

Post-Pandemic Resilience of Retort-Based SMEs: A Literature-Based Analysis of Business Model Adaptation

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DOI: <https://dx.doi.org/10.47772/IJRISS.2025.909000022>

Received: 24 August 2025; Accepted: 30 August 2025; Published: 27 September 2025

ABSTRACT

The COVID-19 pandemic exposed vulnerabilities across small and medium-sized enterprises (SMEs), particularly in the food processing sector. Disruptions in supply chains, labour shortages, and shifting consumer demands threatened operational continuity. Retort-based SMEs, specialising in shelf-stable food production, hold a unique position in post-pandemic resilience due to their role in food security and consumer convenience. This article analyses how business models in retort-based SMEs adapted to challenges and opportunities post-pandemic. By synthesising existing research on business model resilience, food SMEs, and crisis adaptation, the study identifies five major themes: supply chain reconfiguration, digitalisation, product innovation, sustainability practices, and workforce adaptation. Findings suggest resilient SMEs demonstrate adaptive capabilities through diversification of distribution channels, integration of e-commerce, agile production strategies, and adoption of green practices. A conceptual framework is proposed, linking business model adaptation with long-term resilience strategies in retort SMEs. The study highlights research gaps and the need for sector-specific frameworks to guide SMEs toward sustainable growth.

Keywords: Retort-based SMEs, business model resilience, COVID-19, food processing, literature review, post-pandemic adaptation.

INTRODUCTION

The COVID-19 pandemic, emerging in late 2019, triggered an unprecedented health crisis that rapidly cascaded into profound economic disruption. Its global impact altered business operations, supply chains, and consumer behaviours. The pandemic also brought a systemic shock as opposed to localised crises because it entailed a supply and demand-side impact on the economy all around the world. Governments put strict steps such as lockdowns and restrictions on movements, resulting in the sudden closing of businesses, reducing their operational capacity, and significant market changes.

Very critical to both employment and GDP, the Small and Medium-sized Enterprises (SMEs), with a lack of financial cushions, customer diversity, and narrow operational models, were at high risk (Juergensen et al. 2020; Shafi et al. 2021). They encountered the difficulties right away: sharp increases in consumer demand loss, a massive disruption of supply chains, and unprecedented labour shortage. These pressures posed a risk to the survival of many businesses, which resulted in bankruptcies and job losses.

In all these chaotic situations, the food processing industry became a lifeline. In contrast to other industries, it was forced to maintain food supply despite the logistical and operational challenges. Important were those retort-based SMEs that offer thermally processed and shelf-stable food products, such as canned foods and ready-to-eat meals (Knorr & Sevenich, 2023). This meant that these SMEs were in a great position because of the natural stability and long shelf life of retort products; the lockdowns have disrupted people's ability to buy non-perishable items that can be stored with minimal effort (FAO, 2023). This reinforced their importance in the broader food system.

The COVID-19 crisis accelerated change, highlighting vulnerabilities of traditional business models. This article conducts a literature-based analysis of adaptation strategies by retort-based SMEs post-pandemic. It synthesises

insights on business model resilience, crisis impact on food SMEs, and broader adaptation strategies to identify key lessons and propose a conceptual framework for fostering resilience in this vital industry segment. The emphasis on literature ensures findings are grounded in scholarly work, providing a robust foundation for future research and sustainable business ecosystems.

METHODOLOGY

This study employs a desktop research design, which is appropriate for synthesising existing knowledge on business model adaptation and resilience in the context of retort-based SMEs. The desktop approach relies on the collection and analysis of secondary data sourced from peer-reviewed journal articles, industry reports, policy documents, and relevant case studies, thereby providing a comprehensive understanding of the research problem without conducting primary fieldwork.

Academic databases were used to search for combinations of keywords systematically, such as business model resilience and SMEs, retort food processing and post-pandemic adaptation and COVID-19 recovery strategies.

Thematic analysis was very rigorous and transparent since it allowed organising the interpretation of a variety of sources. Thematic analysis was chosen specifically because it best suited this study in identifying patterns and interrelationships across the literature, but also in its flexibility to discover unique insights that were relevant to the retort industry.

The integration of the method not only plans the study to track the gap that needs to be filled but also ensures a systematic synthesis between the theoretical understanding and the practical implications of the study. This enhances the validity of the findings and helps evolve a conceptual framework of learnings on adaptation of the business model in retort-based SMEs over the post-pandemic period.

LITERATURE REVIEW

Business Model Resilience

Business model resilience is a dynamic capability to react, adapt, transform and absorb to a disruption (Wirtz et al. 2016). It is more than simple survival, meaning tactical renewal and coming out of an unfortunate situation stronger. The resilient business model comes down to restructuring, which refers to redesigning its elements that consist of a proposition, customer segment, practices, channels, relationships, revenue, resources, activities, partnerships and cost structure about the altered conditions (Osterwalder & Pigneur, 2010).

