.
- Bernardes, E. S., & Hanna, M. D. (2009). A theoretical review of flexibility, agility and responsiveness in the operations management literature: Toward a conceptual definition of customer responsiveness. *International Journal of Operations & Production Management*, 29(1), 30-53.
- Blome, C., Schoenherr, T., & Rexhausen, D. (2013). Antecedents and enablers of supply chain agility and its effect on performance: a dynamic capabilities perspective. *International Journal of Production Research*, 51(4), 1295-1318.
- Bouckennooghe, D., Zafar, A., & Raja, U., (2015). How Ethical Leadership Shapes Employees' Job Performance: The Mediating Roles of Goal Congruence and Psychological Capital. *Journal of Business Ethics*, 129(2), 251-264.
- Brdulak, A. (2019). The Importance of Information Flow and Knowledge Exchange for the Creation of Green Supply Chains *SMART Supply Network* (pp. 161-177): Springer.
- Childerhouse, P., Aitken, J., & Towill, D. R. (2002). Analysis and design of focused demand chains. *Journal of Operations Management*, 20(6), 675-689.
- Choo, C. W. (1996). The knowing organization: How organizations use information to construct meaning, create knowledge and make decisions. *International Journal of Information Management*, 16(5), 329-340.
- Christopher, M., & Gattorna, J. (2005). Supply chain cost management and value-based pricing. *Industrial Marketing Management*, 34(2), 115-121.
- Chuang, S. P., & Huang, S. J. (2018). The effect of environmental corporate social responsibility on environmental performance and business competitiveness: The mediation of green information technology capital. *Journal of Business Ethics*, 150(4), 991-1009.
- Churchill, G. A., Jr (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research*, 16(1), 64–73 .
- Cohen, W., & Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Sciences Quarterly*, 35(1), 128-152.
- Cohen, W. M., & Levinthal, D. A. (1989). Innovation and learning: the two faces of R & D. *The Economic Journal*, 99(397), 569-596.
- Cohen, W. M., & Levinthal, D. A. (2000). Absorptive capacity: A new perspective on learning and innovation. In *Strategic Learning in a Knowledge Economy* (pp. 39-67): Elsevier.
- de Sousa Jabbour, A. B. L., de Oliveira Frascareli, F. C., & Jabbour, C. J. C. (2015). Green supply chain management and firms' performance: Understanding potential relationships and the role of green sourcing and some other green practices. *Resources, Conservation and Recycling*, 104, 366-374.
- Deligianni, I., Voudouris, I., & Lioukas, S. (2015). Growth paths of small technology firms: The effects of different knowledge types over time. *Journal of World Business*, 50(3), 491-504.
- Dobrzykowski, D. D. (2012). Examining heterogeneous patterns of Electronic Health Records Use: A contingency perspective and assessment. *International Journal of Healthcare Information Systems and Informatics*, 7(2), 1-16.
- Dobrzykowski, D. D., Leuschner, R., Hong, P. C., & Roh, J. J. (2015). Examining absorptive capacity in supply

chains: Linking responsive strategy and firm performance. *Journal of Supply Chain Management*, 51(4), 3-28.

