

HOW A SUPPLY CHAIN PROCESS MATTERS IN FIRMS' PERFORMANCE-AN EMPIRICAL EVIDENCE OF PAKISTAN

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Abstract

In recent years, supply chain processes (i.e. demand management, customer relationship management, and new product development) have gained a great importance from academicians and practitioners. Yet, research into the subject of supply chain processes' effects on performance is nascent. The purpose of this study is to examine the process dimensions' effects on supply chain (SC) partners' trust and firms' performance as supply chain processes are essential for firms' competitiveness. The research framework consists of seven hypotheses. An empirical study was conducted in Pakistan, and the data were collected from 164 supply chain firms. The reliability and validity of the model were examined through the exploratory factor analysis (EFA) and Confirmatory factor analysis (CFA). The results delineate that supply chain processes have a significant relationship with SC partners' trust and performance. Thus, all hypotheses were supported. This study presents interesting theoretical contributions and managerial implications. At last, limitations regarding future research directions are discussed.

Keywords: demand management, process integration, performance, supply chain trust

JEL Classification: L14

1. INTRODUCTION

In recent years, technology has been developing rapidly and firms are facing a fierce globalized competition. As boundaries across the economies are also eliminated, it has become a great challenge for enterprises to quickly respond to the customers' requests and satisfying them in a timely manner. Handfield and Nichols (1999) demonstrated that it is not important for organizations to produce quality products in the 21st century. It is essential for firms to meet customers' requests (needs and wants) at a cheaper price and ensure timely deliveries. Moreover, technology and speed are the two integral factors for enterprises to survive in competitiveness.

In the rapidly changing environment, firms' success and survival entirely depend on the effective supply chains management (Bayraktar et al., 2007), and adopting recent innovative ways and practices of operating business in the domain of supply chain (Wunder et al., 2012).

Supply chain integration (SCI) has been considered the trend in management and business practices across diverse industries (Shou et al., 2013; Ziaullah et al., 2015). As the purpose of SCI is to achieve the efficient and effective flow of products, information, money, services and decisions in order to provide maximum value to customers at low cost with high speed (Frohlich & Westbrook, 2001).

Fernandes et al. (2017) pointed out that SCM extends the concept of integration among all enterprises involved in the processes which start from suppliers of raw material to end customers. Thus, SCM seems to be an important tool for competitive advantage in the markets. It enables the establishment of a link within the distribution network, production processes and various procurement activities which are used to offer excellent services at a low cost to customers. In past the studies, researchers pointed out three important practices of a supply chain integration, i.e. information sharing (Yeung et al., 2009), relationship commitment (Zhao et al., 2008) and process integration (Yeung et al., 2009). It is pertinent to indicate that through improving the level of a supply chain integration, firms attempted to handle the supply chain complexities. As SCI is considered to be an important tool to management supply chains and accomplishes superior performance (Wiengarten et al., 2016).

Building on the concept of a supply chain process integration along with a relational view, our objective is to explore how supply chain processes influence developing trust between partners and firms' operational performance. Subsequently, this article concentrates on the following research questions:

RQ1. To what extent do the processes (e.g.) associate with developing the supply chain trust between the partners of Pakistan firms?

RQ2. To what extent does the supply chain trust affect Pakistan firms' operational performance?

The remainder of the paper is described as follows. Section 2 describes the reviews of related literature and the research hypotheses. Research design and methodology is presented in Section 3. Section 4 describes the data analysis and results. While Section 5 explains the logical results discussion and research contributions in the context of practice and literature. Finally, the article is concluded with future research directions and limitations.

2. THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

The main objective of this paper is to examine the interrelationships between supply chain processes (e.g. demand management, new product development and customer relationship management), trust and Pakistan firms' operational performance. Thus, the study constructs will include supply chain processes, trust, and operational performance. However, after carefully reviewing the related literature and considering the study objectives, the research framework is depicted in Figure 1.

