

Integrating Information Sharing into Agile Supply Chain to Improve Supply Chain Performance

Susan Sabah Abdulameer^{#1}, Noorulsadiqin Azbiya Yaacob^{#2}

^{1,2#} School of Technology Management and Logistics, College of Business, Universiti Utara Malaysia,
Kedah, Malaysia

¹ susansabah50@gmail.com

² noorulsadiqin@gmail.com

Article Info

Volume 81

Page Number: 3425 - 3434

Publication Issue:

November-December 2019

Abstract:

This study aims to propose a framework for integrating information sharing (IS) into agile supply chain (ASC) to improving supply chain performance (SCP). This through reviewed the studies published in the supply chain and going deep in ASC and its impact on SCP and disclosure of other relevant factors that play a significant role in enhancing the relationship such as IS. Also, it developed a conceptual model to explain the moderating role of IS to reduce the uncertainty of the environment. The most important result presented is a conceptual model for integrating the ASC and IS to improve SCP. Proper implementation of the proposed model will help managers in manufacturing industries to enhance their SCP. Thus, the paper focuses on bridging the gap of IS as a moderator between ASC and SCP, as well as determining the common objective of ASC and IS which is improving SCP.

Keywords: Agile supply chain; Information sharing; Quality of information sharing; Level of information sharing; Supply chain performance.

Article History

Article Received: 5 March 2019

Revised: 18 May 2019

Accepted: 24 September 2019

Publication: 16 December 2019

I. INTRODUCTION

Nowadays, competition has become by supply chains (SCs) rather than individual companies. In other words, the best competition is between SCs each other [1]. In fact, the companies are facing a series of challenges and issues in a volatile market environment and unexpected demands. Moreover, to counteract uncertainty, the companies require a suitable supply chain strategy (SCS) able to manoeuvre to exploit opportunities. Besides, the flow of materials, information and cash needs a good information system capable of information sharing (IS) among supply chain partners which represented by suppliers, manufacturers,

distributors and customers to reduce the uncertainty and improve supply chain performance (SCP). Thus, the supply chain (SC) must develop a strategy that suits its products, markets and target customers [2].

Generally, Iacocca institute, (1991) the first to introduce the term agile in their report which titled "21st Century Manufacturing Enterprise Strategy" [3]. The Iacocca Institute in Pennsylvania, United States of America introduced the concept of agile with the aim of bringing United States industry back to the forefront of global industries. The concept of agility has been employed in the supply chain to take advantage of its advantages being a successful strategy [4]. Due to today's challenges

facing supply chains and environmental complexity, the ASC is very important for global competitiveness [5]. Besides, the ASC focuses not only on efficiency but also on responsiveness [6]. In addition, ASC to function properly and harmoniously, there should be sharing the information with suitable quality and relevant level among the supply chain partners, as this has an essential role in improving the SCP. The ASC has not been widely studied and documented by researchers [7]. Additionally, limited empirical evidences suggest that ASC contribute to improved SCP [8, 9]. However, the impact of the ASC on SCP is still in its infancy and needs further investigation. Moreover, Prawira, Syafidinal, Anwar and Alaeddin [10] pointed out that ASC needs more study.

The supply chain is a network of partners have a common goal [11]. These partners linked to each other [11]. The availability of appropriate information facilitates the communication between partners of the supply chain [11, 12]. The IS considered as the nerve to enhance communication among supply chain partners [13]. In other words, Acharyulu [14] observed that the IS led to improving communication among the supply chain members.

As for the authors of the agile school, they stressed that IS enhances the work of the ASC in responding to the demands of the troubled environment [15]. To achieve rapid response the need to implement the ASC has emerged. The ASC is the best strategy for a volatile and highly uncertain environment [16, 17]. Therefore, companies that have an interesting in the ASC are more inclined to adopt IS [18, 19]. This is because they have the same goal of improving the SCP [20]. Besides, some studies have examined the

relationship between ASC and the SCP [8-10]. Nonetheless, IS has not been given any consideration in their studies. Thus, there is a necessity to bridge this theoretical gap through the investigation of the IS as a moderator in the relationship between ASC and SCP. Consequently, this research aims to encourage the companies to achieve a balance among dimensions of SCP by providing a proposed framework that integrates IS into ASC.

