

Supply Chain Collaboration in the Pharmaceutical Industry: A Triadic View

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Abstract

Collaboration is a value-adding activity to achieve competitive advantages. The rise in outsourcing has led to a supply landscape increasingly rely on networks rather than vertical-integration. To explore collaborations in a triadic view is the first step towards network. This research aims to explore the drivers and patterns of triadic collaboration in adoption of case study methodology.

Keywords: Supply chain collaboration, Triadic pattern, Pharmaceutical Industry, SMEs

1. Introduction

Collaborations in supply chain are regarded as activities of value-adding partnership construction in achieving certain competitive advantages of cost efficiency (Frödell, 2011), business flexibility (Chan et al., 2009), opportunity (Korsgaard, 2011), sustainability (Gimenez and Tachizawa, 2012), and Legitimacy (Fiedler and Deegan, 2007). Most of collaborative relationships are formed based on non-contractual

exchanges and unspecified obligations over a long period of time (Tanskanen, 2015). The dyadic partnership as the starting mode in value creation encourage individual parties to pool their resource and information (Gomes and Dahab, 2010) to improve supply chain performance on the whole. However, due to the complexity of supply chain (Braziotis et al., 2013), increasing number of scholars argue that investigations on dyadic relationships are not able to reflect the nature of supply network (Choi and Wu, 2009; Wu, Choi and Rungtusanatham, 2010). Moreover, due to the rise in outsourcing (Scarlett, 1996; Bhaskaran and Jenkins, 2009; Yakhlef, 2009), the supply landscape is increasingly rely on networks rather than vertical-integration. A triadic view on supply chain collaboration is said the “first step” (Choi and Wu, 2009) in exploring firms’ relational behaviours of collaboration in network perspective, which is significant to the development of supply chain management.

The formation of triadic construction is based on existing relationship dyads (eg., supplier-buyer, supplier-customer) in industry (Burt, 2000; Barratt, 2013). Usually, vertical relationships are in mainstream research domain of supply chain collaboration (Buchanan, 1992; Peyrefitte, Golden and Jr, 2002; Vallet-Bellmunt, Martínez-Fernández and Capó-Vicedo, 2011), and it is said that a successful vertical relationship is critical to utilize organizations’ relevant capabilities in a comparatively large degree (Tanskanen, 2015). More and more people from different functions of R&D, procurement, and operations are able to be involved into the same business to approach mutual benefits make collaboration happened not only between parties in up-downstream, but also among parties in one group, which is also called horizontal relationship (Wilhelm, 2011). In manufacturing industry, supplier-supplier relationship as the typical horizontal relationship is treated as a significant unit plugged-in the triad of supplier-supplier-manufacturer (Carr, 1999; Wu, Choi and Rungtusanatham, 2010). And there is a growing trend of collaboration among suppliers rather than compete with each other in upstream of supply chain (Ateş, Ende and Ianniello, 2015), especially in innovation driven industries.

A structure of triadic collaboration is fundamentally different from the dyadic researches in the linear supply chain often discussed in Operation Management (OM) and Supply Chain Management (SCM) in last few decades. As an elementary block of a supply chain network, the three-dimensional relationship context may contain different linear two-dimensional context in particular area. Refer to the “power balance” and “structural hole” theory (Burt, 2000; Zaheer and Bell, 2005; Burt, 2009; Hughes-Morgan and Yao, 2016), when two parties which are not originally related to each other are indirectly connected through the bridging of a focal company, the centrally located firm in a network is more alike to enjoy larger share of resource and information than other two partners. However, the supply chain is dynamically changed (Fynes, Voss and de Búrca, 2005), and the selection of appropriate units to temporally connected can be various in according to different projects (Ateş, Ende and Ianniello, 2015). When necessary, the structural hole even can be spanned, where resource and information advantages over all partners can be shared (Hughes-Morgan and Yao, 2016). In previous researches, several assumptions of possible triadic collaborative modes have been proposed (Wu and Choi, 2005; Wu, Choi and Rungtusanatham, 2010); but as theoretical contracts, there is lack of sufficient empirical evidence to support.