Among the most important dimensions are strategic foresight that allows proactive planning and pivoting even before the crisis (Sahu & Panda, 2024). Redundancy and resource fluidity enable rapid reorganisation of the resources and back-up systems during the interruptions (Erdiaw-Kwasie et al., 2023). A quick adaptation and ever-changing improvement are made possible by organisational flexibility and the ability to learn (Nosike et al., 2024). Lastly, good stakeholder relationships mean that they get resources, information sharing, and solutions to common problems (Sahu & Panda, 2024). All these dimensions will help a business model survive uncertainty.

SMEs and Crisis Vulnerability

The SMEs are very susceptible to crises because they have low financial resilience and access to financing (Mohammed, 2024; Ogunwale et al., 2024). They cannot absorb the decline in revenue or other unanticipated expenses, and they experience insolvencies. They are vulnerable to supply chains due to operational rigidities and dependence on a small number of suppliers or particular raw materials (Al-Shwaf & Bell, 2025; Juergensen et al., 2020). In contrast to large firms, SMEs usually do not have the funds to reconfigure supply chains dynamically.

Many SMEs also suffer from limited access to information and underdeveloped digital infrastructure (Kurniati et al. 2022; Sarif & Susanto, 2023). This hinders informed decision-making and pivots to online sales. Human capital vulnerabilities include labour shortages due to illness or quarantine, impacting production and continuity

(Erdiaw-Kwasie, 2023). The reliance on a few key personnel means that the incapacitation of one can have a disproportionate impact on the business. These factors highlight the precarious position of SMEs during economic shocks.

Retort-Based SMEs in Food Processing

Retort technology, a thermal sterilisation process, enables shelf-stable food production, crucial for food security and accessibility (Jimenez, 2024; Saifullah, 2023). Retort-based SMEs produce diverse products, from canned goods to ready-to-eat meals, which saw increased demand during the pandemic as consumers sought long-lasting, safe alternatives (FAO, 2023; Sharma et al., 2025). Their operational model requires specialised equipment, skilled operators, and adherence to stringent food safety regulations.

Despite increased demand, these SMEs faced challenges: disruptions in specialised raw materials and packaging, and labour shortages due to health concerns and social distancing (Erdiaw-Kwasie, 2023; Mohammed, 2024). Retort packaging was somewhat unique, and thus, the substitute became unavailable. However, it has also opened up opportunities, and SMEs are seeking to diversify their channels by engaging in e-commerce and driving efficiency innovation (Le et al., 2023). This brought out their importance in the ongoing food supply in times of crisis.

Post-Pandemic Adaptation in Food SMEs

According to the literature, the digitalization and innovation are accelerated notably after the pandemic. Technology has also been actively used by SMEs to penetrate new markets and diversify their product range to suit the changing needs of consumers in terms of health, convenience and new avenues of purchase (Clemente-Almendros et al., 2024; Sarif & Susanto, 2023; Macca et al. 2024).

The adaptations in supply chains focused more on resilience rather than on cost-efficiency and entailed the localisation of both sourcing and diversification of procurement, as well as flexible inventory management (Mohammed, 2024; Mizrak, 2024). Strategic changes were meant to transform more resilient and flexible supply chains to survive future shocks.

FINDINGS AND DISCUSSION

The findings from the literature reveal that resilient retort-based SMEs engaged in proactive adaptation, which entails constant environmental observations and back-up planning, leading to the following key adaptations which are supply chain reconfiguration, digitalisation and e-commerce, product and market innovation, sustainability and circular practices, and workforce adaptation and skills development.

Supply Chain Reconfiguration

Supply chain weaknesses in the face of the pandemic revealed the pressure to build resilience by reorganising the supply chains by retort-based SMEs (Mizrak, 2024). Among the most important strategies were the shift of strategic sourcing to local sourcing, to decrease delivery times and risks of international transportation (Sharma et al., 2025). This was done so that they could have greater visibility and control by establishing a connection with the local or regional producers. It was important to create redundancy by multi-sourcing or providing the essential raw materials and components to ensure alternative sources (Ogunwole et al. 2024). The process of replacing just-in-time inventory with just-in-case inventory included the preservation of buffer levels of key inputs (M

As well, SMEs dedicated their efforts to enhancing logistics and distribution channels, diversification of transport means and development of direct-to-consumer channels (Mohammed, 2024). Promoting resilience, they tended to complicate operations and raise costs, and an optimal balance between cost-effectiveness and resilience should be found (Kydyrbekova & Meiramkulova, 2024). The capacity to easily switch between various types of distribution channels, with emphasis on both the conventional retort networks and the digital platforms, as well as direct sales, was a characteristic feature of the resilient retort SMEs.

