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Zhao, G

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Agri-food supply chain resilience strategies for preparing, responding, recovering, and adapting in relation to unexpected crisis: A cross-country comparative analysis from the COVID-19 pandemic

Guoqing Zhao[1] | **Mar Vazquez-Noguerol**[2] | **Shaofeng Liu**[3] | **J. Carlos Prado-Prado**[2]

[1]School of Management, Swansea University, Swansea, UK

[2]Departamento Organización de Empresas e Márketing, Grupo de Ingeniería de Organización (GIO), Escola de Enxeñaría Industrial, Universidade de Vigo, Vigo, Spain

[3]Plymouth Business School, University of Plymouth, Plymouth, UK

Correspondence
Guoqing Zhao, School of Management, Swansea University, Swansea, UK.
Email: guoqing.zhao@swansea.ac.uk

Abstract

Researchers and practitioners insist on equipping supply chains with the adaptive capability to return to a more desirable state after being disrupted. Various resilience capabilities have been emphasized in the literature; however, limited research has linked them to resilience phases and cultural value orientations. Moreover, preparedness and adaption phases have hardly been studied. To address these gaps, we adopted middle-range theory to investigate agri-food supply chain (AFSC) resilience to the COVID-19 crisis in a cross-country setting. Data were collected from interviews with AFSC practitioners from China and Spain, followed by thematic and comparative analyses. The results indicate that frequently discussed resilience capabilities, such as collaboration, redundancy, flexibility, leadership, and innovation, were implemented across the preparedness, response and recovery, and adaption phases; however, successful AFSC recovery also depends on each country's cultural value orientations. A hierarchical cultural orientation generates sense-making and collectiveness and further leads to synergy across all AFSC stakeholders, thereby contributing to AFSC response and recovery. Under an egalitarianism cultural orientation that places self-interest ahead of group goals, organizations are encouraged to make decisions based on their own situational understanding, which contributes to their response and recovery. This study also provides theoretical contributions and managerial and policy implications.

KEYWORDS

agri-food supply chain resilience, cross-country comparative analysis, middle-range theory, resilience capability factors, two cultural value orientations

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Since the virus was first identified in Wuhan, China, in late December 2019, it has led to over 630 million infections and 6.5 million deaths (World Health Organization [WHO], 2022). Unlike other pandemics, such as the 1957 Asian Flu, 1968 Hong Kong Flu, and 2009 Swine Flu outbreaks, for which few infected people required hospitalization and the case fatality rate was nearly 0%, those infected with COVID-19 are much more likely to be hospitalized, and the case fatality rate has been estimated to be between 0.1% and 9.6% (Johns Hopkins University & Medicine, 2021). To protect people from the spread of COVID-19 and avoid the breakdown of health systems, various measures were adopted such as social distancing, travel bans, facility closures, and local lockdowns (Do et al., 2021; Scala & Lindsay, 2021). These measures have caused severe economic shocks in many countries and led to unprecedented challenges for operations and supply chain management (OSCM) (Polyviou et al., 2023; Schleper et al., 2021). For example, the global economy contracted by 3% in 2020, and although the global gross domestic product (GDP) increased by 5.88% in 2021, it was 3.2% below pre-pandemic projections (McKinsey, 2021; Sodhi & Tang, 2021). Furthermore, several supply chains, including those for automotive parts, electronics, medical equipment, and consumer goods, have all been severely affected by the COVID-19 pandemic.

Agri-food supply chains (AFSCs) have not been exempt from the impact of the pandemic. The term AFSC refers to a series of stages that food products go through from production to consumption (Yadav et al., 2022). AFSCs differ from other types of supply chains in their important roles in reducing poverty, increasing employment, empowering women, acting as catalyst for the development of broader manufacturing industries, and providing sufficient, affordable, sustainable, and safe food, fiber, feed, and fuel to consumers (Food and Agriculture Organization of the United Nations [FAO], 2017; Zhao et al., 2020). The impact of COVID-19 on AFSCs has several dimensions. First, travel bans, lockdowns, and limitations on people's mobility have contributed to labor shortages. Thus, additional health and safety measures adopted to reduce the exposure of the workforce have resulted in extra costs being incurred for production and distribution. Labor shortages have also caused delays in farming activities because most require a specific timetable and rely on the season and climate. For example, a fruit and vegetable supply chain in Northern India encompassing more than 350 farmers, 40 interstate wholesalers, 45 imported fruit suppliers, and 8 logistics service providers was seriously affected by the COVID-19 pandemic due to labor shortages (Mishra et al., 2022). This is because warehouse operations (e.g., loading, unloading, storing, and packaging) and sourcing (e.g., procuring of seeds, sowing, and harvesting) are all labor-intensive activities. Approximately 6.7 million migrant laborers from six states in India were required to return to their native places because of lockdowns, which further affected food deliveries and resulted in a 10% increase in the wholesale prices of fruits and vegetables.

Second, measures adopted to control the spread of COVID-19 delayed and disrupted transportation and logistics services. For example, the pandemic seriously affected food distribution services in Wuhan, especially transportation services from farmers to wholesalers, wholesalers to processors, and processors to retailers (Min et al., 2020). Thus, the accumulation of agri-food products and a lack of additional refrigerated storage facilities may increase food loss. This is a nightmare scenario for highly perishable products such as fruits and vegetables. The situation worsens when consumers purchase fewer fresh products, while purchasing more pantry, frozen, and packaged food items. Third, the lack of specialized or trained people to perform quality and certification checks may lead to food safety issues. For example, during the COVID-19 pandemic, supermarket inspectors experienced difficulties performing on-site checks of meat products processed by a large-scale abattoir because of high infection rates caused by the factory's low temperature and enclosed working environment (Do et al., 2021). Fourth, processing facilities working efficiency has been heavily affected by social distancing requirements, which make close working conditions impossible. These disruptions caused by the COVID-19 pandemic severely affected the supply and demand of AFSCs, making it extremely difficult to run them smoothly and efficiently.

Currently, over 49 million people worldwide are experiencing extreme hunger due to economic shocks caused by the COVID-19 pandemic (World Food Programme, 2022). This number is 22.5% higher than that in 2021. The preventive measures (e.g., border closures and movement restrictions) adopted to stop the spread of COVID-19 seriously disrupted income-generating activities and exacerbated food price increases (Rizou et al., 2020). In particular, people who rely on unstable income sources (e.g., casual workers and small traders) were most affected. However, sufficient quantities of food are available globally (United Nations Environment Programme, 2020). This is because the COVID-19 pandemic exposed several vulnerabilities in AFSCs; it disrupted the functions of AFSCs for supplying, processing, and delivering agri-food products to end consumers; and it ravaged the most vulnerable communities across different countries. From this perspective, how AFSCs can prepare, respond and recover, and adapt in response to various disruptions

caused by the COVID-19 pandemic is worth studying. In other words, options for strengthening the overall resilience of AFSCs need to be explored.

Resilience means to "bounce back" and originally came from the Latin word "resiliere." It represents a process of continuously anticipating and responding to external threats rather than focusing on only a simple outcome (Azadegan & Dooley, 2021; Weick & Sutcliffe, 2007). Resilience as a multidimensional phenomenon has been defined across different disciplines (e.g., engineering, psychology, sociology, and economics). The commonality of the resilience concept across disciplines is that it helps to manage or cope with any changes or disruptions to a system (Novak et al., 2021; Shishodia et al., 2021). Considering this, AFSC resilience (AFSCRes) can help agri-food firms recover quickly from a disruptive event or even achieve a better operational performance, thereby contributing to the unbroken flow of safe and appropriate food to end consumers in the face of a disruption (Stone & Rahimifard, 2018; Tukamuhabwa et al., 2015). This study also answers the call of the FAO to build resilient AFSCs by providing novel solutions for achieving zero hunger.

AFSCs are extremely complex systems comprising linked activities that form a "farm-to-fork" sequence, including cultivating, producing, harvesting, cleaning, testing, processing, packaging, warehousing, transporting, distributing, and retailing (Zhao et al., 2021). To support these activities, farmers/producers, farmer cooperatives/associations, intermediaries, processors/manufacturers, research institutions, universities/schools, communities, importers/exporters, wholesalers, logistics service providers, and retailers participate in moving agri-food products from initial production to final consumption (Tsolakis et al., 2014). Most agri-food products are perishable, sensitive to seasonality, and need to comply with national/international food safety standards and special measures should therefore be considered, such as refrigerated trucks and warehouses, traceability technologies, and environmentally friendly packaging materials. Undoubtedly, adopting these measures will increase the costs for AFSC stakeholders and strengthen the overall complexity of AFSCs. Recently, several unusual and severe weather conditions occurred globally without warning, including deadly floods in China and Germany and record-breaking heatwaves across the Middle East, indicating that the climate crisis will place increasing strain on AFSCs.

Thus, AFSCs urgently need to be equipped with the capability to prevent or alleviate the effects of disruptions and prepare, respond and recover, and adapt in the face of such effects in a timely, efficient, and affordable manner (Aboah et al., 2019). For example, researchers have suggested embedding four resilience capabilities in the preparedness phase, including situation awareness, visibility, security, and redundancy (Han et al., 2020). Regarding the response and recovery phases, agility, flexibility, collaboration, leadership, and knowledge management (KM) have been widely discussed in the literature (Essuman et al., 2023; Pettit et al., 2010, 2019; Um & Han, 2021). Resilience capability factors, which represent detailed management practices that can contribute to resilience capability building, are critical (Cotta & Salvador, 2020). Researchers have suggested that the use of resilience capability factors can be associated with different resilience phases, as each phase requires different factors (Stone & Rahimifard, 2018). When facing a disruption, the successful survival of organizations and AFSCs depends on not only resilience capability factors but also contextual factors, such as cultural value orientations. A cultural value orientation has the capability to shape and justify individual and group beliefs and further influences an organization's arrangements (Schwartz, 2006). Therefore, it can affect individual evaluations of and organizational responses to disruption (Sarafan et al., 2020).

Previous works focusing on AFSCRes have investigated resilience capability factors from the whole AFSC perspective, specific capabilities for building AFSCRes, and overwhelmingly viewed disruption from the reactive and recovery phases only (Duong & Chong, 2020; Roh et al., 2022; Scholten & Schilder, 2015). However, limited attention has been paid to conducting an event-based empirical study to investigate AFSCRes capability factors and their use across preparedness, response, recovery, and adaption, while considering the impact of cultural value orientations (De Sa et al., 2020; Van Hoek, 2020). Resilience frameworks that contribute to disruption management are difficult to propose without understanding the underlying factors that shape response and recovery (Sarafan et al., 2020). Accordingly, the COVID-19 pandemic provides an extensive opportunity to investigate how AFSCs prepare, respond and recover, and adapt under different cultural value orientations.

This study aims to explore AFSCRes in the face of the COVID-19 crisis. Thus, two research questions are formulated:

RQ1: What are the resilience capability factors used at the organizational and AFSC levels in the face of the COVID-19 crisis?
RQ2: How are these resilience capability factors used across the four phases of resilience building (preparedness, response, recovery, and adaption)?

To answer these questions, we conducted a qualitative, inductive study exploring the resilience capability factors used to help AFSCs prepare, respond and recover, and adapt in the face of the COVID-19 crisis in two different

countries: China and Spain. In particular, middle-range theory (MRT) was adopted because it could allow us to consider resilience capability factors used in a specific cultural value orientation. We chose to conduct a cross-national comparative study because COVID-19 is a crisis on a global scale, and different countries have different cultural value orientations. AFSCs located in different countries must be adversely affected by the pandemic (Gunessee & Subramanian, 2020). For example, China was the origin of COVID-19, and Spain was one of the countries most affected at the business level. By comparing the resilience capability factors used across different resilience phases between China and Spain, we hope to shed light on AFSCRes building in relation to different cultural value orientations. Thus, we first conducted 40 interviews (i.e., 20 interviews per country) with farmers, farmer cooperatives, distributors, processors, wholesalers, retailers, and regional agricultural governments. Then, we used thematic analysis to identify AFSCRes capability factors that each AFSC practitioner used at each resilience phase. Finally, we conducted a comparative analysis between China and Spain to contrast the factors used in each resilience phase and the impact of cultural value orientation on AFSCRes building.

Our study makes two important theoretical contributions. First, using MRT, we identify that different cultural value orientations may facilitate or impede the response and recovery of organizations and AFSCs in relation to the COVID-19 pandemic. Therefore, this study extends previous research that has examined the impact of cultural value orientations on supply chain resilience (SCRes), supply chain risk management, or organizational risk management (Revilla & Saenz, 2014; Sarafan et al., 2020). For example, in a hierarchical cultural environment, AFSC organizations can achieve synergy with government assistance and guidance, thereby contributing to the AFSC's response and recovery in the face of COVID-19. However, the cultural environment may delay some organizations' response and recovery, due to the authorities expecting all AFSC organizations to implement the same policy. The situation differs, though, in an egalitarianism cultural environment, which will support response and recovery for organizations, but may potentially delay them for supply chains. Second, this study links resilience capability factors and different resilience phases. Existing studies on SCRes in relation to COVID-19 crisis have mostly focused on the response and recovery phases (Ali et al., 2021, 2023; Khan & Ali, 2022; Mishra et al., 2022; Raassens et al., 2022). We contribute to previous research by identifying resilience capability factors for not only the response and recovery phases but also the preparedness and adaption phases. This study also generates managerial implications for agri-food business and AFSC managers regarding how to prepare, respond, recover, and adapt in the future to face a crisis similar to the COVID-19 pandemic. Policy implications are also provided for the Chinese and Spanish governments.

The remainder of this paper is organized as follows. In Literature review section, a literature review on AFSCRes is presented. Then, the research methodology is discussed in Research methodology section. In Empirical data collection section, empirical data collection activities in China and Spain are described, followed by the data analysis and findings in Data analysis and findings section. In Discussion section, the discussion and managerial and policy implications are presented. Finally, the main conclusions, limitations, and future research directions are provided in Conclusions section.

LITERATURE REVIEW

In this section, we firstly discuss the unique nature of AFSCs. Next, we present the definitions of AFSCRes and its related phases. Then, we consider AFSCRes capabilities and their adoption in different phases. Thereafter, we review studies related to COVID-19 and AFSCRes. Finally, we propose a theoretical foundation for this study, then identify the research gaps.

