

Research Article

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The Impact of Hospital Supplier Integration on Hospital Performance in Pakistan

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ABSTRACT

The aim of this research is to analyze the Supplier Integration on performance of Hospitals within Pakistan. Four factors of supplier integration are identified as Logistics Integration (LI), Information Technology (IT), Cost Reduction (CR) and Information Sharing (IS) which have been analyzed using Smart PLS. Sample of 299 workers of hospitals is obtained using structured questionnaire comprising of 21 questions where the responses were measured on Likert Scale. Data was studied using SEM (Structural Equation Modelling). It was concluded that information sharing, information technology and cost reduction have significant impact on hospital performance while logistics integration has less significant impact on the hospital performance in Pakistan. The scope of this research is to conclude the factors involved in enhancing the performance of Hospitals by bringing about supplier integration.

Key words: Hospital Performance, Information Technology, Information Sharing, Logistics Integration, Pakistan, Hospital

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INTRODUCTION

Healthcare is basic facility needed for every individual and demanded in an equivalent way as education. Provision of good healthcare services is required in the same manner when the economy is declining, as well as in high inflation as healthcare services are not a want but they are necessity. The hospital expenditures are subsidized by government and privately working NGOs, a small delay in provision of facility or shortage of material at hospital can have a tremendous impact on the patients who are getting services from hospital as it can be life threatening and bring legal repercussions to the hospital. Thus it is compulsory for decision makers at hospital to keep the supply of material and flow of information readily available (Park and Dickerson, 2009). According to OECD (2015) health data and status report of the world, about 56% of the total cost of the hospitals is spent on materials (OECD, 2015) which is a significant part of total hospital cost (DeJohn, 2009) as the materials used needs to be disposed of after a single use as per World Health Organization guidelines issued for Safe Hospitals Initiative (WHO, 2015).

Barlow (2010) in his article emphasized on the importance of cost and concluded that in order to optimize the performance of hospitals in Pakistan it becomes compulsory to periodically review the supply chain function of hospitals. According to Poirier and Reiter (1996), the optimization cannot be achieved by the firms on individual level as it is a group/ business level activity and require conclusive efforts by building strong business networks. The networks in modern organizations are primarily managed by information technology as concluded by Spithoven and Knockert (2011). Information technology has always been key factor in supply chain but the same has rarely been studied in context of hospitals. Thus the study is aimed at hospital setups supply chain management and its integration.

Hospitals in Pakistan have not upgraded as their performance and their relationship with supplier is weak. This study aimed to create a bridge between the time lag required to and patients with the help of proper supplier integration. It highlights the relationship of suppliers and organizations which is an issue of pivotal importance. Problem occurs when there is lack of effectiveness and efficiency in the organization as delay from both the sites. This study will discuss these factors with the help of information technology, cost reduction, logistic information and sharing information it can be identified as removing the gap from organization that which of the mentioned factors are more authentic and appropriate.

Gap Analysis

Manzoor (2016) state that the biggest challenge Pakistani hospitals facing these are lack of doctors and new and innovative technology implementation which is not up to the mark. These authors have worked on the framework of logistics integration in hospital setup but this study has signified the importance of Information Technology, information sharing as well as cost reduction factors' impact on performance of hospitals in Pakistan which is a key gap that was not covered previously.

Objective of Research

Following are the objectives of this research:

- Ascertain relationship in between supplier integration and hospitals in Pakistan
- Determining the ability of Logistics information, cost reduction, information sharing and information technology in hospitals.
- Analyze how hospitals and their suppliers can best address the challenges and their support in creating initiatives.

Significance

The hospitality sector in Pakistan is far lacking in terms of many factor which includes the provision of salaries to the doctors to the facilities provided to the patients. The main factors which are leading to the poor performance of the hospitality sector high cost involved in the operations of hospitals, untrustworthiness of patients on doctors at hospital especially impacting the public sector hospital.

The performance of hospitals in Pakistan is factor of many variables. This study is aimed to analyze the factors which have impact on the performance of hospitals in Pakistan especially in terms of the supplier integration to bring about reduction in cost of operations by timely sharing of information using modernized information technology resources and bringing about logistics regression. This research will contribute to improve the overall performance of hospitals in Pakistan by effectively optimizing the factors responsible for performance and their statistical relationship.

