

RESEARCH ARTICLE

Food Supply Chain Disruptions Owing to Covid-19

Anupam Saxena^{1*} • Preetam Suman²

¹Associate Professor, Operation Analytics, Jaipuria Institute of Management, Lucknow, India.

E-mail: anupam.saxena@jaipuria.ac.in

²Assistant Professor, Information Technology, Jaipuria Institute of Management, Lucknow, India.

E-mail: preetam.suman@jaipuria.ac.in

ARTICLE INFO

Article History:
Received: 04.05.2021
Accepted: 15.06.2021
Available Online: 14.07.2021

Keywords

Covid-19
Disruption
Lockdown
Labour Issues
Food Supply Chain Management

ABSTRACT

The Covid-19 pandemic has shown that food supply chains are the most critical component of economic and human activities. It has also created a lot of interest among researchers, practitioners and policymakers to study the significant challenges of the food supply chain caused by the pandemic. Therefore this work wanted to investigate the critical supply chain challenges due to Covid-19 with the help of a systematic literature review of well-established articles published in interdisciplinary journals. The selection of thirty one papers was made through a research protocol that helped select and identify research papers which were coded with the help of qualitative software Atlasti 9.0 to study which supply chain challenge amongst disruption, forecasting and inventory was most prominently studied in the literature. Results of software coding revealed that disruption was coded 170 times whereas forecasting 10 times and inventory 37 times as challenges of food Supply Chain Management (SCM). Therefore, it was concluded that most of the researchers considered disruption as one of the significant food supply chain challenges. Further coding also revealed that lockdown and labour related issues were the primary reasons for food supply chain disruption.

Please cite this paper as follows:

Saxena, A. and Suman, P. (2021). Food Supply Chain Disruptions Owing to Covid-19. *Alinteri Journal of Agriculture Sciences*, 36(2): 94-103. doi: 10.47059/alinteri/V36I2/AJAS21120

Introduction

The pandemic that has lasted for more than a year now has transformed people's lives across the globe. It has impacted all sectors of life and businesses. No sector of society is left untouched by the effects of the Covid-19 pandemic. The most essential of all survival activities is food which has been severely affected by the impact of this pandemic. Food supply chains across the globe have been facing severe problems.

These problems have occurred due to various reasons like lack of forecasting, sudden change in political decisions, strict restrictions in the movement of people and goods, lockdowns, transport and logistics being mismanaged due to shortage of human resources. All these reasons have left a profound impact on the food supply chain, and research has shown that this impact leads to a shortage of food and food security.

This work wants to explore the significant challenges of the food supply chain in detail with the help of a systematic literature review and identify the causes of supply chain problems and which major supply chain issue has been widely studied by literature.

For this purpose, a systematic literature review was conducted, fifty six papers were collected and based on the research protocol thirty-one research papers published between March, 2020 to January, 2021 were selected and analysed for supply chain issues like disruptions, forecasting and inventory.

The main finding was that disruption is considered more significant supply chain issue in comparison to forecasting and inventory. The papers were further coded for reasons of disruption during Covid-19. It was found that most papers have considered lockdowns and restriction on people and goods and labour shortage as the significant causes of disruption.

* Corresponding author: anupam.saxena@jaipuria.ac.in

Systematic Literature Review

The current work follows a systematic literature review as the methodology for the study. This research methodology has been widely accepted in the domain of supply chain management and is being used by authors like Aria and Cuccurullo, 2017; Kamal and Irani, 2014; Pereira, Christopher and Lago Da Silva, 2014; Petticrew, 2001; Queiroz *et al.*, 2019; Queiroz *et al.*, 2020; Schanes, Dobernick and Gözet, 2018; Tachizawa and Wong, 2014.

Fink (2005) defines systematic literature review as “a systematic, explicit, comprehensive, and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners” cited in (Okoli, 2015). Exploring the systematic literature review

methodology helped the researcher conclude that this methodology is well suited for the kind of research this work aims to conduct.

