


REPURPOSING FOOD SUPPLY CHAIN MANAGEMENT FOR VIABILITY DURING COVID-19: A SYSTEMATIC REVIEW

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ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 21 April 2023</p> <p>Accepted 18 July 2023</p>	<p>Purpose: The purpose of this study is to examine existing studies on recycled food supply chain management during the COVID-19 epidemic.</p> <p>Theoretical framework: The theoretical framework of the study includes research areas, research agendas, and implications for the viability during the crisis.</p>
<p>Keywords:</p> <p>Repurposing; Food Supply Chain Management; COVID-19 Outbreak; Main Research Areas; Agendas.</p> <div data-bbox="172 981 480 1234" style="text-align: center;">  </div>	<p>Design/Methodology/Approach: Mendeley Desktop Software retrieved articles from ScienceDirect.com and Google Scholar. This review included 63 full papers published in 2019–2021.</p> <p>Findings: This review covers food waste management, food safety, insecurity, crises, wellness, food supply chains and chain management, impact on alternative and local food systems, consumption, evaluation of alternative food provision systems, scaling and food policies, proposed business models, strategies, and mechanisms, logistics, economics, and resilience building. The research agendas include refusing, reducing, reusing, repurposing, recycling, and rescaling abandoned or outmoded goods, and rescaling. Implications include food supply chain management, food network viability, impact evaluation, and nutrition risk management.</p> <p>Research, practical, and social implications: This study presents research themes and agendas for adaptive management to ensure viability throughout the COVID-19 outbreak and its long-term impacts. It provides insights into food waste management, food safety, security, insecurity, wellness, food supply networks, chain management, etc. Socially, it offers future studies on outbreak viability, food network vitality, effect evaluation, and nutrition risk management.</p> <p>Originality/Value: In view of the current COVID-19 situation, this study revises food supply chain management. Food supply chain management on a worldwide scale has been impacted by this outbreak. This situation calls for an out-of-the-box solution.</p> <p>Doi: https://doi.org/10.26668/businessreview/2023.v8i7.1438</p>

REDEFINIÇÃO DE OBJETIVOS DA GESTÃO DA CADEIA DE ABASTECIMENTO ALIMENTAR PARA A VIABILIDADE DURANTE A COVID-19: UMA REVISÃO SISTEMÁTICA

RESUMO

Objetivo: O objetivo deste estudo é examinar os estudos existentes sobre a gestão da cadeia de abastecimento alimentar reciclada durante a epidemia de COVID-19.

Estrutura teórica: A estrutura teórica do estudo inclui áreas de pesquisa, agendas de pesquisa e implicações para a viabilidade durante a crise.

Design/Methodologia/Abordagem: Mendeley Desktop Software recuperou artigos de ScienceDirect.com e Google Scholar. Esta revisão incluiu 63 artigos completos publicados em 2019-2021.

Conclusões: Esta revisão abrange a gestão de resíduos alimentares, segurança alimentar, insegurança, crises, bem-estar, cadeias de abastecimento alimentar e gestão da cadeia alimentar, impacto em sistemas alimentares

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alternativos e locais, consumo, avaliação de sistemas de abastecimento alimentar alternativos, políticas de escala e alimentos, modelos de negócios propostos, estratégias e mecanismos, logística, economia e construção de resiliência. As agendas de pesquisa incluem recusar, reduzir, reutilizar, redirecionar, reciclar e redimensionar bens abandonados ou obsoletos, e redimensionar. As implicações incluem a gestão da cadeia de abastecimento alimentar, a viabilidade da rede alimentar, a avaliação de impacto e a gestão do risco nutricional.

Implicações em pesquisa, práticas e sociais: Este estudo apresenta temas e agendas de pesquisa para o gerenciamento adaptável a fim de garantir viabilidade durante todo o surto de Covid-19 e seus impactos a longo prazo. Fornece informações sobre a gestão de resíduos alimentares, segurança alimentar, insegurança, bem-estar, redes de abastecimento alimentar, gestão da cadeia, etc. Socialmente, oferece estudos futuros sobre viabilidade de surtos, vitalidade da rede alimentar, avaliação de efeitos e gestão de riscos nutricionais.

Originalidade/Valor: Tendo em conta a atual situação da COVID-19, este estudo revê a gestão da cadeia de abastecimento alimentar. A gestão da cadeia de abastecimento alimentar à escala mundial foi afetada por este surto. Essa situação exige uma solução imediata.

Palavras-chave: Redirecionamento, Gestão da Cadeia de Suprimentos Alimentares, Surto de COVID-19, Principais áreas de pesquisa, Agendas.

REORIENTACIÓN DE LA GESTIÓN DE LA CADENA ALIMENTARIA PARA LA VIABILIDAD DURANTE LA COVID-19: UNA REVISIÓN SISTEMÁTICA

RESUMEN

Objetivo: El objetivo de este estudio es examinar los estudios existentes sobre la gestión de la cadena de suministro de alimentos reciclados durante la epidemia de COVID-19.

Marco teórico: El marco teórico del estudio incluye áreas de investigación, agendas de investigación e implicaciones para la viabilidad durante la crisis.

Diseño/Metodología/Enfoque: Mendeley Desktop Software recuperó artículos de ScienceDirect.com y Google Scholar. Esta revisión incluyó 63 artículos completos publicados en 2019-2021.

Hallazgos: Esta revisión cubre la gestión de residuos alimentarios, seguridad alimentaria, inseguridad, crisis, bienestar, cadenas de suministro de alimentos y gestión de cadenas, impacto en sistemas alimentarios alternativos y locales, consumo, evaluación de sistemas de suministro de alimentos alternativos, escalamiento y políticas alimentarias, modelos de negocio propuestos, estrategias y mecanismos, logística, economía y construcción de resiliencia. Las agendas de investigación incluyen rechazar, reducir, reutilizar, reciclar y reescalar bienes abandonados u obsoletos, y reescalar. Las implicaciones incluyen la gestión de la cadena de suministro de alimentos, la viabilidad de la red alimentaria, la evaluación de impacto y la gestión del riesgo nutricional.