Research Question

Following are the research questions of the study:

- How hospital performance can increase while having supplier integration?
- What tools will be using to figure-out the facts and figures?
- Is Information technology, cost reduction, information sharing and logistics integration are appropriate variables for the study and how they affects hospital performance?
- Can collaboration and coordination between the supplier and organization leads, the generation towards betterment and new technology?

LITERATURE REVIEW

One of the major challenges faced by hospitals these days are to reduce the servicing cost along with providing good care to the patients visiting in Outpatient clinics. Prior researches show that logistics & equipment represent a large portion of the hospital expenses i.e. more than 45%, which is always on verging trend due to less recycling of material and dispose of equipment and medicines once used, as per the International Laws, so as to avoid contagious diseases. The cost can be reduced by focusing on supply chain which is decisive area for the flow of hospitals supplies and equipment. From the researches available on the subject matter, it is indicated that logistics have deep impact on the performance of hospitals (Alshahrani et al., 2018). However, key focus has never been the hospitals, especially in Pakistan; where the poverty percentage is very high. Pakistan ought to have proper hospitals and care centers to give proper treatment .But due to the influence of private hospitals, government hospitals are not given due importance. Therefore, the prime objective is to focus on supplier integration keeping in view hospitals in Pakistan.

Current research starts along with pertinent researches already done that showcase supplier integration in hospitals while working on several variables that facilitate the study in order to logistics integration, information technology; sharing and cost of reduction of equipment used therein. There are various facts relating to supplier integration and hospitals system that have been identified. In addition, methodology section will summarize the qualitative and quantitative techniques for this research, followed by summary, ending up with concluding comments.

A study was conducted by OECD to analyze the annual expenditure on health in the countries affiliated with this organization. Although healthcare spending has not declined any country's economies; the inclination in health expenditures has pushed the decision makers to monitor and improve methods to control the cost and proper utilization of used equipment without affecting the healthcare quality (Jia et al., 2015).

A new and modern healthcare management has led to unique way of thinking in both SCM & IS (Alin, 2010). For a smooth and well-coordinated operation, process of material from suppliers, known as logistics integration (Alshahrani et al., 2018) has been carried out providing sufficient coordination and trust in each other so as to create a linkage between organization and its suppliers. (Anand and Goyal, 2009).

According to few researches, the impact of logistic integration on hospitals suppliers portrayed that LI allows firms the SC cohort to act as a single entity which creates better performance without any flaws in the contract. Through LI, organization may have an advantage of integrating the supplies vertically (planning, & cost control) without sharing any physical sense, which is having profound impression on customer happiness & services, improving sales, just in time delivery, minimizing risk factors and increasing service levels. According to the carried out research, it is observed the IT integrations also has key impression at supply chain quality at the Hospitals, compared to the past researches, it was seen that there is no direct or indirect relationship with IT integration as it doesn't have any relationship with the SC Performance; it indirectly enhance SC integration.

In the view point of Yusuf et al. (2014), it can be seen that a significant strong linkage is found between well maintained IT, SC Integration & firm performance of the Hospital. The specialized knowledge is sharing inter-organizational information between suppliers and hospital is playing a vital role in maintaining proper transaction in the business. IS and KS amongst supplier of materials at organizations have vital factor for lead on the competitors (DeJohn, 2009). Another study conducted to assess the linkage of IS on the hospitality industry and its suppliers which shows that uninterrupted sharing of information across the stakeholders of the SC (Ghaus, 2015). Jiang and Teng (2016) justified that without sharing proper and complete information with suppliers, huge investments in IT could decline to get the expected products and benefits. They also showcases a factor of risk by sharing internal information of the hospital with someone who is not a part of that particular firm, so trust is necessary while building a contract. (Manzoor, 2016) signified that there is a positive impact of trust on hospital supplier as it plays a speedy role in sharing information within the firm and suppliers, and improves the quality of information and also it augments the service.