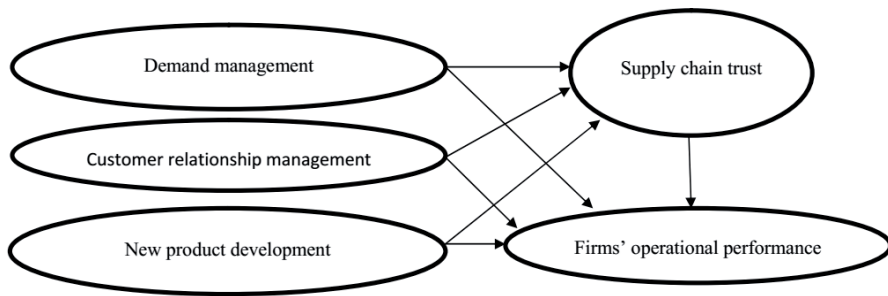


Fig. 1 – Research framework (Source: Authors)

2.1 Interrelationship between demand management, supply chain trust, and performance

Demand management is referred to as “the flow of raw material and products is intertwined with customers’ demand” (Wu, 2004). It is the essential business process of a supply chain integration. It is based on a set of practices used to coordinate and manage a complete demand chain which starts from the final customer and moved backward to the raw material supplier (Selen & Soliman, 2002). Thus, the aim of demand management is to make everything produced, handled and moved ideally in response to known customers’ requirements (Jüttner et al., 2007). This process has two main important concerns related to forecasting and reducing demand variability. The accuracy in forecasting and efficient demand management might develop and improve SC partner’s trust. Further, this process belongs to the firms’ routine operational activities; therefore, it also can improve firms’ performance. Thus, we proposed the following hypotheses:

- H1: Demand management has a positive effect on firms’ operational performance
- H2: Demand management has a positive effect on SC partners’ trust

2.2 Interrelationship between customer relationship management, supply chain trust, and performance

The customer relationship management concept is not new, but currently, it has gained much attention from researchers and practitioners due to a dramatic change in technology. As CRM has three main pillars, for example, technology, people, process (Chen and Popovich, 2003). Customer relationship management (CRM) is referred to as “the identifying key customer target markets and then developing and implementing programs with key customers” (Wu et al., 2004). Basically, CRM is an initial step toward supply chain integration, and the aim is to identify key target customer groups that the firm’s targets as critical to its mission. However, the service and product agreements show the levels of performance developed with the key customer groups. Moreover, firms are required to work with customers to indicate and eliminate the sources of demand variability. The firms may improve SC partners’ trust and performance by managing the process of CRM. Thus, we proposed the following hypotheses:

- H3: Customer relationship management has a positive effect on firms’ operational performance
- H4: Customer relationship management has a positive effect on SC partners’ trust

2.3 Interrelationship between new product development, supply chain trust, and performance

The supply chain process of new product development (NPD) is an important component of the enterprise's success and key suppliers and customers which are integrated into the product development process to reduce time to market (Wu et al., 2004). NPD process enables firms to integrate the flow of new products and also help them in the ramp up efficient manufacturing, sourcing, distribution and various sales related activities that support the product commercialization (Carrillo & Franza, 2006). In the past researches, four market characteristics, for example, market potential, the length of product life cycle, competitive response intensity and competitor's aggressiveness have identified which affect the success of new products (Cheng & Shiu, 2008). Whereas some other scholars pointed out that technological sophistication, innovativeness, price and value advantage are common product characteristics that affect the success of a new product (Perks et al., 2005). As a product lifecycle has been shortening due to the rapid pace of change in technology, though retention of customers is a big challenge for organizations. In order to keep customers for a long term with firms, it has become quite essential to manage their NPD process. In this manner, enterprises can build trust among SC partners and can also improve their operational performance. Thus, we proposed the following hypotheses:

H5: New product development has a positive effect on firms' operational performance

