Exploring firm supply chain resilience capabilities in the food industry: a dynamic capabilities perspective

Abubakar Ali (abubakar.ali@dit.ie)
3S Group, College of Business, Dublin Institute of Technology, Ireland

Amr Mahfouz
3S Group, College of Business, Dublin Institute of Technology, Ireland

Amr Arisha
3S Group, College of Business, Dublin Institute of Technology, Ireland

Abstract
Supply chain resilience (SCRES) and dynamic capabilities share similar attributes that explain how firms survive and thrive under uncertain business environment to maintain their competitiveness. This paper explores firm SCRES capabilities and their impact on operational performance grounded in dynamic capabilities theory (DCT). An exploratory case study consisting of five semi-structured interviews was conducted to empirically examine SCRES practices in the food supply chain (FSC) in Ireland. The findings indicate that through the ability to anticipate, adapt, respond, recover and learn, firms create, extend, and modify their operational capabilities to match the environment and hence, sustain their continuity and competitiveness.

Keywords: supply chain resilience, food supply chain, dynamic capabilities

Introduction
The food industry is dynamic, characterised with constant changes in customer demands and influenced by various economic, social, environmental and technological factors (Mena and Stevens, 2010; Trienekens et al., 2012). Despite many public and private regulations and standards in the food industry, concerns about food supply chain (FSC) risks and their potential disruptive events have become central issues for policy decision-makers (Dani & Deep, 2010). There is a growing concern that the global FSC need to be more resilient in its food production and distribution to a variety of risks—be it economic, natural disaster, intentional or unintentional (Peck, 2006; Leat and Revoredo-Giha, 2013; Baum et al., 2015). Resilience is a multi-disciplinary concept, which explains how an entity (e.g. individual, organisation, community, nation) can bounce back from adversity (Boin and van Eeten, 2013). Hence, researchers and practitioners studying supply chain disruptions invoke the concept of supply chain resilience (SCRES) as a mechanism to prepare, respond, recover and grow from disturbances (Ponomarov and Holcomb, 2009; Sheffi, 2015). However, the understanding of FSC resilience is still in its infancy, lacking

an integrated framework and generalised theory to understand the complex interactions (Tendall et al., 2015; Umar et al., 2017).

This study seeks to address these gaps by presenting a SCRES framework in the food industry that covers the three phases of resilience: pre-disruption, during-disruption and post-disruption. Drawing from dynamic capabilities theory (DCT), this study empirically validates a previous framework of SCRES capabilities in the food industry context. Hence, the aim of this study is twofold: first, to explore the dimensions of firm SCRES capabilities in the food industry; and second, to exam their impact on operational performance.

Theoretical Background

The DCT serve as a suitable theoretical lens to address our research aims because it informs managers on how to integrate, build, and reconfigure competencies/capabilities to cope with the rapidly changing business environment (Teece et al., 1997). In such conditions, firms must develop dynamic capabilities to create, extend, and modify how they make their living (Helfat et al., 2007). In a dynamic environment, the firm uses its dynamic capabilities and associated managerial and organisational processes or routines to alter its initial position and path (Zollo and Winter, 2002; Helfat et al., 2007).

Extending this logic to SCRES context, this paper argues that SCRES capabilities can be considered as dynamic capabilities supported by SCRES practices and elements. Indeed, building SCRES capabilities are deemed an essential strategy that enables firms to prepare, adapt, respond and recover quickly from disturbances (Ponomarov and Holcomb, 2009; Pettit et al., 2013). Previous SCRES studies have adapted DCT to explain the different capabilities needed to build a firm resilience to sustain performance and competitiveness in disruptive events (Dabhilkar et al., 2016). Building on these studies, we explicate that dynamic capabilities action routines of sensing, adapting, coordinating, reconfiguring and learning (Eisenhardt and Martin, 2000; Teece, 2007; Wang and Ahmed, 2007) share similar attributes to those SCRES capabilities as discussed in the literature. Specifically, we adapt Ali et al. (2017) taxonomy of SCRES capabilities: the ability to anticipate, adapt, respond, recover and learn which cover the three resilience phases. That is, through the ability to anticipate, adapt, respond, recover and learn, firms can sense, adapt, coordinate, reconfigure and learn from their firm-level and supply chain-level resources to survive and thrive under disturbances, thereby sustaining their competitive advantage. Ali et al. (2017) integrative framework on SCRES capabilities provide a theoretical foundation for this study to apply and test empirically (Table 1).

