

# Examining Innovation Capability In A Supply Chain Context

**Faisal Iddris**

*School of Business, Engineering and Science  
Halmstad, University  
Halmstad, Sweden*

*faisal.iddris1@hh.se*

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## Abstract

The current competitive business environment demands that firms are able to integrate operational capabilities of their supply chain members in order to develop, produce and deliver offerings at low cost and high quality. In order to understand innovation capability in a supply chain context, this paper provides an in-depth analysis of 'Comfort Audio', a leading company in medical technology in Sweden, which show incredible ability to develop innovative solutions and medical products over the years. A single case study was adopted in this study, which enabled in-depth analysis of the case company.

Findings, highlight, innovation capability factors is made up of: idea management, interactive learning, collaboration and idea implementation. In addition, consultants were found to be one of the key supply chain members contributing to the firm's innovation capability. The main theoretical contribution of the study is that innovation capability of a firm has been found to go beyond the internal capabilities that a focal firm owns or possesses, but rather through the access and utilisation of external actors' resources and capabilities, as a result of exchange relationships with the supply chain members

**Keywords:** Innovation Capability, Supply Chain, Collaboration, Idea Management, Innovation Strategy.

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## 1. INTRODUCTION

The current competitive business environment demands that firms are able to integrate operational capabilities of their supply chain members in order to develop, produce and deliver offerings at low cost and high quality Hsu, Tan, Kannan and Keong Leong [1]. In search for potential improvement for innovation a supply chain need to focus on developing its innovation capability, increase profitability and competitiveness [1].

Supply chain can be described as a network of multiple businesses and relationships [2], or be viewed as network of organisations that are involved, through upstream and downstream linkages, in different processes and activities that produce value in the form of products and services to the final consumer [3]. The literature shows that supply chain context can be regarded as enabler of innovation. Conversely however, it is becoming extremely difficult for a single company to innovate without collaborating with customers, suppliers, business partners and across business [4], despite that realisation, most firms struggle to open up innovation capability activities to include supply chain members. Innovation capability is conceptualised as innovation generation process, which serves as a source of competitive advantage. Dutta, Narasimhan and Rajiv [5] hold the view that capabilities should be seen as intermediate steps between input and output. Although there have been few studies that focus separately on different aspects of innovation capability at a supply chain level [see, 1, 6, 7]. However, there is little empirical research on how a focal firm's interactions with its supply chain members affect its innovation capability. Therefore, this study aims at examining innovation capability as firms interact with their supply chain members. Examining these issues may help to advance knowledge in innovation capability literature. Thus, the main research question the paper seeks to address is as follows:

RQ: How does a focal firm's interaction with its supply chain members affect its innovation capability?

This paper is structured as follows; the next section provides overview of literature on innovation capability and the conceptual framework. This is followed by the method employed for the data collection. This is then followed by a presentation and analysis of the empirical results. Finally, the last section will consist of the conclusion of the study, theoretical implication, managerial implication(s) and suggestions for future research.

## **2. LITERATURE REVIEW**

### **2.1 The Concept of Innovation Capability**

Innovation capability is conceptualised as innovation generation process, which serves as a source of competitive advantage. Various scholars have defined the concept of innovation capability. For instance, Assink [8, p.5] defined innovation capability as "the internal driving energy to generate and explore radical new ideas and concepts, to experiment with solutions for potential opportunity patterns detected in the markets 'whitespace' and to develop them into marketable and effective innovations, leveraging internal and external resources and competencies"; In another study, Zawislak, Cherubini Alves, Tello-Gamarra, Barbieux and Reichert [9, p.15] defined innovation capability "as the ability to absorb, adapt and transform a given technology into specific operational, managerial and transactional routines that can lead a firm to Schumpeterian profits, i.e.. By doing so, a firm can perpetuate itself overtime". [2] Defined innovation capability as "the ability to continuously transform knowledge and ideas into new products, process and systems for the benefit of the firm and its stakeholders". Our point of departure from the above definitions is that this study focuses on how focal firm's interaction with supplier chain members affects its innovation capability. Hence, in this study, "innovation capability refers to focal firms' continuous ability to utilise collective expertise, knowledge, skills and resources of significant supply chain members in innovation activities in relation to new processes, products, services, administrative, or organisational systems in order to create and capture value for the entire supply chain" [10]

