

The Relationship of Operational Performance with Internal Supply Chain Structure: Evidence from Jordanian Pharmaceutical Companies

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Abstract

The purpose of this research is to highlight the role of internal supply chain structure in enhancement of operational performance. This research is based on quantitative research approach. The required information is collected through a structured questionnaire. Target population of this study is the managerial level employees of pharmaceutical companies in Jordan. Sample of study is consisted of 180 managerial level employees of Jordanian pharmaceutical companies. The collected quantitative information is analysed statistically through using AMOS and SPSS software. The relationship of operational performance and internal supply chain structure is analysed using regression analysis. The findings from empirical analysis indicate that internal supply chain structure has significant positive impact on the operational performance of organisations. The findings indicate that the structure of internal supply chain has significant positive relationship with the operational performance. In case of Jordanian pharmaceutical companies, the internal supply chain structure is centralized that leads to have negative impact on the operational performance. This research has significant contribution to the literature of supply chain especially about manufacturing industries in Jordan. It provides an insight to the manufacturers to enhance their operational performance through having a major focus on the structure of their internal supply chain and establishing integration at its different levels.

Keywords: *Operational performance, Internal supply chain, Supply chain integration, Pharmaceutical industry, Jordan.*

1. Introduction

The role of supply chain has been the focused of researchers in previous literature, but the dilemma is the huge focus on external supply chain leaves behind the attention for internal supply chain, its structure and significant role in operational efficiency. The external supply chain refers to the chain of activities outside the organisation including external stakeholders, environmental factors, external market structures etc. (Nakano and Matsuyama, 2022). On the other hand, internal supply chain (ISC) refers to the series of structured activities within a company that leads to the delivery of product to their customers. This process involves multiple functions including production, distribution, sales etc. that significantly contributes to the organisational performance and success. For this, the operations are required to run smoothly so that harmonization can be achieved and work can flow efficiently (Nakano and Matsuyama, 2020). Such harmonization of operations can be achieved when structure of internal supply chain is designed effectively

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and appropriately. However, there is no single best way to structure the supply chain in any particular industry, rather the supply chain structure needs to be aligned with the structure of competitors (Bentz, 2014).

Unfortunately, the structure of internal supply chain has gained minimal attention despite knowing the fact that not only the external supply chain but the whole supply chain has significant impact on the operational performance of organisations (Dreyer et al., 2016). The interaction of the stakeholders of the supply chains and their inter-relationships has been widely reported as the key contributors of supply chain success (Nakano and Oji, 2017; Huang et al., 2014; Prajogo et al., 2012), but minimum attention has been paid to the role of the structure of internal supply chain in operational performance efficiency. Therefore, there is a dire need to focus on the structures of internal supply chain of manufacturing firms and their critical contribution to the operational performance and efficiency of the organisations. This research is a significant contribution in this regard. So the main research question addressed by this research is; does internal supply chain structure contribute in enhancement of operational performance of the organisation?

2. Literature Review

The optimum performance of supply chain and ultimately enhancement of the operational performance of the organisation have been the key focus of researchers since last decades (Huang et al., 2014; Roh et al., 2017; Prajogo et al., 2015; Trzuskańska-Grzesińska, 2017; Bier et al., 2019). Researchers (Arora and Ventresca, 2018; Bak, 2018; Roh et al., 2017) indicates that the efficiency of the supply chains significantly depends on organisational structure, supply chain quality, supply chain integration, and the structure of supply chain (Nakano and Oji, 2017).

2.1 Supply Chain Structure

Initially the structures were discussed in terms of the single organisations (Wang, 2007; Child, 1972, Dale et al., 2007). In the context of supply chain management, the structure indicates the collection of different stake holders i.e. suppliers, firms, customers (external stakeholders) and departments, employees etc. (internal stakeholders). Regardless of the level, whether it's at organisational level or within a supply chain, the core aim of the structure is the achievement of ultimate goals (Arora and Ventresca, 2018). In recent dynamic business environment, organisations are frequently making modifications in their internal and external structures to provide maximum satisfaction to their customers (Bak, 2018). Hence, the structure of supply chains is rooted from the organisational structure which is defined as "the established pattern of relationships between the components parts of an organisation, outlining communication, control, and authority patterns. Structure distinguishes the parts of an organisation and delineates the relationship between them" (Rosenfeld and Wilson, 1999).