To conduct the literature review, a keyword search was performed, which comprised of keywords like: “Covid-19 food supply chain”, “Pandemic and agriculture supply chain impact”, “Food supply chain problems during Covid-19”. Papers that were being published on the topic of food supply chain problems focusing on Covid-19 were considered. Abstracts of the selected documents were studied for deeper understanding, and papers were selected based on the research protocol discussed below (Table 1 & Figure 1).

Table 1. Research protocol

Serial Number	Research Protocol	Descriptions
1	Research Databases	Elsevier, Wiley, MDPI, Cambridge University Press, Springer, Taylor & Francis, BSAAE, Oxford University Press, FRM, JAFSCD, Nature publishing group and many others
2	Publication Type	Peer-Reviewed journals
3	Language	Only those papers which were written in English were considered
4	Date Range	March 2020 till January 2021
5	Search terms	Covid-19 food supply chain, Pandemic and agriculture supply chain impact, Food supply chain problems during Covid-19
6	Search fields	Title and keywords
7	Criteria for inclusion	Papers that discussed food supply chain disruptions during the Covid 19 pandemic
8	Data analysis & synthesis	Used Atlasti 9.0 Qualitative software version 9.0 was used to perform coding

After selecting research papers based on the protocol mentioned above, it was found that thirty-one research papers were most relevant in the context of the current study (table 2 & figures 2a & 2b). It was also observed that Sustainability Journal published by MDPI has a maximum number of papers, followed by journals like the Canadian Journal of Agricultural Economics published by Wiley and the Journal on Food security by Springer, as depicted in figures

2a & 2b. These journals and publishers suited the current study’s scope and had papers on the theme of food supply chain. An important observation was that most of the journals were interdisciplinary and were not specific to supply chain and operations management; however, they gave valuable insights about disruptions in food supply chain management.

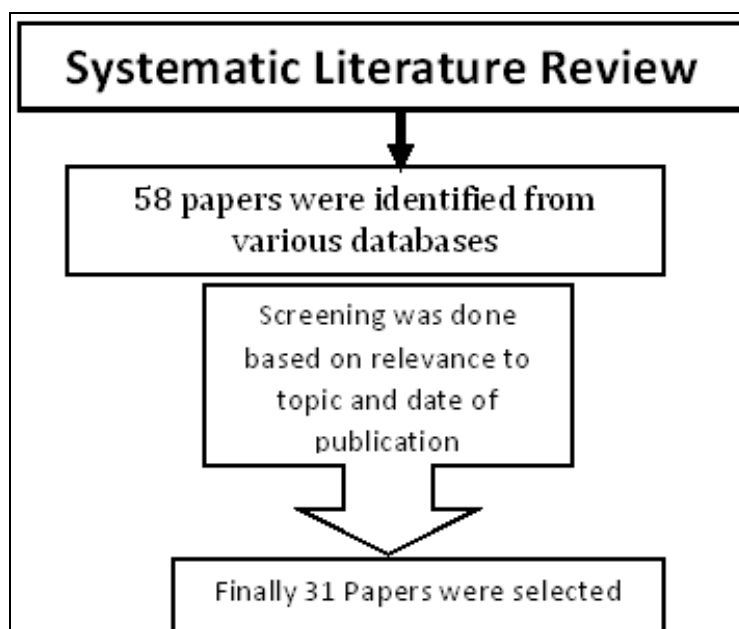


Figure 1. Research protocol

The articles selected were from a mixed category of journals, giving us a holistic picture of how disruptions have

been researched across disciplines, especially in the pandemic context.

