Rethinking the Dynamic Capabilities View

Non-Sequential Sensing, Seizing and Transforming in the Scottish Beef Supply Chain

The Scottish Beef Supply Chain (SBSC) faces persistent structural, economic, and demographic pressures threatening its long-term viability. While existing supply chain resilience (SCR) research often applies the Dynamic Capabilities View (DCV) as a sequential firm-level process (sensing-seizing-transforming), this paper reconceptualizes resilience as a collective dynamic capability enacted across a decentralized, multi-actor network. Drawing on a qualitative multiple-case study involving 25 semi-structured interviews, the findings identify twelve critical resilience capability factors. The capability factors identified are traceability, Inherent resilience, supplier relationships, supplier selection, supply base diversity, transparency, risk mitigation, market position, contingency planning, logistical capabilities, government support and redundancy. This study makes a dual theoretical contribution: (1) it extends DCV from a firm-centric to a supply-chain-level lens, and (2) it challenges the linear application of DCV by proposing a non-sequential, fragmented execution model for decentralized networks.

1. Introduction

The Scottish Beef Supply Chain (SBSC) plays a central role in Scotland's rural economy, contributing over £1 billion and supporting a globally recognized brand (QMS, 2025). Despite this importance, the SBSC faces persistent structural pressures including a 14.7% decline in national cattle production over the last decade, coupled with chronic labour shortages, succession constraints, and critically low profitability (QMS, 2024; Leat and Giha, 2016). These enduring systemic challenges threaten the long-term viability of the sector and represent a significant policy and economic concern. The SBSC operates within a wider agri-food system exposed to both acute disruptions such as disease outbreaks, market shocks, and extreme weather events and ongoing structural challenges (QMS, 2024; EPIC, 2014; Hayes et al., 2023). Existing supply chain resilience research has largely conceptualized resilience as the ability to prepare for, respond to, and recover from discrete disruptions, with a strong emphasis on maintaining operational continuity and managing disruption risk (Christopher and Peck, 2004; Ponomarov and Holcomb, 2009; Hohenstein et al., 2015; Ali and Golgeci, 2019). However, this event-centric focus does not adequately account for the persistent economic, demographic, and structural conditions that shape resilience over time in sectors such as Scottish beef. The theoretical foundation of this research is the Dynamic Capabilities View (DCV), which emphasizes an organization's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece et al., 1997; Teece, 2007). While DCV has been applied to supply chain resilience, it has predominantly been used at the firm level and often in relation to discrete events such as Brexit or natural disasters (Hendry et al., 2019; Sá et al., 2020; Payne-Gifford et al., 2022; Zhao et al., 2024). There remains limited insight into how dynamic capabilities operate at the level of a decentralized, multi-actor agri-food supply chain, and how they are shaped by chronic systemic challenges. This paper addresses that gap by treating the SBSC as the unit of analysis and exploring supply chain resilience explicitly as a dynamic capability. It examines how resilience capability factors are developed and enacted across livestock farmers, auction marts, processors, and retailers. In doing so, it seeks to amend the DCV by demonstrating that resilience at supply-chain level is better understood as a collective, non-sequential dynamic capability rather than a linear sequence of firm-level processes. The remainder of the article is structured as follows. Section 2 reviews the Dynamic Capabilities View and its application to supply chain resilience. Section 3 outlines the research methodology. Section 4 presents empirical findings on resilience capability factors in the SBSC examined under the theoretical lens of DCV. Section 5 develops the theoretical contribution, showing how these findings extend and amend the DCV at supply-chain level. Section 6 concludes with implications for theory and practice.

2. Theoretical Frameworks used in Supply Chain Resilience

Various theoretical frameworks have been used in supply chain resilience studies. The most notable theoretical frameworks are elaborated below. The framework is described first, and then a brief description of the studies that have used those frameworks is also mentioned. The purpose is to provide an in-depth understanding of how different dimensions of supply chain resilience are explored while using the respective frameworks. To begin with, the most widely used theory in Supply chain resilience is resource-based.

i) Resource Based View

The resource-based view (RBV), later termed the resource-based theory (RBT), emphasises the role of a firm's internal resources in achieving and sustaining a competitive advantage. Initially proposed by Penrose (1958), the theory identifies resources as unique and valuable assets within a firm that can differentiate it from competitors. Barney (1991) further refined the

RBV, categorising firm resources into three groups: physical capital, human capital, and organisational capital. These resources must meet four criteria to confer a sustained competitive advantage they must be valuable, rare, inimitable, and non-substitutable. By leveraging these unique resources effectively, firms can outperform competitors and adapt to dynamic environments. This framework suggests that strategic success is primarily rooted in how well a firm develops and exploits its internal resources rather than relying solely on external market positioning. Thus, RBV/RBT provides a robust lens to analyse and enhance firm-level capabilities and resilience.