Pharmaceutical industry is highly motivated by innovations which has fast evolved in past 30 years, that involves a complex of organizations in medication discovery, development, and manufacturing (Shah, 2004). Evidence show that challenges including high R&D cost and the declining R&D rate (Laínez, Schaefer and Reklaitis, 2012) pressure companies in the field to seek available resources to ensure their sustainable development. Collaboration as an effective means to tackle those challenges has been practiced by many big pharma (Forster et al., 2014). Wildly outsourcing of R&D functions and closely work with relevant research institutions are the distinguished feature of the industry (Rees, 2011). For big pharma, comparatively thorough practical system of supplier management and aggregate power in business enable them to better compete for resources and impact on rules of playing. But for small and medium sized enterprises (SMEs), not many of them do really know how to acquire more benefits through collaborations, although they may have realized the potential power of such strategy in competitions. The complexity of participation in supply network and lacking of experienced predecessors' directions are said the barriers of the alliance (Koh et al., 2003), a revelation of how to build valuable collaborative relationships is desired.

The network research on pharmaceutical supply chain collaboration is still scarce in the moment. A triadic view on collaborative relationships in industry field may indicate business practitioners of how to maximize profitability and develop sustainability. In addition to this, scholars may get inspirations in further exploration of supply chain network. This paper aims to discover the drivers and configuration patterns of collaborative triad in a supply chain network, and to investigate the impacts of supply chain collaboration under certain triadic configuration on supply chain performance.

In supply chain, in the perspective of a focal company, there are upstream and downstream, where the related contributory activities are different. As the roles played by participants in triadic collaborations are dynamically changed in accordance with certain project requirements (Ateş, Ende and Ianniello, 2015) and various purposes (Björklund and Forslund, 2013), which are not permanent; we argue that the triadic collaborative patterns in upstream are different from the ones in downstream. And in this research we will only illustrate the upstream part. Outsourcing gets involved more parties into existing relationships (Cao and Zhang, 2011), and we argue that it could be a connection point of dyads in constructing triads. This research is in an exploratory approach, and in this paper following research questions are aimed to be answered.

***Question One:** What are the triadic patterns observed in the upstream of pharmaceutical supply chain?*

***Question Two:** What are the drivers of triadic patterns observed?*

***Question Three:** How does particular triadic pattern may impact on supply chain performance?*

2. Literature Review

2.1 Drivers of collaboration

The “driver” can be interchangeable with the word “motivation”, which is defined as stimulus-driven (Moody and Pesut, 2006) that urge activities in response to desired needs (Fiedler and Deegan, 2007); or the goal directedness of potential advantages (Antikainen, Mäkipää and Ahonen, 2010). The main drivers of collaboration can be concluded in seven aspects: *Stability*, which refer to stable in continuing business at a minimum level of probability of failure (Fiedler and Deegan, 2007); *Legitimacy*, which refer to appearing by regulations, rules, beliefs, or expectations of certain stakeholders (Boehm and Hogan, 2013); *Cost-efficiency*, which refer to money saving in particular processes while the chain performance can be guaranteed in a maximum level (Yang et al., 2013; Kohl et al., 2015); *Effectiveness*, which refer to resource leverage to focus on core business (Leavy, 2006); *Flexibility*, which refer to quick response to changes with effective strategy in addressing uncertainties (Duclos, Vokurka and Lummus, 2003); *Sustainability*, maintain continuing well business performance (Schaltegger and Burritt, 2014); and *Opportunity*, which refer to able to enter new areas or align external resources for further improvement (Mabey and Nicholds, 2014).