H6: New product development has a positive effect on SC partners' trust

2.4 Interrelationship between supply chain trust and performance

Yeung et al. (2009) pointed out that supply chain trust has gained much importance and top priority to upholding the relationships between supply chain partners. Moorman et al. (1993) refer to trust as to "a willingness to rely on the exchange partner". In the past researches, it is highlighted that supply chain trust is the essential factor for a supply chain integration (Sheu et al., 2006; Fynes et al., 2005). However, lack of supply chain trust is the crucial and single most important obstacle in the supply chain process integration (Forslund & Jonsson, 2009). In 2007, Forslund & Johnsson (2007) indicated that partners' trust has to affect the process integration positively. Johnston et al. (2004) demonstrated the importance of developing the trust among supply chain partners to enhance the scope and level of cooperative activities. Moreover, an increase in cooperative behaviors can improve the firm's performance. Thus, we proposed the following hypothesis:

H7: Supply chain partners' trust has a positive effect on firms' operational performance

3. RESEARCH DESIGN AND METHODOLOGY

3.1 Instrument design

This empirical study was conducted in Pakistan and a survey research approach was used to collect the data. We used a two-section questionnaire. In the first section, a nominal scale was used, and the second section used a seven-point Likert scale (1=strongly disagree, 7=strongly agree). In the first section, the information about occupation was collected, then types of industries,

experience, nature of firm’s ownership, firm’s sales and type of supply chain partners. The second section of the questionnaire comprises the construct of supply chain processes, e.g. demand management, customer relationship management and new product development, supply chain trust, and firms’ operational performance. The measurement items of supply chain processes constructs, including DM, CRM, and NPD, were adapted from the measurement developed by Wu et al. (2004). The DM, CRM and NPD constructs comprise six, six and four items, respectively. The measurement items of supply chain trust were adapted from Kumar et al. (1995) and Chen et al. (2011) that contain six items. The firm’s operational performance contains five items that were adapted from Flynn et al. (2010).

We reviewed the extensive literature and the drawn scales were in the English language. In Pakistan, the official language is English in all firms belonging to public and private sectors. Thus, an English-version questionnaire was used in mainland of Pakistan.

3.2 Data collection and sampling approach

The survey was initiated in the month of December 2016 to May 2017 and the data was collected from various cities of Pakistan, for example, Karachi, Lahore, Sukkur, Sahiwal, Multan and D.G. Khan. The hypotheses were tested based on the data collected from a wide range of industries of Pakistan including cement, electronic and communication, agriculture, textile, tobacco, retail, and furniture. The operational domains of the firms participating in the survey were regional, national and international.

The response rate was encouraged by using some professional approaches, for instance, pointing out the importance of the research objectives and significant potential contributions of the study. Further, we ensured the confidentiality of data. The research report and practitioners’ contributions will be shared with respondents after a successful completion of the study. Similarly, tactics and approaches were applied in the past empirical studies to encourage the response rate (e.g., Panayides et al., 2009; Li et al., 2009).

During the survey process, we initially contacted every sampled enterprise to explain regarding the study purpose to then before delivering a questionnaire. Initially, 250 questionnaires were delivered personally and also postage paid return envelopes were provided to respondents. Three weeks later, we made follow-up calls to remind them about filling in the questionnaires. Finally, 190 questionnaires were received; the response rate was 76%. But 26 questionnaires were incomplete and having missing values. Thus, the final sample consists of 164 usable responses, yielding a usable response rate of 65.6%. The profiles of respondents is described in Table 1.

Tab. 1 – Respondents’ profiles (Source: Authors)

Occupation	Ratio	Experience	Ratio	Firm’s Nature	Ratio
General Manager	4.9	1-3 Years	25.6	State owned	11.0
Production Manager	10.4	4-6 Years	25.6	Private	88.4
Sales/Marketing Manager	24.4	7-12 Years	23.8	Joint Venture	0.6



Not reported	3.7	More than 12 Years	25.0		
Sales Executive	15.2				
Financial Manager	22.0				
Admin. Manager	19.5				
Industries	Ratio	Employees	Ratio	Sales	Ratio
Electronic & Communication	14.0	<200	46.3	<10	5.5
Mechanical Mfg./Tractors	9.8	200-500	4.3	10-100	14.0
Cement	6.1	500-1000	13.4	100-300	23.8
Foods	12.8	1000-3000	7.3	300-1000	6.1
Textile	6.7	3000-5000	7.9	1000-3000	4.9
Fertilizer/Pesticides	15.2	>5000	20.7	>3000	45.7
Furniture & Fixture	9.1				
Retail	9.1				
Tobacco	6.7				
Petroleum/Refinery	10.4				
Supply chain partners	Ratio				
Manufacturer	50.0				
Wholesaler/Distributor	29.3				
Retailer	9.1				
Supplier	11.6				