Implicaciones de investigación, prácticas y sociales: Este estudio presenta temas de investigación y agendas para la gestión adaptativa para garantizar la viabilidad durante el brote de COVID-19 y sus impactos a largo plazo. Proporciona información sobre la gestión de residuos alimentarios, la seguridad alimentaria, la inseguridad, el bienestar, las redes de suministro de alimentos, la gestión de cadenas, etc. Socialmente, ofrece estudios futuros sobre viabilidad de brotes, vitalidad de redes alimentarias, evaluación de efectos y gestión de riesgos nutricionales.

Originalidad/Valor: En vista de la situación actual de la COVID-19, este estudio revisa la gestión de la cadena de suministro de alimentos. La gestión de la cadena de suministro de alimentos a escala mundial se ha visto afectada por este brote. Esta situación exige una solución inmediata.

Palabras clave: Reutilización, Gestión de la Cadena Alimentaria, Brote de COVID-19, Principales Áreas de Investigación, Agendas.

INTRODUCTION

The worldwide food supply system has been significantly impacted since the COVID-19 epidemic. Essential food supplies are in limited supply as a result of idle and lost production capacity in the world's major food production industries. On the other side, while there is a high level of severe food insecurity, there is a low global demand for food consumption. Additionally, the health crisis had substantial impacts on consumer behaviors, which led to a

rise in interest in wellness and immune system-supporting products. Food products that are produced sustainably are becoming more popular as customers everywhere become more conscious of the effects that the food they consume has on the environment. The management, production, and manufacturing food supply chain systems need to be repurposed for the COVID-19 emergency and beyond for wellness improvement and global environmental sustainability as a result of all these worldwide developments.

Repurposing can help address significant shortages of vital food supplies during and after the outbreak, offer some insights into this crisis and possible crises in the future, and act as a rapid reaction plan. Repurposing can also be used as a sustainable response technique to address environmental sustainability and wellbeing enhancement. Even though the outbreak has only been going on for a short time, changing the way food is distributed has had some good effects that have been seen in countries all over the world. A literature review of past research on emergencies, health promotion, and the long-term health of the global environment (Kumar et al., 2020) covers these important issues.

A thorough review of these three research questions will help you figure out how repurposing strategies can help keep or improve food supply chain management during the outbreak and get ready for resilience and future emergencies. (RQ1) What are the research areas of repurposed management to maintain food supply chain viability during the outbreak? (RQ2): What are the research agendas of the repurposed management to maintain viability during the outbreak? (RQ3) What are the implications for viability during the crisis?

This paper is divided into seven sections. Part 1, "Introduction," involves the background of the study and research questions. Part 2, "Research Design," describes research design. Part 3, "Results of the Study," presents the results of the review. Part 4, "Conclusion of the Study," summarizes the conclusion of the review. Part 5, "Implications of the Study," illustrates the implications of this review. Part 6, "Limitation," provides the limitations of this review. Part 7, "Implication," provides implication for future research, policy, and planning challenges.

RESEARCH DESIGN

In order to minimize biases and increase transparency and objectivity in the selection process for analysis in this study, SLR was used since it enables a reproducible, transparent, and objective search of the included papers. The selection and application of the criteria for inclusion and exclusion, or rejection, of a work were done with great care and transparency.

Follow this guidance from Tranfield et al. (2003) to ensure repeatability. The review process for this study consists of the following seven steps: (1) review planning; (2) definition of criteria; (3) definition of database; (4) selection of articles; (5) review execution; (6) creation of a framework for RQs; and (7) data analysis. The specifics for each phase are listed below.

Review Planning

This review looks at 63 research papers that were all published between January 2019 and September 2021. Using the terms "repurposing food supply chain management due to COVID-19," which is the topic of this review, two databases (namely googlescholar.com and sciencedirect.com) were searched.

Definition of criteria

The inclusion and exclusion criteria were defined as follows.

Inclusion

"Repurposing food supply chain management due to the COVID-19 outbreak" was a keyword for internet searches. The keyword-based online search was restricted to research papers published in English between 2019 and September 2021. The papers available from the authors' institution were also included. To ensure that the selection substantially relates to the subject of this study, the keywords must appear in the titles of the selected papers. The keywords containing the subsistence, not just the existence, of the subject were also included. Full research papers were counted as data if they explicitly identified the research designs. Therefore, conference papers on the subject of this review that were full research articles were included. The contributions of dissertations and theses on the topic of this review were also incorporated in order to expand the data analysis and establish rigorous and inclusive study outcomes. The papers available at the authors' institution were also included.

Exclusion

The keywords in abstracts only referring to the existence of the subject were not included. The symposium papers were eliminated because they were too succinct to be included. As books, workshops, and annual conferences are not research studies, they were excluded. Theses and dissertations were not considered "data."

Definition of Database

The databases were specified according to the requirements. The articles were extracted from these two databases (namely, ScienceDirect.com and Google Scholar) searched by Mendeley Desktop Software.

Selection of Articles

The selection was based on search phrases in multiple publications' electronic databases. The title's keywords were detected. To enhance the trustworthiness of the results, a variety of sources was favored. Among the 112 papers, 63 full papers from journals were eligible for this review.

