

REDUCING THE IMPACT OF DEMAND FLUCTUATIONS THROUGH SUPPLY CHAIN COLLABORATION IN THE FINNISH RETAIL GROCERY SECTOR

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Abstract

Purpose: The purpose of the paper is to explore how a collaborative approach to supply chain management can be used to enhance supply chain performance when demand is fluctuating and uncertain. Enablers and barriers of collaboration will be assessed to provide insights into optimal methods of collaborating between supply chain partners.

Research Approach: The study is a qualitative two-echelon case study of a grocery retail supply chain, focussing on a retail grocery wholesaler in Finland and its tier 1 small retail customers. An a priori conceptual framework for collaboration implementation that also details its impact on supply chain performance during periods of fluctuating and uncertain demand is developed through insights from the literature. The validity of the framework is explored through interviews conducted with key respondents at both echelon levels, which were analysed to evaluate and refine this framework.

Findings and Originality: The paper demonstrates that collaboration can be a useful and successful technique to reduce costs and improve performance across the supply chain, particularly when demand is volatile and uncertain. This paper also provides insight into one alternative for implementing supply chain integration across several echelons and improving performance in the whole supply chain as a result.

Research Impact: The paper provides a list of enablers and barriers for supply chain collaboration, discusses the importance of several key factors, and offers suggestions and guidelines for further research to generalise the findings.

Practical Impact: The paper provides insight into the challenges and benefits of increased collaboration for grocery retail supply chain actors. It will be especially useful for those firms in the retail sector and other industries where demand is characterized by demand uncertainty and volatility.

Keywords: supply chain management, supply chain collaboration, supply chain integration, retail, grocery

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Introduction

During the last two decades of research into supply chain collaboration (SCC) several different ideas about the practical means and results of collaboration have been developed. Early advances in the field of supply chain collaboration were primarily concerned with information exchange, and these include e.g. continuous replenishment (CR) and vendor-managed inventory (VMI) (Skjoett-Larsen *et al.*, 2003). Later advances addressed the needs of the supply chain more holistically, widening the scope from only information exchange to e.g. joint planning, forecasting and replenishment in the forms of collaborative planning, forecasting and replenishment (CPFR) or efficient consumer response (ECR). However, fluctuating demand and demand uncertainty still causes decreased performance for supply chains using advanced collaborative processes (Ehrental *et al.*, 2014; Barratt and Oliveira, 2001) and it has been suggested that deeper collaboration is the key to decreasing the impact of demand fluctuations (Alftan *et al.*, 2015; Simatupang and Sridharan, 2005).

The grocery retail industry and associated supply chains differ from supply chains in manufacturing through e.g. the perishable nature of most goods and greater demand fluctuations caused by frequent promotional campaigns (Taylor and Fearn, 2009). Several earlier articles have researched the state of SCC and different SCC initiatives in the grocery and retail industries (e.g. Alftan *et al.*, 2015; Ehrental *et al.*, 2014; Elkady *et al.*, 2014; Kaipia *et al.*, 2013), however research on the links between information technology (IT) sharing, SCC and supply chain (SC) performance in retail remains sparse (Elkady *et al.*, 2014). In addition, demand uncertainty and seasonality are fields which are often poorly considered by especially small retail chains (Ehrental *et al.*, 2014). This paper provides a deeper insight into bridging the gap between IT, SCC, and SC performance by extending knowledge from previous research and combining it with new empirical data. This study will also seek to examine the possibilities offered by SCC especially in a context of demand uncertainty and volatility.

Literature Review

Nowadays, SCC is considered almost vital for achieving increased competitive advantage for the SC (Kumar and Banerjee, 2012). Advances in IT and the Internet have made IT easily available for anyone with money to buy it, and thus the application of IT has lost the status of competitive advantage, instead becoming a competitive necessity (Fawcett *et al.*, 2011). However, previous failures to obtain automatic benefits from IT implementation, especially in the collaborative efforts of small supply chains, have showed flaws in thinking that SCC is a way to always increase the performance of the supply chain (Elkady *et al.*, 2014). Also, many SCC initiatives are still at a theoretical level and have not progressed to widespread practical application by industry (Panahifar *et al.*, 2014; Büyüközkan and Vardaloğlu, 2012). However, the literature also suggests that collaboration is not a question of 'either or', instead supply chains collaborate on different levels with different companies, and the intensity of collaboration with different supply chain partners generally increases gradually with time, resulting in a contingent approach to collaboration among companies (Danese, 2011; Skjoett-Larsen *et al.*, 2003).