Table 2. List of Selected Journals and Publishers

Journal Name	Publisher	Number of articles
American Journal of Agricultural Economics	Wiley	1
Asian Journal of Economics, Business and Accounting	Asian Journal of Economics, Business and Accounting	1
Canadian Journal of Agricultural Economics	Wiley	3
Current Research in Behavioral Sciences	Elsevier	1
Current Research in Environmental Sustainability	Elsevier	1
Discussion paper series in Economics	Ashoka University	1
Economics of Agriculture	BSAAE	1
European Journal of Risk Regulation	Cambridge University Press / European Journal of Risk Regulation	1
Food Quality and Safety	Oxford University Press	1
Food Security	Springer	2
Foods	MDPI	1
Foods and Raw Materials	FRM	1
International Journal of Production Research	Taylor & Francis	1
Journal of Agriculture, Food Systems, and Community Development	JAFSCD	1
Journal of Integrative Agriculture	Elsevier	1
Nature Food	Nature	1
Outlook on Agriculture	Sage	1
PLOS ONE	PLOS ONE	1
Progress in Disaster Science	Elsevier	1
Sustainability	MDPI	7
Transportation Research Part E	Elsevier	1
Trends in Food Science & Technology	Elsevier	1

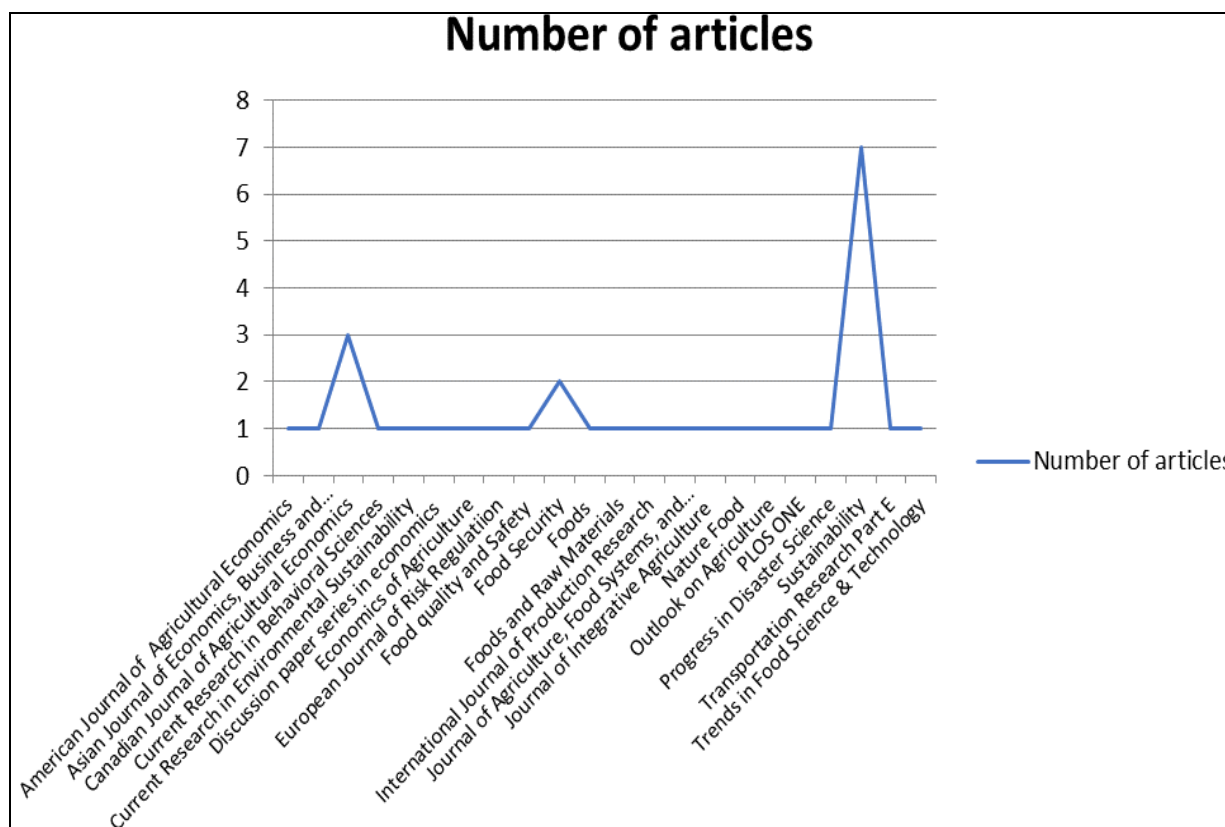


Figure 2a. Number of articles in selected Journals

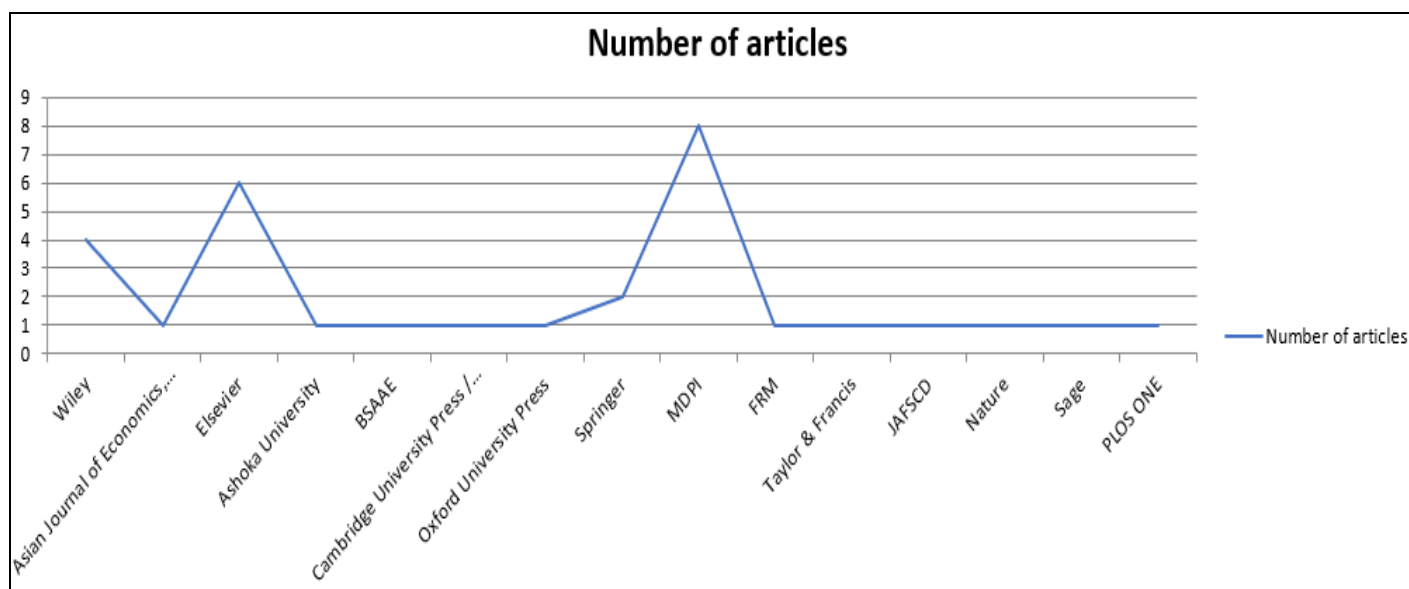


Figure 2b. Number of articles in selected Journals

Literature Review

Supply chain disruptions can occur due to natural and man-made disasters. Several disasters have occurred globally, like the tsunami in Japan in 2011, the tsunami in 2004 and the Gujarat earthquake of 2001 (Gou & Lam, 2019), leading to supply chain disruptions in the food and agricultural industry in the past. However, these disruptions were not similar to the disruptions caused by the Covid-19 because Covid-19 impact is across the globe at the same time, and similar restrictions are being imposed throughout the world for an extended period of more than a year. There is no certainty when this pandemic will be over since it is changing its variants and forms. Therefore dealing with this is more complicated compared to another type of disasters.