Ali and Govindan (2023) applied the resource-based view (RBV) to analyse how firms in the Australian agri-food supply chains leverage Industry 4.0 technologies (I4Ts) as unique and valuable resources to mitigate supply chain risks (SCRs) and improve firm performance. RBV emphasises that competitive advantage stems from a firm's ability to acquire, develop, and exploit resources that are valuable, rare, inimitable, and non-substitutable (Barney, 1991). The study conceptualises I4Ts, such as IoT, blockchain, and big data analytics, as critical technological resources that enable the development of capabilities like real-time information exchange, visibility, and traceability. These capabilities help address operational risks, including supply-demand mismatches, transportation disruptions, and financial risks. Empirical findings demonstrate that firms adopting I4Ts perform significantly better under risk-laden environments than non-adopters, reinforcing RBV's central premise that strategic resource exploitation enhances resilience and firm performance.

Dubey et al., 2016 applied the resource-based view (RBV) to explore how the strategic bundling of critical resources, such as supply chain connectivity and information sharing, creates the capability of supply chain visibility, which is essential for enhancing supply chain resilience. The study integrated RBV with the relational view (Dyer and Singh 1998), emphasising the importance of relational constructs like trust and cooperation among supply chain partners. Trust and cooperation are identified as critical relational capabilities that strengthen the ability of supply chains to withstand disruptions. The study demonstrates that combining RBV (Barney 1991) and the relational view (Dyer and Singh,1998) provides a more comprehensive understanding of how resource bundling and inter-organisational relationships jointly contribute to building resilient supply chains.

Yang and Hsu (2018) used the resource-based view (RBV) to examine how maritime firms leverage relationship orientation as a strategic resource to enhance resilience capability and cargo operational performance through security management practices. The study demonstrated relationship orientation as a strategic resource, security management practices as lower-order capabilities, and resilience capability as an operational capability. The study established a resource-capability-performance framework, demonstrating that relationship orientation enables maritime firms to acquire and integrate critical inter-organisational resources, which facilitate the implementation of security management practices. These practices, in turn, strengthen resilience capability, allowing firms to adapt to disruptions with agility, flexibility, and speed.

ii) Dynamic Capabilities View

Dynamic capabilities theory extended the resource-based view (RBV) by focusing on how firms integrate, build and reconfigure their internal and external resources to address rapidly changing environments. The theory developed by Teece et al., (1997) emphasised that competitive advantage in dynamic markets arises not just from owning valuable, rare, inimitable, and non-substitutable resources (as RBV suggests) but from an organisation’s ability to transform these resources into capabilities that respond to environmental changes.

Teece (2007) developed the micro-foundations of dynamic capabilities, providing a more granular analysis of the processes and structures underlying these capabilities. The authors introduced three key elements: sensing opportunities and threats, seizing opportunities, and reconfiguring resources.

Golgeci and Ponomarov (2013) utilised dynamic capabilities theory (DCT) to investigate the role of firm innovativeness in achieving supply chain resilience (SCR) in the face of disruptions. This study conceptualised firm innovativeness as a dynamic capability, reflecting the ability to respond to supply chain disruptions through innovation.

Brusset and Teller (2017) used DCT in their research and found that integration and flexibility capabilities positively impact resilience, whereas external capabilities have proven insignificant in achieving resilience.

Yu et al., (2019) applied the dynamic capabilities theory (DCT) to examine the relationships among supply chain dynamism, supply chain disruption orientation (SCDO), supply chain resilience (SCR), and financial performance. This study conceptualises SCR as a dynamic capability that allows firms to be prepared, respond to, and recover from supply chain disruptions while maintaining operational continuity.

Hendry et al., 2019 employed the dynamic capabilities theory (DCT) to explore how local agri-food supply chains (AFSCs) in the UK are building resilience to constitutional change, specifically Brexit. The research employs the dynamic capabilities framework to investigate how AFSC actors prepare for and respond to Brexit-induced challenges and opportunities.

The study applied the three core processes of Dynamic Capabilities view of sensing, seizing, and transforming. In the sensing stage, AFSC actors identified potential threats, such as uncertainty about agricultural subsidies, labour shortages, and disrupted international trade agreements, while also recognising opportunities, such as increased demand for local food and improved domestic supply chain models. This stage involved gathering information and sharing it across supply chain tiers to anticipate the impacts of Brexit.The research concludes that disruptions like Brexit require an emphasis on horizontal and vertical collaboration between supply chain actors in the sensing, seizing and transforming process

iii) Contingency Theory

Brandon-Jones et al., (2014) integrated contingency theory with the RBV by addressing critiques of the RBV's static nature. Contingency theory suggests that the effectiveness of resources and capabilities is context-dependent, and organisations must adapt to environmental conditions to sustain competitive advantage (Donaldson, 2001). The authors focused on two key resources supply chain connectivity and information sharing and conceptualised supply chain visibility as a capability emerging from the bundling of these resources. Visibility, in turn, is seen as a critical antecedent to two performance outcomes: resilience, defined as the ability of a supply chain to recover quickly from disruptions, and robustness, which refers to the ability to maintain operations despite disruptions. The study also incorporates supply base complexity as a moderating factor, examining its impact on the relationship between visibility and the performance outcomes of resilience and robustness.