Refer to Huang et al. (2015)’s research, the drivers can be further allocated into strategical level, operational level, and political level. It has been argued that collaboration patterns constructed should be identified with the considerations relevant to the levelled drivers. As with certain strategic highlights in reality (Montoya-Torres and Ortiz-Vargas, 2014), a better understanding of collaboration can be expected. And in this research, a further study of drivers of triadic collaboration will be specified.

2.2 Theory background of network building

Triads is built with dyads, and relationships between organizations do not exist isolated with each other (Ritter, 2000). To integrate existing dyads into triads, the fundamental theories can be referred are “Balance Theory”, “Structural hole effect”, and “Bridge concept” (Carson et al., 1997; Burt, 2000; Wu, Choi and Rungtusanatham, 2010; Burt, 2009). It has been argued that the triadic structure of collaboration is in dynamic status (Squire et al., 2009; Ateş, Ende and Ianniello, 2015). An integrator is usually needed in the connection of two dyads, and the asymmetry of resource and information can be one of the most important factors that impact on the relationship building.

In previous researches, the emphasis was put on how the triadic construction can be formed rather than discuss the possible patterns existing in particular industries. Readers may able to get to know the principles of how to build a triad in a theoretical perspective; however, still confused about the practicing. In this paper, with observed triadic patterns, a comprehensive statement will be stated to demonstrate the application of triadic collaboration in pharmaceutical industry.

3. Design/Methodology/Approach

Literature review has been applied to identify the research gaps, to propose research questions, and to develop the research structure.

Due to privation of researches in triadic collaboration pattern identification and the little knowns of triads' practice, an exploratory approach has been adopted. Refer to Yin (2014), we used the methodology of multiple-case study to collect data and further extend relevant theory building (Jia and Lamming, 2013). The multiple-case study is a robust method (Forslund and Jonsson, 2007) will not limit the potential of research to generalize findings (Bhaskaran and Jenkins, 2009). Multi sources of evidence are used to address broader range of validity issues, including documentation, archival records, interviews, and observations.

Three SMEs (China) in pharmaceutical industry have been chosen for case studies (Table 3-1). To get rid of the regional bias in policy preference, business manner, and market driven, all case companies involved are located in the same district. Pilot studies have been made for formal interview question design. Semi-structural interviews with a research protocol have been applied in data collection (*stage-one*); a follow-up survey (*stage-two*) was designed and sent out to all relevant interviewees to further confirm our data.

As this research is to identify collaborative relationships which involves not only the case companies, but also their possible partners. To avoid the bias of particular parties in specific angle, we randomly picked 6 partners (introduced by case companies) who ever had business connection with all case companies in upstream (3 R&D partners, and 3 conventional material providers) to do the survey similar to the ones sent to case companies. With the unclear stated parts, we tend to email them to further confirm.

Table 3-1 Basic information of case company

Case Company 1 (CC-1) ➤ CEO ➤ Operation Manager ➤ Production Manager	A Bio-pharmaceutical company specialized in genetically engineered drug making. CC-1 was developed from a local research institution, and has a professional team in R&D. Has three subsidiaries, including a group which is able to support CC-1 with particular pharmaceutical materials regularly.
Case Company 2 (CC-2) ➤ General Manager ➤ R&D Manager ➤ Production Manager	CC-2 is a pharmaceutical manufacturer mainly produce chemical drugs, and traditional Chinese medicine and synthetic drugs. An R&D centre is in building. Has two subsidiaries, including a company able to produce required pharmaceutical materials for CC-2.
Case Company 3 (CC-3) ➤ CEO ➤ R&D Manager ➤ Production Manager	CC-3 is a pharmaceutical manufacturing company working on innovative drug R&D and production. Operating an online platform to communicate with relevant R&D parties regularly. Does not have any subsidiary.

4. Result and discussion

Refer to the data collected, the drivers of triadic collaboration in upstream pharmaceutical supply chain mainly are stability (strategic driver), effectiveness (operational driver), and sustainability (strategic driver). Political drivers are significant in project-launch; however, there is no clear evidence in this case research to show that the triadic collaboration is actively motivated by political drivers in approaching mutual benefit.