Review Execution

This review was conducted using the paper filter technique. A backward search was also conducted, but only when essential to comprehending the paper's context; it was not included in the study. 63 papers were eligible for review: (Filimonau, & Uddin, 2021), (Ananda et al., 2021), (Read & Muth, 2021), (Strotmann et al., 2021), (Zhao & You, 2021), (Vizzoto et al., 2021), (Ceryes et al., 2021), (Filimonau & Sulyok, 2021), (Lohnes, 2021), (Shurson, 2020), (Buczacki et al., 2021), (Lombardi & Costantino, 2021), (O'Hara & Toussaint, 2021), (Das et al., 2020), (Harris et al. 2020), (Howard & Simmons, 2020), (Trmcic et al., 2021), (Glaros et al., 2021), (Giap, B. M. (2020), (Fabusuyi et al. 2021), (Yates et al., 2021), (Suresh et al., 2020), (Throup et al., 2020), (Dempsey & Pautz, 2021), (Mayer & Ryder, 2021), (Zuber & Brüßow, 2020), (Galanakis et al., 2020), (Buckner et al., 2021), (Rishi et al., 2020), (Singh et al., 2020), (Khan et al., 2021), (Ntambara & Chu, 2021), (Ayivi et al., 2021), (Pendyala et al., 2021), (Bandyopadhyay & Samanta, 2020), (Hobbs, 2020), (Ivanov, 2021), (Kumar & Babu, 2021), (Nemes et al., 2021), (Rosenzweig et al., 2021), (Moragues-Faus, 2021), (Workie et al., 2020), (Cummins et al., 2020), (Naresh et al., 2021), (Filimonau & Ermolaev, 2021), (Kumar et al., 2021), (Wang et al., 2021), (van Meijl et al., 2021), (Galimberti et al., 2020), (Kerr, 2021), (Björklund et al., 2020), (Reardon et al., 2021), (Coleman et al., 2021), (Haslberger et al. 2020), (Walters et al., 2020), (Hailu, 2020), (Dossa et al., 2020), (do Canto et al., 2021), (Blay-Palmer et al., 2021), (Kronfli, 2021), (Blake, 2021), and (Forum et al., 2020).

Creation of a Framework for RQs

This review established operational definitions to identify the research areas, the research agendas, and the implications for the viability of the chain during the crisis.

Data analysis

The data analysis included data extraction, content analysis, and data synthesis. To help with data analysis, a spreadsheet was constructed. The spreadsheet contained information about data identification (such as databases, journal and paper titles, year of publication, first author's institution, and industry the study was conducted in); study contents (such as research objectives, RQs, and methodological approach); and results of the study. The review process above could be summarized as shown in Table 1.

Table 1 SLR protocol summary

Subject of the review	Repurposing food supply chain management due to COVID-19 outbreak
RQs	(RQ1) What are the research areas of repurposed management to maintain food supply chain viability during the outbreak? (RQ2) What are the research agendas of the repurposed management to maintain viability during the outbreak? (RQ3) What are the implications for viability during the crisis?
Dates of publication	between 2019 and September, 2021
Databanks	63 articles under review
Search criteria	Full text in English; peer reviewed; title, abstract and keywords, online search, dissertations, theses, conferences, electronic databases
Inclusion criteria	Research papers focusing on the subject of this review and keywords, i.e., “repurposing food supply chain management due to COVID-19 outbreak”
Exclusion criteria	Papers in symposiums, books, workshops, and meetings
Keywords	Repurposing food supply chain management due to COVID-19 outbreak
Tool for analysis	The following information is included in a spreadsheet: identification of the publications (including databases, journal and paper names, year of publication, first author's institution, etc.); papers' contents (such as the research questions, research design, methodology, results of the study, key conclusion; limitations; and implications of this review.

Source: Durach, C. F., Kembro, J., & Wieland, A. 2017.

Table 1 displays the SLR protocol summary. The summary includes the subject of the review, research questions, dates of publication, databanks, search criteria, inclusion criteria, exclusion criteria, keywords, and tools for analysis.

The results of the review and the findings of the review were then reported, as seen in the next part.

RESULTS OF THE STUDY

The Research Areas of Repurposed Management to Maintain the Viability During COVID-19 Outbreak

Table 1 shows a summary of the types of articles that were chosen for this review.

Table 2 The research areas of the selected articles

Research areas	Articles
Food waste management	(Filimonau, & Uddin, 2021), (Ananda et al., 2021), (Read & Muth, 2021), (Strotmann et al., 2021), (Zhao & You, 2021), (Vizzoto et al., 2021), (Ceryes et al., 2021), (Filimonau & Sulyok, 2021), (Lohnes, 2021), (Shurson, 2020), (Buczacki et al., 2021), (Lombardi & Costantino, 2021)
Food safety, food security, food insecurity and food crisis	(O'Hara & Toussaint, 2021), (Das et al., 2020), (Harris et al. 2020), (Howard & Simmons, 2020), (Trmcic et al., 2021), (Glaros et al., 2021), (Giap, B. M. (2020), (Fabusuyi et al. 2021), (Yates et al., 2021), (Suresh et al., 2020), (Throup et al., 2020), (Dempsey & Pautz, 2021), (Mayer & Ryder, 2021), (Zuber & Brüssow, 2020)
Wellness	(Galanakis et al., 2020), (Buckner et al., 2021), (Rishi et al., 2020), (Singh et al., 2020), (Khan et al., 2021), (Ntambara & Chu, 2021), (Ayivi et al., 2021), (Pendyala et al., 2021), (Bandyopadhyay & Samanta, 2020)
Food supply chains and chain management	(Hobbs, 2020), (Ivanov, 2021), (Kumar & Babu, 2021)
Impact	(Nemes et al., 2021), (Rosenzweig et al., 2021), (Moragues-Faus, 2021), (Workie et al., 2020), (Cummins et al., 2020), (Naresh et al., 2021)
Consumption	(Filimonau & Ermolaev, 2021), (Kumar et al., 2021)
Evaluation	(Wang et al., 2021), (van Meijl et al., 2021)
Scaling & food policies	(Moragues-Faus, 2021), (Galimberti et al., 2020), (Kerr, 2021)
Business models, strategies and mechanisms	(Björklund et al., 2020), (Reardon et al., 2021), (Coleman et al., 2021), (Haslberger et al. 2020)
Logistics	(Walters et al., 2020)
Economics	(Hailu, 2020), (Dossa et al., 2020), (do Canto et al., 2021)
Resilience building	(Blay-Palmer et al., 2021), (Kronfli, 2021), (Blake, 2021), (Forum et al., 2020)

Source: The Author, 2023

Table 2 outlines the research areas of the publications chosen for this review. The other twelve major categories include food waste management, food supply chain management and chain management, impact, consumption, evaluation, scaling, and food policies, business models, strategies, and mechanisms, logistics, economics, and resilience building. Each research area's specifics are shown below.