Covid-19 has impacted every sphere of human life, and the food supply chain is not untouched by the impact (Sowinski, 2020; Workie et al., 2020). As rightly said by Szegedi, 2021 "COVID-19 pandemic have drastically impacted the essential flow of food from farms and producers to consumers" This has severely impacted food supply chains, the lockdown has "reportedly led to massive disruptions in global and domestic supply chains", and availability of food products that were procured from far off places got severely impacted due to disruption in the supply chain caused by the restrictions (Mahajan & Tomar, 2021). Especially, "labour shortage due to COVID-19 crisis caused severe disruptions in some sectors such as livestock production, horticulture, planting, harvesting, and crop processing which are relatively labour intensive" (Stephens et al., 2020). "COVID-19 outbreak also caused a significant rise in food price related to lockdown restrictions accompanied by panic buying, as well as supply chain disruptions". (EDP, 2020) as cited in (Aday & Aday, 2020a).

Covid-19 pandemic also "caused a significant impact on food trade and led to disruption in food supply chain due to the export restrictions. Export-restricted policies pushed up world prices of staple food commodities such as wheat, maize, and rice. They resulted in a reduction of the quantity and quality of food eaten" as cited in (Aday & Aday, 2020a).

The economic chaos due to the pandemic threatens financial access and physical availability of food. Disruptions and possible problems in marketing, logistics, and trade systems may restrict access to food in some places and times. Therefore, hunger and malnutrition problems may appear (FAO, 2020).

Food supply chains need to adjust to changing demand by panic buying and change in food buying patterns and supply disruptions due to shortages of workforce and labour (Hobbs, 2020).

All this relevant literature pointed towards the fact that food supply chains have been disrupted due to lockdown and other such restrictions. Disruption has been identified as the primary food supply chain challenge during the pandemic by researchers.

Results & Discussion

The literature review conducted for thirty-one papers from reputed journals and publishers (Table 2) was conducted to analyse which supply chain challenge is the most prominent one in Covid-19 and which food supply chain risk has been significantly studied and identified by the literature. As discussed above, thirty-one papers were coded through qualitative software Atlas ti 9.0 for three types of common food supply chain risks, namely: forecast, inventory and disruption through the coding method. It was observed that the thirty-one research papers considered disruption as the significant supply chain risk or challenge for food supply chains against forecasting and inventory (as depicted in figures 3 and 4). In thirty-one papers, disruption was coded 170 times compared to forecasting, which was coded only ten times and inventory only 37 times. The statistics generated from qualitative software also clearly indicate that most papers have discussed disruption and risk, meaning that disruption is the primary food supply chain risk during the Covid-19 identified by the literature (as depicted in figures 5 and 6).