The food industry is dynamic, and trends such as globalisation, increasing interdependency and complexity in the global FSC have highlighted the shortcomings of traditional approaches to risks prevention and preparation strategies. Hence, there are calls to adopt resilience thinking to understand the complex interactions in the FSC to cope with shocks, complexity and uncertainty (Stone and Rahimifard, 2018). Indeed, the study of FSC resilience includes an array of literature examining practices on how to mitigate global FSC risks relative to food quality, food safety and food security. For example, traceability and transparency (Roth et al., 2008), collaboration and leadership (Dani and Deep, 2010), building robustness (Vlajic et al., 2012), flexibility (Tendall et al., 2015), to name a few. Grounding these practices in the five SCRES capabilities and dynamic capabilities routines of sensing, adaptive, coordinating, reconfiguring, and learning capability provides an integrative view of SCRES capabilities in the food industry. Thus, contributing to current studies which lack a holistic view of the concept and a theoretical lens to exam FSC resilience (Tendall et al., 2015; Umar et al., 2017).

Table 1 – Integrated view of SCRES (Adapted from Ali et al. (2017))

Resilience Phase	SCRES Capabilities/Description	SCRES Elements
Pre-disruption	Ability to Anticipate: Proactive capabilities to identify and monitor potential events, changing environments, and performance before the supply chain is affected	Situation awareness, Robustness, Increasing visibility, Pre-disruption knowledge management
During-disruption	Ability to Adapt: Concurrent capabilities required to manage and adjust critical supply chain resources continually during disruptions and normal business activities	Increasing flexibility, Building redundancy
	Ability to Respond: Concurrent capabilities needed to react to supply chain events on time and efficiently, to lessen the impact of disruptions or change the effects to ensure a desirable outcome	Collaboration, Agility
Post-disruption	Ability to Recover: Reactive capabilities essential in the aftershock of a supply chain event, to restore or return to normal operations	Contingency planning, Market position
	Ability to Learn: Reactive capabilities required after a supply chain event to understand what has happened and improve future performance based on the experience	Post-disruption knowledge management, Building social capital

Research Methodology

An exploratory study based on multiple cases in the Irish FSC was conducted to empirically investigate the dimensions of firm SCRES capabilities and their impact on operational performance. The unit of analysis in this study is a supply chain function and their interfaces with critical suppliers and customers. Consequently, four companies were selected that serve local/global markets to understand their supply chain challenges and SCRES practices. The case companies are of relevant interest for investigating SCRES practices because of two weather-related disruptive events witnessed in the Irish FSC that occurred in a six months period (October 2017-March 2018). These events disrupted the food production and distribution systems and hence, the flow of products resulting in shortages of essential foods for the end customers. Specifically, cases that differ in the size, product variety (ambient, chilled and frozen), number of customers and number of suppliers to were sought to gain insights into multiple perspectives of FSC disruptions. Table 2 provides an overview of the four cases including the key informant experience and the time taken for each interview.

The primary sources of data in this study are five semi-structured interviews conducted in a four months period (December 2017–March 2018). The interviewee selection was based on their work experience, knowledge of supply chain risks, and expertise about internal or external processes (Table 2). An interview protocol was developed based on Ali et al. (2017) classification of SCRES constructs: practices, elements and capabilities. The interview protocol was divided into three parts: supply chain overview and challenges, evaluation of a disruption and the firm's action, and impact of firm's action on operational performance. Out of the five interviews, two were telephone interviews (B2 and C), and the rest were face-to-face interviews at the company (D) or a neutral venue (A and B1). All interviews were recorded, transcribed and send back to the interviewees for verification and validation. If needed, interviews were followed up with emails or informal discussion to clarify aspects of the interview.