First, food waste management encompasses waste that can have an impact on health, wellness, and the environment, such as: management of food waste in chain-affiliated and independent consumer locations (Filimonau, & Uddin, 2021); Australian household food waste influenced by a number of behavioral and sociodemographic characteristics and behaviors (Ananda et al., 2021); cost-effectiveness of interventions to reduce food waste (Read & Muth,

2021); digital methods to address the pandemic epidemic, German food service industry waste production and avoidance (Strotmann et al., 2021); optimization of the food-energy-water-waste nexus systems for New York State under the pandemic to address environmental and public health issues (Zhao & You, 2021); methods for reducing food waste in the foodservice industry (Vizzoto et al., 2021); variables affecting food waste and how the food recovery hierarchy is implemented in American supermarkets (Ceryes et al., 2021); managing food waste in restaurants in a mid-sized (Filimonau & Sulyok, 2021); controlling excess by charitable giving and enclosing food waste legally (Lohnes, 2021); enhancing the sustainability of food animal production systems in the face of health, climatic, and economic issues by recycling food waste streams into animal feed (Shurson, 2020); and food waste and sustainable development goals (Buczacki et al., 2021); and food waste based on a social innovation perspective (Lombardi & Costantino, 2021).

Second, there are studies on food crises, food insecurity, food safety, and food security: food insecurity during COVID-19 (Dempsey & Pautz, 2021; Mayer & Ryder, 2021); crisis in food availability, food security, and COVID-19 (O'Hara & Toussaint, 2021); urban and rural Bangladeshi households' severe food insecurity and short-term coping mechanisms during the pandemic lockdown in 2020 (Das et al., 2020); food system disruption in the instance of early outbreak nutritional and livelihood consequences on Indian vegetable producers (Harris et al. 2020); challenges to global food security posed by COVID-19 solutions in the USA (Howard & Simmons, 2020); the outbreak's effects on food safety and worker health (Trmcic et al., 2021); gaps, possibilities, and policy supports: navigating food security during the outbreak as a systems approach (Glaros et al., 2021); Pandemic, strategic alternatives, and effects on Central and West Asian food security (Giap, B. M. (2020); increasing COVID-19-vulnerable families' access to food (Fabusuyi et al. 2021); the effects of food system plastics on the environment, food security, and health (Yates et al., 2021); the address food insecurity with a focus on the role of rural federally qualified health centers (Suresh et al., 2020); rapid converting of breweries, pulp and paper mills, and biorefineries to lignocellulosic sugar production in response to a global food shortfall (Throup et al., 2020); and threats to virologists in the food business in the wake of COVID 19 (Zuber & Brüssow, 2020).

Third, wellness includes compounds that are present in food and are effective against the coronavirus pandemic (Galanakis et al., 2020), influencing healthcare for food provision in the community during the COVID-19 epidemic (Buckner et al., 2021), COVID-19, diet, and gut microbiota (Rishi et al., 2020), possible SARS-CoV-2 inhibitors, and functional dietary

components as a nutritional supplement for COVID-19 (Singh et al., 2020), feeding nations during pandemics with an emphasis on fish meals and aquatic foods in Africa (Khan et al., 2021), the danger to child nutrition during and after the pandemic (Ntambara & Chu, 2021), the impact of food ingredients and active substances on human immunity in the context of COVID-19 (Ayivi et al., 2021), strong broad-spectrum food-based inhibitors of the SARS-CoV-2 and other Coronavirus proteases (Pendyala et al., 2021), and low- and middle-income nations' perspectives on antimicrobial resistance in the agri-food chain and companion animals as a re-emerging danger in the post-COVID era (Bandyopadhyay & Samanta, 2020).

Fourth, food supply networks and chain management during the pandemic (Hobbs, 2020), a conceptual and formal generalization of the four main adaptation techniques in relation to supply chain viability and the pandemic (Ivanov, 2021), and focus on COVID-19 value chain management's answers to and lessons learned from India's grape production (Kumar & Babu, 2021).

Fifth, impacts focuses on the possibilities for the sustainability transition and the influence of COVID-19 on alternative and local food systems using insights from 13 different nations (Nemes et al., 2021), finding and reducing emissions from the food system: a double helix of research and policy (Rosenzweig et al., 2021), the development of urban food systems and the scaling up of the effects of urban food policy (Moragues-Faus, 2021), utilizing data from developing nations and examining the effects of the COVID-19 pandemic (Workie et al., 2020), COVID-19's effects on the UK's urban food retail sector and dietary disparities (Cummins et al., 2020), and impact of the epidemic on India's food systems, natural resources, and agriculture (Naresh et al., 2021).

Sixth, consumption consists of the COVID-19 pandemic and food consumption at home and away (Filimonau & Ermolaev, 2021) and mitigating risks in perishable food supply chains (Kumar et al., 2021).

Seventh, evaluation comprises evaluating the carbon emissions of alternative food provision systems (Wang et al., 2021) and evaluating COVID-19's financial effects on the agri-food sector and on world food security (van Meijl et al., 2021).