In the current research, a conceptual framework has been developed to improve SCP by using ASC and the IS based on a theoretical perspective that includes Contingent Resource-Based View (CRBV) theory. The environmental characteristics involve complexity, uncertainty and munificence led to suggest a new theory by Brush and Artz [21] which called CRBV. Evidently, CRBV theory combining between Resource-Based View (RBV) theory and Contingency Theory (CT) theory to limit the weaknesses of the two theories and also to help explain the SC phenomena that currently occur [22]. Therefore, the IS chosen as a catalyst for the ASC, to improve the SCP as competitive advantages.

Given that the SC and its performance are interesting for the researchers and practitioners, the present research will be of great importance to the literature and industries. This is through studying the ASC that lead to improving SCP which includes supply chain quality (SCQ), supply chain lead time (SCLT) and supply chain responsiveness (SCR), and the moderator role of IS which consists of two dimensions quality of information sharing (QIS) and level of information sharing (LIS). Thus, present research will provide many practical managerial implications to solve the SCP problems facing by the companies. Also, this research provides for relevant key individuals, practitioners,

policymakers, manufacturing industry, and related industries insight into the implementation of successful ASC.

II. LITERATURE REVIEW AND CONCEPTUAL MODEL DEVELOPMENT

This section discusses the concepts of supply chain performance (SCP), agile supply chain (ASC), and information sharing (IS) and the relationships between them from a theoretical perspective.

A. Agile Supply Chain (ASC)

The most important aim of the ASC to achieve the rapid responsiveness to customers' demands [23], in order to keep pace with changes in the market and customer demands [24]. These changes can take place in different aspects such as technologies, trade relations, markets [25], product mix or size [26], quantity and location of demand [27], and customer demands [17]. The responsiveness is the market winner for the ASC, while quality, cost and lead time are market qualifiers [28]. Moreover, the responsiveness is improved by pre-identifying to changes and catching new opportunities that will arise [29]. Also, the ASC is producing what has been already sold only or what committed in the marketplace, through the adoption of the principle “wait and see” [27]. When you discover the customer needs as soon as possible and improve the product to respond to customer demand, this leads to higher profits to the companies [30]. Therefore, The ASC needs to improve responsiveness to respond effectively and quickly to changes, making the strategy suitable to processes in a dynamic manner [17, 31]. According to, Childerhouse and Towill [32] the ASC has several features, as diagrammed in Figure 1.

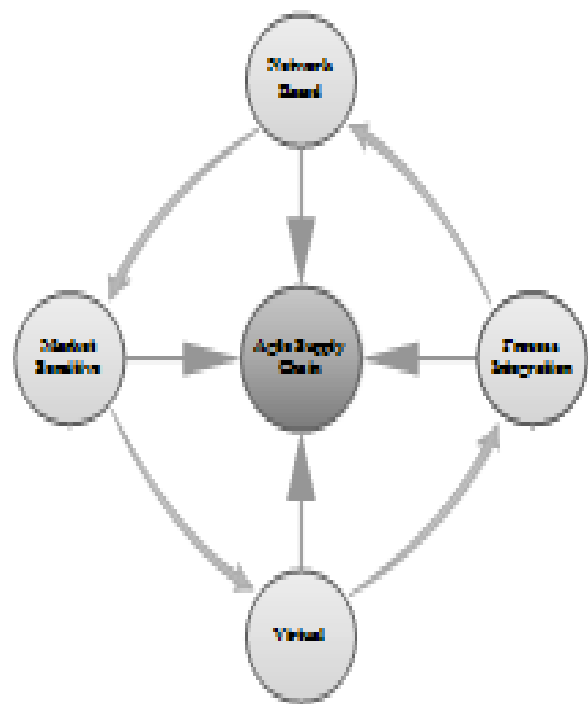


Fig. 1 The Features of Agile supply chain

Source: Adopted from Christopher and Towill (2000)

- 1) *Market Sensitive*: Meaning the company can hear the voice of the end customer and provide products based on real demand.
- 2) *Virtual*: Meaning using the information technology to share information among all partners in the supply chain ranging from customers down to suppliers.
- 3) *Process Integration*: Meaning cooperation among supply chain partners and remove the boundaries among them regarding the development of products and systems and sharing the information among them, leading to prevail a spirit of trust and commitment.
- 4) *Network-Based*: Meaning the companies no longer compete individually, but rather as supply chains, will be responsive better to

customers' demands by exploiting the core competencies and strengths of the supply chain partners, then the benefits will go to all partners.

The ASC is appropriate for innovative products, i.e. products whose properties are oversensitive [33, 34]. Many researchers defined the ASC, as illustrated in Table 1.