The data was analysed based on the directed content analysis (Hsieh and Shannon, 2005), using the three steps guideline of coding, sorting and synthesising (Saldana, 2016). The analysis started by condensing the transcripts into relevant sentences, quotes, and paragraphs before engaging in the first and second cycle coding process (Saldana, 2016). In the first cycle, the condensed data was coded using descriptive and process coding by identifying SCRES practices as discussed in the literature (e.g. information sharing, collaborative planning). The second cycle coding involved sorting and grouping these codes into categories of SCRES elements using pattern coding to provide meaningful units of analysis (Miles et al., 2014). These categories allowed authors to identify SCRES

elements that are prevalent in the food industry (e.g. visibility, situation awareness) and link them to the five themes of SCRES capabilities (e.g. ability to anticipate, adapt, respond, recover and learn).

Table 2 - Cases Overview

Case	Description/Revenue	Customers	Number/Origin of Suppliers	Product/Interviewees
A	International FMCG. Turnover > €53 Billion	Wholesalers and retailers. Exported worldwide	High/local and global	Frozen food: Logistics Network Manager (45 mins, 12 years)
B	International manufacturer of nutritional solutions and cheese group. Turnover > €2 Billion	Wholesalers, retailers and consumers. Exported worldwide	High/local and global	Ambient food: B1 Distribution Supply Planner (38 mins, 12 years) B2 Head of Operations (40 mins, 13 years)
C	A manufacturer of dairy food ingredients. Turnover €756 Million	Wholesalers and retailers. Exported worldwide	High/local and global	Ambient and chilled food ingredients: Warehouse Manager (45 mins, 20 years)
D	Food Wholesaler/Retailer in Ireland/UK. Turnover > €4 Billion	Wholesalers and retailers. Irish Market	High/local	Chilled agri-fresh: Distribution Manager (31 mins, 20 years)

Findings

In analysing the data, we provide specific details of SCRES practices in the Irish FSC that relate to SCRES elements and their linkage to the five SCRES capabilities: the ability to anticipate, adapt, respond, recover and learn. In outlining our findings, we categorise the dimensions of firm SCRES capabilities based on the three phases of resilience: pre-disruption, during-disruption and post-disruption, which are discussed next, followed by their impact on operational performance.

Dimensions of Firm SCRES Capabilities: Pre-disruption

Our findings highlight the importance of readiness posture in building SCRES, as they increase not only sensing capabilities and proactiveness but also situation awareness, visibility and pre-disruption knowledge management. Firms are always in a state of alert seeking information and knowledge to reduce or eliminate the threat of FSC disruptions. To this end, firms engage in various practices within and across their supply chains to spot potential problems and to prepare for expected and unexpected interruptions. For example, to spot potential interruptions, firms use supply chain experts or taskforce working together to gather knowledge before a disruption happens. This pre-disruption knowledge management approaches could relate to reducing risk on a new product launch, anticipating potential risk or part of the continuous improvement programs. For example, "with our continuous improvement team, we focus not only on our own business but also on our suppliers in equal measures" (case C). Furthermore, they rely on real-time information sharing to create visibility to communicate with their partners as the following exemplary quote shows:

> We have very good data; we have very good systems that speak to each other. We have real-time information, so I use all of that, and we track behaviours. So, from a strategic perspective, we will look at trends and overall behaviours (case A).

Similarly, to prepare for expected and unexpected interruptions, the data analysis has highlighted several practices relating to situation awareness as captured in the following quote.

> There would be several different people from across all operational areas would be involved in this [potential disruption]. You will have people from procurement, planning, sales, customer services, brand marketing, and legal if required and finance. Some of the products then, depending on the level of risk identified, it is a five-stage process (case B1).

In addition to risk identification and cross-functional team, the analysis also shows that firms increase their situation awareness through practices such as leadership support, proactive risk management culture and dedicated risk management department, to mention a few. However, we also found that the level of visibility differs among the cases. For example, case A despite its size, the logistics manager share concerns about communication issues with their partners on identifying potential problems: "I have put much energy in the last four years because it has not been good. Our 3PL partners have been letting us down".

Overall, our findings show that in the pre-disruption phase enhancing knowledge management, higher situation awareness and increasing visibility improves a firm's ability to anticipate disruptions, which in turn increases a firm's SCRES readiness. In contrast, low levels of readiness stance impede a firm ability to sense threats, and therefore, reduce its ability to anticipate disruptions.