CONCEPTUAL FRAMEWORK

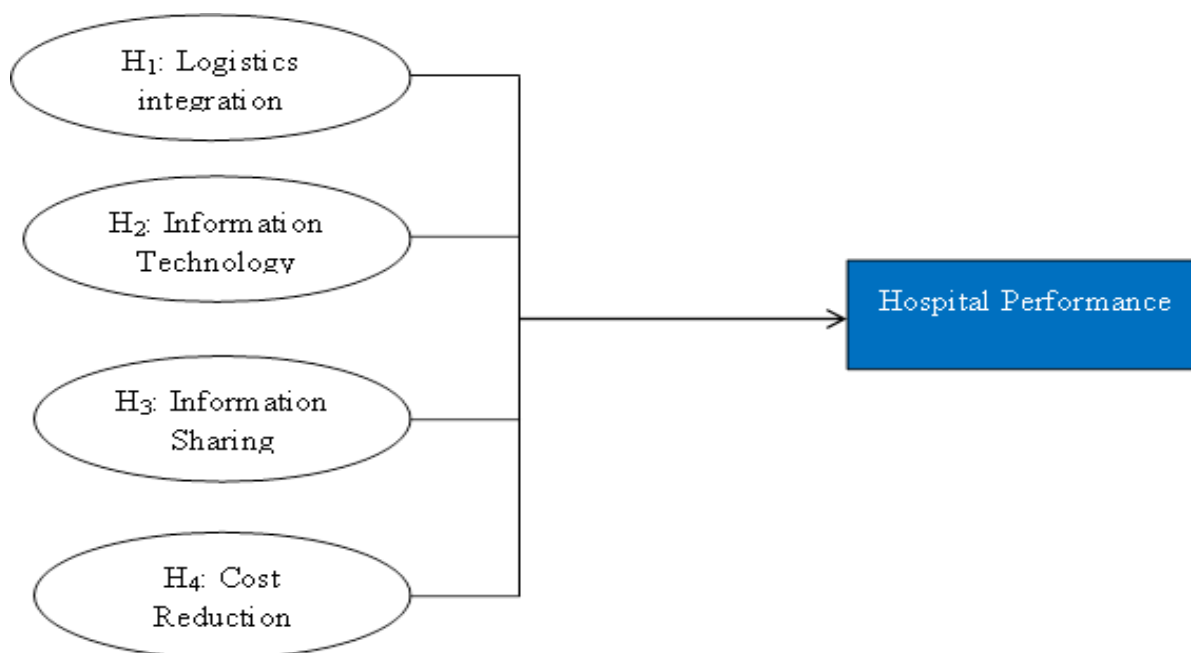
While using the literature as discussed above, a conceptual model is demonstrated which depicts hospital-supplier integration as a variable which is sub divided into four variables Logistic integration, cost reduction, IS & information technology. The research question assumes that IS, IT CR and LI have key role in the performance of supplier and hospital performance.

According to research conducted in 2012 by Prajogo and Olhager, the integration of supply chain is not merely a task to integrate with the suppliers, who are the key providers of material to the organization, but also comprises the integration within the organization which includes the accurate and timely flow of information of material requisitions by the departments i.e. ward, operation theater, HDU unit emergency unit etc. With the timely flow of information in a timely manner with good accuracy, the effectiveness is achieved but the efficiency can also be obtained by using the lean practices (Fearne and Fowler 2006).

IT has deep & profound linkage and association with the overall performance of organizations (Sabara et al., 2019). In the modern era, every organization, from little sole proprietor operating in local markets to huge multinational firm, are basing their activities in information technology now. Information technology has a key role in every aspect of business from Human resource to customer services and logistics. The use of efficient Information Technology like procure to pay system (P2P), a domain which can authenticate the user like (@hospital.com), smart and user friendly domains, where the logistic related requisitions and orders can be made: as per the research made by Mantzana et al. (2007).

Cost reduction is one of the major challenge faced by patients in hospitals, as it may declines the service and quality of medication. In view of quality management, the hospitals ought to take in sufficient measures to view their reputation, which can get affected due to the poor service quality to the patients, if reduction in cost of equipment is

emphasized. Procurement and logistics are linked with cost reduction and increase profitability, and assure supplies and competitive advantages.



Hypotheses of the study:

H₁: There is a positive relationship between Logistics integration & hospital Performance.

H₂: There is a positive relationship between information technology & hospital Performance.

H₃: There is a positive relationship between information sharing & hospital Performance.

H₄: There is a positive relationship between cost reduction & hospital Performance.

METHODOLOGY

The most prior method used for the data collection and for survey was from the decision makers (Managers) and Staff members of different hospitals as they could give the most authentic results regarding the said topic in Pakistan. Managers and staff members were contacted through online questionnaires and personal visits. Data was collected from 299 respondents who answered 21 statements under Likert scale based questionnaire.