- Dobrzykowski, D., Saboorideilami, V., Hong, P., & Kim, S. C. (2014). A structured analysis of operations and supply chain management research in healthcare (1982-2011). *International Journal of Production Economics*, 147(1B), 514-530.
- Ferreras-Méndez, J. L., Newell, S., Fernández-Mesa, A., & Alegre, J. (2015). Depth and breadth of external knowledge search and performance: The mediating role of absorptive capacity. *Industrial Marketing Management*, 47(5), 86-97.
- Fisher, L.M., (1997). What is the right supply chain for your product? *Harvard Business Review* 75 (2), 105–116.
- Flatten, T. C., Engelen, A., Zahra, S. A., & Brettel, M. (2011). A measure of absorptive capacity: Scale development and validation. *European Management Journal*, 29(2), 98-116.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50.
- Fuller, J. B., O’Conor, J., & Rawlinson, R. (1993). Tailored logistics: the next advantage. *Harvard Business Review*, 71(3), 87-98.
- Galbraith, J. R. (1973). *Designing complex organizations*: New York, Addison-Wesley.
- Galbraith, J. R. (1974). Organization design: An information processing view. *Interfaces*, 4(3), 28-36.
- Gandomi, A., & Haider, M. (2015). Beyond the hype: Big data concepts, methods, and analytics. *International Journal of Information Management*, 35(2), 137-144.
- Gefen, D., Straub, D., & Boudreau, M. C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems*, 4(1), 1-77.
- Goldman, S. L., Nagel, R. N., & Preiss, K. (1995). *Agile competitors and virtual organizations: strategies for enriching the customer* (Vol. 8): Van Nostrand Reinhold New York.
- Grossmann, I. (2005). Enterprise-wide optimization: A new frontier in process systems engineering. *AIChE Journal*, 51(7), 1846-1857.
- Haas, M. R. (2010). The double-edged swords of autonomy and external knowledge: Analyzing team effectiveness in a multinational organization. *Academy of Management Journal*, 53(5), 989-1008.
- Hair, J. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (Second ed). Los Angeles: Sage Publications.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2016). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Los Angeles: Sage Publications.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19(2), 139-152.
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the academy of marketing sciences*, 40 (3), 414-433.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Planning*, 46 (1-2), 1-12.
- Hillman, A. J., & Keim, G. D. (2001). Shareholder value, stakeholder management, and social issues: what's the bottom line? *Strategic Management Journal*, 22(2), 125-139.
- Hislop, D., Bosua, R., & Helms, R. (2018). *Knowledge management in organizations: A critical introduction*: Oxford University Press.
- Hult, G. T. M., Ketchen, D. J., & Slater, S. F. (2004). Information processing, knowledge development, and strategic supply chain performance. *Academy of Management Journal*, 47(2), 241-253.
- Im, G., & Rai, A. (2008). Knowledge sharing ambidexterity in long-term interorganizational relationships.

Management Science, 54(7), 1281-1296.

- Jha, P., & Karn, B. (2018). Knowledge-Based Supply Chain Practice: A study on Indian digital selling companies. *NMIMS Management Review*, 36(2), 45-59.
- Katiyar, R., Meena, P. L., Barua, M. K., Tibrewala, R., & Kumar, G. (2018). Impact of sustainability and manufacturing practices on supply chain performance: Findings from an emerging economy. *International Journal of Production Economics*, 197, 303-316.
- Ketchen Jr, D. J., Crook, T. R., & Craighead, C. W. (2014). From supply chains to supply ecosystems: Implications for strategic sourcing research and practice. *Journal of Business Logistics*, 35(3), 165-171.
- Kezang, Lama, P., & Dorji, S. T. (2017). Gross National Happiness and SCP in Bhutan. In *Sustainable Asia: Supporting the Transition to Sustainable Consumption and Production in Asian Developing Countries* (pp. 133-162).
- Klassen, R. D., & Whybark, D. C. (1999). The impact of environmental technologies on manufacturing performance. *Academy of Management Journal*, 42(6), 599-615.
- Kling, R. B. (2001). *Principles and practices of structural equation modelling*. New York: Guilford Press.
- Kock, N. (2012). WarpPLS 3.0 user manual. ScriptWarp Systems™, Laredo.
- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-collaboration (IJeC)*, 11(4), 1-10.
- Kock, N., & Lynn, G. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. *Journal of the Association for Information Systems*, 13(7), 546-580.
- Lane, P. J., Koka, B. R., & Pathak, S. (2006). The reification of absorptive capacity: A critical review and rejuvenation of the construct. *Academy of Management Review*, 31(4), 833-863.
- Lau, A. K., Tang, E., & Yam, R. (2010). Effects of supplier and customer integration on product innovation and performance: Empirical evidence in Hong Kong manufacturers. *Journal of Product Innovation Management*, 27(5), 761-777.
- Lee, H. L. (2002). Aligning supply chain strategies with product uncertainties. *California Management Review*, 44(3), 105-119.
- Lee, H. L., Padmanabhan, V., & Whang, S. (2004). Information distortion in a supply chain: the bullwhip effect. *Management Science*, 50(12_supplement), 1875-1886.
- Liao, J., Welsch, H., & Stoica, M. (2003). Organizational Absorptive Capacity and Responsiveness: An Empirical Investigation of Growth-Oriented SMEs. *Entrepreneurship Theory and Practice*, 28(1), 63-86.
- Lucas Jr, R. E. (2018). What Was the Industrial Revolution?. *Journal of Human Capital*, 12(2), 182-203.
- Luo, X., Wu, C., Rosenberg, D., & Barnes, D. (2009). Supplier selection in agile supply chains: An information-processing model and an illustration. *Journal of Purchasing and Supply Management*, 15(4), 249-262.
- MacKenzie, S. B., & Podsakoff, P. M. (2012). Common method bias in marketing: Causes, mechanisms, and procedural remedies. *Journal of Retailing*, 88(4), 542-555.
- Martinez-Sanchez, A., & Lahoz-Leo, F. (2018). Supply chain agility: a mediator for absorptive capacity. *Baltic Journal of Management*, 13(2), 264-278.
- Meinschmidt, J., Foerstl, K., & Kirchoff, J. F. (2016). The role of absorptive and desorptive capacity (ACDC) in sustainable supply management: A longitudinal analysis. *International Journal of Physical Distribution & Logistics Management*, 46(2), 177-211.
- Moretti, E. (2004). Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data. *Journal of Econometrics*, 121(1-2), 175-212.
- Moyeen, A. (2018). CSR Management Strategies, Stakeholder Engagement and MNE Subsidiaries Efforts to Foster Sustainable Development. In *The Goals of Sustainable Development* (pp. 43-54). Springer, Singapore.

- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory*. Third McGraw-Hill.
- McAfee, A. (2003). When too much IT knowledge is a dangerous thing. *MIT Sloan Management Review*, 44(2), 83-89.
- Moradlou, H., Backhouse, C., & Ranganathan, R. (2017). Responsiveness, the primary reason behind re-shoring manufacturing activities to the UK: an Indian industry perspective. *International Journal of Physical Distribution & Logistics Management*, 47(2/3), 222-236.
- Pathak, D. (2017). Role of Green Marketing in Satisfying the Customers and Its Impact on Environmental Safety. *International Research Journal of Interdisciplinary & Multidisciplinary Studies (IRJIMS)*, 2(12), 17-29.
- Petersen, K. J., Handfield, R. B., & Ragatz, G. L. (2005). Supplier integration into new product development: coordinating product, process and supply chain design. *Journal of Operations Management*, 23(3-4), 371-388.
- Pettey, C. (2015, May 1). Why supply chain analytics is a must have. Smarter with Gartner.
- Qi, Y., Boyer, K., & Zhao, X. (2009). Supply chain strategy, product characteristics, and performance impact: Evidence from Chinese manufacturers. *Decision Sciences*, 40(4), 667-695.
- Qi, Y., Zhao, X., & Sheu, C. (2011). The impact of competitive strategy and supply chain strategy on business performance: the role of environmental uncertainty. *Decision Sciences*, 42(2), 371-389.
- Rafique, M., Hameed, S., & Agha, M. H. (2018). Impact of knowledge sharing, learning adaptability and organizational commitment on absorptive capacity in pharmaceutical firms based in Pakistan. *Journal of Knowledge Management*, 22(1), 44-56.
- Raymond, L., Paré, G., & Maillet, E. (2015). *IT-enabled Knowledge Management in Primary Care Settings: An Absorptive Capacity Perspective*. Paper presented at the International Conference on Information Systems (ICIS).
- Rojo, A., Stevenson, M., Lloréns Montes, F. J., & Perez-Arostegui, M. N. (2018). Supply chain flexibility in dynamic environments: The enabling role of operational absorptive capacity and organisational learning. *International Journal of Operations & Production Management*, 38(3), 636-666.
- Sabat, K. C., & Krishnamoorthy, B. (2018). An empirical study to understand the factors influencing green supply chain management adoption in India. *NMIMS Management Review*, 35(4), 94-108.
- Sabherwal, R., & Chan, Y.E., (2001). Alignment between business and IS strategies: a study of prospectors, analyzers, and defenders. *Information Systems Research*, 12(1), 11-33.
- Saeed, K. A., Malhotra, M. K., & Grover, V. (2011). Interorganizational system characteristics and supply chain integration: an empirical assessment. *Decision Sciences*, 42(1), 7-42.
- Saenz, M. J., Revilla, E., & Knoppen, D. (2014). Absorptive capacity in buyer-supplier relationships: empirical evidence of its mediating role. *Journal of Supply Chain Management*, 50(2), 18-40.
- Shafique, I., Kalyar, M. N., & Ahmad, B., (2018). The Nexus of Ethical Leadership, Job Performance, and Turnover Intention: The Mediating Role of Job Satisfaction. *Interdisciplinary Description of Complex Systems: INDECS*, 16(1), 71-87.
- Sharma, S., & Vredenburg, H. (1998). Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. *Strategic Management Journal*, 19(8), 729-753.
- Sim, I., Gorman, P., Greenes, R. A., Haynes, R. B., Kaplan, B., Lehmann, H., & Tang, P. C. (2001). Clinical decision support systems for the practice of evidence-based medicine. *Journal of the American Medical Informatics Association*, 8(6), 527-534.
- Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2003). Designing and management the supply chain. *Editorial: McGraw-Hill, Irwin, New York, NY*.
- Skinner, W. (1974). The focused factory. *Harvard Business Review*, May/June, 113-121.
- Tenenhaus, M., Vinzi, V. E., Chatelin, Y.-M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics and*