Dimensions of Firm SCRES Capabilities: During-disruption

In responding to disruptive events, firms in the Irish FSC use various practices to adapt by managing and adjusting resources. Some of these practices emerging from the data include flexible labour, flexible manufacturing, alternative supply or product. Hence, increasing flexibility in firm's operation enhances SCRES, which gives firms the ability to adapt during-disruption as shown below:

> Because quality is so important to us, so it depends on the level of the interruption and the impact it has. We look for alternative sources and can we change manufacturing around. For example [if] there is a quality issue and we must pull certain products, what happens with that for continuity, we check an alternative supplier (case B2).

Moreover, firms build redundancies in their operations to adapt to disruptions by adjusting resources. For examples, building redundancies such as buffer and safety stock, resource allocation and sharing, multiple suppliers and extra capacity, among others as illustrated by the quote below:

> 9.30 this morning, I was on a conference call with each of the sites, the transport team and this is an early stage [bad weather]. I am looking for our other site to lend us some storage so that we will be a bit more comfortable. They have about 10,000 more cases then we normally would, so that is ok and not huge for them. So, they can deploy a bit more resources to us; we can build around that (case D).

Also, during a disruptive event, firms leverage their collaborative relationships with partners to lessen the impact of disruptions. Firms involve their supply chain partners by sharing information, aligning their processes, collaborative planning and seeing partners as part of the solution as captured in below quote:

> They are [suppliers] part of the solution. So, what we would do as part of the task force, is to involve them because they are the source, they might be the source of the issue, or they might be the solution. We would work with them, and in the last few cases, our partners sorted things for us. So, they would be part of the discussion, part of the investigation and part of the solution (case B2).

The data also indicate that firms have an agile structure and processes that allow them to respond to disruptions in a timely and efficient manner. This theme came up for

example when the warehouse manager (case C) explained in discussions of how they respond to a disruptive event as illustrated below.

> There is an overall structure to respond, a high-level structure, coming from the senior management that is in place in the event of a disruption to the supply chain. And that comes into effect whether it is a supply chain issue with our suppliers or customers level. The planning group will meet to decide on the best way forward. So, there is very agile management and set of processes in place to respond to a disruption (Case C).

In summary, our finding reveals that given the discovery of a disruptive event, firms develop their adaptive capabilities by increasing flexibility and building redundancies. Similarly, firms enhance their coordinating capabilities during disruption via collaboration with partners and agility in their processes to improve their responsiveness. Consequently, the ability to adapt and respond are critical capabilities for a firm SCRES, which in turn increases their responsiveness to disruption.

Dimensions of Firm SCRES Capabilities: Post-disruption

In the aftermath of a disruptive event, our finding reveals various practices that firms use to improve their recovery capabilities and learning capabilities in the post-disruption phase. To increase their ability to recover firms activate their recovery planning and business continuity planning as shown in the quote below:

> But it also then must be able to be agile to change back and manufacture the correct product to minimise the disruption going forward. So, there is a lot of good work and planning, and most of it is in the recovery planning (case C).

However, most cases (A, B, and D) have highlighted these recovery plans are either internally driven and do not extend to their supply chain partners, informal processes or based on IT systems failure as illustrated by the quotes below.

> Well, there is a BCP for full failure. Which is around systems failure. So, we do have a BCP which is practised and documented, and there is a little computer and hard drive over there, we are very reliant. Not so much documented but part of what we do (case D). We do not necessarily have a recovery programme; it is all linked to understanding the root cause. We do periodically meet up to see how we have improved. We do focus on areas that are part of a monthly business review (case A). You know we have this task force, and we do not have documented [plan]. It is just a way of working we have now. If something happens, we automatically set it up. It is an enforced way of working, rather than going to a document (case B2).

Similarly, our analysis reveals evidence that firms participate in knowledge management to improve their ability to learn in post-disruption phase. Firms capture lessons learned through practices such as inter-organisational learning, becoming a learning organisation and looking beyond risks to see opportunities, as shown below:

> We are more a recipient of our customers. They have given us ways and suggestions using their QA staff. They are testing with us, developing new tests, developing new products and we are working with them in collaboration, and a lot of it is partnership now. It is not that we are in awe of our customers, we are working with them to develop new products, and to develop higher spec products (case C). So how do we capture them [lessons learned]? We capture them through our management systems, whether that is on a network level or whether that is a lesson for the site, or whatever it is. Those lessons, whether they are problems to be solved or whether they are opportunities to be found, they find their way into our CI system, and we use A3s to track them (case D).