Eighth, scaling and food policies include rescaling the effects of urban food policies when city food networks start to change (Moragues-Faus, 2021), rethinking urban and food regulations after the COVID-19 epidemic (Galimberti et al., 2020), and looking at the long-term effects of COVID-19 on international agricultural trade policy (Kerr, 2021).

Ninth, proposed business models, strategies, and mechanisms are increasing entrepreneurial solution areas during times of crisis and packaged food and beverage companies trying out new business models (Bjorklund et al., 2020); food industry businesses to adapt to COVID 19 in developing countries in case of e-commerce and co-opted delivery intermediaries (Reardon et al., 2021); creating a food system for everyone (Coleman et al., 2021); and a focus on COVID-19 mechanisms of specific functional foods against viral infections (Haslberger et al. 2020).

Tenth, the only study on the challenges of moving food and agricultural products during the COVID-19 pandemic is in logistics (Walters et al., 2020).

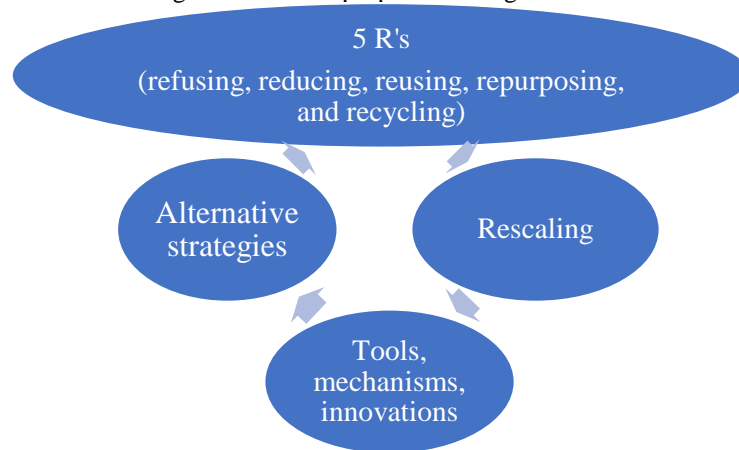
Eleventh, economics incorporates economic considerations for Canadian food manufacturers regarding COVID-19 (Hailu, 2020), use of circular economy principles in the UK's food supply chain for wheat (Dossa et al., 2020), and circular food behaviors (do Canto et al., 2021).

Lastly, building resilience embraces the interrelationship between humans, food, and nature (Batini, 2021) and builds resilience to COVID-19, focusing on metropolitan food systems (Blay-Palmer et al., 2021), growing a stronger food supply (Kronfli, 2021), and enhancing community resilience post-COVID-19 by going beyond emergency food assistance (Blake, 2021) and constructing a food system that is more dependable, wholesome, and equitable (Forum et al., 2020).

The Repurposed Management's Research Agendas to Maintain Viability During the Outbreak

The outbreak has brought food supply chain management into attention, with several contemporary scholars researching how to repurpose food supply chain management in response to the outbreak, in a new and creative way or process by adapting, utilizing, reusing, transforming, redeploying, or re-channeling a single-use object or tool for use in a different and new purpose, on a short-term and long-term basis, with or without alteration, to an object with an alternate functionality or into another tool or alternative innovation, usually for purposes unintended by the original tool.

Figure 1 The research agendas of the repurposed management to maintain the viability



Source: The Author, 2023

Figure 1 illustrates the research agendas for the papers chosen for this review that were repurposed to keep the food supply chain viable during the COVID-19 epidemic. There are five major areas: 5 R's (namely, refusing, reducing, reusing, repurposing, and recycling); rescaling; tools, mechanisms, and innovations; and alternative strategies. Below are details for each agenda item.

Above all, the agenda was built around the 5 Rs. In order to respond to food security during the pandemic, typically well-known actions were incorporated into the adapted management to sustain food supply chain viability during the outbreak. Among the actions were the 5 Rs. Several researchers have attempted repurposing strategies such as food waste reduction and other regulating surplus to creatively respond to the ecological and economic crises due to COVID-19 disruptions on a short-term and long-term basis at micro- and macro-levels and at local, national, international, and global levels. Repurposing is carried out using items that are typically considered junk or obsolete.

The earthship-style dwelling, where tires are utilized as wall insulation and bottles serve as glass walls, is a classic example. Repurposing and reuse are not just one-time applications for the same purpose. The recycling practice of using rubber as a boat fender is one example, and steel or plastic buckets are used as compost bins or feed troughs. Fly ash from power plants and waste incinerators is sometimes added to concrete to boost strength. This kind of recycling can occasionally lead to the use of materials that are no longer useful for their original function, such as the use of worn-out garments as rags. In times of health, economic, and climate change problems, for instance, Shurson (2020) suggests an innovative method of recycling food waste into animal feed to improve the sustainability of feed production systems. Additionally, during the 2020 COVID-19 pandemic lockdown, Das et al. (2020) provide acute food insecurity and

short-term response strategies for Bangladesh's urban and rural households. Additionally, Throup et al. (2020) start the quick recycling of breweries, pulp and paper mills, and biorefineries for the manufacture of lignocellulose in times of global food shortages. Then, in order to effectively reduce food waste, Ananda et al. (2021) proposed household food waste reduction techniques concentrating on regular food-related behaviors and implemented activities to build overall food-management abilities. By creating the first standard for the creation of food waste in the Hungarian food service industry and identifying institutional, contextual, locational, organizational, and cultural factors that impede food waste prevention and mitigation, Filimonau and Sulyok (2021) attempt to address food waste management issues in a mid-sized Hungarian restaurant. This guideline was developed using best practices and international experience in managing food waste, and recommendations are offered for how these factors should be handled. Through the charity and legal geography of the food waste attachment, Lohnes (2021) remodels excessive control and eliminates the long-standing tension between waste and the needs of the food system. Ivanov (2021) indicates key adaptation mechanisms for supply chain survival during the COVID-19 pandemic.