The unique nature of AFSCs

Most agri-food products have unique characteristics (e.g., perishability) that distinguish them from manufactured commodities (Darby et al., 2022), making AFSCs different than other manufacturing and service supply chains (Sporleder & Boland, 2011). First, most agri-food products are characterized by perishability, but the period of their perishability ranges from a few hours to a few months (Vazquez-Noguerol et al., 2022). Thus, refrigeration facilities are required during the distribution, storage, and marketing processes, which raises costs for agri-food practitioners. Second, production seasonality means that agri-food products can only be produced during a particular season of the year, which leads to intra-year seasonality in product prices and worker migration during the harvesting season. Normally, product prices fall at the start of the harvest season and rise when supplies begin to decrease. Agricultural technology (e.g., greenhouses and genetic modification) and the growing role of globalized AFSCs have alleviated the effects of seasonality to some degree; however, this also increases the complexity of AFSCs. Third, the quality and quantity of agri-food products are determined by a range of factors (e.g., climate, soil, and people) (Hornick, 1992), which may cause price variations

and further influence an agri-food firm's profitability. Thus, a grading system was introduced and is used by most AFSC practitioners. Fourth, the perishability of agri-food products and lean strategy implementation leads to low buffer stock. Finally, the prevalent market structure at the farm gate remains an oligopsony (Sporleder & Boland, 2011). Thus, most farmers collaborate with each other to form farmers' associations to acquire more bargaining power, as more than 80% of agribusinesses are small- and medium-sized enterprises.

AFSCRes definitions and phases

AFSCRes is increasingly important due to the rising intensity and frequency of supply chain disruptions. Therefore, AFSC stakeholders seek to avoid these disruptions or accelerate the recovery process by employing resilience (Liu & Wei, 2022; Scholten et al., 2020). Ribeiro and Barbosa-Povoa (2018) argued that resilience is a desirable characteristic for AFSC stakeholders to survive unexpected, unpredictable, or extreme events with acceptable costs and time. Owing to its positive effects when dealing with various types of adversity, researchers, policymakers, and industrial practitioners have dedicated themselves to understanding and building resilience.

Resilience is a multidisciplinary and multifaceted concept that has been discussed in several disciplines, including engineering, ecology, and psychology (Ponis & Koronis, 2012; Sawyerr & Harrison, 2023). From an engineering perspective, resilience is considered the capacity of a material to store, unload, and recover from strain energy without breaking or becoming deformed (Wieland & Durach, 2021). From an ecology perspective, the definition of resilience is similar to that in engineering; however, it shows a clear difference in that it describes how fast an ecosystem's stability can recover following a perturbation (Pimm, 1984). From a psychology perspective, the definition of resilience provides more potential meanings and shows completeness. For example, "3C" principles have been introduced (Reich, 2006): (1) "control" (i.e., helping those with mental illness regain control of their lives), (2) "coherence" (i.e., reducing the negative effects of disasters imposed on patients), and (3) "connectedness" (i.e., providing patients with the supports necessary to reestablish stable bonds with others).

Before further exploring the definition of AFSCRes, an understanding of organizational resilience is necessary, because organizations are a fundamental component of AFSCs (Cotta & Salvador, 2020). Without organizational resilience, resilience across the whole supply chain cannot be achieved (De Sa et al., 2020). Organizational resilience is assumed, as a firm has the capacity to survive, adapt, and grow in the face of change and uncertainty (Pettit et al., 2013). It postulates that an organization should have four fundamental components: (1) dynamic capacity to embrace and respond to change, (2) subsystems that can be resilient, (3) managers who can be sensitive to changes in the environment, and (4) flexible and innovative responses (Kamalahmadi & Parast, 2016). Regardless of perspective, some commonalities can be seen in the definition of resilience. First, resilience should fulfill the basic requirements of a system. For example, the most basic function of AFSCs is to fulfill consumers' requirements for high-quality foods with competitive prices and desirable service. Second, resilience can be considered a closed-loop system that includes preparation, response, recovery, and adaption phases. Third, resilience capability factors should be used to help a system achieve resilience. Finally, resilience equilibrium cannot be achieved, as the resilience of a system is continuously evolving.

Achieving organizational resilience alone cannot help organizations survive in this increasingly uncertain world because competition has shifted from being between organizations to between supply chains. Therefore, relevant research related to SCRes is evolving. For example, Rice et al. (2003) provided one of the earliest definitions of SCRes describing it as the ability to react to disruptions and restore normal operations. Then, Ponomarov and Holcomb (2009) provided a more comprehensive definition of SCRes and included different phases to explain it, such as preparing for, responding to, and recovering from disruptions, and finally achieving a desired level of performance. Later definitions of SCRes are similar with the definition proposed by Ponomarov and Holcomb (2009) but involve more elements. For example, Kamalahmadi and Parast (2016) considered four phases across SCRes (i.e., anticipation, resistance, recovery, and response) and indicated that adaptability, flexibility, and agility have critical roles in tackling disruptions. Ribeiro and Barbosa-Povoa (2018) simply defined SCRes as a resilient supply chain that should be able to prepare for, respond to, and recover from disruptions with acceptable costs and time. Finally, after reviewing 137 articles on SCRes and considering the characteristics of AFSCs, Stone and Rahimifard (2018, p. 219) have provided the most up-to-date and comprehensive definition of AFSCRes (Hendry et al., 2019): "The collective ability of Agri-food supply chain stakeholders to ensure acceptable, sufficient and stable food supplies, at the required times and locations, via accurate anticipation of disruptions and the use of strategies which delay impact, aid recovery and allow cumulative learning post-disruption."

The above discussion on SCRes shows that, although they may describe it using different words, the existing definitions all comprise four phases: preparedness (or

anticipation or readiness), response (or resistance), recovery, and adaption (or growth or post-disruption learning). Hohenstein et al. (2015) reported the same finding after reviewing more than 67 articles on SCRes. Thus, this study follows previous work and categorizes SCRes into four phases (Kamalahmadi & Parast, 2016; Stone & Rahimifard, 2018; Tukamuhabwa et al., 2015). First, preparedness, as the initial phase of SCRes, indicates that supply chains should be prepared for any expected or unexpected changes in their environment. Second, in the response phase, as soon as a foreseen or unforeseen disturbance is detected, any strategies based on available resources that can alleviate or minimize the negative effects of the disturbance should be adopted. Third, in the recovery phase, with increased understanding of the disturbance, existing resources can be used and strategies applied until supply chain performance returns to its original state. Fourth, the adaption phase includes learning from and summarizing experiences based on the disruption and preparing for future disturbances.

AFSCRes capabilities and adoption in different phases

Several terms have been used interchangeably to describe AFSCRes capabilities, including enablers, antecedents, elements, competencies, and principles (Cotta & Salvador, 2020; Kamalahmadi & Parast, 2016). These terms are heterogeneous and show inconsistencies because resilience research is sparse and fragmented. To achieve consistency, and in line with previous research (Tang & Tomlin, 2008), the term "capabilities" is used in relation to this study. Resilience capabilities can be used to underpin AFSCRes, whereas resilience capability factors are detailed managerial practices that can be used to enhance AFSCRes capabilities, as noted in Introduction section.

Widely accepted resilience capabilities include flexibility, redundancy, trust, information-sharing, visibility, collaboration, velocity, leadership, innovation, risk management culture, and KM (Han et al., 2020; Scholten et al., 2014; Singh et al., 2023; Zinn & Goldsby, 2017). However, these capabilities are not set in stone and can change based on the situations. For example, in AFSCs, community resources, cohesion, bargaining power, node criticality, agility, and adaptability have been mentioned in previous research as being able to effectively build AFSCRes (Stone & Rahimifard, 2018). In other contexts, contingency planning, market position, security, and situation awareness were identified as critical when building resilience (Ivanov & Dolgui, 2019; Yaroson et al., 2023). The variations in resilience capabilities adopted in different contexts indicate that no rules are universally applicable for building resilience. Resilience capabilities can only be embedded into supply chains through empirical investigation. This is why a call for event-based, less-conceptual, and more empirical research has been continuously arising from academia and industry in the last two decades (Kahiluoto & Makinen, 2020).

Scholars have frequently discussed the abovementioned resilience capabilities in the context of tackling supply chain disruptions (Hughes et al., 2023; Leat & Revoredo-Giha, 2013). However, few have investigated the influence of cultural value orientations on SCRes (Sarafan et al., 2020). Previous literature highlighting the important role of culture in enhancing SCRes, primarily from an organizational perspective, such as Acar et al.'s research (2022), has noted that organizational learning culture and supplier trust have positive and significant effects on SCRes. Chunsheng et al. (2020) highlighted the critical role of risk management culture in enhancing the relationship between SCRes and financial performance, while Ali et al. (2021) indicated that AFSCRes can be achieved through KM and risk management culture. Cultural value orientations represent the basic and core beliefs of a given society (Yoo et al., 2011). Different cultural value orientations across countries pertain to various social attitudes, work values, beliefs, and judgments (Schwartz, 2006), and further influence supply chain managers' views on disruptions and reactions to certain events (Vanpoucke & Ellis, 2020). Therefore, cultural value orientation influences SCRes. For example, using a scenario-based experiment, Sarafan et al. (2020) found that collectivism has no significant impact on the perceived disruption risk in low uncertainty environments, but a higher and significant impact in high-uncertainty circumstances.

Resilience capabilities can be classified into different categories based on their effectiveness across different phases of a disruption. Accordingly, they have been categorized into proactive and reactive strategies depending on whether they were adopted to avoid or recover from a risk, threat, or disaster (Gabler et al., 2017; Tukamuhabwa et al., 2017). For example, redundancy and flexibility have been used as proactive strategies for building buffer capacity and providing alternative options, respectively (Stone & Rahimifard, 2018). From a reactive strategy perspective, KM has been employed to learn from a threat and develop more effective plans for future disruptions (Ponomarov & Holcomb, 2009). Other capabilities such as collaboration among partners, agility enhancement, contingency planning, and market position have been used in the reactive phase (Scholten et al., 2014), whereas visibility, security, situation awareness, and increased cohesion have been used in the proactive phase (Vanpoucke & Ellis, 2020). Aside from simply categorizing resilience capabilities into proactive and reactive strategies, resilience capabilities

can also be categorized as preparedness, response, recovery, or adaptive based on the phases of a disruption (De Sa et al., 2020). Further, Stone and Rahimifard (2018) suggested that AFSCRes capabilities should be divided into two categories for easier application: core capabilities (e.g., redundancy, collaboration, flexibility, and visibility) and supportive capabilities (e.g., co-learning, trust, network complexity, and responsiveness).

COVID-19 and AFSCRes

Scholars and industry practitioners have been exploring AFSC issues raised by the COVID-19 pandemic since it began. These topics include but are not limited to (1) the impact of COVID-19 on AFSCs; (2) AFSCRes capability factors used to tackle and recover from disruptions caused by the COVID-19 crisis; (3) the role of digital technology in enhancing AFSCRes and addressing risks, threats, or disruptions related to the COVID-19 crisis; and (4) sustainable AFSC management in light of COVID-19 (Chowdhury et al., 2021; Herold et al., 2021; Mussell et al., 2020; Treiblmaier & Rejeb, 2023). In particular, the first two research topics have received considerable attention because the effects of COVID-19 on AFSCs are heterogeneous, devastating, and comprehensive. For example, supply, demand, production, transportation and logistics, retail, relationships among AFSC stakeholders, financial management, and AFSC sustainability have all been seriously affected by the COVID-19 pandemic. Building resilience is an effective way to help AFSCs recover from disruptions and must receive urgent attention. In particular, AFSCRes has attracted substantial scholarly interest because food shortages have been widely reported.

Some studies related to the COVID-19 pandemic and AFSCRes are summarized in Table 1. We applied three criteria when selecting these papers. First, the selected papers should be published in highly ranked journals, including those with rankings of 3 (or A) and above. Thus, we used the 2021 *Academic Journal Guide* developed by the Chartered Association of Business Schools and the 2019 *Journal Quality List* developed by the Australian Business Deans Council to identify relevant publications. To avoid missing contributions, papers published in other high-quality journals not listed in those two journal guides were also considered based on the 2021 *Journal Citation Report* developed by Clarivate. For example, papers published in *Trends in Food Science & Technology* (2021 IF: 16.002, ranked second among 144 journals) and *Agricultural Systems* (2021 IF: 6.765, ranked third among 59 journals) are included in Table 1. Second, the selected studies should have a clear focus on COVID-19 and AFSCRes. However, this does not mean that any papers focusing on COVID-19 and AFSCRes were included. We only concentrated on papers that provided clear AFSCRes frameworks/capabilities for managing the impact of COVID-19. Thus, papers that highlighted the role of technology in mitigating risks caused by COVID-19 but merely linked with AFSCRes, focused on AFSC sustainability but shed some light on resilience, or reported effects of COVID-19 but only provided some managerial practices to build AFSCRes were not included. Third, two experienced OSCM professors involved in this study who have collaborated with the agri-food industry for over 20 years were asked to review each paper (e.g., title, abstract, introduction, and conclusion) to ensure that we included appropriate studies based on our criteria.

Middle-range theory (MRT)

General theories (e.g., resource-based theory, social network theory, contingency theory, and transaction cost economics) emphasize extending a theory's generalizability to other domains by conducting research in new areas. This results in a weak understanding of why investigated phenomena occur, as general theories define concepts and relationships at a high level of abstraction (Hunt, 1983). MRT differs from general theories because it focuses on consolidating knowledge in terms of how, why, and when elements are related to a specific phenomenon of interest (Stank et al., 2017). Accordingly, MRT postulates that all actions occur within a specific context (Russo et al., 2021). Thus, this study adopted a middle-range theorizing framework (Bastl et al., 2019; Pellathy et al., 2018; Stank et al., 2017) of context + mechanism = outcomes (CMO) to provide a deep understanding of how AFSCs prepared for, responded to, recovered from, and adapted to the COVID-19 crisis. Context pertains to situational opportunities for or impediments against certain actions (Johns, 2006), whereas mechanisms are understood as causal processes that have the potential to generate outcomes (Pawson & Tilley, 1998).

