



Research Article

The Mediating Role of Information Leakage on the Relationship between Supply Chain Information Integration and Operational Performance

Gohar Nadeem

Department of Business Administration, Faculty of Management Sciences, The University of Agriculture D.I.Khan, Pakistan.
Email: gohar.nadeem@uad.edu.pk

Correspondence

Department of Business Administration
Faculty of Management Sciences, The University of Agriculture D.I.Khan, Pakistan.
Email: gohar.nadeem@uad.edu.pk

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ABSTRACT

This existing study aimed at investigating indirect effects of leakage of information on supply chain and operational performance. Nature of this study is quantitative and nature of data was cross-sectional. Primary data was collected through questionnaire. Population of this study comprised of organizations' directors, managers. Snow ball sampling technique was used to select sample. Total 250 questionnaires were distributed and total 152 questionnaires were received which were then used in the analysis of data in SPSS. The response rate was 60.8%. Cronbach alpha and exploratory factor analysis (EFA) was used to test reliability and validity of the questionnaire. Mediation analysis was run in process file using resample rate of 5000 bootstrapping at 95% confidence interval. Cronbach alpha and factors loadings met the threshold. Information leakage mediated between supply chain and operational performance. It was also evident from the indirect effects that information leak could have worse effects on supply chain and operational performance. It is concluded that leak of information whether intentional or accidental both have effect on operational performance. It is therefore mandatory for professionals to take great care while dealing with supply chain partners so that it may not affect their performance. Managers have to raise awareness to secure the information confidential and to maintain secrecy. Doors for further research are open for professionals, scholars and academicians. They may add other variables in this model and extend the body of knowledge of supply chain, operational performance and leak of information.

KEYWORDS

Operational Performance, Accidental and Intentional Information Leakage. Supply chain Information Integration (SCII), SPSS, Mediation Process

1 | INTRODUCTION

Due to increase in complexity in the businesses, the firms have found the solution to integrate supply chain information integration in the workplace to decrease the risk faced by the firms (Fan et al., 2017). Firms have realized the importance of supply chain that sharing information on time, at low cost and securing information while dealing with suppliers and creditors is the key to business success. It helps in obtaining optimal operational performance. In addition firms also realized that while sharing information with external partners' involved huge risk. This may harm the profits, reputation and image of the firms. Instead of risks firms have to link their internal environment with external partners by keeping in mind the importance of confidential information image of firms should not be compromised (Ahmad, 2022). Supply chain information integration (SCII) is useful for the firms to obtain competitive advantage and sustainable operational performance. Firms share confidential documents with partners through electronic platforms. In last few years a significant increase in sharing knowledge and information has been seen among chain partners. Using electronic platforms to share information is less expensive, cost effective and also enhanced the operational performance of the firms on the contrary it has associated few risks as well (Info Watch, 2017). Leak of information whether it is unintentional or intentional may lead to serious consequences. It is essential for the firms to maintain secrecy and confidentiality while trading (Danese, 2013). Since last five years more than 65% information has been leaked using electronic platforms. Information related with products, services, consumers, customers, prices, and logistics is very important for those firms who are in manufacturing sector. It not only has negative effect on reputation, image and goodwill of the firm but it raise cost, of production and prices of products. Due to this reason firms are reluctant to share information with supply partners. Very limited literature is available regarding SCII, information leak and operational performance in Pakistan. It is therefore very important to fill the gap and contributes to wards body of knowledge by extending literature on SCII and information leakage in Pakistani perspective using resource orchestration theory (ROT). In order to survive and compete in the market partners requires timely and accurate upto date information which helps them to coordinate intra and inter-organizational level (Yu et al., 2018). Today business activities are more complex and firms have developed digital platforms and electronic connectivity for sharing information on time with supply chain partners (Wong, Heng & Cheng, 2012; Shou et al., 2017). The framework of the study is developed to test hypotheses and answer following research question.

1. Does information leakage affect SCII and operational performance?

1.1 | Problem Statement

Performance is the main problem of the firms. Operating the firm alone without having effective and qualified partners in today's business environment is very difficult. Therefore it is crucial for the firms to integrate supply chain in to their operation. For this purpose integration of supply chain in the internal environment of the firms could be helpful to link with external partners by keeping in view the secrecy of confidential information.

Research Objective

- To determine the mediating role of information leakage upon supply chain information integration and operational performance.