Supply chain collaboration has been described and defined in several different ways, however the general idea is that supply chains work together to achieve a competitive edge (Soosay and Hyland, 2015). The practical implementation of supply chain management can be seen as a balance between two processes, as collaboration is both about the relationship between companies as well as the

integration of the business processes of two or more companies that decide to collaborate. The type of supply chain collaboration can be assessed on two different scales: systems collaboration (Kim and Lee, 2010) and collaboration depth (Matopoulos *et al.*, 2007). Systems collaboration can be viewed as the extent to which supply chain partners align and integrate their IT systems with each other, while the depth of a collaborative relationship can be either strategic, tactical or operational (Kim and Lee, 2010). On an operational level, firms focus on information exchange, on a tactical level firms seek some form of integration with each other and on a strategic level firms seek to develop a culture and relationship of collaboration that affect all business processes and decisions (Matopoulos *et al.*, 2007). Strategic collaboration and systems collaboration have a tendency to strengthen each other: increased depth of collaboration make increased systems integration and real-time information exchange necessary, while the sharing of increasingly sensitive data and systems integration call for a more strategic partnership between firms (Kim and Lee, 2010).

A collaborative relationship begins from two factors: trust and technology (Barratt and Oliveira, 2001). Especially trust is seen as an important enabler of collaboration, and inversely a lack of trust is seen as a barrier to collaboration (Attaran and Attaran, 2007; Skjoett-Larsen *et al.*, 2003; Barratt and Oliveira, 2001). Simatupang and Sridharan (2005) suggested five critical factors for supply chain collaboration: a collaborative performance system (CPS), information sharing, decision synchronization, incentive alignment and integrated supply chain processes. The concept of power is an integral part of supply chain relationship management: the levels of thrust and dependency can either enable or inhibit the development of collaborative relationships (Matopoulos *et al.*, 2007) while a fair sharing of risks and rewards are necessary for a successful SC relationship (Simatupang and Sridharan, 2005). The alignment of the supply chain partners is critical, as synchronization of both systems and decision-making is in a key role in supply chain collaboration (Matopoulos *et al.*, 2007). Information sharing also plays a key role in the coordination of supply chain activities, and especially in reducing the bullwhip effect (Elkady *et al.*, 2014). The extent of collaboration is also important since supply chain collaboration requires resources and thus it is important to choose with how and on what level one should collaborate. Skjoett-Larsen *et al.* (2003) suggested that there are three levels of CPFR collaboration based on the scope (number of business processes in collaboration) and depth (level of integration of these processes), and e.g. Matopoulos *et al.* (2007) suggested similar levels of collaborative relationships. The basic idea behind this is that companies can tailor suitable collaborative solutions for their specific needs, and this is also one of the conclusions proposed by Danese (2011).

Supply chain collaboration consists of managing supply chain activities and managing supply chain relationships. These include the process of selecting collaborative partners and what practical implementations and processes the collaboration should involve, as well as managing the levels of trust and power among partners. The implementation of supply chain collaboration is also affected by barriers and enablers to collaboration. The companies should seek to emphasize and exploit enablers while mitigating and removing barriers to collaboration. As the literature suggests, the need for collaboration generally comes from external, macro-industrial factors in the form of increased competition. The grocery retail setting is also especially competitive due to the products being quite similar everywhere, thus making price the key competing factor between retail chains. The key drivers behind the integration of supply chain partners are therefore the need to achieve increased effectiveness for the whole supply chain as well as higher quality service to customers. Also, the supply chain-internal reason of mitigating bullwhip effect is an important driver for increased transparency and integration in the SC. The primary focus of this article is on information flows, and thus IT capabilities become a primary driver for supply chain processes.