TABLE I
DEFINITIONS OF THE AGILE SUPPLY CHAIN

Author/Year	Definitions
Virmani, Saha and Sahai [35]	"Means using market knowledge as well as virtual corporation to exploit profitable opportunities in volatile market".
Matawale, Datta and Mahapatra [25]	"Is the ability to respond and create new windows of opportunity in a turbulent market environment, driven by the individualization of customers' requirements cost effectively, rapidly and continuously".
Birhanu, Lanka and Rao [36]	"It is responds to rapidly changing, continually fragmenting global markets by being dynamic, context-specific, growth-oriented, and customer focused".
Christopher [37]	"Is a business-wide capability that embraces organizational structures, information systems, logistics processes, and, in particular, mindsets".

Seemingly, from Table 1 that most of the definitions focused on the major goal of the ASC is the responsiveness, by increasing flexibility and speed in all activities, to meet volatile customer demands. In present study the ASC can be defined as the ability to respond quickly to changing customer requirements and a volatile market by increasing the flexibility of the structure.

B. Supply Chain Performance (SCP)

In the last decade, many research has published on the theories and practices of the SC, but the SCP has not received sufficient attention [38]. However, at present, companies face many challenges because of fierce competition not only between companies but also between SCs [39]. In addition, achieve the

success and excellence of the SC in the global markets requires from the companies to develop their the SCP continuously [40]. Improving the SCP is not limited to the company individually, but any partner of supply chain upstream or downstream has an essential role in improving the SCP [41].

On the other hand, Ahi and Searcy [42] and Basu [43] found that that measuring SCP is a hard task and complex issue. In the same way, many authors have pointed out that the development and selection of measures to measure the SCP have always been a complicated matter and a continuing challenge e.g., [44]. This challenge is due to the difficulty of coordination among many organisations that comprise the SC, as well as activities within these

organisations [45]. Moreover, as a result of dynamic changes in the SC environment, some measures are beginning to be inoperable, at this time there is a need for the SC to changeable and rebalance all parties in the chain through continuous improvement of SCP [44]. Therefore, in the current research, the emphasis has been placed on performance measures that are appropriate to the practical issues experienced by the manufacturing industries, namely SCQ, SCLT and SCR.

Nowaday, to survive in competitive environment should focus on responsiveness [46]. Despite the complexity and rapid changes in the market, using the ASC can bring quick response and high profits in the manufacturing industry [9]. Also, quality and meet customer goals are important decisions that are challenging for businesses in today's complex environment [25]. In addition, lead time is one of the critical SCP metrics that relate to the customer [47].

C. Information Sharing (IS)

The IS is one of the most important issues that SC literature is focusing on today. Many researchers have mentioned this importance in their research [e.g., 18, 48, 49]. This is due to the transformation of factors of value creation into the intangible assets such as information rather than focusing on the tangible assets like financial and material assets [19].

Hsu, Chiu, Jason and Liu [50] see that the importance of the IS because the SC consists of a group of participants who can better share their individual information with each other. Also, the IS achieves effective communication between suppliers, manufacturers, distributors and customers. Besides, there are two directions for sharing information the first trend share information from

suppliers to retailers, and the second trend of the IS from retailers to suppliers [51].

Gandhi, Shaikh and Sheorey [18] claim that if all partners of the SC continually share information about the sales status from the side of retailers, the delivery status from the side of suppliers and the shipping status from the side of the freight forwarder, rather than firefighting all the time, the company will be able to manage the business with greater predictability. Therefore, the IS can be defined as the effective use of modern communication tools to help the company and its partners achieve goals and improve performance by reducing uncertainty. Successful IS achieves integration, synergy, cooperation and coordination among SC members and thus improves the SCP which involves SCC, SCQ, SCLT, SCR. The IS has been studied in many dimensions, the present research will focus on two main dimensions: the QIS and the LIS which selected according to [12, 20, 52].

The QIS is one of the most critical dimensions of the IS. It is also considered a vital and effective factor for achieving integration and cooperation among SC partners [20, 48]. In addition, the LIS is the second dimension of the IS. The concept of the LIS has received much attention from researchers [20, 52]. Thus, when the company begins to share information with its partners, this may expose it to certain risks so there is a need to know the extent or level at which the company can share its information.