Ali et al., (2018) used both Contingency Theory (CT) and Resource-Based Theory (RBT) as their foundational theoretical frameworks. These theories guided the study in understanding cold chain logistics risks (CCLRs) dynamics, resilience, and firm performance in perishable product supply chains. Contingency Theory was employed to identify and classify the cold chain logistics risks within the context of internal and external environmental conditions.

Resource-based theory was used to identify and evaluate the tangible and intangible resources that firms leveraged to build supply chain resilience.

iv) Complex Adaptive System

Choi et al., (2001) argued that supply networks are not static systems but Complex adaptive systems that evolve, self-organise, and adapt dynamically without centralised control. The authors identified three main aspects of CAS: internal mechanisms, environment, and co-evolution. These aspects collectively define how supply networks behave and adapt.

Day (2014) analysed disaster relief efforts as Complex adaptive supply networks and concluded that achieving supply network resilience cannot depend solely on deterministic or reductionist approaches. Instead, a complexity-based perspective on disaster relief supply networks offers a theoretical framework to better understand the variability in their performance. This perspective also provides valuable insights into management strategies that can enhance collective resilience.

Yaroson et al., (2021) employed Complex Adaptive Systems (CAS) theory to explore pharmaceutical supply chain (PSC) resilience, emphasising its systemic and dynamic nature. CAS theory is utilised to explain how PSC actors interact with internal and external mechanisms and co-evolve to build resilience.

Ali & Golgeci (2019) mentioned in their systematic literature review that the Dynamic Capabilities view is widely used in supply chain resilience research. The review of theoretical frameworks demonstrates that supply chain resilience has been examined through multiple lenses, each contributing valuable but partial insights. Table 2.1 synthesises these perspectives to clarify their analytical strengths and limitations and to justify the selection of the Dynamic Capabilities View (DCV) as the primary theoretical framework for this study.

Theoretical Framework	Use in Supply Chain Resilience (SCR) Literature	Limitations and Gaps	Justification for Selecting DCV
Resource-Based View (RBV) (Ali & Govindan, 2023; Dubey et al., 2016; Yang and Hsu (2018)	Explains how (VRIN) valuable, rare inimitable and non-substitutable resources contribute to sustainable competitive advantage	Static, firm-centric, does not explain how resilience capabilities evolve or are reconfigured over time.	DCV extends RBV by explaining how resources are continuously integrated, built, and reconfigured in dynamic environments
Contingency Theory (CT) (Brandon-Jones et al., 2014; Ali et al., (2018)	Explains how resilience outcomes depend on environmental conditions and contextual fit.	CT explains the necessity of contextual fit but lacks a clear process-based explanation of how resilience capabilities are proactively developed or renewed. It identifies the need for adaptation but not the mechanism of execution.	DCV was selected because it provides a specific managerial mechanism through the micro-foundations of sensing, seizing, and transforming.
Complex Adaptive System (CAS) Choi et al., 2001; Day(2014); Yaroson et al., (2021)	Emphasises dynamic interactions among agents and between agents and their environment; system evolves through learning and emergence	It offers limited guidance on the specific organizational routines or managerial actions required to build collective resilience.	DCV provides a more actionable, routine-oriented framework. By focusing on Processes, Positions, and Paths, it enables the identification of specific resilience routines enacted by supply chain actors.
Dynamic Capabilities View (DCV) Golgeci and Ponomarov (2013); Brusset and Teller (2017); Yu et al., (2019); Hendry et al., 2019	Emphasizes sensing threats, seizing opportunities, and transforming resources.	Existing DCV research is predominantly firm-centric and focuses on linear, sequential processes. There is limited insight into how these processes are enacted in specific sectoral contexts or decentralized networks.	DCV is the most appropriate lens to explore SCR as an integrated capability. This study addresses theoretical gaps by extending DCV to the sectoral and whole-supply-chain level, capturing distributed and concurrent resilience routines.

Table 2.1 Theories Used in Supply Chain Resilience Literature

The Resource-Based View (RBV) has been extensively applied in supply chain resilience research (Ali & Govindan, 2023; Dubey et al., 2016; Yang and Hsu, 2018) to explain how valuable, rare, inimitable, and non-substitutable resources underpin competitive advantage and resilience outcomes. However, RBV remains fundamentally static and firm centric. While it explains what resources contribute to resilience, it offers limited insight into how these resources are renewed, reconfigured, or deployed over time in dynamic environments. This

limitation is particularly problematic in volatile environments such as agri-food supply chains, where resilience is not a fixed attribute but an evolving capability.

Contingency Theory (CT) addresses some of RBV's limitations by emphasising the importance of contextual fit between organisational strategies, resources, and environmental conditions. Research (Brandon-Jones et al., 2014; Ali et al., 2018) adopting CT demonstrates that resilience outcomes vary depending on factors such as supply base complexity and environmental uncertainty. Nevertheless, CT primarily identifies when adaptation is required rather than how it is enacted. As summarised in table 2.1 CT lacks a clear process-based explanation of how resilience capabilities are developed, coordinated, and renewed across time and across supply chain actors. This constrains its usefulness for examining resilience as an active, capability-building process.