To aid in focusing the research, research questions were generated and interviews with key personnel from the companies involved were set up to gather empirical data on the questions. The final aim of the proposed study was to map how collaborative supply chain capabilities can cope with uncertain

demand, i.e. extend previous research on collaborative supply chains to a field which is not extensively researched yet (Elkady *et al.*, 2014). One of the growing aspects of contemporary SCM research is how technological advances enable supply chain collaboration (Soosay and Hyland, 2015) and this is one part of the aim of this research as well. However, as can be seen from the proposed framework in Figure 1, there are several other factors that influence successful SCC. Thus some explanatory research was needed to explore how the framework works in practice and how the phenomenon it seeks to clarify works (Yin, 2009).

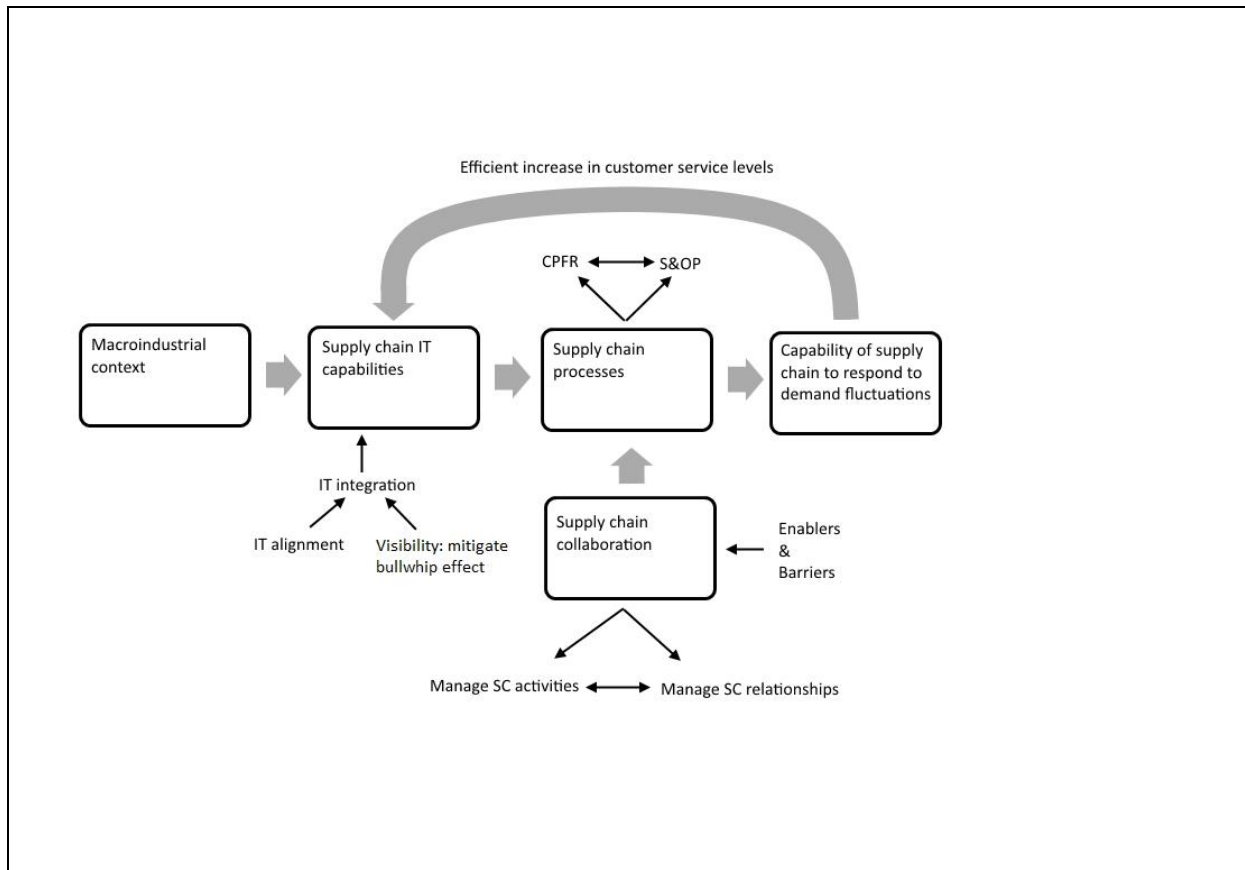


Figure 1: Proposed Empirical Study Framework

The research questions for this study were as follows:

RQ1: How are the various partners or actors collaborating in this supply chain?