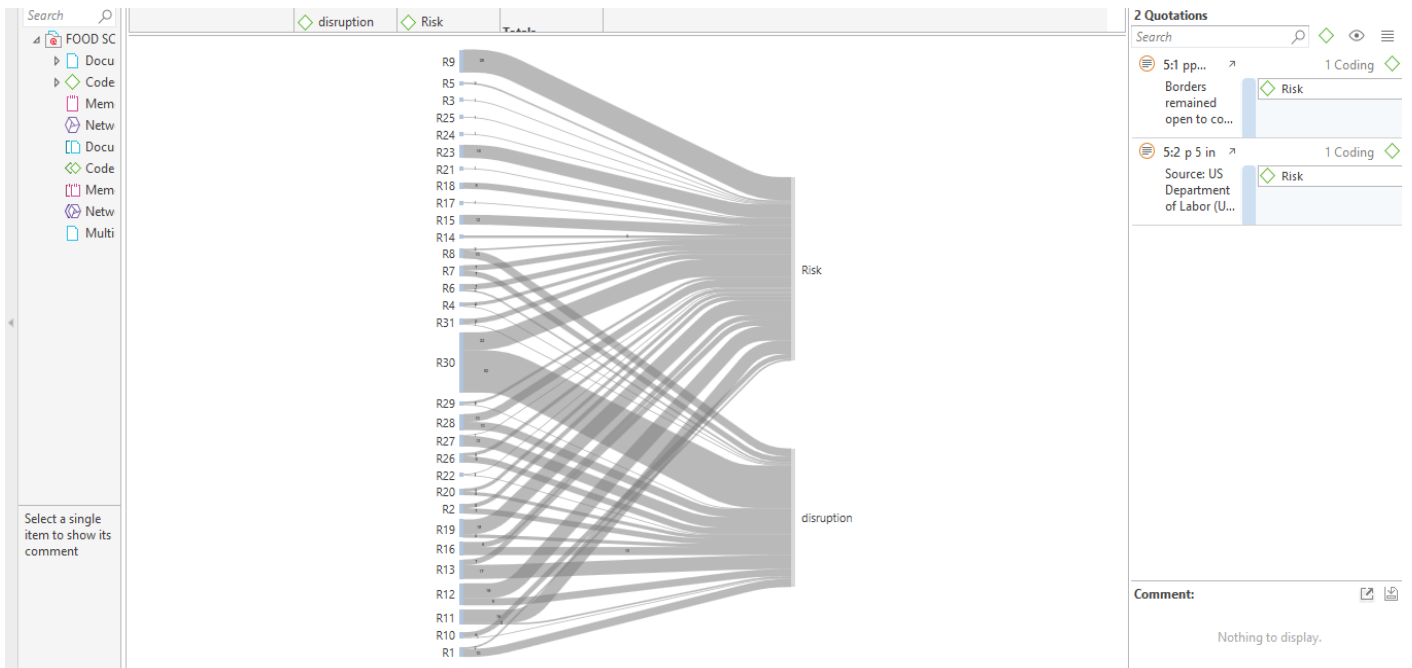


Figure 3. Output from the software depicting the relationship between risks and disruptions