Next, repurposing includes rescaling. O'Hara and Toussaint (2021) adjust food policy in cities to rescale the impact, while Björklund et al. (2020) expand entrepreneurial solutions in crisis by conducting business model experiments among packaged food and beverage businesses. Dossa et al. (2020) reform the circular economy approach to the diffusion of the wheat food supply chain in the UK. Naresh et al. (2021) bring forward a reduction of the COVID-19 outbreak in food systems. Moragues-Faus (2021), Moragues-Faus (2021), and Workie et al. (2020) propose merging the urban food network by employing a rescaling approach to the impact of urban food policy.

Then, tools, mechanisms, and innovations are effective for repurposing. Several studies suggest tools, mechanisms, innovations (both economic, digital, and social), and approaches (both digital and theoretical). Haslberger et al. (2020) reselected functional food mechanisms against viral infection in view of digital approaches to facing pandemic-related crises. Using contingency theory, Kumar et al. (2021) repurpose all mitigation strategies related to socioeconomic commitments. Glaros et al. (2021) use a systematic approach to plan and direct food security during COVID-19.

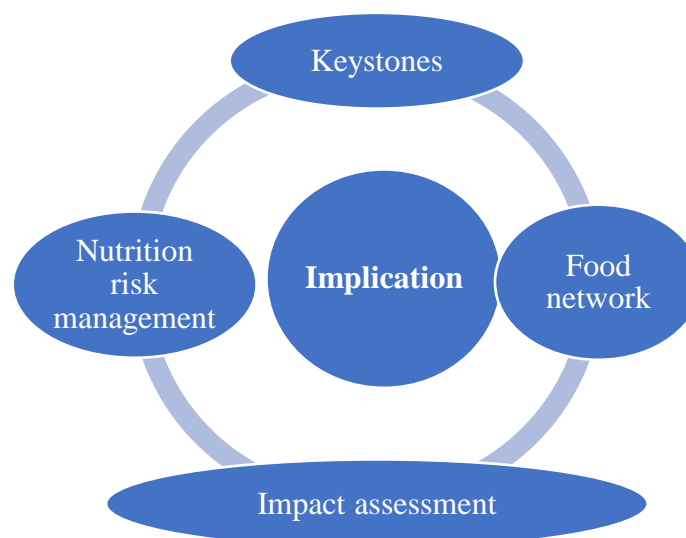
Lastly, scholars also proposed alternative strategies. Lombardi and Costantino (2021), for instance, propose a hierarchical pyramid for food waste based on social innovations and perspectives on the food service and hotel industries. Nemes et al. (2021) recommend insights

on the possibility of alternative and local food systems for sustainable change drawn from the impacts of several countries. Filimonau and Uddin (2021) suggest international and national strategies to prevent and mitigate food waste in restaurants, with a focus on free food service operators in the area with the greatest potential to reduce food intake.

The Implications for the Crisis and the Future

The implications for food supply chain viability during a COVID-19 crisis in the future could be photographically illustrated as follows.

Figure 2 The implications for the viability during the crisis



Source: The Author, 2023

Figure 2 depicts the implications for viability during the crisis in the short, medium, and long terms. The implications cover four issues: (1) keystones of the outbreak's viability, (2) food networks for the outbreak's viability, (3) impact assessment, and (4) nutrition risk management. Below are details for each issue.

Keystones of the outbreak's viability

First, recent research has attempted to link food supply chain management activities with involving entities based on keystones of viability during the outbreak. The keystones on which all relevant elements depend involve network, nexus, cooperation, connection, affiliation, and collaboration that link the elements and fuse them into a single entity. Zhao and You (2021) suggest optimizing the COVID-19 pandemic's food, energy, water, and waste nexus systems to address environmental and public health issues. Filimonau and Uddin (2021)

recommend affiliate companies periodically measure food waste and create related actions to avoid or lessen instances. Kumar et al. (2021) re-generate the most effective risk-reduction measures (namely, co-management, proactive business continuity planning, and financial sustainability). Workie et al. (2020) scale urban food policy and food network development. Local area network operations across areas include network structure, mechanisms to promote interaction among network members and between membership and network infrastructure, and the capacity to distribute resources, network capabilities, and activities.

Food network

Some researchers offer food networks as recommendations for their viability during the outbreak. Moragues-Faus (2021), Moragues-Faus (2021), and Workie et al. (2020) propose the emergence of the urban food network, using a rescaling approach to urban food policy. This study's results are translated into policy recommendations aimed at expanding cross-regional networks' transformative capacities and enhancing their role in unveiling the food agenda in new egalitarian and equal urban centers. Most of these recommendations support cross-scalar alignment of food policies. Invest in connected infrastructures (such as network organizations and backbones), engage with a variety of agents, and provide open places to access knowledge and general competency. This research emphasizes the necessity of scaling food system reforms that effectively achieve social and geographic equity when urban food policy becomes the norm. Workie et al. (2020) provide policy recommendations to scale the impact of food policy on cities by strengthening multi-scalar intervention, building a case to invest in connected infrastructure such as networks and core enterprises, and increasing the flexibility of food-specific networks and policies in cities by working closely with municipal officials and other relevant constituents.

Impact assessment

Future perspectives should focus on impact assessment. van Meijl et al. (2021) assess COVID-19's economic impact on food and agriculture. Trmcic et al. (2021) evaluated the food safety and health impact of COVID-19. Ceryes et al. (2021) investigated food waste and the food recovery hierarchy in research and future interventions in US supermarkets. Howard and Simmons (2020) evaluated how COVID-19 threatens global food security to find out the pandemic's impact on low-income countries' food security. The study revealed these findings. First, many low-income countries, which are at the greatest risk from the pandemic,

also face critical threats to crop and livestock systems resulting from climate change. Second, the pandemic provides an opportunity to invigorate the manufacturing, marketing, and consumption of nutritious and safe food. Third, accelerate the adoption of digital technology. The pandemic's physical distancing requirements will provide a unique opportunity to expand access to digital information tools and services for manufacturing, marketing, health, and social services functions.