2 | THEORETICAL BASIS RESOURCE ORCHESTRATION THEORY (ROT)

Resource based view theory posits that organizations have tangible and intangible assets these assets help firms to get advantage and better performance but only these resources are not enough, it is essential to have managerial acumen to efficiently and effectively handle these resources (Barney, 1991). This element was not covered in RBV theory later on resource orchestration theory had filled that gap (Chadwick, Super, Kwon, 2015). Managers have to efficiently and carefully handle the human and non human resources. If these assets are mis managed it would have negative effect on performance of the firms. That is why firms need to develop specific protocols when they are going to share some information with supply chain partners (Wang et al., 2017). Well trained and experienced

individual must be given the position to share information with supply chain (SC) partners. Intangible assets of the firms are trade mark, goodwill, reputation and human resources which are not easy to imitate by competitors because they are gained after so much time and experience (Malik et al., 2021).

2.1 | Supply Chain Information Integration and Operational Performance

Having good relations with stakeholder especially supply chain partners have better effects on operational performance of the firms. On the other hand studies also reported negative effect of such relationships as well; this might be due to some other factors like resources, capabilities and operational functions. SC is getting affected by integration of information (Shou et al., 2017). Partners have to make sure that authentic and accurate information is shared. In turn it would bring fruitful results. The information about customers, consumers, creditors, suppliers must be shared accurately. In this way firms could be able to reduce cost of logistics, procurement, production and manufacturing cost and thus enhance operational performance (Zhou et al., 2017). According to Liu et al., (2017) operational performance is predicted by SCII. SCII brings improvement in operational performance. Therefore following hypothesis is developed:

H_{1a}: Supply chain information integration is positively and significantly related with operational performance.

2.2 | Information Leakage and Operational Performance

There are two forms of information leakage one is accidental and 2nd is intentional but both could have worse effects on supply chain and operational performance. Supply chain partners share data with each other to achieve better performance level and strategic objectives. That is why information integration plays integral role in this regard and it helps firms to improve their performance and also firms gain several other benefits. Sharing of information outside the firms is sometimes destructive for firms (Yu et al., 2018). This leads to leakage of information. This might be accidental or intentional to some specific group, individual or group of individuals and firms. It would harm reputation of firms. Ignorance of employees and lack of experience leads towards leakage of information (Rossit, Tohme, & Frutos, 2019). Leakage of information is possible due to lose control of managers on employees. Some employees leak some confidential papers intentionally to harm the firms and give it to unauthorized people this is unethical, illegal and have serious consequences (Hitt, Carnes, Xu, 2016). There are so many factors which are the reason of intentional leak of information by an employee such as unattractive salary package, dissatisfaction from job and supervisor, lack of trust in leadership, organizational cronyism, and lack of growth and promotion chances. Competitors take benefits from these opportunities and might use them for their own benefits. More the integration occurs between supply partners there is high risk of information leakage. This has worse effect on association between stakeholders and firms and result in reduces operational performance (Liu, Jian, Feng Chin, 2018). Past studies have already reported the direct, indirect and buffering effects of information leakage on SCII ad OP. this is one of pioneer studies in Pakistan’s’ perspective. Therefore, following hypotheses are developed:

H_{2a}: Accidental information leak mediated supply chain information integration and operational performance
 H_{3a}: Intentional information leak mediated supply chain information integration and operational performance

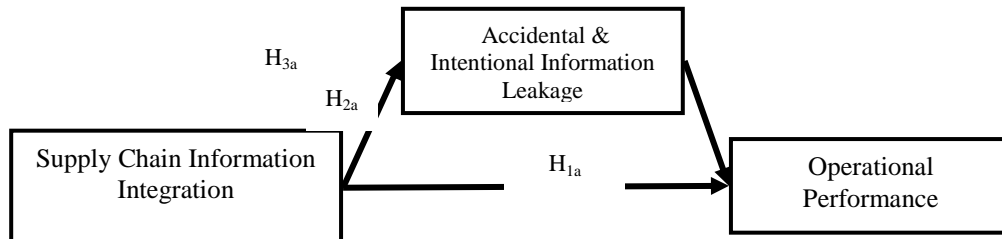


Figure 1 Theoretical Framework

3 | RESEARCH METHODS

3.1 | Research Design Population and Sampling

Survey approach is used in this study. Closed ended questionnaire was adopted from past studies to collect the primary data. Nature of data was cross-sectional i.e. data collected at one point OF time. The proposed model was tested in analysis by SPSS. To test the hypotheses questionnaires were distributed for data collection from different organizations. Population of the study was managers from supply chain and those who have experience of supply chain (SC) were contacted. Non-probability sampling technique i.e. snow ball technique was used in the current study. The sample companies were selected on basis of a criteria those firms having SC sections have high risk of leaking information. Total 152 SC managers and directors from different firms have participated in the survey. The questionnaire was checked for content validity from 5 experts in the relevant field. The questionnaire was found fit for the survey. 250 questionnaires were sent to respondents out of which 152 were received and used in the analysis. Thus, yielding the response rate of 60.8%.