RQ2: What are perceived as barriers and enablers to supply chain collaboration in the supply chain?

RQ3: What are practical implications of increased supply chain collaboration and information sharing in the supply chain?

The answers to these questions will be used to (1) validate the proposed framework and (2) adapt it if needed. A case study often answers a question about 'why' (Yin, 2009), however the previous literature already provides some answers to this: (1) to answer to fiercer competition (Matopoulos *et al.*, 2007) and (2) to reduce waste and increase shelf availability and effectiveness, ultimately providing increased service levels to customers (Alftan *et al.*, 2015; Kaipia *et al.*, 2006; Kaipia *et al.*, 2013). Thus, this study specifically focuses on the link between performance increases and collaboration with a focus on the challenges of demand volatility and uncertainty.

Methods

This study investigated two echelons, a wholesaler (focal company) and two of its retail customers. Case studies are studies that “*focus on holistic situations in real life settings, and tend to have set boundaries of interest, such as an organization, a particular industry, or a particular type of operation*” (Ellram, 1996: 99). This research project will specifically focus on a real-life setting within a specified bound of interest (i.e. specific organization, industry and operational setting). This study will also be based on the theoretical background set out in the three research questions presented in the thesis that are based on the literature review (Yin, 2009). Case studies are appropriate methods when doing explorative research (typically why or how questions) (Ellram, 1996), in this study the first research question seeks to explore the function of the supply chain collaboration within the context of wholesaler-retailer. However, the second and third research questions are more focused on descriptive research, and case studies are also appropriate for this (Yin, 2009; Ellram, 1996). This research project will be conducted from a ‘reality-oriented’ perspective, placing focus on the validity, reliability and objectivity of the data in light of previous literature and taking into account the fact that total objectivity is not possible (Patton, 2002). The research process will from the outset be deductive, i.e. progress from theory to empirical testing (Patton, 2002).

The focal company, which is called WS in this paper, is a wholesaler in the Finnish grocery industry. The retail customers of WS that are part of this research are called RS and RW in this paper. RS is a retail chain consisting of several hundred small grocery stores operating nationwide in Finland. RW is a retailer-wholesaler, whose customers consist of primarily smaller grocery and retail chains and corporate customers in the HoReCa (Hotel, Restaurant, and Catering) sector. RW also operates cash-and-carry grocery stores that serve both private and corporate customers (primarily small restaurants) directly around Finland. WS also has other customers, but these two are the most important when considering revenue and volumes, and thus only these two customers will be included in the case study. RS and RW also have a symbiotic relationship with WS through a shared ownership structure.

The empirical data was gathered through semi-structured interviews with key personnel from the three companies, see Table 1 for a more detailed data gathering schedule. The sampling was made together with the planning manager of WS, the sampling method was a purposeful sampling based on the perceived quality of information that the respondent could give (Patton, 2002). An interview guide was created to aid in the data gathering process and give structure and coverage to the interviews, however the interviews were still conversational with open-ended questions to allow increased depth (Patton, 2002; Ellram, 1996). During the analysis process some additional questions arose, these were answered through e-mail correspondence with PlanMng from WS.

Organization	Title	Abbreviation	Date	Interview duration
RS	Logistics Manager	LogMng	4.3.2016	0h 52 min
RW	Logistics Development Manager	LogDev	9.3.2016	0h 44 min
WS	Planning Manager	PlanMng	15.3.2016	0h 35 min
WS	Logistics Manager	LogMng	15.3.2016	0h 39 min
WS	Logistics Development Manager	LogDev	15.3.2016	0h 32 min
WS	Planning Manager	PlanMng	12.4.2016	E-mail

Table 1: Interviews conducted for this paper, as well as e-mail used to collect information.