Several research studies focused on four potential medium- to long-term pandemic-related changes in the diet and dietary inequality of the UK population. Costa-Font and Revoredo-Giha (2020) evaluated food, health, and disparities. The study found: first, the potential re-localization, especially the capacity of the urban food retail system; second, the rapid transformation towards digital food purchase; third, the restructuring of the fast-food environment; and fourth, the reduction of the capacity of the emergency food assistance system. This study recommended a better and fairer food retail system. Cummins et al. (2020) studied UK urban food retail systems, food, and health inequality. The study found the pandemic could alter consumer behavior, food availability, affordability, choice, and price, as well as urban food retail. Demand and panic buying have disrupted global food supply chains and increased food insecurity.

Nutrition risk management

During the crisis, several researchers (e.g., Ntambara & Chu, 2021; Naresh et al., 2021; Forum et al., 2020; Kumar & Babu, 2021) investigated the effectiveness of access to community nutrition services as solutions for what to expect and how to respond to COVID-19 child nutrition concerns. Collectively, drawing upon the prior studies, key management strategies were proposed to empower families and communities at local and national levels in the short, medium, and long terms.

At a local level, nutrition risk management strategies for family and community include: first, integrating family and community extension committees that coordinate community engagement programs focused on nutrition; second, organizing community gatherings to improve food production, food security, and food hygiene; and lastly, rehabilitating and re-introducing educational, mentoring, and community nutrition programs.

At a national level, the government and public sectors should pay attention to these policies, programs, and innovations to improve the nutritional status of children. First, they should come up with nutrition plans for mothers and children, especially pregnant women and

kids under five. Second, it is important to make sure that nutrition laws, like those about food safety and hygiene, are written and enforced in the right way. Third, it is necessary to establish an independent national nutrition committee to oversee and monitor community nutrition programs. Fourth, there is a need to establish a supreme council responsible for the development and implementation of nutrition policies. Fifth, nutrition experts should formulate maternal and child nutrition policies. Sixth, policies should be defined to make it easy for NGOs and independent community organizations to work on nutrition. Seventh, collaborative approaches should work with local media outlets such as radio, television, and other forms of mass media to provide or deliver nutrition knowledge about a healthy diet and exercise. Eighth and lastly, lines across regions, cities, and sectors should be created for better nutrition coordination.

In order to create a sustainable, resilient, equitable, and nurturing food system, these insights were proposed, including: first, redefining the role of government in response to the crisis effectively; second, reassessing supply chain strategy; third, redirecting farm supply chains to local areas; fourth, changing consumer expectations; fifth, investing in sustainable infrastructure; sixth, relying on global supply chains; seventh, paying more attention to the physical safety of workers in the supply chain; eighth, reducing air pollution and greenhouse gas emissions; Last but not least, providing visibility into the supply chain through digital transformation, digital horticulture, digital technologies (such as AI, big data crop guidance through SMS and an online portal, the introduction of an online trading platform with financial support, etc.), analytics, blockchain technology, and the Internet of Things can modernize horticulture activities and help spread agricultural information.

CONCLUSION

In retrospect, the review draws three conclusions based on the three RQs, as follows:

Above all, in response to RQ 1, the research areas of repurposed management to maintain food supply chain viability during the outbreak comprise these twelve issues. First, food waste management includes: waste that can affect health, wellness, and the environment (such as chain-affiliated and independent consumers' food waste management); behavioral and sociodemographic characteristics and food waste habits; the cost-effectiveness of food waste interventions; and food service waste generation and prevention. Second, food safety, insecurity, and crises comprise food access in crisis; food security; acute food insecurity in Bangladeshi households and short-term coping mechanisms during the lockdown; food system disruption in the case of COVID-19 effects on vegetable farmers' livelihoods and diet; COVID-

19 threats and solutions (namely, food security systems during the outbreak using a system approach; key issues; strategic options pandemic; impacts on food security; enhancing food security for COVID-19-vulnerable families; and food system plastics impact on environment, food security, and health). Third, wellness incorporates food components and active substances against coronavirus, making a difference in healthcare for community food provision during the outbreak, diet, gut microbiota, and COVID-19, as well as possible SARS-CoV-2 inhibitors and COVID-19 dietary supplements. Fourth, food supply chains and chain management include supply chain viability and the pandemic: a conceptual and formal generalization of four primary adaptation techniques, and ensuring supply chain resilience in the food retail business during the outbreak using resource-based perspective theory. Fifth, implications focus on COVID-19's impact on alternative and local food systems and the sustainability transition, discovering and resolving food system emissions: the double helix of science and policy, the establishment of city food networks, and rescaling the impact of urban food policies. Fifth, implications focus on COVID-19's impact on the sustainability transition, and alternative food systems, detecting and addressing food system emissions, establishing city food networks, and rescaling urban food policies. Sixth, COVID-19 and home and away food are included in consumption. Seventh, evaluate alternative food provision systems' carbon emissions and COVID-19's economic impact on the agrifood sector and global food security. Eighth, scaling and food policies, include rescaling urban food policies in the case of city food networks, rethinking urban and food policies to promote public safety, and long-term consequences for agriculture trade policy after a year with COVID-19. Ninth, proposed business models, strategies, and mechanisms include food sector firms dealing with COVID-19 in developing nations for e-commerce; expanding entrepreneurial solution areas during crises; packaged food and beverage ventures testing business methods; and building a food system that works for everyone. Tenth, logistics covers food and agricultural transport during the outbreak. Eleventh, food processors, circular economy methods in the UK wheat supply chain, and circular food behaviors are all discussed in relation to economics. Lastly, building resilience focuses on city area food systems, establishing a more resilient food supply chain, and moving beyond emergency food handouts to create post-COVID community resilience.