For this section, the example of mini-case is the 'Golden Harvest' Cannery at Southeast Asia. In response to the unavailability of imported packaging materials early on in the pandemic lockdowns, Golden Harvest, a retort-based cannery that packages fruit preserves, shifted to local suppliers. This first posed difficulties with regards to achieving certain quality standards and volume requirements. Nevertheless, through close co-operation with a local plastics manufacturer, they developed a new, slightly different packaging solution. This move not only stabilized their supply chain, but also shortened lead times to acquire packaging in the market by 30% and created a more robust local ecosystem, which enabled them to continue producing even when the region was otherwise restricted.

Digitalisation and E-Commerce

Digital transition was a necessity, and the retort-based SME businesses quickly embraced the world of online sales and the model of direct-to-consumer (Sarif & Susanto, 2023). By putting in place an e-commerce platform, the business already opened online shops or used the existing market platforms to avoid the traditional commerce chain that was disrupted and continued to generate revenues (Fodouop Kouam, 2025). By transitioning to D2C models, business entities expanded their profit margin, gained direct insights into their customers, and became able to respond to customer feedback quickly (Sarif & Susanto, 2023).

In addition to sales, the use of digital payment systems and data analytics made it possible to track consumer behaviour and identify what products were popular and adjust the prices accordingly (Gupta et al., 2022; Sarif & Susanto, 2023). This was more data-driven decision-making that provided increased agility and responsiveness. In addition, the digitalisation improved internal efficiencies using cloud-based inventory management software, CRM, and collaboration software in remote work (Kurniati, 2022). The transformation translates to long-term competitive benefit, better market penetration, and flexibility of operations (Clemente-Almendros et al. 2024).

Product and Market Innovation

Change in consumer patterns also forced retort-based SMEs to introduce new products and markets (Le et al. 2023). This also entailed the launching of products that are nutritionally rich and health-forward (Kydyrbekova & Meiramkulova, 2024), which aligns with increased health awareness. There was also an adaptation that considered re-evaluation of both product forms and portion sizes to enhance convenience and cater to changes in household consumption habits (Macca et al., 2024).

The innovation was also applied to a variety of market channels and widely applicable applications (FAO, 2023). This was in the form of direct-to-consumer sales, institutional sales, and collaboration with online delivery services. Some explored supplying humanitarian organisations. The crisis also spurred innovation in eco-friendly packaging solutions, balancing food safety with environmental stewardship. This continuous innovation proved intrinsically linked to resilience, enabling SMEs to capitalise on emerging market opportunities (Le et al., 2023).

Sustainability and Circular Practices

Sustainability became a strategic dimension of resilience for retort SMEs (Sharma et al. 2025). This involved investments in energy-efficient retort systems to reduce consumption and costs (Jimenez et al., 2024) and adopting sustainable packaging solutions (recyclable, biodegradable) (Saifullah et al., 2023). This aligns with growing consumer and regulatory pressures and contributes to operational efficiencies.