Analysis and Discussion

RQ1: How are the various partners or actors collaborating in this supply chain? The companies collaborate in all phases of the physical flow of goods through the supply chain. The companies collaborate on a range of issues beginning from the procurement, quality control and import of goods.

Forecasting and replenishment is centralized to the wholesaler, and strategic business plans are made in collaboration through regular meetings on multiple executive levels. This can be seen as e.g. collaboration with regards to exception management and promotional campaigns, but also in the day-to-day distribution and logistics as these are largely handled by the wholesaler. The distribution of goods is outsourced to third party logistics (3PL) firms, WS coordinates and handles the process of sending the right cargo with the right truck to its customers but does not own the trucks itself.

The interviewees list multiple reasons for this kind of collaborative approach. The case supply chain is characterized by a drive to enable better service to the end customer and increase efficiency or reduce redundancies in the supply chain. The motive for increased collaboration is to increase the efficiency of the supply chain, and one of the interviewees commented on the collaboration in the following way: *"[...] of course we work more like a single company [...], create a win-win-win situation through success"* (LogMng, RS, interview 4.3.2016). The role of WS in the supply chain was described in e.g. the following way: *"we are this kind of strategic supply chain partner, so we have sought integration both with customers and towards suppliers [...] and build more added value through this, compared to buying and selling which is more like traditional wholesaling"* (LogMan, WS, interview 15.3.2016). As Simatupang and Sridharan (2005) suggested, supply chain collaboration needs a fair balance of power, and this supply chain has resolved the issue through the ownership structure of the wholesaler. Thus, a lot of the executive power can be transferred to the wholesaler without the retail echelon of the supply chain losing control. Costs of this arrangement are generally also distributed according to the resources allocated to each of the retailers.

Some interviewees also mentioned that important reasons for collaboration were e.g. the idea to use shared and common information and to work more like a single company across the supply chain, instead of everyone doing their own thing. The supply chain collaborates on multiple levels, and as Danese (2011) and Skjoett-Larsen *et al.* (2003) suggested collaboration can be seen as a gradual process or a contingency from "basic collaboration" to "advanced collaboration". This is also something that can be applied to the collaborative practices of WS, as it collaborates on different levels with some of its customers than with others, based on mutual needs and understandings. As suggested by e.g. Matopoulos *et al.* (2007) companies should choose with whom and with what they want to collaborate (operational-tactical-strategic level). WS has a high level of collaboration with especially RS, and this has also brought efficient synergies to both companies.

The collaboration in the supply chain is quite extensive, as a centralized forecasting and replenishment function is managed by WS and the goal is to use this data as far as possible both downstream and upstream in the supply chain. The management of relationships in the SC is handled through agreements on cost sharing and trust building, and also through KPI and data showing that the integration actually works. This leads to the topic of the second research question, as the second research question inquired about the factors that were considered to enable supply chain collaboration, and inversely about barriers to this kind of collaboration.

RQ2: What are perceived as barriers and enablers to supply chain collaboration in the supply chain?

Three key topics emerged in the interviews that cover most of the enablers mentioned: culture (trust, willingness to collaborate, top management support), communication and (technological) capabilities. These topics are also frequently found and cited in literature as key enablers to SCC (Barratt and Oliveira, 2001). The role of IT was mentioned several times, however the underlying culture of openness, trust and communication was in a key role in enabling the technological aspects of collaboration. The barriers were more diverse, and the views on the matter differed more between respondents as well. Generally, the topic of barriers was considered more difficult, as the collaboration in the supply chain seemed to be working very smoothly. The IT capabilities of the supply chain was generally considered to be adequate, but the accuracy and reliability of the forecast was mentioned as a limit to the extent of IT-enabled collaboration. However, the main barriers were seen in

collaborative culture and traditional thinking that causes companies to hold information secret from supply chain partners, and this is also in line with previous research (Skjoett-Larsen *et al.*, 2003).