MRT is a well-developed theory; therefore, it provides a structured process to follow (Bastl et al., 2019; Pellathy et al., 2018; Stank et al., 2017). The formulation of MRT begins with an empirical relationship, which can be established based on existing knowledge within a specific discipline and validated through repeated observations. Compared with general theories that conceptualize such relationships from a general theoretical perspective, MRT builds empirical relationships as a starting point for further theorizing (Stank et al., 2017). Then, empirical investigation mechanisms and contexts are used to link antecedents and outcomes. In particular, mechanisms that link antecedents and outcomes and contextual factors that enable or inhibit the mechanism are described in detail (Stank et al., 2017). Finally, the CMO configuration is

TABLE 1 Studies related to COVID-19 and AFSCRes.

Author(s) (year)	Topic focused	Theory adopted	Journal name and ranking	Focused AFSCRes phases				National context	AFSCRes capability stressed
				Preparedness	Response	Recovery	Adaption		
Ali et al. (2021)	Providing a broad view of SCRes reactive strategies for SMEs in dealing with crises in the context of COVID-19	Resourced-based theory and contingency theory	*Trends in Food Science & Technology* (2021 IF: 16.002)		✓	✓		N/A	Agility, flexibility, collaboration, human resource management, and redundancy
Burgos and Ivanov (2021)	Examining the impact of COVID-19 pandemic on food retail supply chain and their resilience	N/A	*Transportation Research Part E: Logistics and Transportation Review* (ABS3)		✓	✓	✓	Germany	Supply chain collaboration, visibility, inventory strategies, redundancy, digitalization
Coopmans et al. (2021)	Obtaining empirical evidence on resilience-enhancing characteristics of AFSCs to sudden shocks	N/A	*Agricultural Systems* (2021 IF: 6.765)	✓	✓	✓		Belgium	Flexibility, openness, reserves, tightness of feedback, profitability, etc.
Do et al. (2021)	The effectiveness of supply chain agility in mitigating the impacts that caused by COVID-19	Dynamic capability theory	*Supply Chain Management: An International Journal* (ABS3)		✓	✓	✓	United Kingdom	Agility
Kumar et al. (2021)	Prioritization of mitigation strategies used for tackling the crisis caused by COVID-19	Contingency theory	*Technological Forecasting and Social Change* (ABS3)	✓	✓	✓		India	Collaborative management, proactive business continuity planning, and financial sustainability
Ali et al. (2022)	Understand the ways of firms to achieve resilience and competitiveness across the COVID-19	Dynamic capability theory	*Journal of Business Research* (ABS3)	✓	✓	✓		Australia	Cross-sector collaboration with local and global partners
Blessley and Mudambi (2022)	Understanding food bank SCRes during COVID-19	Dynamic capability theory	*Industrial Marketing Management* (A*)	✓	✓	✓	✓	USA	Identified 13 resilience capabilities across four phases
Kayikci et al. (2022)	Exploring the role of blockchain technology to activate operational excellence during outbreaks	N/A	*The International Journal of Logistics Management* (A)	✓	✓	✓		N/A	Blockchain technology equips AFSCs with transparency and visibility
Khan and Ali (2022)	Resilience strategies used for cold chain during the COVID-19 crisis	N/A	*Australian Journal of Management* (A)		✓	✓		Pakistan	Crisis simulation, identification and securing logistics, digitalization of supply chain
Mishra et al. (2022)	Synthesis the fragmented knowledge on SCRes to tackle the disruptions caused by COVID-19 pandemic	Dynamic capability theory	*The International Journal of Logistics Management* (A)		✓	✓		India	Collaboration, coordination, ICT, and ground-level inputs
Raassens et al. (2022)	Identifying the crisis management strategies that can be used during the hectic early phase of the COVID-19 pandemic	N/A	*The International Journal of Logistics Management* (A)		✓	✓		N/A	Management resources, diversifying strategically, prioritizing long-term outcomes, bonding socially

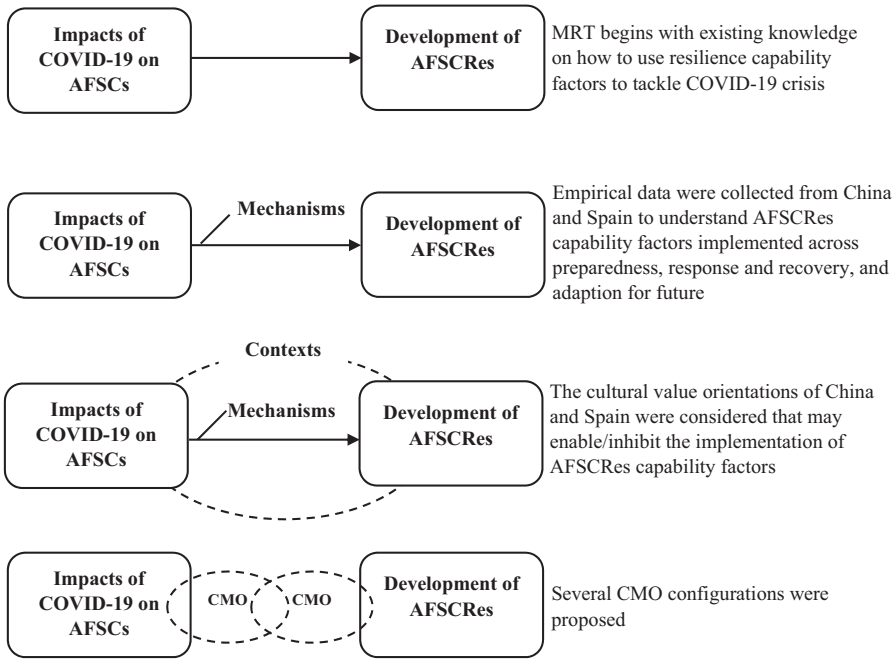

FIGURE 1 MRT theoretical framework for AFSCRes under different cultural value orientations.

proposed, which is a mechanism operating within a context that generates an outcome (Stank et al., 2017).

Figure 1 illustrates the MRT process for this study. It began with existing knowledge on AFSCRes capability factors used to tackle the crisis caused by COVID-19. Empirical data collected from China and Spain were used to describe how AFSCs prepared, responded and recovered, and adapted in relation to the COVID-19 crisis under different cultural value orientations. Finally, several CMO configurations were proposed based on the study's findings.

Synthesis of research gaps

Based on a detailed analysis of relevant literature, we identified four research gaps. First, existing studies published in high-quality journals and relevant to COVID-19 and AFSCRes (see Table 1) have all shed light on methods for responding and recovering from the COVID-19 crisis. This includes the technological perspective (e.g., blockchain) (Kayikci et al., 2022), unique AFSCRes capability perspective (e.g., agility) (Do et al., 2021), unique stakeholder perspective (e.g., Burgos & Ivanov, 2021), and broad AFSCRes perspective (e.g., Ali et al., 2021, 2023). However, a comprehensive understanding of AFSCRes across the preparedness, response, recovery, and adaption phases is still lacking because extant research focuses on the response and recovery phases in relation to tackling the crisis caused by COVID-19. An improved understanding of AFSCRes cannot be achieved without providing a proper understanding of the preparation (how to prepare for potential disruptions) and adaption (adapting for competitive advantage) phases (Van Hoek, 2020).

Second, based on the most up-to-date literature review on supply chain studies related to the COVID-19 pandemic (Chowdhury et al., 2021), empirical research is still lacking on how real-world practices should be managed to combat the COVID-19 crisis. For example, supply chain executives have recognized that they were insufficiently prepared for COVID-19 and their existing plans were not fully applicable to the situation. However, how to increase preparedness, activate effective response and recovery strategies, and adapt based on the COVID-19 crisis are still valuable topics that deserve special attention (Chowdhury et al., 2021; Van Hoek, 2020). Thus, conducting empirical research to close the gaps between research findings and industrial practice will not only improve the knowledge of supply chain managers but also contribute to structural changes for dealing with future crises similar to the COVID-19 pandemic.

Third, our review on relevant research shows that dynamic theory, contingency theory, and resource-based theory have been widely used in study designs, measurements, and analyses (see Table 1). However, MRT was seldom used to evaluate resilience capability factors for managing the effects of and recovery from COVID-19. MRT is particularly suitable for understanding why particularly outcomes occur in a given setting, especially for this study, which included a comparative analysis between different countries. Chowdhury et al. (2021) also call for applying theory in the field of disruption management after

reviewing 74 articles related to supply chain COVID-19 management.

Finally, we observed that existing studies investigated AFSCRes from a single-country perspective (see Table 1). Thus, contextual factors such as cultural value orientation have seldom been considered in prior work regarding whether it has effects on supply chain recovery from the COVID-19 crisis. Thus, this study addresses this gap by providing a comparative analysis between two countries with different cultural value orientations to examine the effects on ASCRes.

RESEARCH METHODOLOGY

Interpretivism research philosophy emphasizes that the social world can be explained in a subjective manner (Walsham, 1995). Thus, it was adopted in this study to investigate how organizations and AFSCs prepare, respond, recover, and adapt in relation to the COVID-19 crisis. The unit of analysis in this study was different organizations involved in AFSCs across China and Spain. Researchers have argued that a tight connection exists between interpretivism and inductive reasoning (Willis, 2007). Inductive reasoning entails a detailed reading of raw data to derive concepts and themes (Thomas, 2006), which makes it suitable for capturing "the most empirically grounded and theoretically interesting factors" (Schussler et al., 2014, p. 147). In particular, this study aimed to deepen the current understanding of how to build AFSCRes in the face of the COVID-19 crisis. Thus, an inductive approach is appropriate to use for identifying the resilience capability factors of organizations or AFSCs. It is expected that interpretivism, by its nature, promotes the value of qualitative data in pursuit of knowledge (Goldkuhl, 2012). Consequently, a qualitative approach was adopted to investigate different capability factors for building AFSCRes in the face of the COVID-19 crisis and to examine the effectiveness of each factor across the preparation, response, recovery, and adaption phases of AFSCRes.

Data collection methods

Semi-structured interviews are exploratory interviews that employ a blend of closed- and open-ended questions for qualitative research purposes (Saunders et al., 2009). Semi-structured interviews were considered appropriate for this study for several reasons. First, the investigation of how to respond to the COVID-19 crisis is still in the preliminary stage; thus, the exploratory nature of this study makes semi-structured interviews appropriate for probing, explaining, and building theory based on participants' responses (Falcone et al., 2022). Second, a critical advantage of semi-structured interviews is the opportunity for previously unknown information to emerge if interviewees are provided with sufficient opportunities to speak freely. Interviews with experienced AFSC practitioners can provide valuable insights and generate new knowledge on how to prepare for, respond to, recover from, and adapt to the COVID-19 crisis. Third, semi-structured interviews are well suited for the exploration of attitudes, values, beliefs, and motives of respondents regarding complex and sensitive issues (Barriball, 1994). Therefore, semi-structured interviews were adopted because of their advantages over other (e.g., structured and unstructured interviews) for exploring complex issues.

We use data triangulation to increase the rigorousness of our study. Data triangulation entails obtaining data from different sources (Carter et al., 2014). Thus, we collected data from two different sources: (1) semi-structured interviews with AFSC practitioners in China and Spain; and (2) documents from government reports, policies, announcements, and company websites.

Data analysis methods

Two data analysis methods were adopted in this study: thematic analysis and comparative analysis. The justifications for using each method are discussed below.

Thematic analysis is a widely used method for analyzing qualitative data that entails searching across a dataset to identify, analyze, organize, describe, and report repeated patterns (Braun & Clarke, 2006). It is a powerful, flexible, appropriate, and simple method that can be applied when seeking to understand a set of experiences, thoughts, or behaviors across a dataset. This study aimed to deepen the current understanding on different AFSCRes capability factors used for preparing for, responding to, recovering from, and adapting to the COVID-19 crisis. Thus, it was necessary to examine different organizations' perspectives regarding the crisis, highlight similarities and differences across each dataset, and generate unanticipated insights, which are the advantages thematic analysis has over other qualitative data analysis methods (Nowell et al., 2017). Furthermore, thematic analysis is useful for summarizing key features of a large dataset (King, 2004). Considering that this study collected data from different sources (e.g., interviewees, policies, and websites), thematic analysis was considered appropriate. However, although thematic analysis has various advantages for analyzing qualitative data, we also needed to understand the pitfalls of applying this method. For example, a particular disadvantage of thematic analysis is that it can lead to inconsistencies and

a lack of coherence when developing themes derived from the data (Holloway & Todres, 2003). To ensure the rigor of our findings and interpretations, trustworthiness was built to alleviate or avoid the disadvantages of thematic analysis by following the criteria defined in Table 2.

We conducted a cross-country comparative analysis to explain the similarities and differences in AFSCRes building between China and Spain in relation to the COVID-19 crisis. Conducting such an analysis has several advantages. First, a critical advantage of cross-country comparative analysis is its capacity to add new knowledge to the investigated phenomenon. In particular, different countries have different cultural value orientations, and different cultural value orientations induce different responses to the COVID-19 crisis from organizations and supply chains. However, the SCRes literature has been silent on this matter (Sarafan et al., 2020). Second, a cross-country comparative analysis can lead to a deep understanding on the AFSCRes capability factors that have been used in different countries to help AFSCs to prepare, respond, recover, or move to a better state after being disrupted by the COVID-19 crisis. In the foreseeable future, AFSCs in different countries will be continuously affected by COVID-19 and its variants. Thus, this situation makes it appropriate to conduct cross-country empirical, event-based, and less-conceptual research. Finally, a cross-country comparative analysis is useful for sharpening the focus of the analysis of the subject under study by suggesting new perspectives and identifying knowledge gaps (Hantrais & Mangen, 1998).

Considering the advantages provided by semi-structured interviews, thematic analysis, and comparative analysis, these methods were combined to compensate for the weaknesses of each method; provide a holistic understanding on how AFSCs prepared for, responded to, recovered from, and adapted to the COVID-19 crisis; and provide stronger results through data triangulation (Stewart, 2009).