Equally, the data support evidence that firms build social capital among their supply chain partners to strengthen their ability to learn from each other. In doing so, firms build trust, improve their inter-organisational relationships, leveraging co-creation process and relational competence as depicted in below quotes:

> The better margin we have can only be achieved by us with our suppliers, building up their skill set, sharing with them information, letting them understand the demands of our customers, and giving them the tools,

> such as what we are doing now with lean farming. Developing lean processes for farmers, which is unheard of particularly in this country (Case C). What you would say to them [suppliers], you are better to tell us because then we can mitigate the risk and work with you. In terms of stock, we can push that out for a couple of weeks, or we can give you the ingredients. So, we do share with them because they are just the other side of the hand like they are experiencing the same issues as us. Plus, many times when this is happening it costs them money, so it is very much in their interest as well (Case B2).

Overall, we found strong indications of SCRES practices in the post-disruption phase that relate to the ability to recover and learn. While this exploratory study is still in its early stage, the data analysed so far indicate that recovery practices do not incorporate supply chain partners in three out of the four cases. However, in all cases, informants report some learning initiatives in the post-disruption phase. Hence, the ability to recover and learn can contribute to a firm's SCRES, which in turn increases their recovery and learning in post-disruption.

Impact of Firm SCRES on Operational Performance

The second research aim examined the impact of a firm SCRES on operational performance. To this end, participants were asked what operational performance are assessed after disruption and why these metrics are critical after disruptions? The findings show that firms assess several operational performances such as on-time delivery, fill rate, order fulfilment accuracy and product quality, to name a few as shown in below quotes.

> So, then it would be the customer relationship would be the first one, but that one would be harder to quantify, whereas it is easier to quantify what sales you lost, and then the fill rate. And then the impact on your customer relationship (Case B2). After the fill rate, another performance metric would be forecasting accuracy (Case B1). The cost would be secondary, on-time delivery and accurate delivery […] customer comes first (Case D). We have on-time delivery is essential and order fulfilment accuracy, so was the order coming full, is it the right product, at the right place, and the right time, we cover all of that (Case A). They [product quality] are critical always, but after disruptions, they are measured against the benchmark or what they should be. And if they are out of spec, they would have to be changed, if the standard and the quality of our ingredients have dropped or changed (Case C).

Based on our findings, these operational performances can be grouped into four categories: cost, customer service, delivery and quality. Firms are concerned with maintaining their service levels through key performance indicators (KPIs) with their key customers. These findings suggest that firm SCRES has significant implications for operational performance not only to maintain business continuity but also competitiveness in the market.

Discussion

In the pre-disruption phase, the ability to anticipate disruptions is designated as a proactive capability that supply chains can possess to identify and monitor events, changes and performance before it affects the functioning of the supply chain (Ali et al., 2017). The findings showed that SCRES practices related to pre-disruption knowledge management, visibility and situation awareness are critical in supporting firms sensing capabilities. This result is consistent with other SCRES studies that highlight the significance of readiness strategies in building SCRES (Chowdhury and Quaddus, 2016). Likewise, these practices are similar to dynamic capabilities routines of scanning, learning, sensing and interpreting activities (Teece, 2007). Therefore, in line with our findings, we propose the following proposition:

P1: *The higher the firm's ability to anticipate disruptions, the greater its dynamic sensing capability will be, which in turn increases the firm's SCRES readiness.*

During a disruption, the ability to adapt by managing and adjusting critical supply chain resources enables a firm to absorb and cope with disturbances (Ali et al., 2017). Firms engage in various flexibility and redundancy practices to improve their adaptive capabilities. The results indicate further support the idea of flexible supply, flexible manufacturing, safety stock, multiple suppliers to name a few, in enhancing firm responsiveness to disruption. Moreover, firms that have high levels of adaptive capability display dynamic capabilities in a volatile environment through mobilisation of resources, resource allocation and timely responsiveness (O'Reilly and Tushman, 2008; Teece, 2014). Thus, the following proposition is formulated:

P2: *The higher the firm's ability to adapt during disruptions, the greater its dynamic adaptive capability will be, which in turn increases the firm's SCRES responsiveness.*