In addition, in response to RQ 2, the research agendas of the repurposed management will maintain viability during the outbreak in a new way by adapting, utilizing, reusing, transforming, redeploying, or re-channeling a single-use object or tool for a different and new purpose, on a short-term and long-term basis, with or without alteration. First, as the outbreak

was sudden, well-known actions were repurposed to sustain viability during the pandemic under the concept of the 5 R's (namely, refusing, reducing, reusing, repurposing, and recycling). Several studies have tried repurposing tactics such as food waste reduction and other ways of controlling surplus to creatively adapt to the ecological and economic difficulties due to COVID-19 disruption at micro and macro levels and at local, national, regional, and global levels. Second, repurposing uses discarded or outmoded items. During health, economic, and climate change problems and disruptions: turning food waste into animal feed, tips for urban and rural homes; recycling biorefineries, pulp and paper, and breweries amid food shortages; regular food-related activities and adopting food-management systems to prevent home food waste; highlighting institutional, contextual, spatial, organizational, and cultural barriers to reducing food waste in restaurants; tackling international experience and best practices; remodeling excess control through charity; and using the legal geography of food waste attachment to resolve waste and food system demands; during waste and food system demands; Third, repurposing entails resizing: rescaling food policy in cities; increasing entrepreneurial solutions in crisis by experimenting with packaged food and beverage company models; reforming the food supply chain circular economy; proposing the merger of the urban food network and rescaling urban food policy; repurposing tools, methods, and innovations (economic, digital, and social tools, methods, and innovations); reselecting functional food mechanisms against viral infection for digital pandemic methods; and adapting socio-economic mitigation solutions utilizing contingency theory. Lastly, suggested alternatives include a hierarchical pyramid for food waste from social innovations and hotel sector viewpoints; alternative and local food systems and sustainable transformation perspectives from multiple countries; and international and national solutions to reduce food waste in restaurants, focusing on free meal service providers.

Lastly, in response to RQ 3, the viability of the food supply chain during the COVID-19 crisis in the future includes these prospective implications. First, linking food supply chain management activities with entities involved in the COVID-19 outbreak are network, nexus, cooperation, connection, affiliation, and collaboration, which link important pieces into a single entity. The links include: optimizing food-energy-water-waste to address health and environmental issues; affiliated firms measuring food waste and implementing preventative strategies; updated risk-reduction techniques; urban food networks and scale food policies; and cross-area local area network operations. Second, on food networks for COVID-19 outbreak viability, researchers advocate food networks for COVID-19 food chain viability, including:

merging the urban food network and rescaling urban food policy; expanding cross-regional networks' transformative capacities and enhancing their role in unveiling the food agenda in new egalitarian and equal urban centers; supporting cross-scalar alignment of food policy; investing in connected infrastructures; engaging a variety of agents; providing open places to access knowledge and general competency; recognizing the necessity to scale food system reforms that effectively achieve social and geographic equity when urban food policy becomes the norm; providing policy recommendations to scale the impact of food policy on cities by strengthening multi-scalar intervention; increasing the flexibility of food-specific networks and regulations in cities by working closely with city officials and other key players. Third, impact analysis should be a priority. The evaluation includes these issues: COVID-19's influence on agricultural and food security; food safety and health effects; food waste and food recovery in supermarkets; influence of COVID-19 on food security in least developed countries; threats of climate change on food and livestock systems in many low-income countries at risk from the pandemic; food manufacturing, marketing, and consumption; accelerated digital technology adoption; pandemic physical distance access to digital information tools and services for industry, marketing, health, and social services; and proposed potential changes caused by pandemics in the medium to long term and their impact on diet and dietary inequality for a better and fair food retail system (namely, first, the potential for re-localization; second, the quick shift to digital food purchases; third, the reorganization of the fast-food industry; fourth, the decreased capacity of the emergency food aid system). Finally, the effectiveness of community nutrition services as a remedy for child nutrition hazards during and after the COVID-19 outbreak should focus on essential management techniques to empower families and communities at the local, national, and long-term levels: local nutrition risk management strategies for family and community; highlight of national policies, programs, and innovations to improve children's nutrition; and proposed insights into creating a sustainable, resilient, equitable, and nurturing food system (namely redefining the role of government in response to the crisis, reassessing supply chain strategy, redirecting farm supply chains to local areas, changing consumer expectations, investing in sustainable infrastructure, relying on global supply chains, and paying more attention to physical safety of food).

IMPLICATIONS

This study provides insights into these key issues, specifically the research areas and agendas of repurposed management to maintain viability during the outbreak as well as the long-term implications for viability during the crisis.

In addition, this study yields insights into the research areas (namely, food waste management; food safety, security, insecurity, and crisis; wellness; food supply chains and chain management; impact; consumption; evaluation; scaling; and food policies; business models, strategies, and mechanisms; logistics; economics; and resilience building). Insights are also concerned with key agendas (namely, the 5 R's: rescaling; tools, mechanisms, innovations; and alternative strategies).

Finally, this study suggests future research inquiries based on greater insights into keystones of viability during the outbreak, food network viability for the food supply chain during the crisis, impact assessment, and nutrition risk management.

LIMITATIONS OF THE STUDY

The number of papers assessed here is constrained. Full papers only were considered.

However, future research should consider the number of selected articles that have been cited in order to produce more thorough and comprehensive study conclusions.

IMPLICATION

Researchers, policymakers, and planners face challenges in keeping tabs on the food system's evolution, reducing the negative effects of change, and guaranteeing that everyone benefits from it equally. Despite the fact that the present COVID-19 problem may have a detrimental effect on food security, in particular for the most vulnerable, there are still chances for individuals engaged in urban practices to better balance the local food system. With some forward thinking and careful long-term planning, a local food system might be able to be flexible and last for a long time.

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