EMPIRICAL DATA COLLECTION

Country settings: China and Spain

Data collection was conducted from March to September 2021 between China and Spain. We selected this specific period to collect data for several reasons. First, China's GDP growth reached 2.3% in 2020, which was a 3.7% decline from 2019. Then, China's GDP grew 8.1% across 2021, reaching $17.73 trillion (National Bureau of Statistics of China, 2022). Spain's GDP achieved 2.1% growth in 2019, recorded it steepest contraction with a 10.8% decline in 2020, and increased by 5.1% in 2021 ($1.43 trillion) (The World Bank, 2022). Particularly, both countries' GDP fell between the last quarter of 2020 and first quarter of 2021, and then turned to growth in the following three quarters of 2021 (see Figure 2). These two countries' economic performance pre- and post-disruption reflects the characteristics of resilience, in that the economy, returned to its original state or to a new or more desirable state after being disturbed. We believe that, in March and September 2021, the AFSCs of these two countries showed resilience in the face of the COVID-19 crisis. Second, an important function of agricultural enterprises is to provide food, basic materials, and primary materials for production, consumption, and processing. Therefore, these enterprises were provided with a "green pass" for production, processing, and transportation during national lockdowns across China and Spain in 2020. We believe that these enterprises

TABLE 2 Trustworthiness criteria.

Trustworthiness criteria	Measures adopted
Credibility (extent to which the results appear to be acceptable representations of the data)	• Data triangulation (the used of variety of data sources: government documents and organization websites were used) • Developed a research protocol to guide the research
Transferability (extent to which the findings from one study in one context will apply to other contexts)	• Involved samples were from the agri-food industry of each country where all companies experienced the COVID-19 crisis • Sample represented firms that have different roles in the AFSCs
Dependability (extent to which the research process is logical, traceable, and clearly documented)	• Audit trails (a study and its findings are auditable when another researcher can clearly follow the decision trail—transcripts and thematic analysis results were sent to the interviewees for extra checking) • Triangulation with governments, as well as documents, policies, and websites
Confirmability (extent to which the findings and interpretations are clearly derived from the data)	• All of the interviews and documents were analyzed by two researchers from each country • Summary of the research findings was analyzed by a OSCM professor who acted as "marker" and "guider" of this research

Source: Hendry et al. (2019) and De Sa et al. (2020).

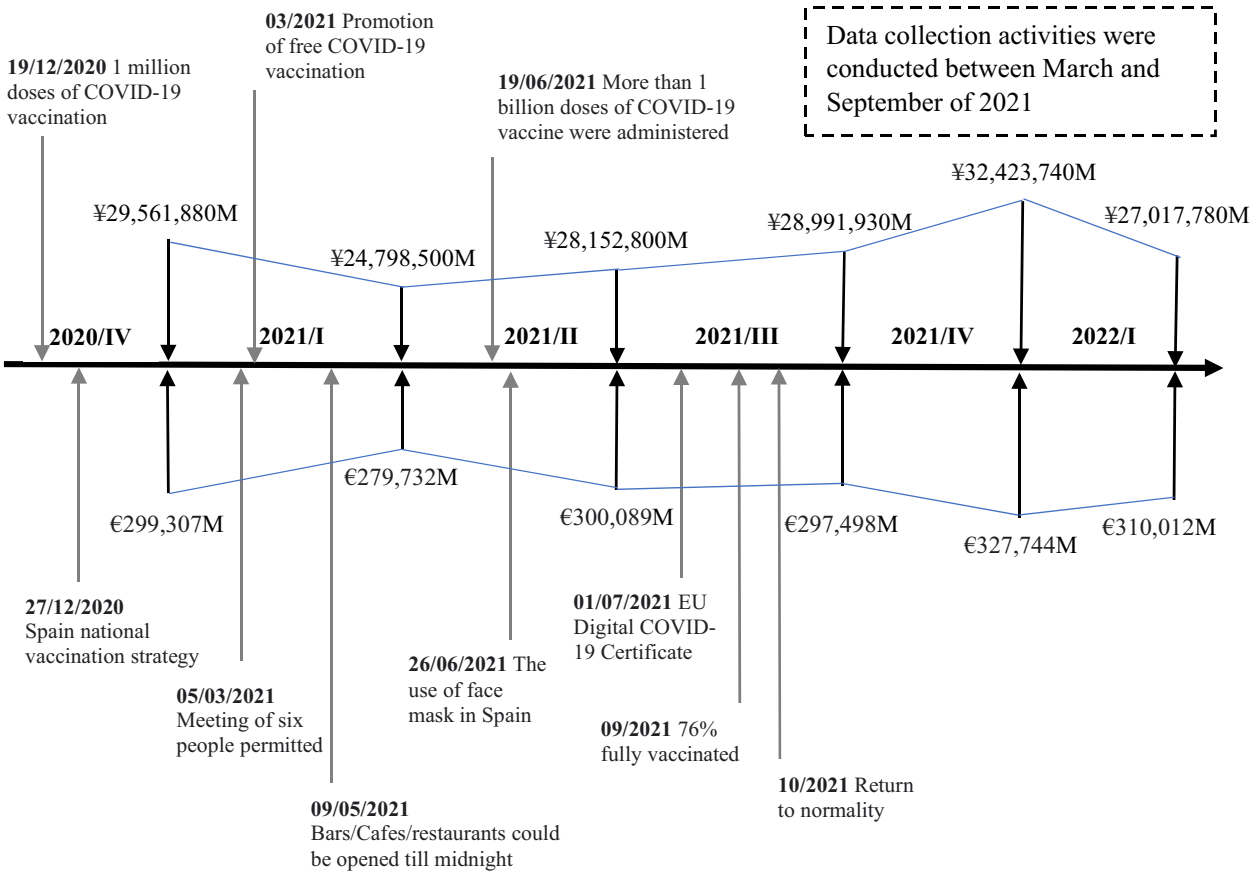

FIGURE 2 National GDP quarterly changes and timeline to tackle COVID-19.

should have had more opportunities to achieve better performance with strong economic growth in China and Spain in 2021. Based on the above, we aimed to examine how organizations and AFSCs prepare, respond, recover, and adapt for the future in relation to COVID-19 crisis. However, we were unable to examine the adaption phase because updating infrastructure and increasing agility and flexibility require more time and efforts. Thus, we added some questions to elicit responses on planned adaption routes for the future, such as "What are the lessons learned from the pandemic?"

China and Spain were selected for the comparative analysis for several reasons. First, agricultural is a pillar industry in both China and Spain (World Bank, 2021). Second, China and Spain experienced smooth progress in their trade relationship from 2011 to 2020. In particular, agricultural products such as meat and edible offal accounted for $3.58 billion of all the products exported from Spain to China during 2020 (United Nations Comtrade Database, 2021). Third, widespread COVID-19 vaccination programs have been applied in China and Spain, allowing AFSC operations to return to normal. We posited that different AFSC practitioners could provide summaries of valuable experience and knowledge for further improvement. Thus, discussions with experienced AFSC practitioners were worthwhile for us to acquire valuable insights in deploying AFSCRes capability factors for future unpredictable disruptions. This also answers the call for stronger empirical research on deploying resilience capability factors across the four phases (e.g., preparation, response, recovery, and adaption) of AFSCRes, as deploying resilience capability factors for building AFSCRes is challenging (Ali et al., 2021, 2023).

Sampling approach and participant selection

Participation in several agriculture-focused projects funded by the Horizon 2020 Marie Sklodowska-Curie Actions and National Natural Science Foundation of China has provided us with wide-ranging connections within the agri-food industry in both China and Spain. Thus, we developed a preliminary list of 52 agri-food companies based on our partners' recommendations. In China, we identified an initial group of 25 agri-food companies based on the recommendation of two professors

in agricultural automation and electrification of an agricultural university, since they have been concentrating on technology transformation for more than 20 years. In Spain, we generated an initial list of 27 agri-food companies based on the recommendation of two OSCM professors, as they have been conducting research projects with companies for over 30 years and worked with more than 200 different agri-food companies. Then, we narrowed the list based on these companies' annual turnover and role in AFSCs.

Regarding the selection criteria, first, the selected agri-food companies should be medium- and large-sized companies from each country. Thus, annual turnover equivalent to or over ¥50 million in China (National Bureau of Statistics of China, 2021) and €50 million in Spain (European Commission, 2021) were considered appropriate for this study. We assumed that enterprises with an annual turnover below ¥/€50 million in each country would be facing more problems than other enterprises because they are typically not insured against disasters and have limited access to financial resources (Sullivan-Taylor & Wilson, 2009). In contrast, enterprises with an annual turnover equivalent to or over ¥/€50 million have likely begun to consider implementing strategies to control risks at the supply chain level and demonstrate some resilience capabilities (Polyviou et al., 2020). Second, the selected agri-food companies should cover most of the roles of AFSCs (e.g., input suppliers, farmers/farmer associations, processors/manufacturers, wholesalers, logistics service providers, and retailers) to ensure our findings were not restricted to a particular product, sector, or process and could be useful for general AFSCRes building (Eisenhardt & Graebner, 2007). Some companies did not meet the annual turnover requirements ($n = 14$) or were only partially involved in agricultural services (e.g., banks supporting rural development) ($n = 4$). Thus, 34 companies were ultimately selected, including 17 in China and 17 in Spain.

Our partners in each country conducted follow-up phone calls, emails, or WeChat communications with the managers of the 34 selected agri-food companies, and we were surprised that all companies happily agreed to participate in this research. This may be because our partners in both countries have collaborated (e.g., funding application and technology transformation) with these 34 companies, making it easier for these companies to accept our research invitation. We adopted purposive and snowball sampling methods (Kelly, 2010) to identify information-rich practitioners from the selected companies who had interests related to organizational resilience and AFSCRes. To gain the interest of the potential practitioners, we conducted Zoom meetings with them regards brief introduction about organizational resilience and SCRes. Thus, two to five practitioners from each company showed willingness to participate in our interviews. However, specific criteria were used to recruit suitable respondents. First, the selected respondents should have more than 10 years of working experience in supply chain, logistics, or risk management, to ensure high levels of expertise, professional experience, and knowledge (Zhao et al., 2021). Second, the selected respondents should be management team members or senior-level managers, and have been working for their company for more than 5 years before the interview was conducted, to ensure that they have sufficient understanding of their company's operations. Then, snowball sampling was implemented to identify additional qualified respondents that could contribute to this research, resulting in another three respondents being identified. Seven other respondents were suggested; however, they could not be included in this study because their company's annual turnover did not meet the criteria or, they did not have the time or sufficient working experience to answer our questions. Detailed interviewee information is shown in Table 3. We relied on quick data analysis to identify the data saturation point. Thus, we followed the 24 h rule proposed by Yin (2009) to analyze the data. The data saturation point emerged after conducting 20 interviews in each country, as the same themes (e.g., agility, collaboration, and top management support) began to recur repeatedly, which indicated further interviews would not help us identify or expand on emerging concepts (Eisenhardt, 1989). Thus, we stopped conducting further interviews, resulting in a total sample size of 40.

Data collection protocol and process

A research protocol was developed through a round table discussion with two OSCM professors. A research protocol was necessary as it can be effective in helping researchers obtain robust and detailed interview data for addressing research questions (Castillo-Montoya, 2016). The protocol included several sections, such as a timeline for data collection and analysis, the types of firms that should be selected, the practitioners who should be interviewed, the duration of each interview, interview guide development and sequence of interview questions, specific training sessions for interviewers and coders to have a good understanding of AFSCRes, devices for recording purposes, and additional documents that should be collected for the purposes of data triangulation.

Then, pilot interviews were conducted with two AFSC practitioners from each country to ensure the interview questions would be unambiguous and could be easily understood by interviewees. Minor and appropriate

TABLE 3 Interviewee information.

Country	Case firm	Main duty in AFSC	Employees	Annual turnover (million)	Key products	Working experience (years)	Role of interviewees
Spain	A	Farmer	10,000	€905	Fish and seafood	16	Logistics manager
	B	Farmer cooperatives	6000	€1000	Meat	15	CEO
	C		500	€60	Kiwi	18	Project manager
	D	Producer/distributor	1000	€134	Fish and seafood	14	Director of external relations
	E	Processor	3600	€350	Seafood	18	IT director
	F		318	€70	Coffee	16	SC manager
	G		190	€59	Seafood	10.5	CEO
	H		500	€78	Wine	27	Commercial director
	I		161	€52	Wine	24	CEO
	J		1200	€63	Canned food	21	Logistics director
	K		171	€76	Seafood	22	Production manager
	L	Processor/wholesaler	65	€89.4	Fish and seafood	14	Business director
	M	Processor/retailer	60	€65	Meat	11.5	Director of marketing
	N		115	€53	Canned food	22	Production manager
	O	Wholesaler	2080	€200	Fish and seafood	13	Purchasing director
	P		325	€100	Pre-packaged food	11	Innovation director
	Q	Distributor	80	€66	Fish and seafood	15	CEO
	R		7992	€1350	Logistic service	34	Logistic director
	S	Retailer	6000	€1079	Logistic service	15	Transport director
	T	Processor	280	€74	Bread	20	Operation director
China	A	Input supplier	100	¥450	Pig feeding	18	CEO
	B		45	¥50	Agri-chemical products	22	Marketing director
	C		38	¥50	Seeds	10	Director of testing
	D	Farmer	60,000	¥360	Maize/Peanuts	25	General manager
	E	Research institutions	98	N/A	Maize	30	CEO
	F		3000	N/A	R&A	20	Professor
	G	Policymaker	56	N/A	Policy making	20	Chief of animal husbandry

TABLE 3 (Continued)

Country	Case firm	Main duty in AFSC	Employees	Annual turnover (million)	Key products	Working experience (years)	Role of interviewees
	H	Processor	50,046	¥1620	Meat	15	Quality control director
	I		220	¥50	Orange juice	10	Production manager
	J		180	¥90	Noodles	16	Marketing director
	K		67	¥60	Fruits	30	CEO
	L	Wholesaler	150	¥65	Pre-packaged food	18	Marketing director
	M		75	¥260	Vegetables	26	Quality control director
	N		620	¥580	Seafood	15	CEO
	O		345	¥845	Seafood	18	General manager
	P	Distributor	150	¥50	Logistic service	12	Planning director
	Q		85	¥50	Logistic service	16	Technical director
	R	Retailer	2000	¥250	N/A	13	CEO
	S		1680	¥320	N/A	24	Purchasing director
	T		1265	¥340	N/A	12	CEO

modifications and corrections were made based on feedback from the pilot interviews, including re-wording and re-ordering questions, changing the grammatical structure of questions, and adding supplementary questions. For example, an additional question was added to Section C of the interview guide: "What are the lessons learned from the pandemic?" After carefully and consistently phrasing the interview questions, an interview guide was finalized (see Appendix 1) with three sections: (1) introductory questions for acquiring interviewee and company information, (2) the effects of COVID-19 on organizations and AFSCs, and (3) organizational and AFSCRes capability factors used to address disruptions caused by COVID-19.