Previous research has largely focused on firm level innovation capability [11]. For example, see the works of [12-17]. Thus, research on innovation capability in supply chain context has not been as extensive as expected, with the exception of these studies [1, 6, 7, 18]. For instance, Soosay, Hyland and Ferrer [1] were among early scholars to examine how collaborative relationships enhance continuous innovation in the supply chain. Their study focused on the effects of collaboration in continuous innovation in logistics. [3] Examined how firms used 'big data' (tweets, videos, click streams, and other unstructured sources) to extract new ideas or to understand customers' markets and products needed for supply chain innovation capability. Swink [6] focused on building collaborative innovation capability for product life cycle management. While, Delbufalo, Adcroft and Adcroft [19] concluded that an interaction between network diversity and network density contributes to innovation capability in supply chain. Hagedoorn and Duysters [20] examined external sources of innovation capabilities through strategic technology alliances, mergers and acquisitions. Their study demonstrate that the industrial and technological environment in which companies operate plays a role in explaining why companies have a certain opt for strategic technology.

Even though the above studies provide broad overview of innovation capability studies at supply chain level. Our current understanding of a focal firm's innovation capability with supply chain members is limited [21]. Thus, this study attempts to explore innovation capability as a firm interacts with its supply chain members, and thereby contributes to the extant literature.

### **2.2 Conceptual Framework**

This study adapt innovation capability conceptual framework proposed by [4]. The framework consists of nine factors: organizational learning, idea management, knowledge management,

creativity, innovation strategy, leadership, organizational culture, creativity and collaboration. But in this study we focus on four of the factors of innovation capability (see figure 1.) These factors are perceived to be important in studying innovation capability building [5-8],

<b>Factors</b>	<b>Operationalisation</b>
organisational learning	<ul style="list-style-type: none"> <li>a) organisation-wide training and development activities</li> <li>b) experimentation</li> <li>c) customer involvement through user experience</li> <li>d) accumulation of lesson and experiences</li> <li>e) inter-firm relationships, networks</li> </ul>
Collaboration	<ul style="list-style-type: none"> <li>a) shared process and knowledge across departments</li> <li>b) share information with customers</li> <li>c) share information with suppliers</li> <li>d) support acquisition of knowledge externally</li> <li>e) cooperation with universities and research centres in innovation activities</li> <li>f) cooperation with consultant for innovation activities</li> </ul>
Innovation strategy	<ul style="list-style-type: none"> <li>a) developing clear innovation strategy</li> <li>b) setting appropriate innovation target</li> <li>c) strategic initiatives for incremental innovation</li> <li>d) strategic initiatives for radical innovation</li> </ul>
idea management and implementation	<ul style="list-style-type: none"> <li>a) existence of strategic guidelines for innovations</li> <li>b) installation of a broad idea-collection point;</li> <li>c) cross-functionality of the decision-making</li> <li>d) generating ideas from bottom-up</li> <li>e) provide feedback and reward for innovative ideas</li> <li>f) integration of idea management into overall strategy</li> </ul>

**FIGURE 1:** Innovation Capability Conceptual Framework.

*Source:* adapted from [4]: *Innovation Capability: A Systematic Review and Research Agenda*

**Innovation strategy:** An innovation strategy facilitates organisation's ability to identify external opportunities and match those opportunities with internal capabilities so as to explore new markets and deliver innovative products [12]. Aramburu and Saenz [13] revealed that innovation strategy have influence on innovation capability. Innovation strategy determines the type organizational learning an organization will undertake.

**Organisational Learning:** Learning has been highlighted as one of the most important factors of innovation capability [5, 6, 9]. Brown and Duguid [5] Described learning as a bridge between working and innovating. The organisation's ability to learn through customer, supplier and other network members determine the kind of collaborative initiatives to be undertaking. The collaborative initiatives may involve joint decision-making and exchange of information.

**Collaboration:** Prior studies have emphasised the importance of collaboration in innovation generating activities [7, 10]. Van Winkelen and Tovstiga [11] indicated that both internal and external collaboration is important for firms' innovation capability building. A well established collaboration between a focal firm and network members may lead to good idea management system.