In addition to adaptive capabilities, the ability to respond in a timely and efficient manner during disruptions lessen the impact of a disruptive event (Ali et al., 2017). The findings highlighted various collaboration and agility practices that firms use to coordinate their response during a disruption. In line with Scholten and Schilder (2015) findings, these results are consistent with how collaborative activities such as communicating with partners and collaborative relationships increase SCRES. Also, those of Christopher and Peck (2004) on agility practices required to respond to changes quickly. Indeed, the dynamic capability is rooted in diverse ways of coordinating, and firms that can demonstrate timely responsiveness to coordinate competencies effectively are competitive in the global market (Teece et al., 1997). Hence, the following proposition is put forth:

P3: *The higher the firm's ability to respond to disruptions, the greater its dynamic coordinating capability will be, which in turn increases the firm's SCRES responsiveness.*

In the post-disruption phase, the ability to recover in the aftershock of a supply chain event is vital to restore and return to normal operations (Ali et al., 2017). Several SCRES practices relating to contingency planning were found to help firm reconfigure their resources after a disruption. Similarly, firms that have dynamic capabilities can maintain competitiveness through reconfiguring assets and resources (Teece, 2007). Surprisingly, these recovery plans in most cases were either informal, based on IT failure or did not incorporate supply chain partners. This finding, while preliminary, suggests a further understanding of how firms develop effective contingency plans with their partners needs clarity. The following proposition is developed:

P4: *The higher the firm's ability to recover after disruptions, the greater its dynamic reconfiguring capability will be, which in turn increases the firm's SCRES recovery.*

In addition to reconfiguring capabilities, the ability to learn from disruptions is critical to understand what has happened and to improve future performance based on the experience with supply chain partners (Ali et al., 2017). All cases of this study implement practices related to learning capabilities to capture lessons learned. Indeed, learning is at the heart of dynamic capabilities and plays a significant role in their creation and development (Eisenhardt and Martin, 2000). Thus, in line with those of previous studies which advocate post-disruption feedback and education and training as enablers of SCRES (Blackhurst et al., 2011). Furthermore, firms also build social capital with their key partners to build trust and leverage co-creation processes, which is consistent with previous studies (Seville et al., 2015). Therefore, the following proposition is developed:

P5: *The higher the firm's ability to learn after disruptions, the greater its dynamic learning capability will be, which in turn increases the firm's SCRES recovery.*

The second research aim sought to understand the impact of firm SCRES on operational performance. Previous studies corroborate with our findings that firm SCRES capabilities improve operational performance such as on-time delivery, order fill rate, quality, speed and cost (Dabhilkar et al., 2016). Thus, high levels of a firm SCRES facilitates quicker response to the market conditions through improved operational performance, which can be a source of competitive advantage (Sheffi, 2015). The following proposition is posited:

P6: *The higher the firm's SCRES levels, the greater its operational performance will be, which can be a source of competitive advantage.*

Figure 1 illustrates a conceptual framework derived from the above discussions.