A copy of the interview guide was emailed to the interviewees 3 days before the interview session, which provided them with sufficient time to prepare answers and address each research question appropriately. Two research teams (along with two OSCM professionals in each team) fluent in Chinese and Spanish were responsible for conducting the interviews in each country. To acquire as much detail as possible, each interview was recorded through a combination of written notes and a voice recorder. Thus, 40 interviews were recorded to avoid knowledge loss. Each interview lasted between 45 and 80 min on average, with some long exceptions of more than 2 h. The data collection effort amounted to over 45 h of recordings (approximately 22 h in China and 23 h in Spain) and nearly 246 pages of transcripts (120 pages of transcripts in China and 126 pages of transcripts in Spain). We emailed the transcripts to the interviewees to allow them a chance to review the transcripts and ensure we did not misunderstand what they had said.

Furthermore, additional checks were conducted to achieve some consistency between archival data and the data collected through interviews (see Appendix 2 for an example). We collected archival data from several sources: government reports, government announcements, and company websites. In China, we collected data from the official website of three different levels of government: the Ministry of Agriculture and Rural Affairs, provincial-level agricultural departments, and county-level agriculture bureaus. In Spain, we focused on collecting data from the official website of the Ministry of Agriculture, European Union, and Council of Ministers. Documents from federations, organizations, and other Spanish community institutions were also reviewed. In addition, the websites of the companies involved were checked to identify their annual turnover and measures adopted to aid in their recovery from the COVID-19 crisis. Ultimately, we collected nine documents from each country that were then analyzed by several AFSC professionals involved in this study. We used these resources as replenishments because

we wanted to understand how COVID-19 had affected the AFSCs of China and Spain and trace changes in the supportive measures adopted to help organizations and ASFCs prepare, respond, recover, and adapt in relation to the COVID-19 crisis. In particular, we found detailed information on how the Chinese government helped agricultural organizations respond to and recover from the COVID-19 crisis, including various cases in which government officers helped agricultural organizations during lockdowns. However, the Spanish documents lacked this type of information.

DATA ANALYSIS AND FINDINGS

Data analysis procedure

The qualitative data were analyzed using a rigorous four-step procedure, including transcribing, editing, coding, and categorizing. Initially, each digital recording was transcribed verbatim by a researcher who was familiar with the qualitative data analysis process and AFSCRes. Then, each transcript was read several times to increase familiarity with the data and irrelevant data were removed. Afterward, open coding was conducted. In this process, the qualitative data analysis software program *NVivo 13* was used for data retrieval and management. This step ended when additional checks showed that no valuable information was missed. The first-order codes, derived from open coding that had similar meanings, were categorized into second-order themes, which were then synthesized into aggregate dimensions (King & Horrocks, 2010). In this step, an iterative approach was adopted to refine the second-order themes and aggregate dimensions by moving back and forth between relevant AFSCRes literature and broader resilience theory. For example, several works describing organizational resilience (e.g., Pal et al., 2014) and SCRes (e.g., Kamalahmadi & Parast, 2016) were used. This step ended with all codes being allocated with precise second-order themes and correct aggregate dimensions. Finally, results were circulated to all research team members to ensure they were satisfied with the results.

Findings

This section describes how organizations and AFSCs have been managed to prepare, respond, recover, and adapt in relation to the COVID-19 crisis in Spain and China. The key organizational and AFSCRes capabilities are summarized in Tables 4 and 5, respectively.

Organizational resilience capability factors from Spain

The preparedness of firms

A lack of preparedness in the face of the COVID-19 crisis was identified among all agri-food companies in this study. This occurred for several reasons. First, companies showed low-risk awareness and underestimated the effects of the COVID-19 crisis. For example, risk management culture has been reinforced as being critical for building organizational resilience (Annarelli & Nonino, 2016); however, this was only identified in two companies. The first imported case of the disease in Spain was detected on January 31, 2020, while the first local confirmed case was detected on February 26, 2020. The first case in Spain was detected 1 month after the first case was detected in China. One month had already passed since the first COVID-19 case was confirmed in December 2019 in Wuhan, China. Agri-food organizations in Spain should have taken advantage of the one-month time period to prepare for the forthcoming crisis. However, they did not because of a lack of knowledge on COVID-19: "It is true that we knew that there was a virus, that there were countries suffering from it, but I believe that nobody imagined that it was going to arrive in the way it did, so quickly and with such seriousness." Furthermore, the egalitarianism cultural value orientation in Spain indicates that they should reject new realities (Schwartz, 2006). Second, organizations are run based on their historical data and the management team's experience set contingency plans based on their uncertainty level. For example, most of the organizations had contingency plans for fires, floods, and machine breakdowns, but not for a global pandemic. Third, knowledge gaps existed between the government's guidance and the public's understanding of how to prevent COVID-19 transmission: "We followed the government's guidance, but they were chaotic. Laws were passed in the early morning and the next day nobody understood them, so it was chaos." Finally, a lack of safety stock (e.g., labels, corks, capsules, cardboard, and plastic packaging materials) or having only several days of safety stock were identified as major issues because of lean strategy implementation, cost reduction, and perishability of agri-food products (e.g., fresh or ultra-fresh products): "We had never had problems with the supply of bottles, but we did at that time."

The response and recovery of firms

The way organizations responded to the COVID-19 crisis was grouped into three categories: learning and culture,

TABLE 4 Organizational and AFSCRes capabilities identified from Spain.

First-order codes/sample quotes from the evidence	Second-order themes/resilience capability factors	Support cases from Spain	Resilience capabilities	Aggregate dimensions
"Three PCR tests were performed boarding... Furthermore, masks had to be worn on board. Additionally, air purifiers and gel were all used."	Employee wellbeing	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T	Learning and culture	Organizational resilience
"Keeping an eye on the two most important things: the health of the workers and the customers and consumers."				
"What we have done is to provide the transporters with showers, toilets, and coffee machines..."				
They give us masks (also for the weekend), vitamins..."				
"... which is part of our strategic plan."	Strategic plan	A, L, M		
"We always have an annual strategic plan for the development of processes and products that we followed and continue to follow independently of the pandemic."				
"We have gone from changing 5 or 6 manufacturing parts per year...when I have been changing parts constantly."				
"We already have plan to update our products and machines regularly."				
"Leadership, in the sense that all the parties involved were very aware..."	Top management support	B, C, D, G, J, K		
"We were forced to get the most out of the lines, productivity has increased."				
"The CEO released announcement addressed to the entire workforce to say what situation was like and what measures were being taken."				
"A fundamental work of the human resources and risk team to raise the awareness of all workers to avoid risky practices, to carry out screening..."	Risk management culture	C, G		
"We have been talking about V.U.C.A environments."				
"The company's management trains us, send us weekly communications on how things are going, what to do..."	Human resource training	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T	Assets and resourcefulness	
"People have to be trained and informed..."				
"In fact, we had to postpone orders and outsource part of the production."	Outsourcing and postpone strategy	E, H, M		
"We did accept orders that were held longer in the warehouse."				
"We have warehouses and safety stock in almost all product categories."	Safety stock	E, F, G, J, P		
"We were able to maintain the supply to the customers... it is a sector that was pulling a lot of stocks and final product."				
"We had more raw materials and auxiliary materials than we usually have..."				
"We are our own supplier, so we are not going to be short of stock."				
"Also, contrary to lean, the importance of stocks, which in many cases can save our lives."				
"We have gone from changing 5 or 6 manufacturing parts per year."	Technical and product renovation	A, M, J, P, Q		
"What we did was to adapt the machines, the equipment, and the organization to the new situation."				
"It made us think about automation certain things, to reduce risks."				
"On the innovation side, we have tried to innovate and bring out new products."				
"What we did to avoid breaking stock was to oversize them."				

(Continues)

TABLE 4 (Continued)

First-order codes/sample quotes from the evidence	Second-order themes/resilience capability factors	Support cases from Spain	Resilience capabilities	Aggregate dimensions
"We have sought more flexibility through working with temporary work agencies."	Flexible labor arrangements	I, J, K, L		
"Eliminating all temporary employment and agreeing with the unions..."				
"We have a lot of flexibility with our personnel..."				
"If a worker is in a section where there is less work, although it would be better if he went to another where he is needed."				
"What we did was to increase the night shift capability to 100%."	Flexible working	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T	Dynamic competitiveness	
"...separating work shifts, giving more breaks than usual so that people would not be overcrowded together..."				
"Although teleworking had to be implemented at the central level, it was something that went quite well."				
"Providing tools so that work can be done from home, aspects of working flexibility."				
"This way, we did not assume the risk of having many people in the same place. In other words, provide work flexibility."				
"Have instant communication for agile decision-making was also necessary."	Flexible decision making	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T		
"We had to make very quick decisions and we had to prioritize we had to change schedules..."				
"We act according to the circumstances."				
"...which changes every week or every week and a half. We had to be constantly replanning."	Flexible planning	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T		
"We had to allocate our production capacity to manufacture those products for which we knew that demand was increasing."				
"We had to be constantly replanning."				
"...to be able to circulate at hours that were not allowed, to be able to deliver in vehicles that are normally allowed..."				
"...the search for the fastest transport."	Flexible transportation	A, B, C, K, N, O, P, Q, T		
"...was to hire many small transporters to be able to supply stores from time to time."				
"...looking for alternative transport suppliers... That is why flexibility was fundamental."				
"We have a platform for meat products in Amazon."	Diversification of market channels	A, C, E, F, H, J, K, L, M, N, O, P, Q		
"We have also tried to contact new chains, but it was a bad time because we all did it."				
"We have had online sales for a long time, but they have increased a lot in a very short time..."				
"You could be very comfortable in a market, but if they close it, you have no margin of operation."				
"They did to look for new markets or advantages in them, since exports slowed down a bit."				
"We had a Crisis Committee, where these issues were discussed, and solutions were sought."	Extending intra-organizational networking	K, N, O, P, Q		
"The process was very fast because even a week before the confinement were already discussing the situation."				
"...but thanks to the management we did with the people and them understanding the situation, we were able to manufacture and provide service with practically no penalties."				
"There was an effort for both the transport colleagues and the salesclerks."				
"...to reinforce everything we could, both with people and machine..."				

TABLE 4 (Continued)

First-order codes/sample quotes from the evidence	Second-order themes/resilience capability factors	Support cases from Spain	Resilience capabilities	Aggregate dimensions
"We did have to accredit some of our suppliers, so that they could continue supplying."	Accredited suppliers	C, D, E, F, G, N, S, T	Supply chain collaboration	AFSCRes
"Maybe the order point was delayed, but by playing with the main suppliers, we were able to over-adjust."				
"One thing that stuck me very much is that the local suppliers are the ones that helped us the most."				
"...but as the days went by, we saw that other companies from other sectors offered us all the means that we lacked, they called us to work with them."				
"...but with negotiations it was easier, because we have a lot of weight in the suppliers, so we were quite lucky."				
"As for the suppliers, the flow of information and decision making was faster, but in general we tried to have a certain fluid communication and to be coordinated."	Information-sharing	C, H, I, K, L, P		
"Being transparent, there is no so much problem."				
"More contacts with the supplier and a lot of transparency."				
"During that time, deadlines were very volatiles, so we tried to make sure that the customer knew the situation at all times."				
"What we did was, as soon as all this arose, we took out credit policies to cover ourselves and to be able to support our distributors..."	Finance resource sharing	A, B, C, D, P, S, T		
"...for accessing the purchase of PPE joint with the companies."	Joint purchases	E		
"The government could have provided more aid to the essential sectors to obtain PPE."	Government aids	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T		
"...although they did follow the government's recommendations."				
"What they were going to give us 3000€, but finally it was 1000€."				

assets and resourcefulness, and dynamic competitiveness. We follow Pal et al. (2014) to categorize organizational resilience capability factors, as they highlighted three broad assets to foster organizational resilience. In the face of the COVID-19 crisis, ensuring employee wellbeing was prioritized. Thus, any elements that could reduce the incidence of illness among employees were applied, such as personal protective equipment (PPE), the obligatory use of face masks, safety distance, personnel to monitor compliance with the measures, proper training for human resources, changing staff arrival and departure times, and updating the air renewal system. Given the seriousness of COVID-19, a "Crisis Cabinet" or "Crisis Committee" was set up in several processors, wholesalers, and distributors to tackle issues related to the pandemic. We posited that a "Crisis Cabinet" could be set up in different organizations in Spain, as their cultural value orientation of "egalitarianism" calls for cooperative regulation of interdependence (Schwartz, 2006). To maximize "Crisis Cabinet" performance, not only top management teams but also frontline workers should be involved to ensure smooth communication between managers and employees. Furthermore, the top management team's support was also critical: "I tried to be very polite and correct with others, giving reassurance and support to my team and empathizing with them." Several processors were able to respond to the crisis by implementing outsourcing, a postponement strategy, or product renovation. Having an initial understanding of COVID-19, processors outsourced their disinfection tasks to other professional services to improve their performance, manufacturing machines were updated with 5 or 6 parts per year, and products were improved based on consumer preferences. For example, canned food was observed to have a dramatic increase in demand. Thus, manufacturers made changes such as producing canned rather than fresh or frozen shrimp to meet the market requirements.

In addition, dynamic competitiveness appeared to be at the core of the responses to the COVID-19 crisis, as it was adopted by all the investigated organizations. Flexible working, decision making, planning, transportation, and labor arrangements, as well as diversification of marketing channels, were all adopted. For example, managers needed to decide whether to continue their manufacturing operations if there were infections: "Managers had to

TABLE 5 Organizational and AFSCRes capabilities identified from China.

