

MEDIATION EFFECT OF INFORMATION TECHNOLOGY BETWEEN SUPPLY CHAIN MANAGEMENT CAPABILITIES AND BUSINESS PERFORMANCE

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ABSTRACT

Information Technology is the core component of business processes 21st century and Pakistani firms have utilized varied aspects of information technology, both advantageously and operationally. Therefore, this quantitative study attempts to determine the mediating relationship of information technology between supply chain management capabilities and business performance. The results indicates that there is a positive relationship between supply chain management capabilities and business performance and information technology significantly mediates the relationship between the independent variable supply chain management and dependent variable business performance.

Keywords: Information Technology, Business Performance, Supply Chain Capabilities

INTRODUCTION

The supply chain encompasses all the companies involved in the production process - upstream and downstream - from raw material supply to the last consumer (Slack, Chambers, & Johnston, 2009; Pires, 2016); Therefore, its management consists of a set of methods to better integrate and manage its parameters, such as transportation, inventory and costs (Christopher, 1997). As a result, companies operating in it, seek to add value to the product at lower costs and improve long-term performance, both individually and within the chain as a whole (Min & Mentzer, 2004). According to Chopra and Meindl (2011), information is paramount for the knowledge of the global scope of the chain; Information systems therefore provide the tools necessary for better decision making in supply chain management (Corrêa, Ganesi, & Caon, 2010). According to Peng, Schroeder and Shah (2011), competitive performance in technological capabilities can be conceived as an advantage assessed in terms of cost, quality, and flexibility and delivery performance.

These characteristics, coupled with human resources, laboratories and state-of-the-art equipment, exchanges between agents involved in the supply chain and less bureaucratic institutional arrangements that encourage the development of technological innovations and organizational performance, define the so-called technological poles (Institute of Studies for Industrial Development, 2014).

These industrial environments have demonstrated efficiency in the transfer of knowledge from science and technology institutions to the business sector, qualifying and generating companies whose focus is to add technology and innovation in their products, processes and services. In Pakistan, the technology centers have already generated more than 30,000 jobs, distributed among research institutes, managing institutes of their own structures and private initiative (Ministry of Science, Technology and Innovation, 2014).

OBJECTIVE

The objective of the study is to determine the mediating relationship of information technology between supply chain management capabilities and business performance.

LITERATURE REVIEW

Regarding the theoretical and empirical ones, it was identified the need for a macro view on IT and an adaptation of this theme to the context of the national technological poles from the perspective of the SC; we sought to fill a gap of methodological knowledge in the relationship between the constructs addressed.

The use of information systems makes collaboration between supply chain partners easier (Chen, Papazafeiropoulou, & Wu, 2012), with integrated management that improves services and suppresses costs, providing a good supplier-company relationship. -customer (Hong & Jeong, 2006). This integration facilitates the development of strategies with partners, enabling companies, for example, to anticipate, with the help of suppliers, the dynamic needs of customers (Flynn et al., 2010). Peng, Jing, Zhang and Dubinsky (2016) argue that companies should be concerned with SCM, coordination and optimization to improve competitive performance, and for this information systems help companies in more complex operations and that They require faster resolutions and, backed by technological capabilities, help improve business processes,

with accurate information that is easily accessible to other departments and companies in the chain (Modgil& Sharma, 2017). CapT-SI integration is required for GCS integration, producing accurate information that improves business and supply chain efficiency and productivity, and hence customer satisfaction, and ultimately business performance (Budiarto, Prabowo, &Herawan, 2017).

Peng J. et al., (2016); Budiarto et al., (2017); Modgil& Sharma, (2017), investigated that the IT - in particular the integration between Chain links via information systems and R&D investments in new product and process technologies - are among the determining variables in the mediation relationship between companies' supply chain and development, particularly in terms of quality (design, product and design compliance introducing new products and design flexibility to meet specific customer needs.

HYPOTHESIS

On the basis of literature review and objective of the study, we have developed the following hypothesis.

H₁ Supply chain management does not influence business process management.

H₂ Technology and information systems don't mediate the relationship between supply chain management and business process management.

H₃ Supply chain management doesn't influences capabilities in information technology and systems.

METHOD

It's a quantitative research and the primary data we have collected through structured questionnaire from graduates of different institutes. A survey questionnaire for the study was adapted from Peng, Quan, Zhang& Dubinsky (2016). The items of the questionnaire are all closed ended. The data was collected from 347 respondents, 180 were female and 162 were male. While the data for literature review is obtained from research journals, papers and articles.

RESULTS

The demographics data included gender, age, occupation and monthly income. Out of 347 respondents, 180 were female and 162 were male. The majority of the respondents were supervisors (228) while rests are project managers (56), middle level management (48) and top management (10).

The age of the respondents were mainly lying between 30 to 49 years (241) while least in age of 50+ having frequency of 7. The highest range of the monthly income falls between Rs.50, 000 to 100,000 (159) followed by Rs.100, 001 to 150,000 (96).