4. DATA ANALYSIS AND RESULTS

4.1 Development of construct

Kaiser-Meyer-Olkin (KMO) was used to examine sampling adequacy and Bartlett test of sphericity. SPSS output indicates KMO value of 0.900 with the significance of Bartlett's test at the level of 0.000 that show the data fitting for the exploratory factor analysis (EFA). A maximum likelihood was chosen as an extraction method, for the data reduction, Promax rotation along with Kaiser Normalizations for clarifying the factors all the measurement scales. However, the five numbers of factors were specified during EFA process. EFA results indicate the cumulative variance explanation of 71.34%, and all the items loading were greater than 0.30 in the pattern matrix. This value is supported by Hair et al. (1998). The detail of EFA is presented in Table 2.

Tab. 2 – Exploratory factor analysis (EFA) (Source: Authors)

Items	CRM	TRST	DM	OP	NPD
CRM1	0.789				
CRM2	0.808				
CRM3	0.933				
CRM4	0.955				
CRM5	0.978				
CRM6	0.931				
DM1			0.504		
DM2			0.509		
DM3			0.859		
DM4			0.765		
DM5			0.857		
DM6			0.799		
NPD1					0.492
NPD2					0.927
NPD3					0.894
NPD4					0.825
OP1				0.586	
OP2				0.536	
OP3				0.747	
OP4				0.805	
OP5				0.861	
TRST3		0.903			
TRST4		0.976			
TRST5		0.898			
TRST6		0.838			
TRST1		0.494			
TRST2		0.713			

CRM: customer relationship management, DM: demand management, NPD: new product development, TRST: supply chain trust, OP: operational performance

4.2 Reliability

We used Cronbach's alpha to examine the measurement construct reliability (Flynn et., 1990). All the constructs indicate the critical values greater than 0.70 as recommended by Hair et al. (2006). The results indicate highly reliable theoretical constructs with good psychometric characteristics of the study. Constructs reliability results are presented in Table 3.



Tab. 3 – Reliability and convergent validity tests (Source: Authors)

Internal reliability			Convergent validity		
Items	Cronbach's alpha α	Items total correlation	Standardized factor loadings	Composite reliability (CR)	Average Variance Extracted (AVE)
CRM1	0.96	0.730	0.699	0.96	0.79
CRM2		0.871	0.858		
CRM3		0.922	0.942		
CRM4		0.927	0.974		
CRM5		0.939	0.958		
CRM6		0.848	0.851		
DM1	0.94	0.722	0.710	0.94	0.73
DM2		0.815	0.825		
DM3		0.869	0.923		
DM4		0.893	0.934		
DM5		0.852	0.867		
DM6		0.801	0.876		
NPD1	0.87	0.573	0.709	0.88	0.65
NPD2		0.851	0.911		
NPD3		0.770	0.837		
NPD4		0.735	0.750		
TRST1	0.92	0.649	0.656	0.92	0.66
TRST2		0.762	0.724		
TRST3		0.840	0.830		
TRST4		0.868	0.935		
TRST5		0.824	0.889		
TRST6		0.742	0.803		
OP1	0.89	0.669	0.738	0.90	0.64
OP2		0.598	0.608		
OP3		0.795	0.822		
OP4		0.862	0.915		
OP5		0.746	0.877		

4.3 Unidimensionality

Li et al. (2009) demonstrate the two prerequisite conditions to establish unidimensionality of the construct. First, items of the measurement scale must be associated with the empirical representation of constructed. Second, all the items of each construct should be associated with the construct. Thus, we applied the confirmatory factor analysis (CFA) to establish and ensure unidimensionality. The Measurement model results show the acceptable fit indices and proved unidimensionality which is presented in Table 4.