Complex Adaptive Systems (CAS) theory conceptualises supply chains through internal mechanisms, external mechanisms, and co-evolution (Yaroson et al., 2021) offering a useful lens to explain complexity and emergent adaptive behaviour at the system level. However, the aim of this study is not to conceptualise resilience as an emergent outcome, but to examine supply chain resilience as a dynamic capability by identifying the specific capability factors and routines enacted by supply chain actors. Therefore, it offers limited analytical clarity on how resilience capabilities are developed, enacted, and reconfigured by supply chain players.

In contrast, the Dynamic Capabilities View explicitly focuses on the processes through which organisations integrate, build, and reconfigure resources in response to changing environments (Teece et al., 1997). Through its micro-foundations of sensing, seizing, and transforming (Teece, 2007), DCV offers a process-oriented and action-based framework capable of explaining how resilience capabilities emerge, evolve, and are sustained over time. Prior studies applying DCV in supply chain contexts conceptualise resilience as a dynamic capability (Golgeci & Ponomarov, 2013; Yu et al., 2019; Hendry et al., 2019).

Accordingly, this study adopts the Dynamic Capabilities View not only because it addresses the limitations of RBV, CT, and CAS, but also to extend DCV itself. By applying DCV at the level of the SBSC, this research advances the framework beyond organisational boundaries and demonstrates how sensing, seizing, and transforming processes are enacted by multiple supply chain actors. In doing so, the study responds directly to calls in the literature to move supply chain resilience research beyond firm-level analysis and towards a more holistic and sectoral based understanding.

3. Methodology

The study adopts a subjectivist ontology, viewing the Scottish Beef Supply Chain (SBSC) as socially constructed by its key actors (Saunders et al., 2009). An interpretivist, constructionist epistemology is used to understand how stakeholders make sense of resilience capabilities and challenges, supporting the use of qualitative semi-structured interviews (Bell et al., 2022).

A holistic multiple-case study design treats the SBSC as the primary unit of analysis to examine how resilience capabilities are configured and contested across the chain (Yin, 1994, 2003; Eisenhardt and Graebner, 2007; Scholten, 2020; Hendry et al., 2019). Twenty-five participants from core supply chain and institutional roles were recruited, and the study is theoretically informed by the Dynamic Capabilities View, using a mono-method qualitative design based on semi-structured interviews and a structured protocol (Ali and Golgeci, 2009; Saunders et al., 2009; Bell et al., 2022; Yin, 2003). Purposive sampling ensured coverage of key stakeholder groups and regions. Online interviews were complemented by secondary sources (e.g. government and industry reports).Rigor was addressed through validity, reliability, and trustworthiness criteria (Yin, 2003; LeCompte and Goetz, 1982; Guba and Lincoln, 1994), supported by a piloted protocol, an audit trail, and data triangulation with policy instruments, traceability databases, Quality Meat Scotland reports, retailer standards, and sector publications (Gibbert et al., 2008; Bell et al., 2022; Carter et al., 2014; Zhao, 2024). The participants comprised of Academic Experts (02), Industry Advisor (01), Official Cattle Society Representative (01), Livestock Farmers (07), Industry Representative Processors (01), Processors (02), Industry Representative Auction Marts (01), Auction Mart (01), Retailer (01),Retail Industry Expert (01), Policy Managers Livestock & Animal /Market (03), Executive Traceability Organisation (01), Head of Industry Development (01), Public Affairs and Industry Strategy Manager (01), and Member of Scottish Parliament, Rural Affairs Committee Member (01). Microsoft Teams interviews (2 July–1 November 2024) were recorded, auto-transcribed with consent, and analysed using reflexive thematic analysis in NVivo 12 (Braun and Clarke, 2006 ; 2022), drawing on Gioia et al. (2013) and Ryan and Bernard (2003) and following six iterative phases, consistent with recent agri-food resilience studies (Sá et al., 2020; Payne-Gifford et al., 2022; Zhao et al., 2024).
The study followed principles of avoiding harm, informed consent, privacy, and non-deception (Diener and Crandall, 1978). Participants received information sheets and signed consent forms; confidentiality and anonymity were ensured through pseudonyms and secure data handling under institutional ethical approval, with voluntary participation and the right to withdraw at any time.

4. Application of DCV in the exploration of capability factors

Teece et al., (1997) proposed that the processes and position of a firm are a composition of its competencies and capabilities. They further elaborated that the competitive advantage of a firm is due to its managerial and organisational processes, which are shaped by its coordination / integration, its asset position and the paths available to it.

Table 4.1 shows the application of DCV in the exploration of capability factors for the resilience of the SBSC.