First-order codes/sample quotes from the evidence	Second-order themes/resilience capability factors	Support cases from China	Resilience capabilities	Aggregate dimensions
"1000 PPM sodium hypochlorite was used in our organization to ensure a safety environment."	Employee wellbeing	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T	Learning and culture	Organizational resilience
"We took measures to protect, guarantee, firstly, the safety and health of people."				
"Avoiding contagions in all the different parts of our company, so we could keep on working."				
"The typical hygienic and sanitary measures that we implemented to avoid possible contagion or to minimize impacts from the outside."				
"We tried pamper the carriers, because we knew that at that time they were heroes, giving them a food package..."				
"Communist party member at the organization should take the lead to work during the COVID-19."	Vanguard and exemplary role of Chinese Communist Party (CCP) Members	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T		
"Quality control personal were required to stay at the factory to ensure that there was no food safety problem."				
"Actively communicate with departments such as commerce and supply and marketing cooperatives many times, establish an information sharing linkage mechanism, guarantee for the green channel of agricultural products."				
"Newly promoted leader, especially the one still in the publicity period was asked to take the leading role in fighting against with COVID-19."				
"Using the high-speed service as a platform, set up special counters for agricultural products."				
"To overcome the crisis, our company chose to work with our employees together. No one was dismissed."	Enhance organizational cohesion	A, B, C, H, I, J, K, L, M, N, O, P, Q, R, S, T		
"Unity is mutual. All workers must strengthen communication, coordination, and cooperation, form a united and harmonious atmosphere, and build team with effectiveness, cohesion and execution."				
"Normally, we have one-month raw material stock in our inventory. We do not have so much because we prefer to use fresh raw materials."	Safety stock	A, B, C, D, H, I, J, K, L, M, N, O	Assets & resourcefulness	
"We have enough stock in our warehouses to supply ourselves."				
"We organized internal training sessions for our employees to know the COVID-19 and the latest government requirements."	Human resource training	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T		
"Timely create a WeChat group of "vegetable planting assistance and relief during the pandemic prevention and control period" to effectively solve the practical problems encountered in vegetable production."				
"Webcast training in multiple industries such as wheat, vegetables, and fruit trees through the form of air classroom + WeChat group tracking guidance."				
"Video classrooms related to agricultural machine such as practical techniques, field management, and maintenance were available online."				
"We not only have contract transporters, but also have individual transporters to ensure our products can be delivered in time."	Backup transporters	L, M, N, O, R, S, T		
"Customer feedback was very important for us. Based on the customer feedback, we could make changes on the products."	Product innovation	H, I, J, K, R, S, T		
"We are state-owned companies. Thus, we have excellent bank credits in comparison with private companies."	Bank credit and financial resource	D, N, M, R, S		
"Some agricultural banks provided financial resources to us, covering all harvesting, planting, irrigating, and plowing processes."				

TABLE 5 (Continued)

First-order codes/sample quotes from the evidence	Second-order themes/resilience capability factors	Support cases from China	Resilience capabilities	Aggregate dimensions
"Due to COVID-19, we combined the offline retail and online retail. Also, we collaborated with the internet celebrities to sale our products online."	Diversification of marketing channels	A, B, C, D, H, I, J, K, L, M, N, O	Dynamic competitiveness	
"We went from consuming services to consuming products, whether through the internet, supermarkets or other channels."				
"The high-speed service area has the advantages of large traffic and people flow, strong mobility, and a wide range of potential customers, were used to demonstrate our agricultural products."				
"New organizational policies were disseminated through Wechat. We did well in transparency."	Promote organizational transparency	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T		
"Any policies or rules related to COVID-19 were required to disseminate as soon as possible to ensure everyone to know the government guidance."				
"We started working from the beginning, making shifts among the workers who went to office."	Flexible working	A, B, C, D, H, I, J, K, L, M, N, O		
"Online working was necessary, mainly through WeChat, telephone, and Tencent meeting."				
"We changed working shifts from 2 to 3 a day. Furthermore, we adjusted the product line to ensure only one type of product was produced during a shift."				
"We needed to find other raw material suppliers locally and internationally, as importing materials from countries with severe pandemics impossible."	Backup suppliers	H, I, J, K, L, M, N, O	Supply chain collaboration	AFSCRes
"Basically, the action we did to reach agreements with external refrigerators, to be able to cover these 100% occupancy peaks."				
"We thought the world was already too globalized...but in the end, we needed to have alternative suppliers closer to us."				
"...including minimum living guarantee, tax reduction, electricity fee reduction, and pension insurance benefits."	Government aids	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T		
"...provide job stabilization subsidies for agricultural enterprises that have difficulties in production and operation due to the impact of COVID-19."				
"Priority was given to arrange relevant agricultural enterprises to return to work, and the chartered vehicles organized by the local government was included in the green channel policy to ensure the emergency transportation."				
"A green pass was issued to breeding enterprises, and a green "guarantee team" was formed to ensure the orderly production and sales operations."				
"After the laboratory passed the inspection, the company's pig slaughtering production qualification was approved as soon as possible."				
"We needed to communicate with our suppliers and retailers to ensure they were following the latest advice from the government."	Information-sharing	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T		
"Information flowed on a daily basis: circumstances, government measures, regulations, how all this could affect our sales... Having all the information up-to-date was essential."				
"Keep communication with our suppliers to ensure that we were not stock out."				
"Basically, trust, support and full communication between customers, distributors, and our team."				
"Dialogue with customers and suppliers was very important both for us and for them, since we had no use for historical records and schedules."				

(Continues)

TABLE 5 (Continued)

First-order codes/sample quotes from the evidence	Second-order themes/resilience capability factors	Support cases from China	Resilience capabilities	Aggregate dimensions
"The provincial agricultural and rural departments shall work with relevant departments to establish contact platforms for key agricultural enterprises, especially leading enterprises..."	Collectiveness and sense-making	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T	Leadership	
"In the fighting against with COVID-19, we should talk less about difficulties, less about objectivity, and more about dedication, so that dedication can make a difference."				
"The government's work is becoming more and more mature and more in line with public opinion, and the government plays a particularly important role."				

decide in just one or two days where the packaging was going to be done and how we had to change the distribution of the line to be able to continue the supply in a very short of time." For logistical problems, flexible transportation methods were adopted to search for the fastest forms of transportation and routes: "Searching for alternative routes to arrive as soon as possible with the merchandise and looking for alternative transport suppliers was fundamental for us to tackle the crisis."

Firm's adaption for the future

This study identified several ways firms adapted for the future. First, they promoted telework. Some manufacturers and wholesalers were already aware that telework was coming; however, COVID-19 accelerated the process. Second, they developed strategic plans covering 5–10 years. A recent study showed that the probability of experiencing a pandemic similar to COVID-19 in one's lifetime is 38%, which may double in the coming decades (Marani et al., 2021). Thus, regularly performing SWOT (Strengths, Weaknesses, Opportunities, Threats) analyses in terms of global business and economical environments may promote a better future. Third, they strengthened intra-organizational relationships, especially those with primary-level employees, as "the degree of involvement of the workers with the company was very important to save that moment." Finally, they aimed to have more safety stock and deploy digital technologies, such as data monitoring and capturing technologies and RFID (Radio Frequency Identification).

AFSCRes capability factors from Spain

The preparedness of AFSC

Our findings showed that AFSCs in Spain lacked preparedness for several reasons. First, a lack of essential PPE resulted in panic in the first few weeks of the COVID-19 crisis in Spain, as importing face masks from China was difficult. Second, international borders were closed for several weeks, which affected and delayed exportation. Third, the cost of auxiliary materials suddenly increased: "12% increase of carton board and 4% to 8% increase of cans." Fourth, harvesting processes became complicated, such as harvesting with face masks and changing harvesting methods. Fifth, consumers appeared to have increased preferences for long-lasting foods, such as frozen and canned foods. This caused pressures and delays for manufacturers to supply plastic bags for frozen food and cans or bottles for canned food: "This increase reached a point where the chains had to ask us to send our total production capacity in order to organize, since the increase had been 60% or 80% per day." Sixth, several key infrastructures (e.g., ports) reached a bottleneck due to a lack of capacity to deal with a large volume of orders in such a short period of time. Finally, a series of strikes delayed start dates for production and logistic activities owing to COVID-19 infections and protests in Spain. For example, logistics services were seriously affected because of nation-wide protests against restrictions imposed in several Spanish cities: "Some of them were because the ship itself had been infected, others because of the impact of a series of transportation strikes." We posited that the Spanish cultural value orientation of egalitarianism contributed to these strikes and protests because it can induce people to act for the benefit of others as a matter of choice and people are concerned for everyone's welfare.

The response and recovery of AFSC

Supply chain responses depended on the joint actions of more than one stakeholder (De Sa et al., 2020); however, only a few of the investigated companies implemented collaborative initiatives from an AFSC perspective. For example, all of them received government aid, while 40%

implemented accredited suppliers, 35% used finance resource sharing, 30% used information-sharing, and 5% used joint purchases. In response to the COVID-19 crisis, information was widely shared among suppliers, manufacturers, and consumers, as "deadlines were very volatile, so we tried to make sure that the customer knew the situation at all times." Government aid was critical for helping AFSCs recover from the crisis. However, our findings showed that the government was criticized by all AFSC stakeholders as being dishonest and ineffective: "What they were going to give us was 3000€, but finally it was 1000€, a third of what they had told us. If we had known it, we would not have even asked for it, because all the paperwork we had to do might have cost use more than that." Several processors and farmer cooperatives used financial techniques to extend supply chain collaborations, such as sharing finance resources with their stakeholders through extending payment terms. Joint purchases were seldom identified, and only occurred at the early stage of the COVID-19 crisis, when joint purchases were made with other companies to buy PPE for their employees.

The adaption of AFSC for the future

After synthesizing all the data from Spain, we summarized two adaption routes for AFSCs. First, shorter supply chains should be encouraged, as they have fewer intermediaries and suppliers. Thus, suppliers can connect with their consumers more directly. Second, try to be more FACT (Flexible, Agile, Collaborative, and Transparent) with other AFSC partners when facing a crisis or a disruption.

Organizational resilience capability factors from China

The preparedness of firms

In comparison with Spanish firms, Chinese firms also identified a lack of preparedness in the face of the COVID-19 crisis, but with differences. First, firms did not have plan to tackle this kind of event, although some had experienced the SARS outbreak in 2003 and global financial crisis in 2008: "In the face of a once-in-a-century pandemic, no one could have predicted that the scope would be so wide, and the impact would be so great." Several meat manufacturers had safety stock in case of uncertainty; however, this was insufficient, as they preferred to use fresh, raw materials. Owing to the effects of African swine fever (ASF), meat manufacturers began to import meat (e.g., beef and pork) from other countries (e.g., Argentina, Uruguay, Canada, Denmark, and the United States), starting in 2018. The continuous effects of ASF plus COVID-19 posed a severe threat to agri-food firms in China: "We have been importing pork from other countries since 2018 due to the severe effects of ASF. The negative effects of ASF plus COVID-19 and the extremely complicated process of inspection and quarantine procedures seriously affected our business." Second, the Chinese government implemented strict national lockdown measures starting in January 2020, which resulted in firms in China not having sufficient time to prepare. In the first several weeks of the COVID-19 outbreak, aggressive measures were adopted, such as people being forced to stay at home unless they had permission from the government, people from Wuhan being persuaded to return, and roads being blocked to reduce people's mobility.

The response and recovery of firms

Chinese firms adopted different resilience strategies to tackle the COVID-19 crisis. Initially, working environments were to be cleaned twice a day with sodium hypochlorite to ensure employee safety. Health registration and daily health monitoring systems were built to strengthen safety measures. Thus, only registered employees who passed body temperature checks, had a green health code, and wore face coverings were allowed to work. To enhance organizational cohesion, shift manager and responsible leader systems were also adopted. In particular, CCP members were required as frontline workers, as the investigated companies or organizations all had local CCP branches. Simultaneously, WeChat groups that included all employees of a company were created to share the latest information related to COVID-19 and promote organizational transparency. Human resource training was also conducted through online training courses and broadcasted events. These measures successfully prevented COVID-19 transmission at the organizational level, as any positive cases would result in a 14-day lockdown of the whole company. In addition, diversifying marketing channels to ensure a company's performance was critical. Thus, companies collaborated with Internet celebrities and e-commerce firms to integrate their online and offline resources and increase their sales. In particular, live commerce became popular in 2020.

Firm's adaption for the future

During the interviews, firms were still struggling to recover from the COVID-19 crisis. However, firms

demonstrated that this was an excellent opportunity for them to adapt to the future. The adaption route could be organized into three categories. First, companies who needed to import raw materials from other countries were willing to find qualified local raw material suppliers to diversify their suppliers. Second, the Chinese government successfully controlled the COVID-19 crisis. However, it also forced strict regulations on the location, hardware, layout, surrounding environment, production processes, and design of food processing facilities: "All food processing plants need to be certified by the government and must be equipped with laboratories and full-time food safety management personnel and departments." Thus, this situation led to food processing companies building good relationships with local governments. Third, the pandemic accelerated the process of building accountability systems, including those for food enterprise managers and the national supervision unit. In particular, main managers were asked to stay at the factory during severe points in the pandemic to ensure that no problems occurred. Thus, enterprise managers should be familiar with food standards and policies. Farmers were not heavily affected by the COVID-19 crisis, because they were located in rural areas and most farming jobs can be done by agricultural machines. However, farmers were willing to collaborate with agricultural research institutes to invest in remote control and automatic irrigation systems for future crises.

AFSCRes capability factors from China

The preparedness of AFSCs

Our interviews provided evidence that Chinese AFSCs lacked preparedness for the COVID-19 crisis. For example, input suppliers who provided agri-chemical products, fodder, and seeds were all heavily affected by the COVID-19 crisis because of the restrictions placed on people's mobility: "When COVID-19 was serious, there were problems in our transportation and market development; people's mobility was not allowed." Processors, wholesalers, and distributors experienced low stock levels or even no stock owing to a lack of contingency plans. In fact, the reduction in people's mobility impeded collaborations among AFSC practitioners, especially for those in rural areas (e.g., farmers and manufacturers). Furthermore, a lack of information-sharing among AFSC practitioners regarding the crisis was widespread because of fierce competition, lack of appropriate infrastructure, low education levels of managers, and lack of professional knowledge on OSCM. We posited that the culture value orientation in China also contributed to the lack of information-sharing, because people with a "hierarchical" cultural value orientation are more likely to view competition as positive (Schwartz, 2006).