Data Analysis, 48(1), 159–205.

- Tortoriello, M. (2015). The social underpinnings of absorptive capacity: The moderating effects of structural holes on innovation generation based on external knowledge. *Strategic Management Journal*, 36(4), 586-597.
- Tsanos, C., G. Zografos, K., & Harrison, A. (2014). Developing a conceptual model for examining the supply chain relationships between behavioural antecedents of collaboration, integration and performance. *The International Journal of Logistics Management*, 25(3), 418-462.
- Tzokas, N., Kim, Y. A., Akbar, H., & Al-Dajani, H. (2015). Absorptive capacity and performance: The role of customer relationship and technological capabilities in high-tech SMEs. *Industrial Marketing Management*, 47, 134-142.
- Van Knippenberg, D., Dahlander, L., Haas, M. R., & George, G. (2015). Information, attention, and decision making. *Academy of Management Journal*, 58(3), 649-657.
- Wetzels, M., Odekerken-Schroder, G., & van Oppen, C. (2009). Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration. *MIS Quarterly*, 33(1), 177-196.
- Walker, H., & Jones, N. (2012). Sustainable supply chain management across the UK private sector. *Supply Chain Management: An International Journal*, 17(1), 15-28.
- Wong, C. W., Lai, K. H., Cheng, T. C. E., & Lun, Y. V. (2015). The role of IT-enabled collaborative decision making in inter-organizational information integration to improve customer service performance. *International Journal of Production Economics*, 159(1), 56-65.
- Xie, C., & Haugland, S. (2016). Formation of reputation in business markets. *Journal of Business-to-Business Marketing*, 23(1), 25-45.
- Xie, Y., & Breen, L. (2012). Greening community pharmaceutical supply chain in UK: a cross boundary approach. *Supply Chain Management: An International Journal*, 17(1), 40-53.
- Zahra, S. A., & Hayton, J. C. (2008). The effect of international venturing on firm performance: The moderating influence of absorptive capacity. *Journal of business venturing*, 23(2), 195-220.
- Zhu, Q., & Sarkis, J. (2004). Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises. *Journal of Operations Management*, 22(3), 265-289.
- Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Confirmation of a Measurement Model for Green Supply Chain Management Practices Implementation. *International Journal of Production Economics*, 111(2), 261-273.

Imran Shafique is Assistant Professor at the Department of Management Sciences, COMSATS University Islamabad, Lahore Campus, Pakistan. He holds a PhD in Human Resource Management (HRM). His research focus includes Organizational Behaviour, Entrepreneurship & Innovation, and Supply Chain Management. He conducts Workshops and Seminars on different analytical techniques as a resource person. He has published both locally and internationally and sits on the editorial board of several journals and serves as external reviewers for many reputable international journals and publications. He can be reached at imranshafique@cuilahore.edu.pk

Taquer Hyder recently completed Master of Sciences in Management Sciences from COMSATS University Islamabad, Lahore Campus. His area of research includes Supply Chain Management and Contemporary Issues in Organizational Studies. He can be reached at taqueerhyder512@gmail.com