

THE IMPACT OF SUPPLY CHAIN AGILITY ON DECISION INTELLIGENCE? THE MEDIATING ROLE OF DIGITAL TRANSFORMATION IN THE FROZEN FOODS INDUSTRY

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Abstract

As a part of the research, the objectives of the article to analyses the relevance of supply chain Agility to the effectiveness in Decision Intelligence of the Frozen Foods Industry with special influence of the mediating variable digital transformation and system integration. A notable topical feature of the Frozen Foods industry management challenges, today is the increasing awareness of the necessity of the supply chain Agility. Or rather the impact it produces on the understanding of the decision making has not been thoroughly studied. The Agility in the Frozen Foods supply chains will be studied in this paper and the determinants that offer Decision Intelligence on a tangible foundation alongside seeking the linkage with the main factors which are of particular concern with regard to the dimension of digital transformation and inter connect the systems. The outcomes suggest that the increase in supply chain Agility enhances Decision Intelligence and both digital transformation and system integration contribute to this process. The given research gives recommendations on how the Frozen Foods chain practitioners can enhance their decision-making and, by extension, their performance by enhancing their flexibility on the supply chain end and digitalizing technologies and systems to enable greater fit between the resource procurement and transformation into Frozen Foods products and their delivery to customers.

Keywords— Supply Chain Dynamism, Collaboration, Coordination, Integration, Decision-Making, Technological and Organizational Integration, Frozen Foods Industry

Introduction

The Frozen Foods industry is not an exception because, due to the rising competition in the market and evolving customer order requirements, better decisions should be made. There is a need to compete and be responsive to change in the Frozen Foods sector pressurizing the sector to change rapidly and streamline their operations. English Supply chain Agility has a significant role to play in this respect particularly because it assists an organization to respond swiftly and offer a flexible response to escalating demand, supply chain disruptions, abrupt downturn, and market tumults. Resilient supply chains have the ability to enable real time decision making to reduce the time span of the bottlenecks in order to enable businesses to prepare in the uncertainties that might lie ahead and use the opportunities in the future. Nonetheless, the extent of digital transformation and system integration within the specified organization largely defines the role of supply chain Agility in the decision making. Digital transformation & system integration: Systematically integrates systems, processes, and resources, across the supply chain, to provide the channel with fluency and coordination among all stakeholders. I feel that such integration is essential in the creation of an environment that ensures information accuracy and process synchronization which is capable of connecting supply chain Agility to the decision-making process. Although the advantages of the supply chain Agility on increasing the efficiency and responsiveness of the operations have been admitted, the intermediary role of digital transformation and the integration of systems in the connection between the supply chain Agility and the decision-making process has not been highly discussed in the literature, particularly in the example of the Frozen Foods industry. The gap in this research will be bridged by examining the influence of supply chain Agility on decision-making and the reasons why integrated digital systems and organizational processes enhance the effect of supply chain Agility on decision-making quality. In this regard, the following research questions will be developed:

- RQ 1: How does supply chain Agility affect decision-making in the Frozen Foods Industry?
- RQ 2: To what extent does digital transformation and system integration moderate the relationship between supply chain Agility and decision-making?
- RQ 3: How does supply chain Agility influence decision-making through digital transformation and system integration in the Frozen Foods industry?

The proposed research will be based on a quantitative study design to gain more insight into the ways supply chain Agility and system integration can be implemented in the Frozen Foods industry. The results will contain important information that can be useful to the readers of this article and the practitioners who work in the Frozen Foods industry as it explains that to make a better decision and gain a advantage over the rivals, Agility needs to be accompanied with efficient digital and system integration.

Literature Review

A. Supply Chain Agility

Supply chain Agility refers to the ability of a supply chain to resist variability and uncertainty that is incurred because of a quick transformation of the market, changing consumer demands or new technologies. According to research, in order to have an effective and responsive supply chain, organizations should consider the flexible approaches and systems. Case in Point: Frozen Foods Industry in Jordan claims that systems constructed based on practices that were developed with traditional principles tend to be slow in responding to the alterations in demand, therefore, a necessity of flexible systems or creative systems that are more responsive to market demands.