Respondents in this research are the hospital staff members which are directly related with the hospital performance also their performance is directly linked with the availability of material which is a factor of logistics integration primarily the supplier integration. The factors for supplier integration used in the study are logistics integration, information technology, information sharing and cost reduction. A primary technique is being used for the study, a paper and pen structure was designed as questionnaire having 21 statements along with five (5) segments. First, consist of logistics integration, second has statements regarding Information technology and third determines the effects information sharing, fourth describe the effects of cost reduction and fifth as last one shows the dependent variable i.e. hospital performance. Snow ball sampling technique is best suited due to many respondents of different field and an organization. Snow-ball sampling is a part of non-probability method, also known as convenience sampling. The effort was to collect data from 299 respondents and above but due to limitation of time and authenticity, number of 299 respondents found valid who had knowledge regarding logistics integration at hospital.

Two hundred and ninety-nine (299) questionnaires were filled for the research. Respondents were the staff members of hospital in Pakistan which includes Civil Hospital (31), the Indus Hospital (17), Jinnah Hospital (31), Pak Land Hospital (28), South City Hospital (18), Eastside Hospital (16), Agha Khan Hospital (36), Liaquat National Hospital (27), Memon Hospital (17), Bantwa Hospital (25), Patel Hospital (29) and Dar ulSehat Hospital (24). They are relevant and sufficient enough for the analysis.

As mentioned above, a questionnaire-based survey was developed to obtain respondents view to test the hypotheses. The statement in the survey form were designed on Likert scale ranging from 1 till 5 from strong disagreement to strong agreement. The data collected through the survey was fed into SPSS 19, software and analyzed for reliability test (Table 3.2). The reliability test showed that the data is reliable and could be used for statistical analysis. Regression

was then applied to determine the statistical validity of the hypotheses. Smart PLS was used to perform SEM and Excel was the tool for demographic assessment.

RESULTS AND INTERPRETATION

The sample collected both females and males staff members from hospitals i.e. 158 Male staff members and 141 female staff members. The respondents were more concentrated in age bucket of 26 to 30 years since the workforce is more concentrated in this age bracket in Pakistan. The respondents are from various departments and various levels including purchase officer, Manager Procurement, Operations Manager, Manager Warehouse, Operations Coordinator, Store Assistant, Assistant manager store, Manager Purchasing etc.

Reliability and validity

Reliability is measure of the stability and internal consistency of the scale (Golafshani, 2003). In order to measure the internal consistency, the frequently used coefficient is Cronbach's Alpha. In the following table 1, the value of alpha is depicted of every being measured under the study. This has done with the motive to evaluate the significance of the data. The depiction of the Cronbach's alpha of info technology (0.84) shows that the data about the information technology is consistent enough and reflects reliable answers by the respondents under the scale of information technology. Cost reduction variable with the value of (0.83) is also showing higher reliability of responses. On the contrary, information sharing is standing on the edge of accepted reliability (0.61) and logistic integration shows the lower reliability value (0.42) which illustrates that the responses are under this construct are deviating with each other and are below the accepted value of reliability. This also assumes that the responses are not adequate under this variable.

Table 1: Description of the Cronbach's alpha

Variables	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
IT	0.84	0.84	0.84	0.56
CR	0.83	0.85	0.83	0.51
HP	0.75	0.8	0.75	0.45
IS	0.61	0.69	0.63	0.28
LI	0.42	0.42	0.39	0.19

The next column depicts about the spearman rank correlation among the variable. The spearman correlation shows the strength of association among the variables (Myers & Sirios, 2004). The correlation value of information technology (0.84), cost reduction (0.85) and hospital performance (0.80) illustrates that there is a strong association among the variables while information sharing (0.61) and logistic integration (0.42) showed comparatively moderate and weak correlation among these variables. In order to assess the internal consistency of the measure, composite reliability has been conducted. The composite reliability of an average value of 0.8 for information technology and cost reduction depicts that the construct measurable is valid of these variables. While information and logistics performance showed less reliability and acceptance of the threshold.

In order to measure the variance due to the measurement error among the variables (Wong, 2013), average variance extraction has been done. The average variance of information technology and cost reductions showed that the loadings under these two factors are good enough, however, for hospital performance (0.45), logistic integration (0.19) and information sharing (0.28), it seems that the loading are less perfect for the study as they are less than the standard value (0.5) of AVE.