We have argued that only when there is directed linkage among all participants, the triad can be regarded as basic construction of triadic collaboration (Figure 4-1). Refer to the level of the degree of collaboration in different involved dyads, two patterns in upstream can be identified. In upstream supply chain, R&D is widely outsourced in pharmaceutical industry; other functions like procurement is seldom to be outsourced. It can be argued that triadic collaboration is usually formed based on an existing high level dyadic collaboration. In *Cultivated Collaboration*, Focal company bridges relevant suppliers (through projects) at very first stage, certain knowledge or information holding by individual suppliers have to be shared when needed; with the level-up of supplier-supplier collaboration, the triadic collaboration is able to be established as a virtuous system. In *Derived Collaboration*, based on a stable dyadic collaboration between focal company and a supplier, another supplier ever had direct business connection is involved; refer to focal company's mission and strategy, supplier-supplier relationship can be monitored to be level-up in approaching maximum benefits.

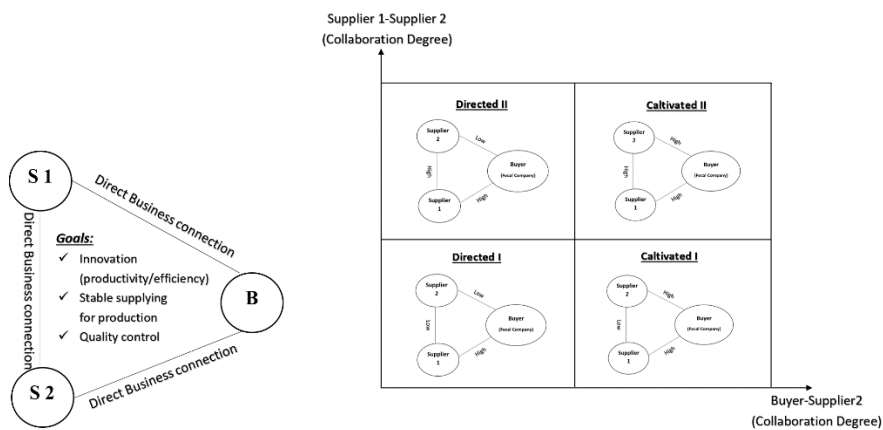


Figure 4-1 Triadic collaborative patterns in downstream supply chain

In upstream supply chain, when collaborative relationship is motivated into dyadic construction, competitive advantages in all three levels can be observed in cases; particularly, outsourcing is significantly benefit case companies in cost-efficiency (Huang et al., 2015). Authorities as the fund provider and policy maker is treated crucial in relationship building and Guanxi (Murray and Fu, 2016; Guo, Guo and Jiang, 2016) maintenance. However, in triadic collaborations, it can be noticed that most managers in case company think it is comparatively cost more than dyadic collaborations; and they have to pay more attention to maintain their central position (Hughes-Morgan and Yao,

2016) in network. The collaboration is not always effective in operation, due to it may takes more time in information processing (Ateş, Ende and Ianniello, 2015).

5. Conclusion

This research explores the drivers and configuration patterns of upstream supply chain in a triadic view, which provide a practical method to further investigate triadic collaborations in downstream supply chain; that enrich the relevant research in supply chain collaboration with empirical evidence in industry field. The results in a way provide pharmaceutical SMEs with practical management strategies to enhance their collaboration and improve their supply chain performance.

In this research, only three cases are involved, which may not sufficient to reveal certain phenomenon. Issues in downstream supply chain were not discussed, which may lead to bias in judging the impact of outsourcing and influence of triadic collaboration on supply chain performance.

In future research, collaborations in downstream supply chain should be further investigated to complete the study. If possible, observed patterns should be examined in other industries.

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