3.2 | Measures

The instrument of the current study was based on seven point likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Scale for supply chain information integration was adopted from Wong, Lai and Bernroider (2015) and scale of operational performance was adopted from Vafaei-Zadeh et al., (2020). Information leakage was adopted form Ritala et al., (2015).

3.3 | Validity and Reliability

Factor analysis is recommended for validity of the instrument. It was recommended by Hair et al (2018) that all the items should have factor loadings higher than 0.7, convergent and discriminant validity should be established and it must be investigated by average variance extracted (AVE)>0.5 and composite reliability must be (CR>0.7), while discriminant validity could be checked by Fornel-Larcker criterion.

4 | RESULTS

Data was analyzed in SPSS 25. The results revealed that 152 respondents have participated in the study. Total number of male respondents were 120 i.e. 78.94% of the sample size on the other hand female respondents were 32 i.e. 21.05% of the sample size. All the respondents were SC managers and directors who have experience and as well as department of SC in their respective organizations.

Table 1
Measurement Model

Variables	Items	Loadings	AVE	CR	Fornell-Larcker
Supply chain Information Integration	SCII1	0.708	0.59	0.87	0.768
	SCII2	0.748			
	SCII3	0.798			
	SCII4	0.806			
	SCII5	0.779			
Operational Performance	Op1	0.839	0.61	0.91	0.786
	Op2	0.777			
	Op3	0.781			
	Op4	0.776			
	Op5	0.806			
	Op6	0.758			
	Op7	0.765			
Information Leakage	AIL1	0.753	0.62	0.86	0.788
	AILK2	0.818			
	IIL1	0.785			
	IIL2	0.795			

Factor analysis was run to investigate the reliability and validity of the instrument. According to Hair et al (2018) measurement model includes factor loadings, convergent validity (AVE and CR), while discriminant validity also included in measurement model. The criteria for factor loadings was suggested as each item loadings should be >0.70 , AVE, average variance extracted should be >0.5 and construct reliability should be >0.7 . Discriminant validity was checked by Fornel-Larcker criterion. It was obtained by having square root of the AVE values.

From the Table-1 it is evident that all the loadings of all items are >0.7 , AVE values are >0.5 and CR >0.70 so it is assumed that scale for SCII, OP and information leakage is found reliable and valid.

Table 2
Hypotheses Testing

Hypotheses	Relationships	R ²	β	p	Support
H ₁ path c	SCII→OP	0.755	0.905	0.000	Yes
H ₂					
Path a	SCII→AIL	0.487	0.774	0.000	
Path b	AIL→OP	0.792	0.254	0.000	Yes
Path c'	SCII→AIL→OP		0.708	0.000	
H ₃					
Path a	SCII→IIL	0.446	0.729	0.000	Yes
Path b	IIL→OP		0.260	0.000	
Path c'	SCII→IIL→OP		0.716	0.000	

To test hypotheses process file of Andrew F Hayes was used and mediation analysis was run selecting model 4. The Table-2 shows results of hypotheses, 1 2 and 3. In first hypotheses it can be seen that supply chain information integration has positive and significant impact upon operation performance ($R^2=0.755$, 75.5%; $\beta=0.905$, $p<0.01$), this means that 75% variance was explained by SCII upon OP. H1 is substantiated. In the second hypotheses it is evident that impact in path a, b and c prime are reduced as compared to path c and all the relationships are positive and significant we assume that there is partial significant mediating role of accidental information leakage upon SCII and operational performance of the firms. So H2 is accepted. In the same way to test hypotheses 3 intentional informational leakage was added as mediator between SCII and OP. it is evident that impact in path a, b and c prime are reduced as compared to path c and all the relationships are positive and significant we assume that there is partial significant mediating role of intentional information leakage (IIL) upon SCII and OP. H3 is also substantiated.