Chen and Paulraj (2004) define structure as coordination, tasks and authority mechanisms across organisational units that significantly enhance the performance of organisational supply chains. Since the supply chains are a collection of different organisations/departments and managerial/employee levels, so same activities including control, authority, communication etc. must be satisfied through supply chain structures (Datta, 2017). Therefore, Choi et al. (2001) defined supply chain structure similar to the definition of organisation structure provided by Rosenfeld and Wilson; "the patterns of relationships between organisations that belong to supply chain". Hur et al. (2004) also define it in similar pattern as; "the processes that control and co-ordinate the objectives and activities of independent organisational units that comprise the supply chain". Different studies adopt different definitions of the supply chain structure.

This study has adopted the definition of Choi et al. (2001) according to the purpose of this study. In most of the studies (Fan and Stevenson, 2018) supply chain structure is

discussed in light of the supply chain integration that helps the structure to achieve the desired performance through enhancement of the supply chain quality. In fact the factors of supply chain structure are closely associated with the factors of supply chain integration which are depicted in the following figure.

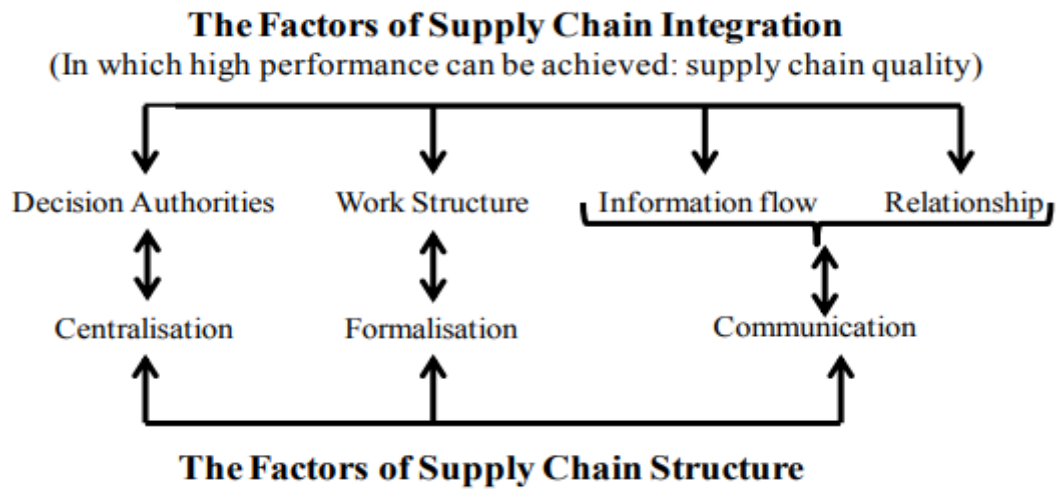


Figure 1: Relationship of Supply chain structure and supply chain integration

(Source: Baban, 2013)

Formalization refers to the institutional norms related to the expected behaviors which are acceptable in an organisational environment and provide a direct relationship between the supply chain integration and organisational norms (Datta, 2017; Baban, 2013). Formalization of structures results from the repeated behaviors which become reified in a way that they become easily understandable and remembered over time without the need of repeating again. It means that the behavioral aspects are repeated several times that these are understood and remembered by majority of the people and transformed to others in similar patterns hence becoming the part of the structure (Awaysheh and Klassen, 2010). In a similar context, formalization of the supply chain is defined as “the degree to which the supply network is controlled by explicit rules, procedures, and norms that prescribe the rights and obligations of the individual companies that populate it” (Choi and Hong, 2002). As its impossible for the firms to implement rules and regulations at system levels, so the formalization of supply chain structure is implemented in internal levels of the originations i.e. defining the rules, norms and procedures for achievement of the steadiness of the output through establishment of the obvious understanding at all levels of internal supply chain structures (Nakano and Matsuyama, 2022).