B. Supply Chain Collaboration

Supply chain Agility refers to the ability of a supply chain to resist variability and uncertainty that is incurred because of a quick transformation of the market, changing consumer demands or new technologies. According to research, in order to have an effective and responsive supply chain, organizations should consider the flexible approaches and systems. Case in Point: Frozen Foods Industry in Jordan claims that systems constructed based on practices that were developed with traditional principles tend to be slow in responding to the alterations in demand, therefore, a necessity of flexible systems or creative systems that are more responsive to market demands.

C. Supply Chain Coordination

Particularly, the aspect of supply chain coordination in the Jordanian Frozen Foods industry is a decisive element in enhancing supply chain Agility, which in turn influences Decision Intelligence. The coordination term entails the integration and alignment of different activities, processes and resources within the supply chain to ensure effective flow of goods between the raw materials and the end consumer. Coordination enhances the responsiveness and efficiency of the supply chain by reducing the fluctuation in information, lead times and service quality. This, in latter sustains enriching decisions in a dynamic background. Being one of the key findings the study has attributed the enhancement in the levels of coordination to the increase in the levels of operational performance and profitability directly. However, there is a challenge of ensuring a well synchronized and coordinated system in the dynamic and competitive Jordanian Frozen Foods market because of the market variability, divergent goals of the supply chain players and logistical complexities. The mediating element that will mitigate these challenges and barriers is digital transformation and integrating systems to ensure more supply chain Agility and enable organizations to make better strategic choices.

D. Supply Chain Integration

Supply chain integration is the fact that the processes, operations, and information in the various functions and organizations of the value chain are connected. Horizontal integration would be between companies at the same level, vertical integration would be between companies in various production and distribution levels. Integration plays a very significant role in the Frozen Foods Industry in Jordan in order to coordinate the supply chain partners

activities to minimize the bullwhip effect, enhance service quality to make the supply chain stronger.

E. Decision-making in Supply Chain Management
planning of strategies, policies and actions engaged in decision making in the supply chain management. The Frozen Foods Industry has by nature a precarious nature, and in particular with the continuously changing consumer trends in markets in Jordan, decision making can be affected by market dynamics and tastes. Decision support tools Supply chain responsiveness.

Theoretical Framework

This means that supply chain Agility can be attributed to the capacity of an organization to react to market uncertainties and meet the demands of customers more promptly than never before. Agility of Supply Chain in Frozen Foods Organization: The resilient supply chain assists the organizations in the Frozen Foods industry to make informed decisions and be agile when responding to the new opportunities. This framework discusses the impacts of supply chain Agility, digital transformation and system integration on the decision making and performance regarding Frozen Foods industry in the framework of Jordan.

A. Dynamic Capabilities Theory
The concept of supply chain Agility is rooted in the theory of dynamic capabilities. It characterizes dynamic capabilities as the firm's ability to integrate, construct, and amend internal and external skills in order to address fast-evolving settings. Dynamism, in the context of supply chains implies the capability to adapt processes to seize opportunities and respond to changing market conditions. Based on this theory, this study examines the impact of dynamic capabilities on effective decision-making and strategy formulation in uncertain market situations in the Frozen Foods Industry in Jordan.

B. Moderating Role of Digital Transformation and System Integration
Hence, digital transformation and system integration can moderate the relationship between supply chain Agility and decision making. Sustainable competitive advantage is based on the development of efficient transactions, knowledge application systems and systems for communication and data sharing in real time that connect the different parties in the supply chain. These attributes drive technological embeds and allows for smart decisions. Nonetheless, organizational integration helping harmonizing business processes as well as collaborative practices among supply chain partners, which enables a seamless and adequate information flow. Even a dynamic supply chain may find it difficult to turn Agility into decisions without integrated systems, according to studies.