*Idea Management and implementation:* Lawson and Samson [2] argue that firms that explicitly develop and invest in idea management individually or collectively have the propensity to achieve valuable innovation outcomes. [14], revealed that idea management systems facilitated the focal firms' gathering of ideas from customers, suppliers, and competitors in their innovation activities. Idea implementation is defined as the ability of the firm to develop new ideas that may be regarded as a new concept, offer, or process [8, 15]. Without the implementation of ideas, there will be a total decline in innovation activities. The conceptual framework (figure 1) will serve as analytical tool for this study.

### 3. RESEARCH METHOD

The use of qualitative methodology is appropriate due to the fact that capabilities are embedded in the organisational process. Jacobides and Winter [16] observe that capabilities are developed through a long and path dependent process that requires accumulation of decisions and action overtime. Hence, they are very difficult to examine quantitatively [17]. Therefore, a single case study is adopted in this study. Furthermore, a single case study enables a deep understanding of a particular case and also generalization to other cases [18]. A single case study approach demands a careful selection of cases [19]. The focal firm in this study was selected based on industry leading in producing innovative products/services in medical technology sector.

#### 3.1 Data Collection and Analysis

The data collected in this study were collected from a high-tech firm specialising in medical technology in Sweden. Triangulation method was used in collecting data from multiple data sources during the research. The secondary data were collected from brochures, annual reports, product catalogue, press releases and the company's websites. In addition, primary data were collected through face-to-face in-depth interviews with the key informant from the case company. The semi-structure interview guide was designed from a review of literature on innovation capability. The aim was to design a research interview guide which consists of themes and questions covering innovation capability. During the interview the questions on the interview guide were not followed strictly. This was to facilitate the flow of the conversation with respondents. Also some questions that were not on the interview guide were asked based on some of the important issues raised by what the respondent said during the interview.

All the interviews were recorded digitally after seeking the approval of the interviewee. In addition, some hand written notes were taking during the interview. The interviews were transcribed verbatim and analysed, and later sent back to the respondents for their feedback in order to check accuracy of the interview. This approach reduced the inaccuracies in the data gathered and helped remove some ambiguities and misinterpretations. The triangulation technique ensures that the data collected is rich and comprehensive.

#### Presenting the Case: Comfort Audio

Comfort Audio is an inquisitive innovative and fast-growing company. The firm develops and manufactures assistive listening devices for people with a hearing loss. The company is one of the first in the world to develop digital hearing aid products using digital modulation (DM). The products are developed for use at work, at school, in public environments and at home. Table 1, provides detail information about the data source and firm characteristics.

Key firm characteristics	Information
Name of the Company	Comfort Audio
Head office	Halmstad, Sweden
Year of establishment	1994
Firm size (no. of employees)	90 people mainly in Sweden
Industry sector	Medical technology

Products	1. COMFORT DIGISYSTEM (wireless receiver and microphone) 2. Comfort Duett (Digital wireless hearing amplifiers) 3. Comfort Contego (Digital wireless hearing products)
Foreign market	United states/Canada, Europe, Mexico Several subsidiaries are established in other parts of the world.
Awards	Best New Product Award , 2011
Turnover	143 million Swedish Krona (US17 million Dollars)
Key informant	CEO
Archival data: electronic and print	Company's website Brochures White papers Comfort Magazine

**TABLE 1:** Data Sources and Key Firm Characteristics.

## 4. RESULTS

The following section provides evidence of innovation capability building in collaboration with supply chain members. The data shows that Comfort Audio develops innovation capability in collaboration with its key supply chain members. The most important network members in the innovation capability development activities were customers, distributors and consultants.

### 4.1 Innovation Strategy For Innovation Capability

Innovative strategy has been the core foundation of the company since its inception in 1994. For instance the mission of the company is to use cutting-edge technology and innovative solutions to enable people to communicate their thoughts and ideas in every situation throughout their lives. "Comfort Digisystem" was launched in 2007, since then the company has been developing both long and short-term strategy for innovation. One important strategy for the case company's innovation strategy is to engage former CEOs and managers as consultants to the company. It is believed that this group of managers has extensive knowledge of which the company can use in designing new product and in process development. Overall the underlying success of the company is built around well-structured strategy for innovation in the company.

We are an innovative company, focused on development..... The users of our products confirm how much their lives have been improved – which we can see in the sales development around the world, (August Pansell, head of research and development at Comfort Audio).