Resilience Capability Factor	Primary SBSC Actors	Processes / Routines	Positions / Assets	Paths
Inherent Resilience	Farmers	Adapting production to natural landscapes; utilizing generational farming knowledge.	Complementary Assets: Scottish temperate climate/topography. Generational expertise.	Evolutionary: Long-term historical adaptation to the Scottish environment.
Traceability	Farmers, Auction Marts, Processors, Retailers	Mandatory digital recording and reporting of cattle movements via web portals.	Institutional: ScotEID portal. Technological: Tracking software and DNA sampling.	Regulatory: A mandatory compliance path set by the government.
Supplier Relationship	Farmers, Processors, Retailers	Long-term trust-building and horizontal/vertical collaboration.	Reputational: Farm/Brand standing. Intangible: Social capital and trust.	Evolutionary: Developing stable, long-standing partnership routes.
Supplier Selection	Farmers, Processors, Retailers	Systematic evaluation routines based on quality, suitability, and accreditation.	Structural: Established supply networks. Reputational: Accreditation status.	Evolutionary: Selecting partners based on historical performance.
Supply Base Diversity	Retailers, Farmers	Multi-channel procurement routines (Dairy-beef, auction markets, agents).	Financial: Capital reserves. Structural: Access to diverse sourcing hubs.	Evolutionary: Strategic shift toward procurement flexibility.

Transparency	Auction Marts	Real-time price discovery and data disclosure during public sales.	Structural: The physical auction platform. Intangible: Market openness and trust.	Equifinality: Achieving transparency via different actor roles and starting points.
Risk Mitigation	Processors, Retailers	Iterative identification and buffering against market/disease shocks.	Financial & Technological: Modern infrastructure and financial reserves.	Evolutionary: Adaptive refinement of tactics from past crises.
Market Position	Retailers, Processors, Farmers	Premium branding and rigorous quality assurance routines.	Reputational: "Scotch Beef" brand equity.	Evolutionary: Maintaining a high-value niche market path.
Contingency Planning	Farmers, Processors, Retailers	"What-if" modeling and the preservation of genetic assets (embryos).	Structural: Embryo storage. Technological: Data backups.	Evolutionary: Learning from historical disruptions to refine readiness.
Logistical Capabilities	Processors, Retailers	Asset orchestration for the efficient movement of livestock and meat.	Financial: In-house transport fleets. Institutional: Public infrastructure.	Evolutionary: Continuous optimization of transport and load routes.
Government Support	Farmers	Administrative management of state aid and policy compliance.	Institutional: Agricultural subsidies (SSBSS, LFASS) and grants.	Evolutionary: Dependency on evolving post-Brexit policy landscapes.
Redundancy	Farmers, Processors	Managing intentional "slack" and physical capacity buffers.	Financial & Structural: Capital assets and excess capacity.	Evolutionary: Deliberate path of safety buffers over "lean" models.

Table 4.1 Application of DCV

Inherent resilience is a capability factor, and the process and routines are the use of the natural landscape for the cattle production and rearing and the use of generational farming knowledge in cattle production. The assets are the Scottish temperate climate and topography suitable for cattle farming. Tacit knowledge is also an asset (Vidic, 2022).

Traceability is contributed by the key SBSC players farmers, auction marts, processors and retailers. The traceability processes and routines comprise of the mandatory digital reporting and recording of cattle movements via web portals. The assets used are the institutional assets

for instance the ScotEID portal. The other assets used are the technological and financial assets of the supply chain players. Livestock keepers, marts and abattoirs can check, record and refine the information for all their livestock on the system, using their own secure log-in details (ScotEID, 2025). All farm holdings, marts and abattoirs have an individual CPH (County Parish Holding) number. The identity of each animal being moved from one CPH to another, or through a mart or to an abattoir, is recorded into the ScotMoves+ system (The Scottish Government, 2025). The retailers are using DNA sampling to trace the origin of the meat back to each individual farm and the animal (M&S, 2024).

Supplier relationship as a capability factor is contributed by all key SBSC players. The processes and routines are the long-term trust building and collaboration. The assets used are the reputational assets of the farm / brand and Intangible relational asset of trust and the financial assets for supplier development. ALDI pledged a £3 billion investment into the domestic beef industry over five years to strengthen supply chain stability. This initiative includes a £260 million partnership with Kepak specifically to expand and enhance their premium Aberdeen Angus beef range (ALDI, 2024). The path adopted is evolutionary which is aimed to develop stable long term partnership routes.

Supplier selection is contributed by the farmers, processors and retailers. The processes and routines are systematic evaluation routines based on quality, suitability and accreditation. The assets are established supply networks and the reputational assets in the form of QMS assurance scheme in procurement decisions. The QMS has introduced whole chain assurance schemes to ensure highest standards of production, animal welfare and wellbeing and to deliver a quality eating experience (QMS, 2025).

Supply Base diversity is a capability factor contributed by the farmers, retailers and processors. The processes and routines are the multi-channel procurement sources such as dairy beef markets, direct farm sourcing, use of livestock agents/marts to avoid dependence on a single source. The retailers are relying on the integrated beef schemes from dairy herds (Gamechanger, 2023). The assets are financial and structural, and the path taken is evolutionary showing a strategic shift towards procurement flexibility.

