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Flexibility and Agility - Key Indicators in Supply Chain

Bianca Maria GULIMAN¹, Larisa GAVRILA²

Abstract

In this paper, we investigate the impact of innovation on supply chain and how flexibility and agility create a real advantage for a supply chain. Under different environmental conditions, supply chain flexibility has sustainably contributed in making logistics systems efficient, agile. The results of a survey applied to 100 responders, shows that, as distinctive capabilities, both logistics flexibility/agility and relationship flexibility have great effects on the level of supply added value, customer satisfaction, level of logistics service quality.

Keywords:

Agility, Supply Chain, Flexibility, Added Value

Introduction

It is quite important for managers and leaders to understand flexibility concept, in order to be able to appreciate what their customers' value is. Flexibility, together with customers requirements are the main tool of manager, in order to survive and grow in competitive markets [11]. Knowing what customers' currently value is clearly not enough because what they value, changed [4], suggesting that suppliers must also have the capability to anticipate what customers will value. Industrial markets are frequently characterized by an oligopolistic market structure. Relying on this, suppliers may become highly selective with respect to decisions that

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involve collaborating with certain customers. The literature presents us also the situation, when in different environmental conditions, supply chain flexibility and relationship flexibility for a focal firm will have distinct effects on supply service quality and the main added value is related with customers satisfaction and create relationships with them.

Nowadays, the source of competitive advantage is not only coming from factors such as price, product and promotions; it is combination between those “old factors” and the new ones’, such as flexibility, customers and suppliers’ interactions, customers’ requirements, customers’ satisfactions and suppliers’ agility to predict customers requirements and to adapt as quickly as possible at customers’ requests. Supply chain performance is not perceived as an operating activity only, but rather as a strategic variable and a key factor in consumer satisfaction [6]. Globalization, rapidly changing information technology, and increasing diversification of consumer requirements cause many firms to face increasingly uncertain environments. In such situations, existing routines and procedures may be inappropriate in that a mismatch exists between organizational responses and external demands [4]. *Industrial Marketing Management* magazine, through “Rigidity versus Flexibility in Business Marketing” debated regarding the need to create flexibility in business to business [9].

The literature presents us some articles that mitigate concepts such as intra firm and inter firm flexibility, supply chain management flexibility, marketing experience based on customers’ experiences and customers feedback [5], [6], [2]. Swafford, Ghosh, and Murthy [12], in their study from 2006 define logistics flexibility as” the capability to adapt the process of controlling the flow of physical and other resources to changing marketplace conditions, which is widely adopted in a channel context.”

Furthermore, flexibility was defined as being critical to organizational performance, as a strategic capability that fits environment requirements. [15]. Flexibility outcomes are related with financial and key performance indicators, such as ROI (return of investment), market share, customers loyalty, profit, returns on sales. Flexibility concept is a strategic tool for companies, as flexibility is considering to be the capability of a company to be and maintain competitive, under uncertain environmental conditions. In other studies, flexibility and agility of companies are reflected through client loyalty, clients’ happiness when buying company products.

Even so, there are some studies that tried to match environmental uncertainty with flexibility, but in same time to how environmental factors moderate the effect of flexibility on performance [3], [10], [13], [7], [8].

In supply chain, customers demand uncertainty and competition uncertainty are the main dimensions of environmental uncertainty. Furthermore, environmental uncertainty manifests itself in several dimensions and a certain type of flexibility is a reaction to a specific dimension of uncertainty.

Flexibility in Supply Chain

How shall understand a manager/a leader flexibility concept? We saw that the literature presents different concepts, different approaches. One answer to this question is coming from Zhang [14], who describe logistics flexibility as “the ability of the organization to respond quickly to customer needs in delivery, support, and service.” Bowersox and Swofford mentioned that supply chain flexibility means “processing material and information flow between the focal firm (e.g. manufacturer, the organizing hub of the supply chain network which integrates upstream and downstream resources) and its supply chain partners [1], [11]. They mitigate this, as an alternative to adjust storage capacity, delivery capacity or schedules, transportation mode, inventory and other outbound logistics activities in response to direct and indirect customer demands. A higher level of supply chain flexibility allows a firm to offer its customers a higher level of supply chain service quality.

Research Hypothesis

After comparing the literature perspectives regarding supply chain flexibility with supply chain day by day constraints we summarize some hypothesis.

H1. The higher the level of supply chain flexibility, the higher will be the level of supply chain service quality offered by the focal firm, which in turn.

H2. The higher the level of relationship flexibility, the higher will be the level of logistics service quality offered by the focal firm.