The response and recovery of AFSCs

Limited AFSC collaboration activities were observed in China when responding to and recovering from the COVID-19 crisis. For example, government aid was necessary, including reduced taxes and electricity fees, a minimum living wage guarantee, and pension benefits for enterprise employees. "Butler service" was also deployed, in which one government officer was responsible for several enterprises until they recovered. Furthermore, various enterprises were actively searching for alternative qualified suppliers locally and internationally because the Chinese government did not allow enterprises to import raw materials from countries that were severely affected by COVID-19. At the same time, we cannot ignore the leadership role of the Chinese government in generating collectiveness and sense-making across the whole AFSC. Government guidance on fighting against the COVID-19 crisis gained public compliance and then generated collective action in society as a whole. We posited that China's hierarchical cultural value orientation makes a person's role in and obligations to collectivities more important than their unique ideas and aspirations (Schwartz, 2006).

The adaption of AFSCs for the future

Our data analysis showed that the government's role in tackling the COVID-19 crisis should be weakened as the situation improves. In particular, in the post-COVID-19 era, the Chinese government should ease the inspection and quarantine policy for the imported products. The policy implemented by the Chinese government is extremely complex and includes the need for certification for enterprises in other countries to have the right to export to China and disinfect the imported products in Beijing and at the regional center before finally distributing them. This complicated import process hinders the efficiency of AFSCs.

Commonalities and differences between Spain and China in tackling the COVID-19 crisis

Figure 3 summarizes the commonalities and differences between China and Spain in relation to the resilience capability factors adopted for preparedness, response, recovery, and adaption for the future in relation to the COVID-19 crisis.

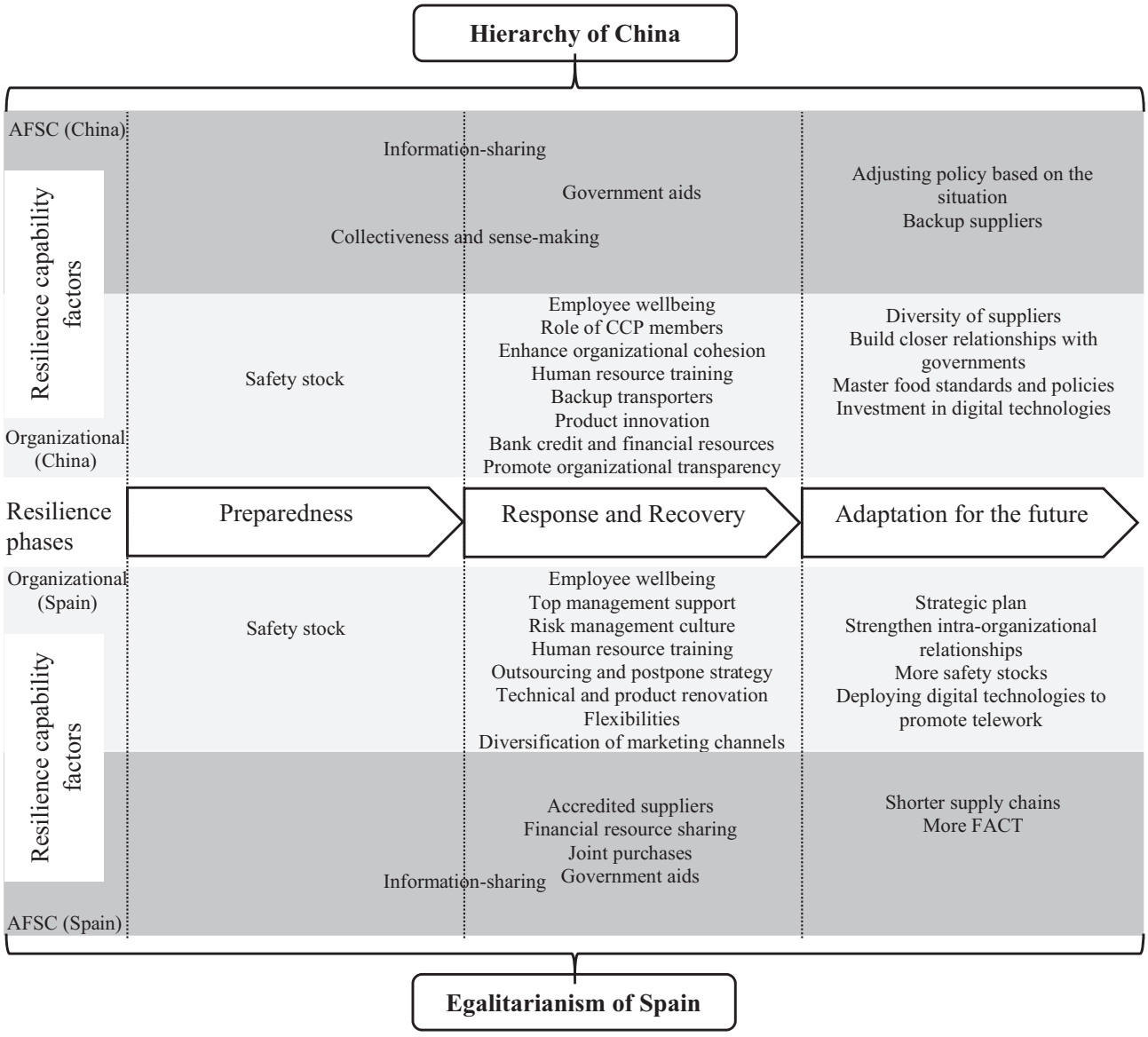

FIGURE 3 Resilience capability factors adopted in China and Spain.

Organizations and AFSCs across Spain and China were identified as lacking the preparedness necessary to face the COVID-19 crisis. However, the enterprises involved in this study with sufficient stock experienced an increase in their annual turnover in 2020: "2020 was the year with the highest turnover in the company's history, reaching €545M, whereas this number was just over €500M in 2019." Another interviewee stated: "Last year's annual turnover was €1.079 billion, increased by 10% compared to the previous year." Taken together, the companies with safety stock appeared to perform better in the face of the COVID-19 crisis. Thus, we propose the following:

> **Proposition 1.** *In the face of the COVID-19 crisis or a situation with a high level of unreliable demand information, the agri-food companies that have safety stock in preparation, the ability to provide their products in a very short period of time, or their own suppliers will achieve higher delivery performance and better performance in annual turnover.*

In the response and recovery phase, various AFSC resilience capability factors were adopted across Spain and China. At the supply chain level, examples included financial resource sharing and joint purchases in Spain, and collectiveness and sense-making in China. At the organization level, the vanguard and exemplary role of CCP members implemented by Chinese organizations, and the various flexibilities adopted by Spanish organizations, provided examples of how to respond to and recover from the COVID-19 crisis. China successfully controlled the COVID-19 pandemic in 2020, achieved 2.2% GDP growth in 2020, and further achieved 8.1% GDP growth in 2021. However, Spain's

GDP shrank by 10.8% in 2020 but grew by 5.1% in 2021. Economic growth and supply chain performance have shown positive correlations (Goel et al., 2021). So, what allowed the AFSCs in China to recover from the COVID-19 crisis in a relatively short period of time? We believe that the difference in cultural value orientations between China and Spain resulted in different resilience capability factors adopted at the organizational and AFSC levels. The Chinese hierarchical cultural value orientation indicates that group goals and collective actions should be placed ahead of one's self-interest and people will gain satisfaction after they accomplish group tasks (Triandis, 1989). This means that obeying expectations from those in roles of greater status or authority is the tradition in China (Schwartz, 2006). Hofstede (1991) also indicated that accepting a hierarchy of authority is a favorable option in China. This supports our findings that the government's leadership role across the whole AFSC generates collectiveness and sense-making among AFSC practitioners and helps AFSCs recover from the COVID-19 crisis more efficiently and effectively. For example, at the national level, the Ministry of Agriculture and Rural Affairs announced measures to help agricultural-related organizations and AFSCs respond to and recover from COVID-19, including a green pass for agricultural organizations and financial resource supports. At the provincial level, key agricultural organizations were allocated with "butlers" to deal with their difficulties, whereas at the county level, the head managers of agricultural organizations were required to stay at their factories until they recovered. Thus, we propose the following:

> **Proposition 2.** *The hierarchical cultural value orientation of China may delay some organizations' response to and recovery from the COVID-19 crisis; however, it leads to synergy across different AFSC organizations and therefore contributes to the AFSC response to and recovery from the COVID-19 crisis.*

The Spanish cultural value orientation of egalitarianism emphasizes that individuals are independent actors with the right and responsibility to express their ideas and interests (Schwartz, 2006). This cultural environment calls for cooperative regulation of interdependence, requires people to take responsibility for their actions, leads to decisions based on their own personal understanding of situations, and indicates self-interest is ahead of group interest (Jia & Rutherford, 2010). Thus, flexibilities were widely implemented at the organizational level and limited supply chain collaboration activities were observed. Even some of the collaborative activities, such as joint purchases and financial resource sharing, were short-term collaborations. This fulfills the cultural value orientation of egalitarianism, as it pertains to short-term orientation in building relationships with other companies. Furthermore, egalitarianism means higher political activism, whereas hierarchy indicates less political activism. It is unsurprising that violent anti-lockdown protests frequently occurred across Spain, which impeded the recovery process of Spanish AFSCs. Thus, we propose the following:

> **Proposition 3.** *The egalitarianism cultural value orientation contributes to an organization's response to and recovery from the COVID-19 crisis; however, it may delay the AFSC response to and recovery from the COVID-19 crisis.*

As for adaption for the future, several adaption routes are available (see Figure 3). At the organizational level, Chinese interviewees mentioned the need to build a close relationship with the government, whereas Spanish interviewees mentioned strengthening intra-organizational relationships. At the supply chain level, shorter supply chains, more FACT, and backup suppliers were suggested.

DISCUSSION

COVID-19 was first identified in late 2019 and soon led to a pandemic with devastating effects on supply chains. Since the pandemic began, scholars have been investigating the various supply chain issues it raised (Chowdhury et al., 2021; Shaheen et al., 2022). In particular, special attention has been paid to the use of resilience capability factors to manage and recover from the impact of COVID-19 (Coopmans et al., 2021; Do et al., 2021; Mishra et al., 2022). In this study, we investigated this topic by conducting a cross-country comparative analysis to explore AFSCRes capability factors for preparing for, responding to, recovering from, and adapting to the COVID-19 crisis. Two research questions were formulated: What are the resilience capability factors used at the organizational and AFSC levels in the face of the COVID-19 crisis? (RQ1); and how were these resilience capability factors used across the four phases of resilience building (preparedness, response, recovery, and adaption)? (RQ2). To answer RQ1, we conducted 40 interviews with experienced AFSC practitioners across 40 agri-food companies between China and Spain (20 companies in each country) and analyzed data through thematic analysis. These open-ended and discovery-oriented interviews provided rich empirical data to gain an understanding of what resilience capability factors were used at the organizational and AFSC levels during the COVID-19 crisis. To answer RQ2, MRT was adopted to link each resilience

capability factor with different phases of AFSCRes based on the empirical data collected. Contextual factors such as the cultural value orientations of Spain and China were also considered in our study to deepen our understanding. This study provides several theoretical contributions, managerial implications, and policy implications.

Theoretical contributions

Our findings suggest that frequently mentioned resilience capability factors (e.g., safety stock, information-sharing, and human resource training) were effective in helping organizations and AFSCs prepare, respond, recover, and adapt in relation to the COVID-19 crisis; however, the effects depended on each country's cultural value orientations (see Figure 4). Cultural differences may not have had a direct impact on supply chain performance, but they indirectly influenced trust, communication intensity, and long-term coordination among supply chain partners (Jia & Rutherford, 2010). This finding differs from those reported in previous works, which represents a novelty of this study. However, some studies also shed light on cultural value orientations in investigating SCRes. For example, Kumar et al. (2015) stated that national culture influences disruption planning and response. The results of this study support this point. Sarafan et al. (2020) indicated that collectivism is positively associated with perceptions of supply-side disruption risk in a high-uncertainty environment. Our research extends this finding to a certain extent, in that a hierarchical cultural environment that places group goals and collective action ahead of self-interest contributes to supply chain response and recovery, but delays some organizations' response and recovery. However, an egalitarianism cultural environment that places self-interest ahead of group goals contributes to an organization's response and recovery but delays the supply chain's response and recovery.

This study aimed to link each resilience capability factor with different resilience phases in terms of the COVID-19 crisis. Most existing studies on AFSCRes in relation to the COVID-19 crisis investigated resilience capability factors from the response and recovery phases (e.g., Ali et al., 2021, 2023; Khan & Ali, 2022; Mishra et al., 2022; Raassens et al., 2022); however, only a few of them provided a comprehensive picture of how to prepare for, respond to, recover from, and adapt to the crisis (Blessley & Mudambi, 2022). Our novel contribution is that we identified organizational and AFSC resilience capability factors based on an in-depth investigation and linked these factors with four resilience phases. This study fills the gap between the understanding of SCRes in the literature and that in the agri-food industry and contributes to the recent call for more research on how firms and supply chains can become more resilient in the face of an unexpected crisis (Van Hoek, 2020; Williams et al., 2017).

Managerial implications

This study also generates managerial implications for agri-food business and supply chain managers on how to prepare for, respond to, recover from, and adapt for the future in the face of a disruption.