Table 2: R Square Measurement

	R square	R square Adjusted
HP	0.94	0.93

To assess the degree of closely fitness with regression line, R square measurement has been undertaken in the study. It is also known as coefficient of determination. The R-square value if 0.94 showed that the higher and adequate correlation among the model of the study and the data. The adjusted R square is therefore showing adjusted predictors in the model and 0.93 value determined that there 93% variation in the data with the change in the study variable.

Factor loadings significant

Below is the mentioned table of (CFA) confirmatory factor analysis with the loadings. Construct with the loading of .5 are consider as strong loading variables whereas the constructs with the loading of below .5 are considered as less are better to be removed from the table.

Table 3: Confirmatory Factor Analysis

Variables	Loadings	T-value	P-value
CR1	0.85	10.95	0
CR2	0.5	3.99	0
CR3	0.82	11.61	0
CR4	0.68	10.66	0
CR5	0.67	13.18	0
HP1	0.35	4.21	0
HP2	0.71	15.56	0
HP3	0.68	14	0
HP4	0.84	14.15	0
IS1	0.55	8.71	0
IS2	0.14	1.44	0.15
IS3	0.62	8.7	0
IS4	0.71	6.71	0
IS5	0.46	4.02	0
IT1	0.78	11.36	0
IT2	0.7	13.59	0
IT3	0.8	14.72	0
IT4	0.71	11.34	0
LI1	0.25	1.49	0.14
LI2	0.54	3.67	0
LI3	0.45	3.95	0

Factor analysis was done to reduce the outliers of the data by seeking the latent variables reflected in the observed variables (Thompson, 2004). Under this all the values less than 0.07 are eliminated while making the path analysis model in order to ensure the consistency of the model. The T value of all the items showed that there is higher deviation among the data with the dependent variable and the P-value showed that there is significant relation existing among the variables with the study variable.

Discriminate validity

Discriminate validity shows that the constructs that have expected to have no relation does not have any relation in real as well. The discriminate validity of info technology, cost reduction and hospital performance implies that the variables are strongly related to their own factor and unrelated in real.

Table 4: Discriminant Validity

	IT	CR	HP	IS	LI
IT	0.75				
CR	0.96	0.71			
HP	0.93	1.05	0.67		
IS	1.05	0.9	1.01	0.53	
LI	0.7	0.75	0.71	0.74	0.43

Discriminate validity is said to be acceptable when the constructs have an AVE loading greater than 0.5 means a minimum of 50% of variance is taken into account by constructed hypotheses Chin (1998). As per the fact that the variance extracted is greater than the correlational value, it can be stated that there is discriminant validity.

Co-linearity statistics (VIF)

The variance inflation factor is defined as the ratio of variance in the model with distinct terms by dividing it with the model variance (Alin, 2010). It quantifies the degree of correlation among the one predictor with the other in the model. If the VIF is closer to the value of 1, the model seems to be much stronger. VIF values in table below showed that there is moderate variation and the factors are seemed to be moderately impacted by the other factors.

Table 5: F-square

	IT	CR	IS	LI
HP	3.26	1.26	4.37	0.01

In order to measure the strength of every predictor variable, F square values have been calculated to explain the endogenous variables (Hair, 2007). The F square value of logistic information showed that there is smaller variation explained in the endogenous variables. For information technology, Cost reduction and information sharing, larger variation has been explained in defining the exogenous variables. Therefore, it can be implied there would be substantial effect on the variables due to the predictor of the study while only logistic integration has been noted having less variation with the hospital performance which showed significant relation among the two variables.

Table 6: Latent variable correlations

	IT	CR	HP	IS	LI
IT					
CR	0.96				
HP	0.93	1.05			
IS	1.05	0.9	1.01		
LI	0.7	0.75	0.71	0.74	

The latent variable correlation depicts that information technology with having diagonally similar value of 1.00 are considered to be perfectly correlated with each other, while, HP is highly correlated with cost reduction and hospital performance is moderately correlated with logistic integration. On the other hand, seeing the relation of cost reduction with other variables, it can be observed that it is highly correlated with information technology and information sharing and is perfectly correlated with hospital performance. With logistic integration, the variable has moderate association with the value of 0.75. Hospital performance was seen having the perfect correlation with cost reduction and information sharing and the variable was seen highly associated with information technology followed with having moderate relation with logistic integration. Lastly, logistic integration seemed to have moderate relation with all the variables.