H3. The effect of supply chain flexibility on the level of logistics service quality offered by the focal firm will be stronger in a relatively uncertain environment.

H4. The effect of supply chain flexibility on the level of satisfaction in the relationship with a key account will be stronger in a relatively uncertain environment.

In order to test relationships between variables and obtain variance in environmental uncertainty, we applied a survey, with responders from

different industries, with different education level, different ages and different professional positions.

Tab. 1 Hypotheses for environmental moderation of relationship flexibility effects

Theory				Information processing			Transaction cost	
Uncertainty				A high number of un-reliable market information			Encourage opportunism	
Flexibility				Task uncertainty and information sharing norm increase demand for information			Flexible adjustment processes function	
				Hypothesis			Hypothesis	
Uncertainty & flexibility -> Quality of customer satisfaction is high				H2C			H2C'	
Uncertainty & flexibility -> Relationship satisfaction				H2D			H2D'	

In the next table, the AVE of each construct exceeds the variance attributable to its measurement error cut-off value of 0.50 (with the single exception of relationship flexibility which falls below 0.50, since AVE is a conservative measure, the convergent validity of the measures as a whole is still acceptable.

Table 2 Reliability of the model

Construct and items	Standard loading	Cronbach's CR	alpha
Logistics flexibility		0.759	0.766
LF1: Adjust storage capacity if demand fluctuates	0.666		
LF2: Adjust delivery capacity to meet volume for delivering	0.792		
LF3: Make flexible use of multiple transportation modes to meet the schedule for delivering	0.706		
LF4: Frequently balance inventory	<i>Dropped</i>		
LF5: Adjust order fulfillment time at request	<i>Dropped</i>		
Relationship flexibility		0.705	0.722
RF1: The relationship is able to respond quickly to request	<i>Dropped</i>		
RF2: Expect to be able to make adjustments in the ongoing relationship	0.644		
RF3: Revalue the ongoing situation to achieve a mutually satisfactory solution when disagreements arise in transactions	0.793		
RF4: Modify the working agreement rather than hold each other to its original terms when an unexpected situation arises	0.600		

Table 3 Convergent validity and discriminant validity

Constructs	Mean	Std. dev.	AVE	LF	RF	LSQ	RS	PEU
Logistics flexibility (LF)	3.931	0.682	0.523	0.723				
Relationship flexibility (RF)	3.906	0.604	0.468	0.319**	0.684			
Logistics service quality (LSQ)	3.876	0.553	0.514	0.434**	0.470**			
Relationship satisfaction (CS)	4.037	0.665	0.648	0.409**	0.496**	0.479**	0.805	
Perceived environmental uncertainty (EU)	3.604	0.786	0.521	0.190**	0.232**	0.339**	0.253**	0.722

We observe that the highest correlation between any pair of the constructs is 0.496, while the lowest square root of AVE is 0.684. Consequently, all constructs exhibit satisfactory discriminant validity. Since a strong correlation exists between the interactions and the predictors, which would create a problem of multicollinearity, the analysis first employed standardized centering and then tested moderating effects. Furthermore, the higher the level of perceived environmental uncertainty, the stronger will be the effect of supply chain flexibility on relationship satisfaction, a finding that supports H2b. In the same time, the effect is exactly the opposite for relationship flexibility, indicating that the positive effect of relationship flexibility on relationship satisfaction is stronger in an environment that is perceived to be stable. Thus, these results support the organizational information processing theory hypothesis H2d but reject the competing transaction cost theory hypothesis H2d'.

We used a regression module, that provides estimates of coefficients for the full sample, and a constrained nonlinear regression (CNLR) module (SPSS Syntax).

Table 4 Results of matching strategy with environment to achieve performance outcomes

Environment strategy	High environmental uncertainty	Low environmental uncertainty
High logistics flexibility	<i>High relationship satisfaction</i> <i>High logistics service quality</i>	Low relationship satisfaction <i>High logistics service quality</i>
High relationship flexibility	Low logistics service quality Low relationship satisfaction	<i>High logistics service quality</i> <i>High relationship satisfaction</i>
Other strategies to enhance logistics service quality	<i>High relationship satisfaction</i>	Low relationship satisfaction

In this study, supply chain flexibility and relationship flexibility represent different capabilities for reacting to the external environment or making changes in response to customers. What we can conclude is supply chain flexibility? Supply chain flexibility is the ability to adjust such activities as storage, inventory, transportation and delivery, while relationship flexibility refers to the ability to adjust activities related to relationship management. This research has limitations that must be overcome in future research. First, the headquarters of all of the sampled companies are in Romania. Future research could conduct a comparative study or replication in a different political and institutional environment.

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