III. RELATIONSHIP BETWEEN ASC, IS AND SCP

A. Relationship Between ASC and SCP

Indeed, the ASC has been argued as a significant factor affecting the SCP. The empirical evidence in

the literature shows mostly a significant positive relationship between the ASC and SCP. For example, Sohail Rana, Osman, Bahari and Solaiman [53] investigated the relationship between ASC and SCP in Bangladesh retail chain stores using a sample of 115 managers. The result showed a significant positive relationship between ASC and SCP. In a similar study, Abdollah and Fard [8] investigated in the context of manufacturing industry in Iran of 104 Managers and found a significant influence of ASC on SCP. Likewise, Jakhar and Barua [54] provided evidence that ASC had a significant relationship with SCP in 560 manufacturing firms in Indonesia. Therefore, based on the arguments above and assumptions of CRBV [21] theory the following proposition is offered:

P1: Agile Supply Chain has a relationship with Supply Chain Performance.

B. Relationship Between IS and SCP

Previous studies have researched about the effect of IS on SCP. Most of the studies found that the implementation and adoption of IS lead to improvement in SCPs. Afshan, Chatterjee and Chhetri [48] in their study conducted in India IS was reported to have a direct relationship with SC collaboration. This, in turn, leads to improved SCP. A study by Baihaqi and Sohal [55] in the context of manufacturing companies in Australia that SCP was influenced by IS. Likewise, Gandhi, Shaikh and Sheorey [18] also found that IS effect on SCP in retail firms.

Furthermore, Sundram, Bahrin, Abdul Munir and Zolait [56] supported the significant relationship between supply chain information management and manufacturing performance. Consequently, the empirical evidence in the literature as above

generally shows a significant positive relationship between IS and SCP. Therefore, based on the arguments above and the assumption of CRBV [21] the following proposition are offered:

P2: Information sharing has a relationship with Supply Chain Performance.

C. The IS as a Moderating Variable

The IS considered as the nerve to enhance communication among SC partners [13]. As for the authors of the lean/agile school, they stressed that sharing information enhances the work of the ASC in responding to the demands of the troubled environment [15]. Besides, the ASC to function better and achieve satisfactory results, it should be supported by the sharing of information whose main objective to reduce uncertainty and environmental complexity [11].

The ASC aims to response rapidly [26]. To achieve this goal, the ASC requires appropriate systems to manage the relationships between supply chain partners and sharing the information among themselves [6]. Li and Lin [12] clarify, the ASC can respond to market volatile depends heavily on IS and improve the SCP. Therefore, when the IS used with the ASC the SCP will improve by enhancing the quality level, reduce lead time and quick responsiveness [13, 16]. Accordingly, based on the arguments above and assumptions of CRBV theory the following proposition is offered:

P3: Information sharing moderates the relationship between Agile supply chain and supply chain performance.

The conceptual framework is proposed based on the theoretical gaps in the literature that explained above integrating IS into ASC to examine their effects on SCP. With consideration, the

underpinning CRBV theory, which defines the dynamic capabilities as “the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” [57]. Thus, the ASC and IS can be considered dynamic capabilities which can improve SCP, along with these motives this is the first study has been directed towards the development of the research framework as shown in Figure 2.

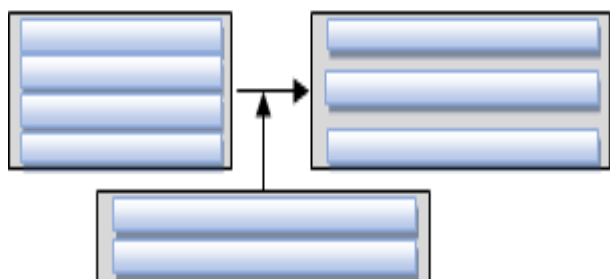


Fig. 2 The conceptual model shown the integrating of IS into ASC to improve SCP

IV. CONCLUSIONS

The current research proposed a unique conceptual framework and different from all the mentioned studies in its contribution. In a more specific way, one of the most important contributions in the present research introducing the IS as a moderator variable. Previous empirical studies have suggested that integrating between ASC and IS in SCs will improve SCP. The current conceptual framework provides for the SC management practitioners and academicians insight into the implementation of successful ASC. This research will help practitioners and concerned individuals to recognize significant factors that have been proven to either cause an obstacle or an improvement of SCQ, SCLT and SCR. Besides, the present research contributes to the body of knowledge including CRBV theory. In addition, the future works agenda of the authors is to conduct an

empirical study of this conceptual framework proposed in the manufacturing industry.

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