5 | DISCUSSION AND CONCLUSION

There is rapid advancement in IT applications on daily basis. This rapid advancement had made the business environment more complex. Likewise these new IT advancements have empowered business firms to enhance their capabilities in the operations. Supply chain information integration has significant impact upon operational performance of the firms. This performance is aided by electronic setup of the organizations. The electronic set up or electronic connectivity platforms from where firms used to share information must have secure connections so no leak of information takes place. These set up help organizations to exchange accurate, adequate and exact knowledge and information among SC partners. The findings revealed that the direct and indirect impact of predictors and mediating variables are significant. The results are consistent with findings of the previous studies Vafaei-Zadeh (2020) reported the direct effect of SCII on OP. Similarly, the indirect effects of this existing study are in line with findings of Yu et al (2018) and Lu et al (2018) also reported the positive and significant role of SCII upon operational performance with integrating role of information leakage (Flynn et al., 2010).

The main question is raised that when supply chain information integration is effective. This study has tried to answer this question that due to increase in use and development of digital platforms and electronic connectivity the chances of leaking confidential information has been increased which may affect the operational performance of the firms, so there is need to raise the awareness to take care while sharing information with supply chain partners. It is concluded that firms should take care while connecting and sharing information with external partners. Any leak of information either accidental or intentions both are harmful for the firms.

6 | THEORETICAL CONTRIBUTIONS

There are certain theories, models and approaches available in the literature which provide support to supply chain information integration either with combination of other theories or individually. These theories are resource dependency theory, RBV theory, transaction cost theory etc. Resource based view theory and resource orchestration theory helps organizations to perform their task effectively and attain competitive advantage. It is very useful for firms to integrate more and more resources in the SC to gain advantage. This will help the firms SC to enhance their operational performance. On the other hand, ROT claimed to help firms to produce better results but creates uncertainty for competitors. In this way leveraging capability and strategy leads the firms towards higher sustainable operational performance. It is concluded that resources are not only sufficient for competitive advantage but managerial orchestration is crucial. This study has addressed the limitation of RBV theory by applying resource orchestration theory (Vafaei-Zadeh, 2020).

This is one of the pioneering research studies on SCII and OP with mediating effect of information leakage i.e. accidental and intentional leakage. Past studies used qualitative methods or the previous studies have used moderating variables (Liu et al., 2018). This study is important because past studies have used information leakage as a whole composite variable but this study has divided information leakage into two parts and investigated mediating effects of AIL, & IIL.

Though resource orchestration theory has been used in the past studies to support supply chain information integration and operational performance with moderating effects but mediating effects were not reported through lens of resource orchestration theory. The current study has contributed towards body of knowledge by adding AIL and IIL as mediators between SCII and OP. It is also concluded that leakage of information either accidental or intentional both have negative effects on operational performance and SCII (Chadwick et al., 2015).

7 | MANAGERIAL IMPLICATIONS

The current study is relevant topic in business, management, health, tourism, hospitality, leisure and manufacturing industries and their practice. In the existing study medium and large firms were selected because these firms have high level of integration. So these firms and sectors have useful significance for these sectors. Management may use strategies to enhance operational performance through SCII. But leakage of information may create imbalance between advantages of SC information integration and OP (Hitt et al., 2016). Management should monitor effectively all the supply chain activities to minimize the loss. This study has implications for these kinds of organizations. This will help the firms how to collaborate and cooperate with partners. Managers and firms should train their employees regarding the prevention of information leakage so that they may enhance their operational performance. The mediating effects of the current study are more important because information leakages either accidental or intentional have consequences for firms but intentional has more severe consequences as compared to accidental leakage of information.

8 | LIMITATIONS

There are some limitations of the current study; the data was collected by using single source that can be source of biasness so in future studies. This study collected and analyzed data from single source that might cause common method bias issue therefore in order to reduce risk of biasness supplement material to support quantitative findings i.e. semi-structured interviews. The 2nd limitation is only directors and managers of manufacturing firms participated in the study therefore one must be careful making generalizing the results to other sectors.

9 | FUTURE DIRECTIONS

It is recommended that researchers should use mix methods, longitudinal data or qualitative data for data triangulation and more sophisticated results. The current study has used two mediators it is recommended that future studies must add moderators and mediators together because more complex models will be helpful for industries to solve more complex problems faced by firms and managers. Moderators like trust, cost, risk, uncertainty might be used a moderators.

Conflict of Interest: Author declares there is no competing interest.

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