Comfort Audio's has developed clear strategic for both radical and incremental innovations. The strategy for incremental innovation focused on improving features of existing products, while strategies for radical innovation focuses on developing completely new products such as 'Access DA20' a product that is able to handle all sound sources in the classroom and contains three SST radio receivers with full diversity.

### 4.2 Interactive Learning with Customers and Suppliers In Innovation Capability

Comfort Audio undertakes need analysis of its customers including audiologist, pediatrics, school children, teachers and the general public to determine their requirements. The company always focuses on the needs of the individual and has a genuine desire to improve the quality of life of those who suffer from a hearing loss (comfortaudio.com).

By engaging with the students and teachers, Comfort Audio was able to test assistive device that transfers sound digitally between the teacher's microphone and the student's receiver. Using digital transmission, disturbing background noise is reduced and the student can more easily concentrate and focus on the

teacher for a longer time (Anna K. Lejon, audiological product specialist at Comfort Audio).

Another important aspect of the interactive learning occurs between the case company and its key supply chain members. For example, supply chain members from nine different geographical locations meet occasionally at the headquarters in Sweden to exchange information, marketing materials and test products [21]. In addition, the company has set up Comfort Audio academy, with the sole aim of enhancing the knowledge base of resellers and distributors in Sweden, distributors in international market and supply chain members or partners. The academy enhances the company's technological and innovation activities.

#### **4.3 Involvement of Idea management and Idea implementation with distributors and customers for innovation capability**

Idea management and implementation appears to be important in the company's overall innovation strategy. The company relies on the idea management systems for generation of innovative ideas for the developing its radical and incremental innovations. The company adopts daily brainstorming sessions to solicit ideas from internal employees. However, this appears to be insufficient so the Comfort Audio relied on external sources for valuable ideas. Comfort audio frequently sends team of personnel to visit and interact with customers and suppliers in different countries through which new ideas are generated. The most important part of idea generation is the point at which the ideas are commercialised through idea implementation activities. Hence, the company together with its partners have implemented sophisticated IT infrastructure backed by cloud computing platform to coordinate the production and distribution of the final product to customers in real-time.

When Comfort Audio planned to improve the performance one of its innovative product namely 'Comfort Digisystem Microphone DM30'. The product was tested on students to gather feedback and valuable ideas that were later incorporated in the production.

The test of Comfort Digisystem Microphone DM30 was conducted over four weeks, after which students were interviewed regarding their experience with the Digisystem Microphone DM30 and the teachers were also interviewed... Together with our own extensive experience and research, we believe that the test results confirm that the upgrade to our DM30 enhances learning in schools that cater for children who have hearing difficulties (Anna K. Lejon, audiological product specialist at Comfort Audio)

Generally, Comfort Audio was able to develop radical innovative solution in every three year period and incremental innovation once a year. The development of the innovative solutions was due to ideas generated and implemented with key supply chain members.

#### **4.4 Collaboration with suppliers for the provision of cloud computing services for innovation capability**

This research found that collaboration with third for the provision of cloud computing services greatly enhances the case firm's innovation capability. The company's cloud-based computing platform enables the employees interact with supply chain members in real-time. The cloud- computing platform helped the integration of e-Procurement and exchange of information across the company's supply chain network. Another important factor that contributes to the case firm's innovation capability is collaboration with wide range of consultants that offer specialised expertise and knowledge, which Comfort Audio lacks internally.

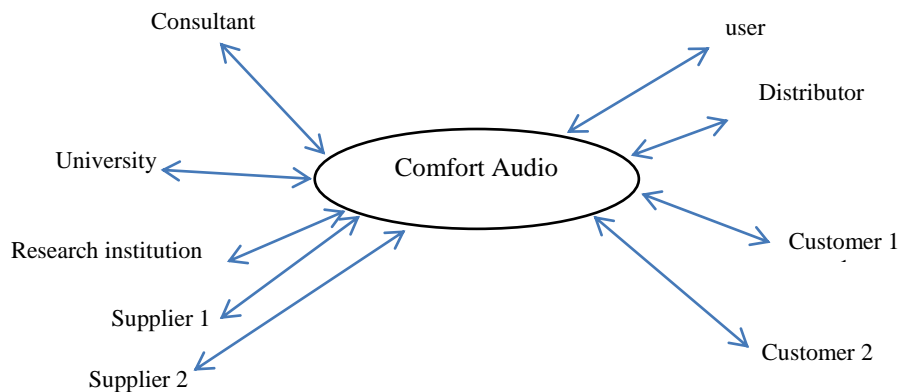
We collaborate with customers, suppliers and more importantly with consultants. In particular consultant greatly contribute to our innovation capability but we have less collaboration with universities comes to innovation related activities...we engage the services of various consultants with specific knowledge in the design

and development of most of our innovative products and solutions but as we grow as a global company we are now focusing on internal competence” (Interview with the CEO).