Centralization is associated with the power, authority and control of the people at different levels of organisations and across the supply chain. It is the power over decisions made in the organisation, which is called centralized when this power rests in the hands of particular individuals at some particular points in the organization. Such structures are called as centralized structures (Huang et al.2014). Centralization in the supply chain structures is associated with the power and authority exerted by the final assembler over the suppliers (Choi and Hong, 2002; Dreyer et al., 2016). Therefore, in centralized supply chains the decisions are made by the final supplier with minimum or even no involvement of the suppliers and other stakeholders. The control over decisions is not only limited to the decisions about suppliers and external supply chains, rather also involve the internal supply chain. In centralized supply chain structures, the decisions are made at higher authorities, while the internal members of the supply chain are not involved in the decision making process (Roh et al., 2017).

Another important factor of supply chain structure is the “communication”, which is referred as the flow of information across the levels of supply chain. Just like the

information flows across various organisational hierarchies, the flow of information across different levels of supply chain also varies in different supply chain structures (Nakano and Oji, 2017). However, the flow of information or communication mechanisms in the supply chain structures are adopted from the organisational structures and determine the system to communicate organisational objectives at all levels and nurturing the relationships among different members of the supply chain. Researchers (Van der Vaart and Van Donk, 2008; Robinson and Malhotra, 2005; Nakano and Matsuyama, 2022) have reported the significance of communication for inter and intra firm relationships in the supply chain and operations management literature. Establishment of effective communication among different levels of the supply chain leads to supply chain integration. Studies (Fynes et al., 2005; Das, 2010; Dreyer et al., 2016) reported a positive significant relationship of information sharing with the performance of supply chain. Operations managers require focusing on these significant factors while designing, establishing and re-structuring the supply chains. Moreover, the practices cannot be developed in isolation, rather must take into account the integration of different levels of the supply chain (Awaysheh and Klassen, 2010; Bak, 2018).

2.2 Operational Performance

Operational performance is the key to the whole supply chain performance, which is mostly resulted from different factors that enable the whole system. Researchers (Lu et al., 2018; Nakano and Matsuyama, 2022) indicate that the performance of supply chain must be indicated by the operational dimensions including operational responsiveness to the dynamic market environment and customer satisfaction. Studies (Dale, 2007; Hur et al., 2004; Nakano and Matsuyama, 2020) also indicate quality, time, delivery, cost and flexibility as significant measures of the operational performance. In contrast to the organisational performance that also incorporates external factors, the operational performance is more internal and can be linked with the structures of supply chains, especially the internal supply chain structures (Fan and Stevenson, 2018).

Operational performance is significantly associated with the internal supply chain structures because Structural Contingency Theory (Galbraith, 1973; Lawrence and Lorsch, 1967; Chandler, 1990) argues that “how well a supply chain performs depends on the extent to which the strategy is aligned with its structural design”. More succinctly the theory suggests that the performance of supply chain is always dependent on the structure of supply chain. However, the theory lacks the specification of the alignment of supply chain performance with its structure.

Researchers (Datta, 2017; Fan and Stevenson, 2018) contributed in the literature through investigation of the relationships among customer integration, supplier integration, and internal integration with the operational performance but studies reported contradictory findings. Some researchers (Awaysheh and Klassen, 2010; Bak, 2018) have reported customer integration as a significant factor of customer satisfaction hence enhancing the operational efficiency as well. Investigating the internal integration, some researchers (Roh et al., 2017; Nakano and Oji, 2017) reported the lack of association between operational performance and the internal supply chain integration. On the other hand, some researchers (Dreyer et al., 2016) reported positive significant relationship between operational performance and internal integration, also incorporating the logistic services and the process efficiency (Arora and Ventresca, 2018). Similarly researchers also reported contradictory findings about the relationships of supplier integration and operational performance (Trzuskawska-Grzesińska, 2017).