Enablers were considerably more prominent when the interviewees were asked about possible enablers and barriers. In particular, the technical aspects and collaborative culture were applauded by the respondents. However, previous research suggests that IT alone is not enough to enable collaboration on a profound level, and thus it would seem like the corporate culture has enabled the technical side of the integration to work at its full potential. Forecasting accuracy was also at some points not good enough, and then flexibility and communication were considered necessary along with improved forecasting abilities to enable the collaboration to go further. Most of the respondents had also positive attitudes towards the idea of further integration, and that there were further gains to be realized from increasing the depth and width of integration. Also, the shared ownership and company structure solved many of the issues related to power that Matopoulos *et al.* (2007) pointed out, i.e. the wholesaler does not gain all the power in the supply chain even though the forecasting and replenishment is concentrated to it.

However, the respondent emphasized that the barriers were quite minor compared to the enablers, and that the practical results and KPIs strongly supported collaboration. As the transparency of KPIs became better through increased understanding of the partners business decisions, it was also easier to “sell” the new collaborative practices within the organizations as the numbers supported this development. The interviewees were also quite content with the results of the integration in the supply chain, and this could also be seen from the answers to the last research question.

RQ3: What are practical implications of increased supply chain collaboration and information sharing in this supply chain? The interviewees reported a range of benefits, including more efficient SC operations and improved customer service. Generally, the collaboration was not regarded as something that would bring additional costs or other harmful effects, as the integration of processes such as forecasting and replenishment freed time from other instances in the supply chain instead. If costs arose from some collaborative activities, the costs would usually be divided between the customers according to the volume impact of the process.

The main benefit of the collaboration at the retailers (RS and RW) was a more efficient allocation of workforce: the store employees no longer had to spend as much time ordering and managing store inventory levels, instead the centralized forecasting and replenishment function freed more time for the “core business” of selling and serving customers. The main benefit at WS was more efficient capacity utilization and more possibilities for optimization. The integrated forecasting and replenishment function at WS also provided better visibility and less redundant work throughout the supply chains, and this was also one of the stated purposes of this arrangement. This was commented on in the following way by one of the interviewees: *“well, the starting point for all these kinds of implementations was to start by freeing time at the store end to concentrate on the relevant tasks, that is customer service. Ordering was not their actual core activity, rather it is selling products and serving customers. [...] And of course through all the possibilities to forecast we have more information at our disposal here at [WS] so we have the possibility to plan our activities better”* (PlanMng, WS, interview 15.3.2016)

Conclusions

The study found that increased information sharing and IT integration together with SCC provided increased supply chain effectiveness for all involved parties. The most important enablers for collaboration were found to be trust and collaborative culture in conjunction with technology. On the other hand, the most important barrier identified was the unwillingness to share information or ultimately to collaborate, this finding highlights the importance of acceptance of collaboration among company personnel and managers, as well as the importance of extensive information sharing. These

findings support previous literature regarding enablers and barriers, especially the trust issues prominent in this case (Simatupang and Sridharan, 2005; Barratt and Oliveira, 2001). The process of implementing collaborative approaches on a range of functions and building up IT capabilities to support this seems to have been a gradual process with a limited beginning and expansion later into areas where the companies experienced a need for it, and this finding is corroborated by literature as well (Danese, 2011; Skjoett-Larsen *et al.*, 2003). However, the findings also suggest that the centralization of forecasting and replenishment to the wholesaler, together with the sharing of forecast data both upstream and downstream in the supply chain, can be a very powerful method of increasing supply chain efficiency.

Key limitations for this study are the small sample and data gathering methods, meaning that the findings will not be applicable to a more general population. Even though the findings are not well generalizable to other supply chains or industries, this study may give interesting pointers for future research. Also, this study gives insight into complex processes and the nature of the collaboration in this supply chain. The results of this article will thus be of interest to practitioners looking for ideas and cases of practical implementation of a deep and strategic supply chain collaboration. The main practical implications of this article are therefore to highlight the importance of information sharing and strategic alignment on successful collaboration. A societal impact of this study can also be identified, as one of the results of increased forecasting accuracy means less spoilage, therefore resulting in less waste and pollution. Future research could also seek to quantitatively verify the effects of centralized forecasting and replenishment to one actor in the supply chain for the customers and the whole supply chain. Furthermore, the limitation to not include any suppliers of WS may warrant additional studies from a multi-echelon viewpoint.

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