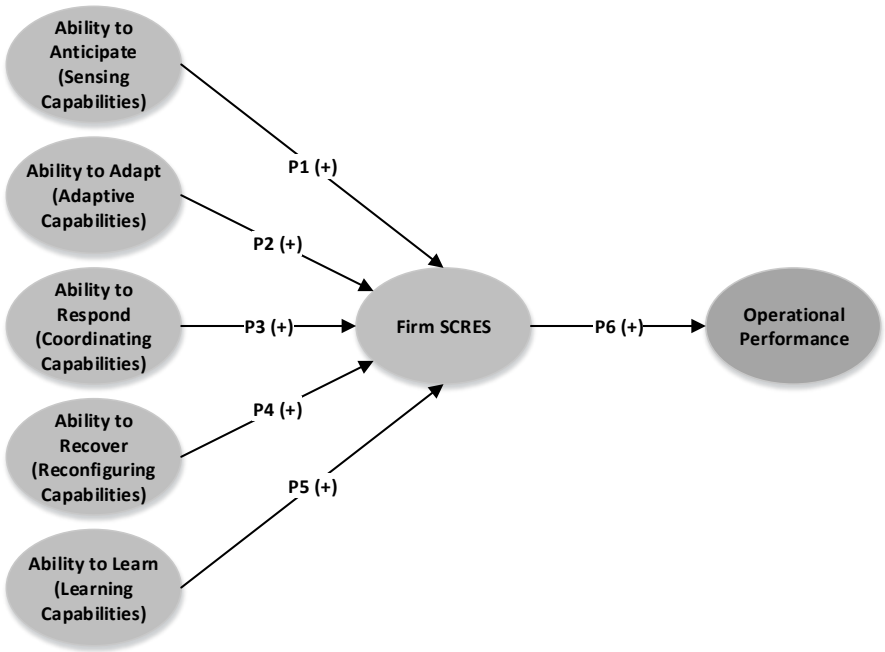

Figure 1 – firm SCRES capabilities framework

Conclusion and Implications

The impact of FSC disruptions can result in costly product recalls, market withdrawals and more importantly, health and safety scare for the public (Dani and Deep, 2010). This study provides valuable empirical insights on firm SCRES capabilities through their practices and elements that cover the three resilience phases: before, during and after a disruption. Drawing on DCT, the study shows how these capabilities enable firms to build sensing, adaptive, coordinating, reconfiguring and learning capabilities to alter their initial path and position in adversity. This study has highlighted some research and managerial implications. The research propositions provide an avenue for further research to better understand the mechanisms and conditions driving SCRES capabilities. Furthermore, there is lack of measures on assessing SCRES; this study lays the foundation to follow it up with a larger sample in a quantitative study to build an assessment instrument of firm SCRES in the food industry. The managerial implications are that by understanding a firm SCRES from the three phases of pre-disruption, during-disruption and post-disruption, managers can identify their firm SCRES level, can assess their weaknesses and strengths, and the usefulness of SCRES practices that support these capabilities.

References

Ali, A., Mahfouz, A. and Arisha, A. (2017), "Analysing supply chain resilience: integrating the constructs in a