More significantly, the literature (Datta, 2017; Nakano and Matsuyama, 2022) emphasizes that supply chain structure, including the structures of external supply chain and internal supply chain, have significant relationship with the operational performance while the extent and direction of relationships vary with the differences in industries (Nakano and Matsuyama, 2020). Hence, based on the above discussion, this study aims at

investigating the relationship between the internal supply chain structure and the operational performance of pharmaceutical industry in Jordan. Therefore, following research question is proposed by this research; whether the structure of internal supply chain influences the operational performance of manufacturing industries?

2.3 Pharmaceutical Industry in Jordan

Although a major proportion of the Jordanian pharmaceutical industry is based on imports, but still it has a fairly well established local pharmaceutical manufacturing sector providing high quality products. However, the sector lacks some major areas of manufacturing capacities but still it is contributing significantly to the local consumption of the pharmaceutical products. The presence of vibrant and sturdy local manufacturing sector leads to the products entering the market even at lower levels of the supply chains unlike the imported ones which are mostly imported by some major importers/ agents and then flowing in the supply chain through distributors and wholesalers. This structure of the supply chain has significant influence on the behaviors, incentives and performance at different levels leading to high competition and enhanced responsiveness of the supply chain (Conesa et al., 2009; Salih et al., 2019).

3. Research Methodology

To investigate the proposed research question, this research has adopted quantitative research approach. The data collection instrument is structured questionnaire adopted from Lu et al. (2018). The adopted questionnaire was established into three parts; addressing the supply chain structure, operational performance and market uncertainty. But as this research is only focusing on two aspects; the supply chain structure and the operational performance so all the irrelevant questions from the questionnaire are dropped. While a new question is introduced in the questionnaire to ask the respondents identifying the type of internal supply chain structure established and adopted by companies in Jordanian pharmaceutical industry. The finally selected questionnaire consists of 10 questions. Target population of this research is managers working in different companies of Jordanian pharmaceutical industry. Based on random sampling a sample of 200 managerial employees was selected and questionnaires were distributed. Among the selected sample 15 has not responded and 5 questionnaires were incomplete, so finally a sample of 180 managerial level employees is incorporated for investigation. The collected quantitative information is analysed using SPSS and AMOS software.

4. Results

Initially, the reliability and validity of the instrument is tested. However, the instrument is adopted from previous literature which is already tested but after removing the irrelevant questions, and the inclusion of new question indicating the type of structure of internal supply chains, the instrument was tested again for reliability employing Cronbach's alpha. The resulted value of Cronbach's alpha is 0.98 which is higher than the benchmark of 0.7 (Cronbach's, 1951). Further, the analysis is started from the descriptive analysis of the respondents. The results are reported in Table 1 as follows;

Table 1: Descriptive Statistics of respondents

Position	%age of respondents
Director	11.9
Chief Officer	21.9
Junior Manager	28.7
Senior Manager	37.5
Years of experience	%age of respondents

1-3	10.3
3-7	34.2
7-12	42.3
More than 12	13.2
Type of Structure	%age of respondents
Formalization	10.7
Centralization	89.3

The results reported in table 1 indicate that most of the respondents are working at senior managerial level and have more than 3 years of experience. Further, the responses reported for the type of structure indicate that the internal supply chain structure of the Jordanian pharmaceutical industry is centralized. The presence of centralized internal supply chain structure is also identified through the set of questions related to the supply chain structure i.e. incorporating questions about the extent of internal integration in internal supply chain, information sharing, and joint activities of the internal departments of the organisation on a seven point scale (1= not at all to 7 = extensive). The greater values of responses indicate the presence of decentralized internal supply chain structure. Initially the CFA is employed using AMOS software to reduce the dimensions into two latent variables; operations performance and supply chain structure. The results of reliability analysis and the factor scores are reported in table 2.