Tab. 4 – Measurement model of fit indices (Source: Authors)

Fit indices	Score	Cut-off values
Absolute fit measure		
Minimum fit function χ^2	607.13	The lower, the better
df	301	
χ^2/df	2.017	<5
GFI	0.89	>0.80
RMSEA	0.043	<0.05
Incremental fit measures		
AGFI	0.85	>0.80
TLI	0.92	>0.90
NFI	0.87	>0.90
CFI	0.93	>0.90
Parsimonious fit measures		
Parsimonious goodness of fit index (PGFI)	0.633	The higher, the better
Parsimonious normed fit index (PNFI)	0.757	The higher, the better

4.4 Measurement model and hypotheses testing

AMOS (21.0 version) software was used to assess the measurement model by using Maximum likelihood estimation approach. The sample size needed for MLE is ten times of the total number of measurement items of the scale (Hair et al., 2010). The total of 164 valid questionnaires were enough for MLE to examine the current study data. The measurement model is applied to test the goodness of a fit model. It means to examine reliability, validity, discriminant and convergent validities. Previous studies suggest that for goodness of a model fit Chi-square/degree of freedom (χ^2/df) should be less than 5. Moreover, comparative fit index (CFI) and Tucker-Lewis Index (TLI) need to be greater than 0.90, and the root means the square error approximation (RMSEA) value is recommended less than 0.10 (Henry and Stone, 1994). The study testing results demonstrated goodness of model fit with the indices e.g. χ^2/df (607.13/301=2.017), CFI (0.93), TLI (0.92), and RMSEA (0.043), normal fit index (NFI: 0.87), and goodness of fit index (GFI: 0.89). The result of measurement model is presented in Table 4.

The current study standardized factor loadings of all the construct items range from i.e. CRM (0.699-0.974), DM (0.710-0.934), NPD (0.709-0.911), TRST (0.656-0.935) and OP (0.608-0.915), which are greater than the minimum recommended value 0.60 (Hair et al., 2006). The composite reliability (CR) value of all the measurement constructs range from 0.88 to 0.96, which is also greater than the recommended value 0.70. While average variance extracted (AVE) values of all the constructs range from 0.64 to 0.79, which is also better than the threshold value 0.50 (Hair et al., 1998). Thus, better values of factor loadings, CR and AVE indicate the adequate convergent validity of measurement items. The convergent validity results are presented in Table 3.

DeVellis (1991) define the discriminant validity as “to measure the extent to which individual items intending to measure one latent construct and at the same time, do not measure a different



latent construct”. The discriminant validity is tested using the measure that the square root of AVE for each construct should be larger than its correlations with another construct (Fornell and Larcker, 1981). Thus, the correlation matrix for the discriminant validity is shown in Table 5.

We proposed a research framework which consists of three independent, one mediating and one dependent variable. Whereas the independent and dependent variables were the main construct that derived from the exploratory factor analysis by using SPSS ver. 20. Structural equation modeling (SEM) was used to estimate the structural coefficient. Thus, all the proposed hypotheses were strongly supported as shown in Table 6. Consequently, the path between DM and TRST ($\beta=0.219$), DM and OP ($\beta=0.174$), CRM and TRST ($\beta=0.201$), CRM and OP ($\beta=0.284$), NPD and TRST ($\beta=0.385$), NPD and OP ($\beta=0.202$) and TRST and OP ($\beta=0.664$) and hypotheses H1, H2, H3, H4, H5 and H6 are proved statistically significant.

Tab. 5 – Correlation matrix (Source: Authors)

Factor	CRM	TRST	DM	OP	NPD
CRM	0.888*				
TRST	0.493	0.812			
DM	0.645	0.642	0.854		
OP	0.438	0.487	0.481	0.800	
NPD	0.428	0.532	0.557	0.416	0.806

* Square root of the AVE is indicated in diagonal elements.