C. Resource-Based View (RBV) of Integration
An alternative perspective on integration in decision-making is provided by the Resource-Based View (RBV). Beyond core processes, technology helps in the Frozen Foods Industry to build faster reactive supply chain processes that allow better decisions. Integration helps to drive performance improvements, minimize decision-related overheads, and offer a competitive edge by reducing uncertainty, delivering accurate insights, and ensuring real-time

visibility into data. Hold on because these can lead to greater customer satisfaction and also help businesses outperform competitors.

D. Supply Chain Agility and Implications on Decision-Making

It can be observed from the literature that resilient supply chains have the ability to make fast decisions due to increased responsiveness and adaptability. Supply chain Agility in the Frozen Foods Industry empowers organizations to quickly adapt with changing customer preferences, supplier dynamics, or market disruptions. Together with solid technological and organizational integration, such supply chain Agility will allow organizations to shorten lead times and improve service quality while also allowing them to make agile yet strategic decisions.

E. Implications for the Frozen Foods Industry

Based on the theoretical perspectives, the study investigated the proposed model of Supply Chain Agility, Digital Transformation, System Integration, and Decision-Making within the Frozen Foods Industry in Jordan. This research provides important insight for the Frozen Foods companies in terms of utilizing digital and smart supply chains to the benefit of business competitiveness. Whereas, Organizations that bring together technological and organizational integration will be able to make informed decisions in no time, improve business performance, and adapt in a fast-changing market.

CONCEPTUAL MODEL

The theoretical framework discussed can help in the making of model through which the paths among supply chain Agility, digital transformation, and system integration can be established and has a direct effect on the decision making and performance in the context of Frozen Foods Industry. The model shown in Fig. The model of 1 has been constructed to explore each of these inter-compartmental interactions, showing how the Frozen Foods industry can make the most out of these integrated systems within their own decision-making processes, thus producing an enduring competitive advantage.

Methodology and Data Analysis

A. Demographic Variables

The population of this study included managers working in the Frozen Foods Industry in Jordan. The survey sampled 250 respondents, drawn from this universe, to capture a cross-section of the management positions and professional backgrounds represented in the industry. Male respondents constitute 85% of the sample while 15% are female. The most populous age group is 27 to 34 years, representing 42% of respondents, in comparison to just 12% under 27 years. There is a distribution of years of experience, with 33% being in the range of 15 to 20 years, and being the largest group. Of the respondents, 53% of them major AA in Business Administration, and 27% in Accounting.

B. Structural Model

In order to assess the validity of the structural model, two main techniques were used, namely discriminant validity and cross-validation. Discriminant validity was established using the method advocated by [29], which was subsequently updated by Franke and Sarstedt (2019). Depending on the context, modest discriminant validity is generally reflected by an HTMT

value greater than 0.90. All HTMT values were within the acceptable limits in the current study and no individual factor showed any significant problem. This means that with the findings of the analysis the measurement model was proven reliable and valid.

TABLE 1 HTMT

	Collaboration	Coordination	Decision-Making	Integration	Technological & organizational Integration
Collaboration					
Coordination	0.693				
Decision-Making	0.644	0.611			
Integration	0.7	0.673	0.655		
Technological & organizational Integration	0.574	0.63	0.454	0.620	

A. The HTMT values presented in Table 1 reveal that the constructs in the model converge in terms of good discriminant validity (all values are diagnosed as below the threshold of 0.85 though a few values slightly exceed 0.7, which is within acceptable range). And so, the constructs of Collaboration, Coordination, Decision-Making, and Technological & Organizational Integration are different constructs from each other. In this sense, Collaboration and Coordination are comparatively moderate (0.693) correlated, whereas Decision-Making relates less, notably with Technological & Organizational Integration (0.454). The results corroborate that these constructs have a sufficiently distinct nature and validate the research model within the various domains in scope: Supply Chain Agility, Digital Transformation and System Integration in the Frozen Foods Industry.