Table 7: Hypothesis Testing and Results

	Estimates	T Statistics	P Values	Decisions
IT ->HP	1.287	0.94	0.35	Not supported
CR ->HP	0.677	8.77	0	Supported
IS ->HP	0.98	3.63	0	Supported
LI ->HP	0.029	0.06	0.95	Not supported

The table above depicts about the hypotheses tested based on the study. As per the table, it can be illustrated that information technology has no association with hospital performance as it has the P value (0.35) greater than the standard value of P which is (0.05) due to which it can be demonstrated that there is no essential relation among information technology and hospital performance and the decision is not supported under these two variables. Moreover, for the second variable cost reduction, a significant relation exists among cost elimination and hospital performance as it lies under the acceptance region of the decision with a P value (0.00) less than standard value and implies that cost reduction also have significant relationship with performance. Information sharing also impacts the hospital performance as its value also lies below the standard value region which gives it a supported decision. The last variable show unsupported decision based on the higher value (0.95) through which it can depict that no relationship exists among logistic integration and hospital performance.

Hence from the table, it can be stated that two of the null hypothesis are rejected relating to information sharing and cost reduction showing a significant association with the hospital performance while the null hypothesis related to information sharing and logistic integration has been accepted showing no relation with the dependent variable.

The regression equation can be written as-

$$\text{Hospital Performance} = \alpha + 0.029 (\text{Logistics Integration}) + 1.287 (\text{Information Technology}) + 0.98 (\text{Information Sharing}) + 0.677 (\text{Cost Reduction}) \dots\dots\dots (\text{Regression Equation applied to the research variables}).$$

DISCUSSION

This research was done to analyze the relationship between the variables identified as CR, LI, IT and IS on the performance of hospitals in Pakistan. The hospital performance is a factor of supplier integration as it helps in availability of material required for the treatment of patients in hospital setup. The effective integration of supplier in

hospital setup makes it easier to have the material available over the counter to treat the patients effectively. The turnaround time at hospital to treat emergency case patients is the key drive to attract patients.

The result signifies that hospital performance is very important and it is reliable on following things: cost reduction CR and information Sharing IS where as logistic integration and information technology is not supporting the studies. While, working on prior research the main factors of organization performance and its enhancement belongs to logistics and technology. In the view points of several authors TQM is important in field of service industry and specifically in hospitals because it's a matter of life and death so proper equipment on time delivery and availability is very necessary as the study shows that cost reduction and information sharing is priority in context of Pakistan. The hospital setups at Pakistan at usually supported by government or other private NGOs and reduction of cost at hospitals is key aim to reduce the expenditure and providing medical facilities to as many as possible patients using the same resource without compromising the quality of facilities to the patients.

CONCLUSION

It can be concluded that model developed for study was reliable and the questionnaire used to collect data was also reliable hence the predictors and dependent variables have impact on each other. In addition to this, the hospital performance is a factor of supplier integration at hospitals in Karachi, Pakistan. From the data collected from 299 respondents of workers at hospitals it is found out that Cost Reduction & information sharing factors of supplier's integration on hospital performance hence the hypotheses are accepted. Whereas, the Information technology and logistics integration have insignificant impact on the hospital performance and we are failed to accept the hypothesis. This study can be used to help the hospitals bring supplier integration at their workplace which will lead to improve their operational efficiency as well as enhance their reputation in the market. Along with this, the top management can focus on the process of supplier integration based on the variables used in this study to enhance the supplier integration in hospitals in Pakistan. The performance of hospitals should be critically analyzed in order to assess the factors that are leading to improve the performance of hospitals in which supplier integration is a key factor.

Due to shortage of time duration and cost involved to collect data only 299 respondents were collected using questionnaire for primary information. The no. of respondents may be increased in order to make data more reliable. Along with that only for factors of supplier integration were used in the study to keep it achievable. Whereas, the supplier integration can be factor of other variables hence should be made part of study. In addition, study was restricted to Pakistan specially Karachi, whereas the scope can be increased to major cities of Pakistan if not covering the urban and rural areas in Pakistan.

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