Tab. 6 – Hypotheses (Source: Authors)

Hypotheses	β	t-value	p-value	Conclusions
H1: DM \rightarrow TRST	0.219	2.865	0.005	Supported
H2: DM \rightarrow OP	0.174	2.032	0.044	Supported
H3: CRM \rightarrow TRST	0.201	2.412	0.017	Supported
H4: CRM \rightarrow OP	0.284	3.048	0.003	Supported
H5: NPD \rightarrow TRST	0.385	5.481	0.000	Supported
H6: NPD \rightarrow OP	0.202	2.567	0.011	Supported

R² 0.44, Adjusted R² 0.43, and F-value 42

5. DISCUSSION AND IMPLICATIONS

The research framework proposed in this article estimate relationship of the business process dimensions (e.g. demand management, customer relationship management and new product development), their impact on supply chain partners’ trust and firms’ operational performance in Pakistan.

The three dimensions of the business process have an impact on supply chain partners’ trust and their firms’ operational performance. Thus, all dimensions of the business process are the

integral antecedents of supply chain partners' trust. In the past studies, it was examined that business process dimensions positively influence supply chain partners' profitability (Schloetzer, 2012) and firms' trust (Ziaullah et al., 2015). However, all business process types have the same relative importance for developing trust among supply chain partners, improving firms' operational performance. Thus, supply chain firms are required to concentrate on all dimensions and effectively manage them, as all types are directly related to customers and suppliers. These study findings have both theoretical and managerial contributions.

5.1 Academic contributions

First, this article contributes to academic literature through development of the conceptual framework. Then, the conceptual framework was verified through collecting data from a range of industries in Pakistan.

Second, the contribution of this article is to empirically test theoretical assumptions in the existing literature on the impact of three types of business process dimensions on SC partners' trust and firms' operational performance. As we know, this is the first kind of study which examines determinants of business process dimensions of SC partners' trust and operational performance. This article proposes a research framework where SC partners' trust bridges between business process dimensions and operational performance. Moreover, this framework helps to reveal the impact of business process dimensions on operational performance and verifies the findings that process dimensions have a positive effect on performance.

Third, this article provides an answer to three basic questions of the study: RQ1. To what extent do the processes (e.g.) associate with developing supply chain trust between the partners of Pakistan firms? It is seen in the H1, H2 and H3, having proven a significant relationship. Whereas RQ2. To what extent does the supply chain trust affect Pakistan firm's operational performance? It is also regarded as statistically significant. Based on the general findings of this paper, priority and importance should be given to make an investment in various business process dimensions and manage them effectively.

5.2 Managerial implications

This article finding provides useful insights as an implication for practice to design the chain process dimensions for building SC trust in order to enhance firms' performance. This study finding has a set of implications for managers. First, it underscores the important role of business process dimensions played in the operational activities of supply chain organizations. On the basis of this finding, firms are required to give top priority to this in order to design and manage three process dimensions effectively.

Second, as the results indicate that firms' performance can be best improved through integration of process dimensions, it also validates the important role played by supply chain partners' trust. The significant effect of process dimensions on performance suggests that firms should invest in such type of strategies that encourage and promote trust across the members of supply chain.



Third, the current study findings indicate that supply chain trust is a source of competitive necessity. SCM can provide long-term benefits to all types of firms participating in the supply chain through supply chain trust. Doing so, we suggest that companies should use effective technologies and communication mechanisms to manage process dimensions effectively, which build SC partners' trust directly.

6. CONCLUSIONS AND FUTURE RESEARCH

In this article, we explored the role of supply chain processes in developing SC trust and firms' operational performance, based on a sample of Pakistan supply chains. Process dimensions significantly influenced both SC partners' trust and performance.

This study has some limitations which open up a "new avenue" and a "road map" for further research. First, limitation relates to the fact that our research only considered three process dimensions as independent variables. Second, this research also ignored the size of firms to understand process dimensions' impact on SC partners' trust and performance. Third, the study data were reported from Pakistan, but Pakistan has a unique cultural characteristic. Thus, the results might not be applicable in other countries. This study was based on the data collected from wide spectrum industries of Pakistan. As every industry has its unique characteristics, a specific research of supply chain processes and their relation to firms' operational performance improvement can potentially yield unique insights. This study primarily focused on all types of supply chain partners, e.g. suppliers, manufacturers, wholesalers, and retailers. However, future research might be conducted on specific SC partners to understand and examine their perceptions regarding various process dimensions in different geographic settings.

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