Whilst universities are important source of knowledge there is less reliance on universities for innovation generation activities by Comfort Audio. But much of the collaboration relating to innovation activities is done with customers, suppliers and consultants.

#### 4.5 Discussion and Conclusion

The overarching aim of this study is to provide deeper understanding of how a focal firm’s interactions with its supply chain members affect its innovation capability. It can be seen that what is being achieved in the on-going collaboration and interaction between Comfort Audio and supply chain members goes beyond an individual firm’s effort. Figure 1 depicts key supply chain members that engage in mutual learning [1, 2], mutual idea generation [3] and idea implementation [4] in an effort to develop its capability to be innovative.



**FIGURE 1:** Key supply chain members who contributed to innovation capability of the focal firm.

While other studies have pointed toward similar concerns by focusing on building collaborative innovation capability for product life cycle management [10], use of big data for innovation capability in supply [3], interaction between network diversity and network density for innovation capability in supply chain. [27]. From this perspective it becomes evident that innovation capability appears to be relevant to incorporate in supply chain context. Thus this paper makes empirical contribution by showing that the focal firm develop its innovation capability in interaction with key supply chain members, through idea management, collaboration, learning and idea implementation. In addition, this paper responds to calls for further studies in supply chain innovation capability [4, 28].

Our analysis revealed that the process of interactive learning by way of engaging customers, suppliers and other stakeholders in innovation generation. This is consistent with previous studies [6, 9, 22], where the scholars indicate that learning is important for innovation capability building. This study’s emphasis on external acquisition of idea generation and implementation resonate well with other studies [15, 23], where external sources of idea generated is found to be important in innovation generation activities. For instance, IBM was successful in generating about 46,000 ideas from virtual idea management system called ‘innovation jam’. Some of the ideas generated from the idea management system facilitated innovation capabilities at IBM [23]. The results of this study provide useful insights into the role of past managers as useful knowledge based for innovation generation.

The main theoretical implications of the study is that innovation capability of a firm have been found to go beyond the internal capabilities that a focal firm owns or possesses, but rather through the access and utilisation of external actors resources and capabilities, as a result of exchange relationships [24], with those actors. For example, the role of consultants has been crucial in the innovation capability development activities. This is in contrast to our previous understanding that capability emerges from resources that a firm controls or possesses [25, 26]. This theoretical insight contributes to our understanding of innovation capability in a supply chain context, highlighting the key factors that facilitate innovation capability. The contribution of customers and former employees as consultants contribute to the achievement of the case company's objectives, such as cost reduction, customer service improvement, or improves aspects of supply chain performance.

#### **4.6 Managerial Implications**

The findings presented in this study imply that innovation capability represent an important step in helping firms to develop innovative solutions. Managers that ignore key important actors and fail to constantly engage in innovation generation activities, risk achieving undesirable outcomes, such as poor product design, low sales and decline in business growth. The findings offer useful hint on how a focal firm can blend idea generation, idea implementation, interactive learning and collaboration with its key supply chain members with the aim of generating innovative solutions.

The findings of the study indicate that idea generation, idea implementation, interactive learning and utilisation of embedded technologies go beyond the internal strength of the focal firms. Therefore, there is the need to invest in resources of the supply chain members or perform activities in order to stimulate their ability to be committed to the focal firms' innovation capability.

#### **4.7 Limitations of The Study and Direction For Future Research**

This study presents an in-depth case study of innovation capability of medical technology firm in Sweden. The study is built on one case; it will be interesting to study other innovation capability factors in different industry in order to examine the innovation capability in supply chain context. .

Finally, this paper investigated the phenomenon (innovation capability) from the account of the account of a single focal firm. Future studies can extend the investigation by collecting data from both a focal firm and its supply chain members. This will provide richer empirical and theoretical understanding.

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