Eisenhardt and Martin (2000) advanced the DCV by proposing equifinality which means that the capability development can have any starting point and can take unique paths. This is evident from table 4.1 that transparency in the SBSC is introduced by the auction marts and the auction marts are not the origin of the SBSC. The process and routines are the real time price discovery and data disclosure during the public sales. The assets are structural and Intangible openness and trust. The Institute of Auctioneers and Appraisers in Scotland (IAAS) advocates for the livestock auction system as the premier transparent mechanism for achieving optimal pricing and ensuring financial security for all participants within the rural economy (IAAS, 2025).

Risk mitigation as a capability factor is primarily driven by processors and retailers. The processes and routines involve iterative identification and buffering against market and disease-related shocks. These mitigation actions are notably uneven across the supply chain, as farm-level mitigation is frequently limited by financial constraints. The assets utilized are financial and technological, encompassing modern infrastructure and capital reserves. The adopted path is evolutionary, characterized by the adaptive refinement of tactics derived from learning from past crises. By learning from the catastrophic 2001 Foot and Mouth outbreak which cost the public and private sectors over £8 billion due to inefficient paper-based systems the SBSC has modernized through the ScotEID initiative ScotEID (2025).

The following interview extract from a retailer shows their financial strength to engage in risk management and contingency planning.

"What I would also say so for disease preparedness. So, we'll assess it by processing site basis..... we would put together a site plan for that disease, understand any risk, understand any changes to procedures that need to be made..... then we would change from pre designation status to designated status and then we can operate as normal under those circumstances" IP17.

These practices have been refined through learning from past crises, reinforcing the evolutionary and experience-based nature of resilience capability development.

Market position is a capability factor contributed by farmers, processors, and retailers. The processes and routines centre on premium branding and the implementation of rigorous quality assurance protocols. Scotch Beef is distinguished by its Geographical Indication (GI) status, which serves as an official assurance of superior quality. This designation confirms that the products strictly adhere to rigorous standards, certifying an authentic connection between the unique natural environment and the traditional agricultural heritage of their specific country of origin (Scotch Beef, 2025). The primary asset is the reputational "Scotch Beef" brand equity, which serves as a critical intangible asset in the marketplace. This follows an evolutionary path aimed at maintaining a high-value niche market trajectory.

Contingency planning involves contributions from farmers, processors, and retailers. The processes and routines are multi-faceted, including the preservation of genetic assets, such as embryos, to safeguard future production. One farmer (IP5) noted regarding the sensing and subsequent transformation of genetic assets as *"We have put a lot of embryos into long-term storage. If we get an outbreak of disease, it won't take us long to rebuild the same genetic basis we have now"*. Other routines include maintaining multiple processing sites and adhering to government-mandated contingency plans against disease outbreaks. The assets utilized are diverse, spanning financial, structural, technological, and institutional categories. The paths taken are both evolutionary, through learning from historical disruptions, and regulatory, particularly regarding mandatory movement restrictions.

Logistical capabilities are established as a resilience factor by processors and retailers. The processes and routines consist of operational practices that enable the efficient movement and coordination of livestock and finished meat products. These are supported by financial assets, such as in-house transport fleets, and institutional assets like public infrastructure. One processor (IP17) highlighted the value of this asset position: *"So we have our fleet of transport….. so we don't see ripple effects from any transport problems or any strikes"*. Another (IP13) reinforced this, noting they have *"sufficient spare vehicles…. to cover our delivery network with reserves"*. The evolutionary path involves the continuous optimization of transport and load routes.

Government support is a capability factor specifically relevant to farmers. The processes and routines which involve the administrative management of, and compliance with, institutional support mechanisms such as subsidies and policy-linked grants. Essential financial assistance is delivered to farmers through the Less Favoured Areas Support Scheme (LFASS) and the Scottish Suckler Beef Support Scheme (SSBSS) (Hall, 2024). The assets are institutional, primarily agricultural subsidies like the SSBSS and LFASS. The path is characterized as both evolutionary, due to dependency on the changing post-Brexit policy landscape, and regulatory, concerning mandatory compliance for support eligibility.

Redundancy is a capability factor maintained by farmers and processors. The processes and routines involve maintaining buffers or alternative operational methods to absorb the impact of disruptions. The interview extract reflects the use of buffer stock. A livestock farmer mentioned that *"and so regards like disruption in the supply chain, like you know, fertilizer 2 years ago went from 250 pounds a ton to 750 pounds a ton. You know, to a certain extent we'll forward buy fertilizer six months in advance of when we need it.So we'll take home. We'll be bringing home fertiliser, probably in September. That won't be used until next spring, purely as a way I can have just hedge in a little bit" IP8*

The assets are both financial and structural, including capital assets and excess operational capacity. This resilience factor follows an evolutionary path, as it is built over time through strategic investment decisions and deliberate operational design.

The application of the Dynamic Capabilities View (DCV) is evident from the table 4.1 and it shows how the key players in the SBSC utilize the Processes, Positions, and Paths to contribute to the resilience of the SBSC. The ability to integrate external competences can be witnessed by the SBSC players to utilize the government's institutional assets, specifically the ScotEID portal, to coordinate movements. The ability to build internal competences is evidenced by Inherent Resilience, where generational expertise and landscape adaptation are cultivated over time to form a foundational asset. Finally, the ability to reconfigure is demonstrated through the flexible procurement routines and physical capacity buffers to absorb disruption impacts and sustain operations.