concept mapping framework via a systematic literature review", *Supply Chain Management: An International Journal*, Vol. 22 No. 1, pp. 16–39.
Baum, S.D., Denkenberger, D.C., Pearce, J.M., Robock, A. and Winkler, R. (2015), "Resilience to global food supply catastrophes", *Environment Systems and Decisions*, Springer US, Vol. 35 No. 2, pp. 301–313.
Blackhurst, J., Dunn, S.K. and Craighead, W.C. (2011), "An Empirically Derived Framework of Global Supply Resiliency", *Journal of Business Logistics*, Vol. 32 No. 4, pp. 374–391.
Boin, A. and van Eeten, J.G.M. (2013), "The Resilient Organization: A Critical Appraisal", *Public Management Review*, Vol. 15 No. 3, pp. 429–445.
Chowdhury, H.M. and Quaddus, M. (2016), "Supply chain readiness, response and recovery for resilience", *Supply Chain Management: An International Journal*, Vol. 21 No. 6, pp. 709–731.
Christopher, M. and Peck, H. (2004), "Building the Resilient Supply Chain", *The International Journal of Logistics Management*, Vol. 15 No. 2, pp. 1–14.
Dabhilkar, M., Birkie, S.E. and Kaulio, M. (2016), "Supply-side resilience as practice bundles: a critical incident study", *International Journal of Operations & Production Management*, Vol. 36 No. 8, pp. 948–970.
Dani, S. and Deep, A. (2010), "Fragile food supply chains: reacting to risks", *International Journal of Logistics Research and Applications*, Vol. 13 No. 5, pp. 395–410.
Eisenhardt, K.M. and Martin, J.A. (2000), "Dynamic Capabilities: What Are They?", *Strategic Management Journal Strat. Mgmt. J*, Vol. 21, pp. 1105–1121.
Helfat, E.C., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D. and Winter, G.S. (2007), *Dynamic Capabilities: Understanding Strategic Change in Organizations*, Blackwell, Oxford.
Hsieh, H.-F. and Shannon, E.S. (2005), "Three Approaches to Qualitative Content Analysis", *Qualitative Health Research*, Vol. 15 No. 9, pp. 1277–1288.
Leat, P. and Revoredo-Giha, C. (2013), "Risk and resilience in agri-food supply chains: the case of the ASDA PorkLink supply chain in Scotland", *Supply Chain Management: An International Journal*, Vol. 18 No. 2, pp. 219–231.
Mena, C. and Stevens, G. (2010), "Delivering Performance in Food Supply Chain: An Introduction", in Mena, Carlos and Stevens, G. (Ed.), *Delivering Performance in Food Supply Chain*, Woodhead Publishing Ltd, Cambridge, pp. 1–557.
Miles, B.M., Huberman, A.M. and Saldana, J. (2014), *Qualitative Data Analysis: A Methods Sourcebook*, 3rd ed., SAGE Publications, Inc., Thousand Oaks, California.
O'Reilly, C.A. and Tushman, M.L. (2008), "Ambidexterity as a dynamic capability: Resolving the innovator's dilemma", *Research in Organizational Behavior*, Vol. 28, pp. 185–206.
Peck, H. (2006), *Resilience in the Food Chain: A Study of Business Continuity Management in the Food and Drink Industry. Final Report to the Department for Environment, Food and Rural Affairs*.
Pettit, T.J., Croxton, K.L. and Fiksel, J. (2013), "Ensuring Supply Chain Resilience: Development and Implementation of an Assessment Tool", *Journal of Business Logistics*, Vol. 34 No. 1, pp. 46–76.
Ponomarov, Y.S. and Holcomb, C.M. (2009), "Understanding the concept of supply chain resilience", *The International Journal of Logistics Management*, Vol. 20 No. 1, pp. 124–143.
Roth, V.A., Tsay, A.A., Pullman, E.M. and Gray, V.J. (2008), "Unraveling the food supply chain: strategic insights from China and the 2007 recalls", *Journal of Supply Chain Management*, Vol. 44 No. 1, pp. 22–39.
Saldana, J. (2016), *The Coding Manual for Qualitative Researchers*, 3rd ed., Sage Publications Ltd, London.
Scholten, K. and Schilder, S. (2015), "The role of collaboration in supply chain resilience", *Supply Chain Management : An International Journal*, Vol. 20 No. 4, pp. 471–484.
Seville, E., Opstal, V.D. and Vargo, J. (2015), "A Primer in Resiliency: Seven Principles for Managing the Unexpected", *Global Business and Organizational Excellence*, Vol. 34 No. 3, pp. 6–18.
Sheffi, Y. (2015), *The Power of Resilience: How The Best Companies Manage The Unexpected*, MIT Press, Cambridge, Massachusetts.
Stone, J. and Rahimifard, S. (2018), "Resilience in agri-food supply chains: a critical analysis of the literature and synthesis of a novel framework", *Supply Chain Management: An International Journal*, available at:https://doi.org/10.1108/SCM-06-2017-0201.
Teece, D.J., Pisano, G. and Shuen, A. (1997), "Dynamic Capabilities and Strategic Management", *Strategic Management Journal*, Vol. 18 No. 7, pp. 509–533.
Teece, J.D. (2007), "Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance", *Strategic Management Journal*, Vol. 28, pp. 1319–1350.
Tendall, D.M., Joerin, J., Kopainsky, B., Edwards, P., Shreck, A., Le, Q.B., Kruetli, P., et al. (2015), "Food system resilience: Defining the concept", *Global Food Security*, Vol. 6, pp. 17–23.
Trienekens, J.H., Wognum, P.M., Beulens, A.J.M. and van der Vorst, J.G.A.J. (2012), "Transparency in complex dynamic food supply chains", *Advanced Engineering Informatics*, Vol. 26 No. 1, pp. 55–65.
Umar, M., Wilson, M. and Heyl, J. (2017), "Food Network Resilience Against Natural Disasters : A Conceptual Framework", *SAGE Open*, No. 1–11, https://doi.org/10.1177/2158244017717570.
Vlajic, V.J., van der Vorst, G.A.J.J. and Haijema, R. (2012), "A framework for designing robust food supply chains", *International Journal of Production Economics*, Vol. 137 No. 1, pp. 176–189.
Wang, L.C. and Ahmed, K.P. (2007), "Dynamic capabilities: A review and research agenda", *International Journal of Management Reviews*, Vol. 9 No. 1, pp. 31–51.
Zollo, M. and Winter, S.G. (2002), "Deliberate Learning and the Evolution of Dynamic Capabilities", *Organization Science*, Vol. 13 No. 3, pp. 339–351.