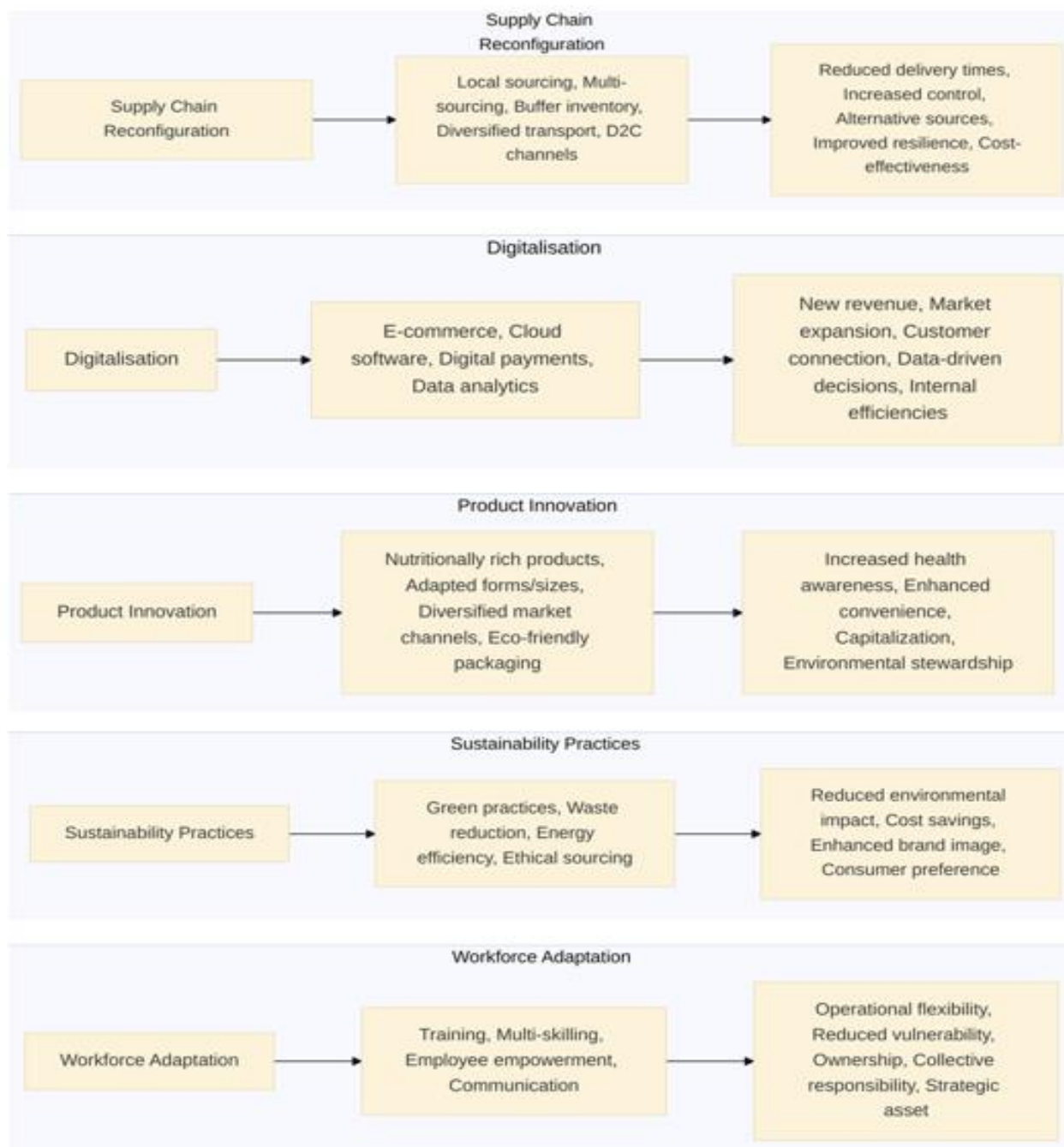
Focus also extended to embracing circular economy principles and waste reduction (Kydyrbekova & Meiramkulova, 2024). This included minimising food waste during processing, optimising water usage, and byproduct valorisation, such as converting waste into animal feed. Collaborative efforts across the supply chain promoted responsible sourcing and efficient transportation. Integrating sustainability enhances operational resilience, fosters innovation, and positions SMEs favourably in markets valuing environmental stewardship (Mohammed, 2024).

Workforce Adaptation and Skills Development

The pandemic presented workforce challenges, to which resilient SMEs responded with flexible working arrangements (Mohammed, 2024). This included staggered shifts, enhanced health and safety protocols, remote work options for administrative staff, and cross-training for redeployment (Mohammed, 2024). These measures ensured business continuity and demonstrated commitment to employee well-being.

Beyond immediate adjustments, SMEs invested in human capital through training, multi-skilling, and empowerment (Ogunwole et al. 2024). Training programs upskilled employees for multiple tasks, enhancing operational flexibility and reducing vulnerability to labour shortages. Employee empowerment and communication fostered ownership and collective responsibility, crucial during uncertainty (Sahu & Panda, 2024). A well-adapted and skilled workforce became a strategic asset, contributing to agility and long-term resilience (Nosike et al. 2024).

In summary, Figure 1 show the mapping of the mapping the five pillars of the conceptual framework in this paper:



CONCLUSION

This article underscores the critical role retort-based SMEs play in food security and transformation, and the strategic resilience of these SMEs following the change and evolution of their business models due to the pandemic. The offered framework integrates five main pillars of adaptation, which demonstrate the dynamic relationship between each other in advancing robust business models. Although literature can reveal important information concerning general resilience in SMEs, comprehensive empirical gaps still exist regarding retort-based SMEs.

The path to post-pandemic resilience should continue to learn, evolve, and be strategic. The pandemic had been one of the severe yet efficient teachers as these businesses were compelled to reassess and introduce new approaches to operating. With the incorporation of the outlined adaptation pillars, retort-based SMEs could strengthen their operations, enhance their market position, and maintain their vital roles in providing sustainable food supplies to their communities on a global scale.

The empirical gaps should be filled with future research in order to deliver specific strategies in this significant segment of the food industry that can be acted on. The lessons of this paper provide an academic and practical background on moving retort SMEs to greater resilience and sustainability, enabling them to thrive in the complexities of the post-pandemic world and make meaningful contributions to global food security.

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