Table 2: Reliability and Factor scores

Items	Mean	SD	Factor Loading	t-value	Cronchbach's alpha	Chi-square	AVE	Factor Score
Operational Performance					0.851	12.91	0.62	
OP1	3.20	1.66	0.763*	Omitted				0.241
OP2	3.09	1.31	0.839*	12.875				0.260
OP3	3.18	1.48	0.757*	10.891				0.253
OP4	3.02	1.42	0.819*	13.216				0.252
OP5	3.01	1.59	0.768*	11.236				0.248
Internal Supply Chain Structure					0.891	20.81	0.69	
ISCS1	3.09	1.32	0.746*	Omitted				0.189
ISCS2	3.63	1.43	0.757*	12.131				0.196
ISCS3	3.23	1.61	0.890*	16.879				0.203
ISCS4	3.18	1.52	0.913*	18.769				0.181
ISCS5	3.29	1.63	0.854*	17.967				0.195

The results reported in table 2 indicate that the mean values of both of the variables; operational performance (OP) and internal supply chain structure (ISCS) are below average. The value lower than the average values indicate that the internal supply chain structure in the Jordanian pharmaceutical companies is the centralized structure that lacks communication (information sharing), integration and joint activities among departments. While on the other hand, the operational performance of pharmaceutical companies is also found to be lower. Furthermore, the relationship between the supply chain structure and operational performance is estimated using the regression analysis through SPSS

incorporating the average scores of the latent constructs to be used as quantitative variables for regression analysis. The results are reported in table 3.

Table 3: Regression Analysis Result

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	8375.813	1798.238		4.373	0.00
Supply Chain Structure	.654	0.069	.864	7.259	0.00

Dependent Variable; Operational Performance

The results reported in table 3 indicate that the internal supply chain structure is positively associated with the operational performance of the companies. The relationship is found to be significant because the p value is lower than the significant value of 0.05.

5. Discussion

The results reported in tables 2 and 3 provide significant information about the internal supply chain structure and the operational performance of the pharmaceutical companies in Jordan. It is found that the internal supply chain structure of these companies is centralized. The main features of the structure measured by this research are the internal integration, flow of communication i.e. information sharing and the presence of joint activities. The mean values of all the items indicate that the structure is centralized that significantly lacks the above mentioned characteristics of decentralized structures. On the other hand, the lower values of the items of operational performance indicate that the operational performance of the pharmaceutical companies in Jordan is still below standard. Moreover, the significant positive relationship found through regression analysis indicates that the structure of the internal supply chain has significant influence on the operational performance of these manufacturing companies. It means in case of Jordanian pharmaceutical companies the reason for the lower operational performance of these companies is the presence of centralized structures in internal supply chains. In a centralized structure, the authority, control and commands of decisions is kept in particular hands and other have to just follow the decisions. No involvement of any other employee is encouraged at any level. Hence, the lack of integration in decisions leads to lack of operational efficiency. The significant positive relationship between variables indicates that operational performance can be improved if the structure of internal supply chain of these companies is changed. In Jordan, most of the organisations have centralized organisational structures, but in this case it is found to have negative impact on the operational efficiency of the pharmaceutical sector. Therefore, it is necessary for the stakeholders of pharmaceutical supply chains that they must focus on the modification of the internal supply chain structures so that operational performance could be enhanced as well.

6. Conclusion

This research mainly focuses on the relationship of internal supply chain structure and operational performance especially in the context of Jordanian Pharmaceutical industry. Employing a sample of 180 managerial level employees working in different companies of the pharmaceutical industry, the findings indicate significant positive relationship of internal supply chain structure and the operational performance. But unfortunately it is found that the operational performance of the pharmaceutical industry is lower than average score indicated by this research. On the other hand, the structure of the internal

supply chain of this industry is found to be centralized in which decisions are made at particular levels with lack of involvement, information sharing and integration at other level. Hence, it is indicated by the findings of this research that the centralized structure of internal supply chain leads to have negative impact on the operational performance of pharmaceutical industry. This research has significant practice implications as it highlights one of the major reasons of the lower operational performance of the pharmaceutical companies in Jordan. The stakeholders, practitioners and govt. personnel must focus on this major concern to enhance the operational performance of supply chains in this industry.

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