B. Hypotheses Testing:

The path coefficients calculated employing the PLS algorithm in Smart PLS 4.0 for hypothesis testing in this study provide details on the relationships established by the proposed model in this study with the Frozen Foods Industry in Jordan. The strength of relationships is reflected by a coefficient ranging from 1 to -1, where values closest to +1 or -1 indicate strong positive/negative relationships. The results indicate that coordination within the supply chain has a direct and significant positive impact ($\beta=0.136$, $P<0.001$) on decision-making, suggesting that increased coordination leads to higher decision-making effectiveness. Coordination also plays a crucial role in the integration of technological and organizational processes ($\beta=0.352$, $P<0.001$), highlighting that an effective coordination process contributes positively to the integration of both technological and organizational processes. Moreover,

integration is positively associated with decision-making ($\beta=0.09$, $P=0.024$), emphasizing the need to integrate processes to enhance the quality of decisions. It also has a significant impact on the technological and organizational integration ($\beta=0.233$, $P<0.01$) which shows its role for a connection between the technological as well as organizational aspects to keep alignment. Moreover, it is evident that decision-making is highly influenced ($\beta=0.387$, $P<0.001$) by synergizing organizational business processes and IT application systems and technology in supply chain operations. Collaboration has an overall less substantial direct effect on decision-making ($\beta=0.048$, $P=0.094$) and technological and organizational integration ($\beta=0.125$, $P=0.057$) when compared with the other detachments, indicating that while collaboration is an important factor, it has the lowest direct impact according to this model. Overall, it is concluded that entire supply chain in Frozen Foods industry of Jordan can benefit from the importance of coordination, integration and alignment of technological and organizational excellence in the business setting to make effective decisions while making collaboration a complementary ingredient.

TABLE 2. Hypotheses testing estimates

	(O)	(STDEV)	T statistics	P values
Collaboration -> Decision-Making	0.046	0.027	1.673	0.091
Collaboration -> TOI	0.123	0.064	1.90	0.005
Coordination -> Decision-Making	0.134	0.041	3.271	0.001
Coordination -> TOI	0.350	0.061	5.636	0
Integration -> Decision-Making	0.07	0.02	2.24	0.003
Integration -> TOI	0.231	0.082	2.782	0.003
TOI -> Decision-Making	0.385	0.084	4.502	0

Table 2: The hypothesis testing results reflect implications on our derived constructs networked collaborations, networked coordination, networked integration, decision-making and technological & organizational (TOI) integration. The effect of collaboration is positive but not significant on DEC (estimate 0.046, $P = 0.091$), while it has a significant effect on TOI (estimate 0.123, $P = 0.005$) indicating that collaboration can help assimilate new technologies and align corporate practice. In contrast, coordination has a strongly positive association with decision making (estimate 0.134, $P = 0.001$) as well as TOI (estimate 0.350, $P = 0.000$) suggesting that well-coordinated supply chain activities allow decision making and improve alignment between technological and organizational systems. Integration also positively influences decision-making (estimate 0.070, $P = 0.003$) and TOI (estimate 0.231, $P = 0.003$), which highlights that tasks and systems should be properly integrated for Decision Intelligence. Finally, TOI stands as a significant predictor for decision making (estimate 0.385,

$P = 0.000$), highlighting the crucial role of matching technology with business strategies to enhance decision quality in the Jordanian Frozen Foods sector.

Conclusion and Implications for Practice

The objective of this research is to find out the implication of supply chain Agility on Decision Intelligence in the Frozen Foods industry considering the mediation variable of digital transformation and system integration. The results suggest that supply chain Agility enables better decision-making; however, it can only be fully leveraged when supported by mechanisms (digital transformation and system integration) that enable wide-ranging processes. Good strategic decisions now require the alignment of technology and organizational systems within the supply chain so that those systems can be agile and resilient. This ensures effective coordination and communication between systems to improve the decision-making process. Collaboration is still a key requirement, but by itself is not going to deliver major improvements without backend interfaces and digital transformation performing those operations. According to the study, combining technology with organizational processes is essential for increasing presence of supply chain Agility on decisions reached at a strategic level. It recommends that Jordanian Frozen Foods companies (and the sector, in general) invest in achieving (and maintaining) a significant technological and organizational integration that will help them make quicker decisions and retrieve better operational results at lower costs distinctive in a more volatile competitive environment.

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