Demographic Profile

		Freq	Per	Valid Per	Cum Per
Gender	Male	162	47.6	47.6	47.6
	Female	180	52.4	52.4	100
	Total	342	100	100	
Age	Under 19	11	3.2	3.2	3.2
	20-29	83	23.9	23.9	27.1
	30-39	125	36.6	36.6	63.7
	40-49	116	34.3	34.3	98
	50+	7	2	2	100
	Total	342	100	100	
Monthly Salary	<50,000	85	24.8	24.8	24.8
	50,000-100,000	159	46.7	46.7	71.5
	100,001-150,000	96	28	28	99.4
	150,000>	2	0.6	0.6	100
	Total	342	100	100	
Management Level	Top Management	10	2.9	2.9	2.9
	Middle Level Management	48	14.1	14.1	17
	Project Managers	56	16.4	16.4	33.4
	Supervisors	228	66.6	66.4	100
	Total	342	100	100	

Descriptive Statistics

Descriptive Statistics

	N	M	S.D	Skew		Kurt	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
BPM	342	3.7560	.67566	-.626	.131	.269	.261
SCP	342	3.4313	.79579	-.381	.131	.065	.261
IT	342	3.4157	.74463	-.182	.131	-.337	.261
Valid N (listwise)	342						

Above mentioned table shows that the maximum skewness belongs to variable of delivery quality i.e. -.172(Mean=3.355, S.D=.753) and the minimum skewness belongs to variable of BPM i.e. -.626 (Mean=3.75, S.D=.675). SCP and IT have positive kurtosis while others have negative kurtosis. As all constructs lie within the range of skewness and kurtosis, i.e. ± 3.5 therefore it can be believed that the data has a normal tendency.

Reliability

Fig 4.3.

Constructs	Cronbach's Alpha	Number of Item
BP	0.721	6
SCM	0.573	3
IT	0.626	4
Overall	0.849	6

The above mentioned table is reliability of all constructs used in this study. According to Hinton, Brownlow, McMurray, and Cozens (2004), Cronbach's alpha value above 0.75 is considered as high reliability while 0.5 to 0.75 signifies moderate reliability. The overall reliability of the complete instrument used in this study is 0.849. The highest reliability is of business process management (0.721) and the lowest is of SCM (0.573).

Inferential Analysis

SCM

MODEL SUMMARY

Model	R	R Square	Adjusted R Square
1	.537 ^a	.289	.287

ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	65.905	1	65.905	139.983	.000 ^b
Residual	162.429	345	.471		
Total	228.334	346			

a. Dependent Variable: BP

b. Predictors: (Constant), SCM, IT

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.960	.208		4.608	.000
SCM	.646	.055	.537	11.831	.000

a. Dependent Variable: BP

The Regression analysis results from the above model signifies that the predictor SCM has an association with business performance and explain 29% of the variance (.289, $f=139.983$, $p<.05$), which according to **Cohen (1988)** is a slightly moderate effect large effect.

IT

Fig 4.4.2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.520 ^a	.270	.268	.69510

ANOVA^a

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	61.641	1	61.641	127.576	.000 ^b
Residual	166.693	345	.483		
Total	228.334	346			

a. Dependent Variable: BP

b. Predictors: (Constant), IT

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.450	.175		8.266	.000
IT	.567	.050	.520	11.295	.000

a. Dependent Variable: BP

The Regression analysis results from the above model signifies that the predictor IT has an association with business performance and explain 27% of the variance (.270, IT=127.576, $p < .05$), which according to **Cohen (1988)** is a slightly moderate effect large effect.

Mediating Effect of IT

Model = 7

Y = BP

X = SCM

M = IT

***** INDEX OF MODERATED MEDIATION *****

Mediator

Fig 4.4.5.

	Index	SE (Boot)	BootLLCI	BootULCI
IT	.0000	.0065	-.0144	.0144

The above model where run on sample size of 342 taking the Independent variable of Supply Chain (X), with the dependent variable of business performance (Y). The mediator here is IT (M). The result of direct effect of X on Y here indicates the sig value of 0.0001 which is less than

the 0.05 value. The index of moderated mediation value here for bootstrap of confidence interval are -0.0144 (LLCI) and 0.0144(ULCI).

SUMMARY OF HYPOTHESIS

S.No.	Hypothesis	Decision
H ₁	Supply chain management does not influence business process management.	Rejected
H ₂	Technology and information systems don't mediate the relationship between supply chain management and business process management.	Rejected
H ₃	Supply chain management doesn't influences capabilities in information technology and systems.	Rejected

CONCLUSION

Supplier-business-customer interactions increasingly depend on fast and effective internet communication. By utilizing information systems for integration between internal sectors, companies invest in new product and process technologies to improve their competitive performance indicators. In the national context, technology cluster companies attribute to these indicator variables such as compliance with the technical specifications of the project, high quality in design and finishing, introduction of new products to the market and ability to customize product designs to meet specific customer needs. .

The hypotheses formulated demonstrate that SCM relates to both competitive performance and capabilities in technology and information systems. These strategies, executed through partnerships at supply chain, consist of actions aimed at adapting new technologies in products and processes, promotional event planning, market forecasting, inventory management, product variety and joint problem solving, providing companies with higher quality, thus increasing their competitive performance. The qualitative and quantitative steps of this study demonstrated the importance of investments in high quality and speed in production and skilled labor to act in innovation processes, corroborating the hypothesis that IT fully intermediate the business performance. It is also noteworthy that companies from Pakistanian technology centers can invest even more in technological capabilities of manufacturing, marketing and strategic planning. Nevertheless, it is worth stressing the limitations of the research, which included the sample size, data collection by accessibility and the studied period, cross-sectional. Finally, it is recommended for future research: a) to develop a computational model that uses different simulation rounds, in order to evaluate the effect of

changes in control variables; b) enlarge the sample and compare the results with those of technological centers in other countries; and c) develop ITmediation scenarios with, for example, the use of scanning or saving methods.

The utilization of IT in Pakistani business process can be a shift Pakistani market from traditional systems of production to a system that will be more responsive to the needs and demands of the customers (**Chandrashekar & Schary,1999**). The effective application of information technology can bring speed and flexibility in supply chain system of Pakistani firms. Moreover, the information about the effectiveness of IT will allow supplier to organize inventories of vendors and distributors, allow managers to manage stock system and make entire supply chain responsive to the needs of consumer market.

LIMITATIONS

The data collected has reduced generalizability to the limited number of participant and a limited number of organizations selected for the study. The research needs a higher number of data for more effective results.

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