5. Theoretical Contribution

The Dynamic Capabilities View (DCV) was first introduced by Teece et al., (1997) focuses on how firms sustain competitive advantage in dynamic environments. This framework extended the Resource-Based View (RBV) of Barney (1991) by emphasising a firm's ability to integrate, build, and reconfigure internal and external competencies to adapt to changing conditions. DCV highlights the role of organisational routines, path dependencies, and firm-specific assets in driving innovation and strategic change.

Teece et al., (2007) further refined the DCV by formalizing it into three stages: sensing, seizing, and transforming. Sensing involves identifying opportunities and threats in the environment. Seizing focuses on mobilizing resources to capture opportunities and mitigate risks. Transforming entails the continuous renewal and reconfiguration of assets and capabilities to maintain competitiveness.

Hendry et al., (2019) applied the DCV framework using the stages of sensing, seizing, and transforming to analyse the resilience of local food supply chains in response to the constitutional change brought about by Brexit. Their research specifically focused on how supply chain actors anticipated the impacts of Brexit (sensing), adapted by implementing strategic changes (seizing), and reconfigured their operations to enhance resilience (transforming). However, their application of DCV was tailored to a singular, well-defined disruption of constitutional change, limiting its broader applicability to other complex and multifaceted supply chain disruptions.

Applying the DCV framework as developed by Teece et al., (2007) to the entire SBSC presented several limitations. The framework was originally designed to analyse firm-specific strategic capabilities rather than the collective dynamics of a decentralized supply chain. The Scottish beef industry comprises diverse, independent actors: livestock farmers, processors, auctioneers, and retailers each with distinct priorities and capabilities. The firm-centric focus of the DCV does not fully capture the interdependencies, collaborative networks, and

governance structures critical for managing resilience across an entire supply chain. Moreover, the linear progression of sensing, seizing, and transforming may not reflect the iterative and concurrent processes involved in supply chain resilience, where proactive and reactive measures often co-occur for instance, the preservation of embryos can be a proactive measure used as reactive capability as a Contingency against a disease outbreak to recover by having the same genetics.

This research makes a primary theoretical contribution by advancing the Dynamic Capabilities View (DCV) beyond the traditional assumption of sequentially, particularly within decentralized agri-food supply chain. This thesis demonstrates that in a continuous sectoral context, SBSC operates through fragmented routines where independent actors occupy different stages of the DCV cycle simultaneously.

The empirical evidence from the SBSC suggests that the micro foundations of dynamic capabilities do not follow a structured, chronological path for all actors. Instead, sensing, seizing, and transforming are enacted independently based on localized risks and the specific operational environment of each player. This fragmentation is often compounded by the lack of centralized data as highlighted in this interview extract *"No, no, there's not one common database that they can all access to get all that information" (IP3).*

In SBSC the livestock Farmers are in a continuous "sensing" phase regarding biological security, highlighted by sudden disruptions such as the detection of Bovine Spongiform Encephalopathy (BSE) in Dumfries (BBC News, 2024). They respond with transformative readiness routines by preserving embryos "*We have put a lot of embryos into long-term storage. If we get an outbreak of disease, it won't take us long to rebuild the same genetic basis we have now"IP5.* This transformation of the resource base occurs proactively before a formal recovery phase is even triggered.

While farmers sense biological threats, retailers are in a "seizing" phase to mitigate the strategic risk of a decreasing national herd. One retailer explained their proactive response through integrated supply models "*We actually have an integrated beef scheme which we operate. I think ultimately how we can give longevity to our supply base by utilising it and growing that arm of the business will only help to bolster the supply chain as a whole"IP17.*

The processors were transforming their resources for logistical capabilities simultaneously to avoid driver shortages as reflected in this comment *"But in terms of getting product to market, we have sufficient spare vehicles, all the struggle for drivers, but we've got sufficient vehicles to cover our delivery network with reserves and vehicles back at Depot for loading up for the next day"IP13.*

On the contrary the retailers do not foresee logistical issues as a disruption as shown in the interview extract.

"So we have our fleet of transport, so we have our own livestock haulage vehicles and so we don't see ripple effects from any transport problems or any strikes, etcetera, So I think that's probably all of the disruptions sort of in a nutshell, I'd say"IP17.

The comparative analysis in Table 5.1 highlights a fundamental shift from the traditional, sequential application of the DCV to the non-sequential reality of the SBSC. In the case of a one-off disruption like Brexit, Hendry et al., (2019) observed that supply chain actors moved in a synchronized, sequential manner, where sensing, seizing, and transforming acted as a unified progression across all tiers.

In contrast, the SBSC demonstrated a fragmented enactment of these capabilities, where different players occupy different stages of the DCV cycle simultaneously based on localized risks.