As for the implications for agri-food business managers, we have the following suggestions. First, safety stock (e.g., packaging materials, raw materials, and agri-food products) should always be in preparation, as safety stock is effective for withstanding a long-term period in which raw materials are scarce. Our findings also show that all the organizations with safety stock successfully survived the COVID-19 crisis and had an 8%–20% increase in their annual turnover. Agri-food businesses can have safety stock by owning their own suppliers or preparing safety stock based on a product's perishability. Second, during the response and recovery phases, there are several key points for agri-food business managers. The first point is that it is necessary to maintain flexibility, including flexible planning, decision making, working, labor arrangements, and

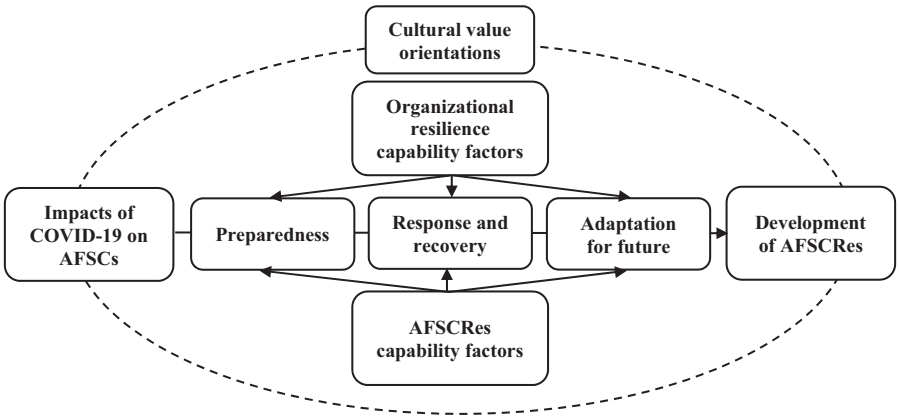

FIGURE 4 Extracted theoretical framework.

transportation. In addition, the top management team should provide supports, from material to mental health supports, such as providing food and residences for transporters who are not allowed to enter the building during the pandemic and working with ground-level employees to increase organization cohesion. Furthermore, managers should conduct human resource training online, such as on knowledge related to supply chain risk and disruption management, agricultural machine maintenance, and pest management. Based on the situation, managers should update products (e.g., canning food) especially in the face of a long-lasting crisis such as COVID-19. Finally, managers should diversify marketing channels, including exploiting international markets, selling online (e.g., livestreaming, short video platforms, and e-commerce platforms), collaborating with influencers, and taking advantage of resources provided by the government (e.g., selling products in high-speed service areas). Third, routes for adapting for the future include building closer relationships with the governments, investing in and deploying digital technologies to promote telework, and having a strategic plan for the next 5–10 years. A recent study showed that the probability of experiencing a pandemic similar to COVID-19 in one's lifetime is 38%, which may double in the coming decades (Marani et al., 2021). Thus, regularly performing SWOT analyses in terms of global business and economic environments and making corresponding changes may promote a better future.

Regarding implications for supply chain managers, we have the following suggestions. First, during the preparation phase, supply chain managers need to obtain disruption information by monitoring primary suppliers. Furthermore, they should contract with a domestic or international backup supplier in preparation if the reservation fee is sufficiently low. Second, during the response and recovery phases, honest and instant information-sharing with suppliers, consumers, and transporters is necessary to ensure other supply chain stakeholders understand the organization's operational status. Furthermore, collectiveness and sense-making among supply chain stakeholders in terms of how to respond and recover from the disruption are effective. Thus, in a hierarchical cultural environment, different levels of government should take leadership roles for facilitating collaboration among supply chain stakeholders in creating change for the disruption, as they can ensure policies and rules are effectively implemented. In an egalitarianism cultural environment, a focal company should take the leadership role, as it has the power to govern the supply chain. Government intervention is not suggested because people are socialized to internalize a commitment to cooperate in this cultural environment. Third, regarding adaption routes for the future, shorter supply chains and more FACT are suggested.

Policy implications

This research also provides implications for policymakers in China and Spain. For Chinese policymakers, it is suggested that more power should be given to county-level governments to adjust COVID-19-related policies, as they directly interact with agri-food organizations. In a hierarchical cultural environment, people are afraid to express their ideas and expected to comply with the obligations and rules attached to their roles. Thus, it is difficult for higher-level governments (e.g., provincial and national-level governments) to adjust COVID-19-related policy based on agri-food organizations' requirements. For example, our Chinese interviewees criticized the strict guidelines for importing products from other countries in the post-COVID-19 era. The imported products need to be disinfected in Beijing and at the regional center, and this complex disinfection process hinders the ability of AFSCs to further increase their efficiency.

Regarding the Spanish policymakers, the government should strengthen its role in tackling crises such as COVID-19. For example, the Spanish government was criticized for causing chaos for AFSCs when facing the COVID-19 pandemic because of a lack of clear explanations regarding COVID-19-related policies. Spanish interviewees also complained about a lack of necessary supports from the governments in terms of response to and recovery from the COVID-19 crisis. Thus, strengthening the government's leadership role in providing guidance and support during a crisis such as COVID-19 is necessary.

CONCLUSIONS

This study investigated AFSCRes in the face of the COVID-19 crisis by conducting a cross-country comparative analysis. Through interviewing experienced AFSC practitioners and applying MRT, this study has generated interesting insights regarding organizations' and AFSCs; preparedness, response, recovery, and adaption for the future in relation to the COVID-19 crisis. In particular, we considered each country's cultural value orientation and demonstrated how hierarchy in China and egalitarianism in Spain influenced organizations and AFSCRes during the COVID-19 crisis. Based on our findings, we proposed theoretical contributions, managerial implications, and policy implications.

Limitations and future research directions

Despite the important research findings presented in this work, our study does have some limitations.

- First, this study focused on identifying resilience capability factors used across the preparedness, response, recovery, and adaption phases. However, we were unable to examine how these selected organizations and AFSCs will adapt for the future. This limited our understanding on AFSCRes. Thus, it would be interesting to extend our research into a longitudinal study to investigate whether these selected enterprises and AFSCs can achieve better performance after adopting adaption measures.
- Second, it is difficult to generalize the findings of this study, as it was conducted in only two countries: China and Spain. Thus, a feasible future research direction is to investigate more countries that have similar cultural value orientations to those of China and Spain. Based on the research of Schwartz (2006), South Asian countries such as India and Thailand have similar cultural value orientations to China, while European countries such as Finland, Italy, and Norway have similar cultural value orientations to Spain. Thus, these countries could be included in further analyses.
- Third, we conducted a comparative analysis between China and Spain. Differences between these two countries can deeply affect the results, such as cultural value orientation, geography, and regulation differences (Mena et al., 2013). However, this study considered the cultural value orientation differences between China and Spain. Future studies should also account for geography and policy differences.
- Fourth, this study only examined AFSCRes capability factors used across preparedness, response, recovery, and adaption phases in the face of the COVID-19 crisis under two cultural value orientations: hierarchy and egalitarianism. Based on the study of Schwartz (2006), there are seven cultural value orientations in the world. Thus, future studies could examine AFSCRes capability factors for preparing, responding, recovering, and adapting in terms of the COVID-19 crisis in other cultural value orientation settings, such as embeddedness, mastery, affective autonomy, intellectual autonomy, and harmony.

ORCID

Guoqing Zhao https://orcid.org/0000-0003-4553-2417
Mar Vazquez-Noguerol https://orcid.org/0000-0002-5319-7359
Shaofeng Liu https://orcid.org/0000-0002-8330-3335
J. Carlos Prado-Prado https://orcid.org/0000-0003-2189-2100

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AUTHOR BIOGRAPHIES

Guoqing Zhao is a lecturer in Operations Management at the School of Management, Swansea University, Swansea, UK. He got his Ph.D. in Supply Chain Management from the Plymouth Business School, University of Plymouth. His research interests include supply chain resilience and supply chain risk management. He has published research in a variety of journals including the *Journal of Business Logistics*, *International Journal of Production Research*, and among others.

Mar Vazquez-Noguerol is a researcher and lecturer at the Department of Business Organization and Marketing, University of Vigo, Spain. She obtained her Ph.D. in Economic Analysis and Business Strategy in 2021. Her research interests include optimization of logistics and supply chain management. She has published research in several journals, such as *Journal of Business Logistics*, *Business Process Management Journal*, and *Central European Journal of Operations Research*.

Shaofeng Liu is a professor of Operations Management and Decision Making, Chair of Management Board for Euro Working Group on Decision Support Systems, an international society. Her main research interests and strengths are in product and service value chain innovation, knowledge management, and decision support. She has published two books and over 200 research papers. She has supervised over 20 PhD students and research staff. She sits on the Steering Committee for UK Digital Supply Chain Hub – Academic Network.

J. Carlos Prado-Prado is a university professor at the Department of Business Organization and Marketing, University of Vigo, Spain. He is the director of the organization engineering group (GIO) and the president of the Association for the Development of Organization Engineering (ADINGOR). His research interests include supply chain design and innovation. He has published research in journals like *Journal of Business Logistics* and *Supply Chain Management: An International Journal*.

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APPENDIX 1

INTERVIEW GUIDE

On commencing the interview

Many thanks for participating in this interview about "exploring agri-food supply chain resilience (AFSCRes) in the face of the crisis caused by COVID-19." AFSCRes is "the collective ability of agri-food supply chain to ensure acceptable, sufficient and stable food supplies, at the required times and locations, via accurate anticipation of disruptions and the use of strategies which delay impact, aid rapid recovery and allow cumulative learning post-disruption." Your feedback may help us understand how organizations and AFSCs prepare, respond, recover, and adapt in the face of the COVID-19 crisis. The interview may be recorded for academic purposes with your permission. Many thanks for your cooperation.

A. Introductory questions

(I) Interviewee information

(1) What is your current designation?
(2) Can you provide a brief overview of your job within the company operations?
(3) How many years have you worked for this company?
(4) How many years of work experience do you have in the same job role in total?

(II) Company information

(1) Can you provide a brief overview of the company structure and its operations?
(2) How many employees work for the company?
(3) What are the key products or services that your company provides?
(4) What was the financial status of your company in the last five years? Annual turnover?

B. Effects of the COVID-19 pandemic on your organization and AFSC

(I) Impact on your organizations

(1) Did the COVID-19 pandemic and its related control measures (e.g., restrictions on movement, travel bans, lockdowns, and social distancing) affect your organization?
(2) How did COVID-19 affect your organization? For example, what were the effects on labor resources, raw materials importation, product prices, products exportation, and other dimensions of your organization?

(II) Impacts on AFSCs

(1) Did the COVID-19 pandemic and its related control measures (e.g., restrictions on movement, travel bans, lockdowns, and social distancing) affect the AFSCs in which your organization is currently working?
(2) How would you describe any challenges or risks for AFSCs caused by the COVID-19 pandemic? For example, supply and demand, inventory management, visibility, and other dimensions of AFSCs.
(3) How would you describe the most vulnerable implications of COVID-19 on AFSCs?

C. Resilience capability factors used to tackle challenges caused by the COVID-19 crisis

(I) Organizational resilience capability factors

(1) How would you describe any resilience capability factors that have been used to help organizations prepare for the crisis caused by COVID-19?
(2) How would you describe any resilience capability factors that have been used to help organizations respond to and recover from the crisis caused by COVID-19? For example, contingency plans, leadership commitment, human resource management, flexibility, and efficiency.
(3) Do you think any other resilience capability factors were effective in helping your organization respond and recover in the face of the COVID-19 crisis?
(4) What opportunities are available post-COVID-19 to re-orient your organization? What are the lessons learned from the pandemic?

(II) AFSCRes capability factors

(1) How would you describe any resilience capability factors that have been used to help AFSCs prepare for the crisis caused by COVID-19?
(2) How would you describe any resilience capability factors have been used to help AFSCs respond to and recover from the crisis caused by COVID-19? For example, supply chain collaboration, information-sharing, risk management culture, knowledge management, flexibility, and agility.
(3) Do you think any other resilience capability factors were effective in helping AFSCs respond and recover?
(4) What opportunities exist post-COVID-19 to re-orient food systems? What are the lessons learned from the pandemic?

APPENDIX 2

AN EXAMPLE OF THE ARCHIVAL DATA

Country	Representative documents	Quotes from documents	Source
China	Ministry of Agriculture and Rural Affairs, National Development and Reform Commission, General Office of the Ministry of Transport jointly issued a notice to speed up the resumption of work and production in aquaculture industry	"Aiming at the current special difficulties of the aquaculture industry, such as the lack of feed supply... Do everything possible to promote the current breeding industry to solve the difficulties..."	http://www.moa.gov.cn/xw/zwdt/202002/t20200215_6337140.htm
	Notice of the General Office of the Ministry of Agriculture and Rural Affairs on the work of ensuring the supply of agricultural materials without missing the farming time during the prevention and control of COVID-19	"...(1) Fully understand the significance of ensuring the supply of agricultural materials for spring production; (2) Promote the opening of agricultural material stores; (3) Solve the problem of agricultural materials entering villages and households..."	http://www.moa.gov.cn/govpublic/nybzzj1/202002/t20200228_6337967.htm
	Circulation Industry Promotion Center	"...The survey found that the epidemic had a certain impact on the consumption habits, purchase channels and product prices of agricultural products. With the effectiveness of the policy of ensuring supply and stabilizing prices, market prices showed a downward trend."	http://www.ltcjzx.org.cn/article/qyzyxd/202006/20200602970300.shtml
Spain	Ministry of Agriculture, Fisheries and Food, other Ministries, Autonomous Communities and other Spanish and Community Institutions issued measures for the recovery of the agri-food sector	"...Among the different measures, the following stand out: (1) Extraordinary benefit for self-employed or self-employed workers due to cessation of activity; (2) Line of loans guaranteed by the State with up to €100,000 M; (3) Aid in the form of direct subsidies, reimbursable advances or tax advantages to those companies and SMEs that have been affected by the COVID-19 crisis; (4) Postponement of drought credits..."	https://www.mapa.gob.es/es/ministerio/servicios/informacion/covid19/Medidas-sector-agroalimentario.aspx
	Ministry of Economic Affairs and Digital Transformation approves the COVID-19 recovery, transformation and resilience plan with a specific line of action for the environmental and digital transformation of the agri-food and fisheries system	"...Ensuring coordination and analysis for the implementation of measures in exceptional situations in the agri-food sectors. The special conditions of population confinement and the restriction of mobility, agreed as an unavoidable sanitary measure, make it even more important for Spanish agri-food production to be able to develop under the best possible conditions and ensure a full, efficient and sufficient supply to citizens of food products that are needed."	https://www.boe.es/biblioteca_juridica/codigos/codigo.php?id=355&modo=2&nota=0&tab=2
	Ministry of Agriculture, Fisheries and Food discusses with the Spanish Federation of Food and Beverage Industries (FIAB) a recovery scenario after COVID-19	"...The Government has informed the FIAB that it is already working on a scenario of recovery of economic activity, in collaboration with the affected sectors, to exchange points of view and learn about their concerns. The Minister of Agriculture has stressed that the objective is to mitigate and limit the effects of COVID-19..."	https://www.mapa.gob.es/es/prensa/200423lplanasconsejofiab_tcm30-537470.pdf