DCV Phase	**Hendry et al., (2019) Sequential application**	**Scottish Beef Supply Chain- Non-Sequential application**
Sensing	Unified and collective sensing across supply chain tiers. Actors simultaneously identified Brexit-related threats (e.g. labour shortages, subsidy uncertainty) to anticipate a defined constitutional deadline.	Fragmented and actor-specific sensing. Farmers primarily sense biological and disease-related risks while retailers sense long-term supply risks arising from declining herd numbers.
Seizing	Coordinated seizing behaviour, with supply chain actors reacting as a unit by developing new local market channels to capitalise on increased demand for domestic food.	Actor-specific seizing. Retailers seize opportunities through integrated beef and long-term supplier schemes to secure future supply, while other actors remain in sensing or reactive modes.
Transforming	Transformation treated as a final, downstream stage, where resources and relationships were collectively reconfigured after sensing and seizing were completed	Processors transform logistical assets to bypass strikes while farmers transform genetics proactively.
Execution	The whole chain moves through steps together in response to a one-off event.	Non sequential transformation. Processors reconfigure logistical assets to bypass transport disruptions and strikes. while farmers simultaneously transform herd genetics through embryo preservation as both a proactive and recovery strategy

.Table 5.1 Sequential vs Non-Sequential application of DCV

Following Ketokivi and Choi's (2014) argument for theory elaboration this research contributes to the theoretical elaboration of supply chain resilience by extending the Dynamic Capabilities View beyond firm-level analysis to capture the collective dynamics of an entire supply chain and highlighting its limited application when the unit of analysis is the entire supply chain. Due to the current linear progression by a firm from one stage to another, an amendment is proposed

in the DCV to introduce a framework which allows the collective sensing, seizing, and transforming of opportunities and threats at a supply chain level.

6. Conclusion

This paper has examined the resilience of the Scottish Beef Supply Chain (SBSC) through the lens of the Dynamic Capabilities View (DCV), treating the whole supply chain rather than the individual firm as the unit of analysis. The study has shown that SBSC resilience is underpinned by a portfolio of capability factors distributed across farmers, auction marts, processors, retailers, and policy actors, including inherent resilience, traceability, supplier relationships and selection, supply base diversity, transparency, logistical capabilities, redundancy, market positioning, contingency planning, risk mitigation, and government support.

Theoretical Implications

The study advances the Dynamic Capabilities View in two main ways. First, it extends DCV beyond its traditional firm-centric focus by conceptualising resilience as a collective dynamic capability enacted across a decentralised, multi-actor agri-food supply chain. Rather than residing within a single organisation, dynamic capabilities in the SBSC emerge from the interplay of processes, positions, and paths distributed across multiple actors, whose routines, assets, and evolutionary trajectories jointly shape system-level resilience.

Second, the findings challenge the assumption that sensing, seizing, and transforming unfold as a linear, sequential cycle at supply-chain level. In the SBSC, different actors simultaneously occupy different DCV "phases": farmers are engaged in continuous biological risk sensing and proactive genetic contingency planning; retailers are seizing long-term supply opportunities through integrated beef schemes; processors are transforming logistical assets to buffer transport and labour shocks. This fragmented, non-sequential pattern contrasts with prior applications of DCV to singular, time-bounded disruptions such as Brexit, where actors progressed more synchronously through the three stages. The study therefore proposes that, in decentralised supply networks, DCV should be understood as overlapping and actor-specific processes rather than a unified chain-wide sequence.

Practical Implications

For policy makers and industry stakeholders, the findings underscore that strengthening SBSC resilience cannot be achieved solely through firm-level interventions or isolated investments. There is a need to support collective sensing and data-sharing mechanisms that move beyond the current fragmentation of information noted by participants, for example by enhancing interoperability and accessibility of traceability and market intelligence systems such as ScotEID and QMS reporting. The contingency planning should be approached as a coordinated, multi-actor endeavour that links farm-level biological buffers (e.g. embryo preservation) with processing capacity strategies and retail-level crisis protocols for disease outbreaks and transport disruptions.

Limitations and Future Research

The study is based on a single sectoral supply chain in one national context, using a qualitative, cross-sectional design. While the holistic multiple-case approach and triangulation with documentary sources enhance analytical generalisation, the findings cannot be statistically generalised to other sectors or regions. Future research should therefore examine whether similar patterns of collective, non-sequential dynamic capabilities arise in other agri-food supply chains (e.g. dairy, lamb, horticulture) and in different institutional settings, including export-oriented and Global South contexts. Longitudinal studies would further enrich

understanding by tracing how resilience capabilities and structural conditions co-evolve over time, particularly in response to overlapping shocks such as climate events, geopolitical disruptions, and policy reforms. Quantitative or mixed-methods designs could complement this work by testing the relationships between specific capability factors, structural and performance outcomes at supply-chain level.

Overall, the research demonstrates that resilience in the Scottish Beef Supply Chain is best understood as a dynamic, distributed capability shaped by the interaction of multiple actors, routines, and structural conditions, and it calls for both theory and practice to move beyond firm-centred, event-focused conceptions of supply chain resilience.

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