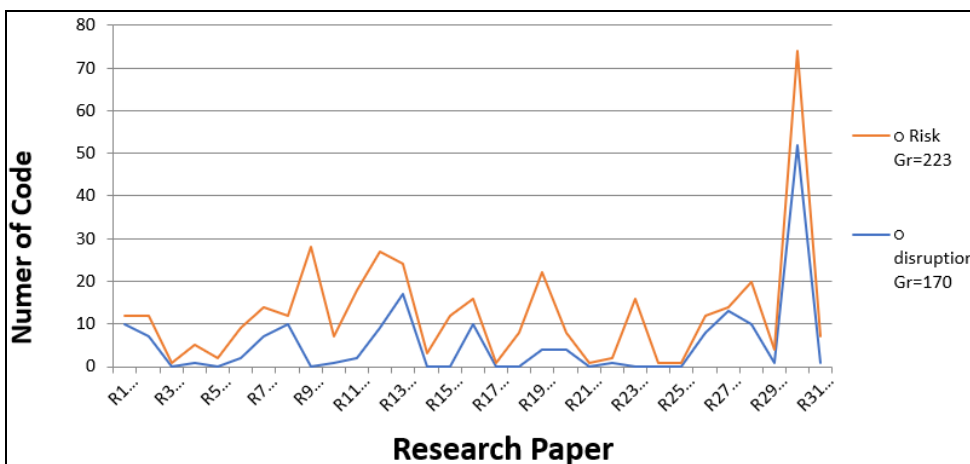


Figure 4. Graph depicting coding trend of risks and disruptions

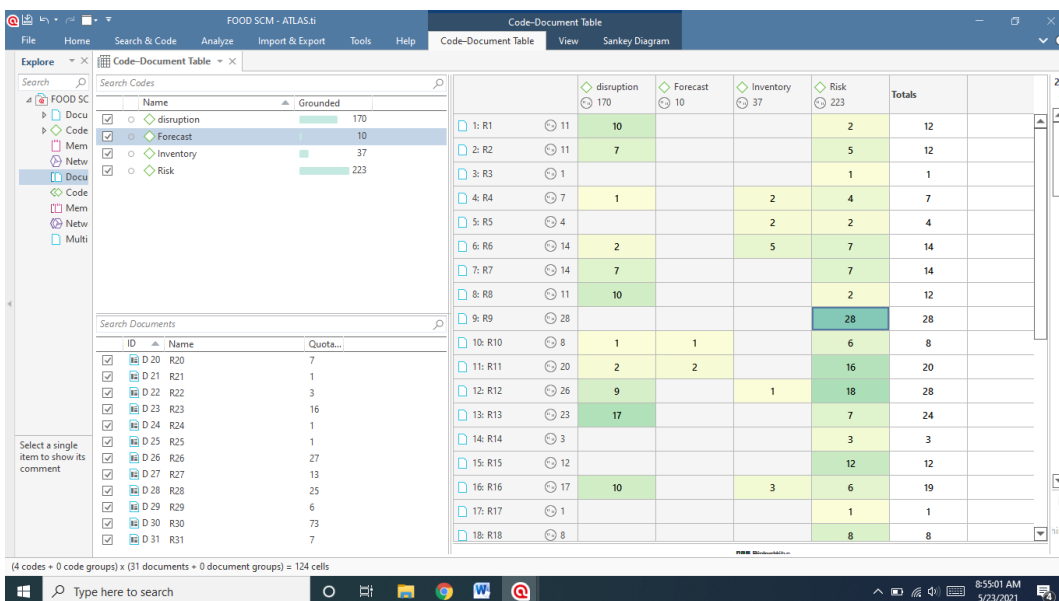


Figure 5. Output from the software depicting the relationship between disruptions, forecasting and inventory with risks

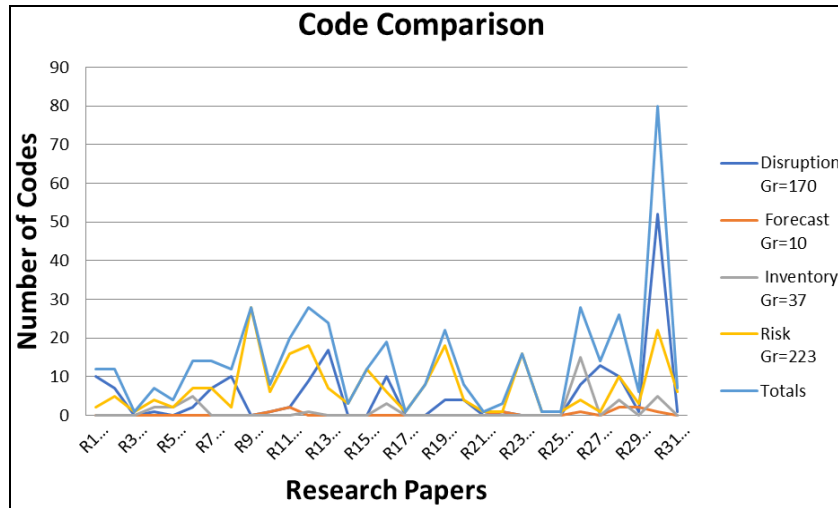


Figure 6. Graph depicting coding trend for three types of risks

After identifying disruption as a significant risk for the food supply chain, the work also wanted to look at the critical factors of disruption during the Covid-19 for the food supply chain in the thirty-one papers selected for review. For this purpose, further coding was being conducted, and it was found that most researchers had a common understanding about the fact that lockdown and labour issues are the

significant reasons for disruption of food supply chains (figures 7 and 8). Mahajan & Tomar, 2021 have quantified that the “level of disruption in the food supply chains in India due to Covid-19 induced lockdown is high”. Their work proposes that “supply chain disruptions during the lockdown are likely to be more severe for products that travel long distances”.

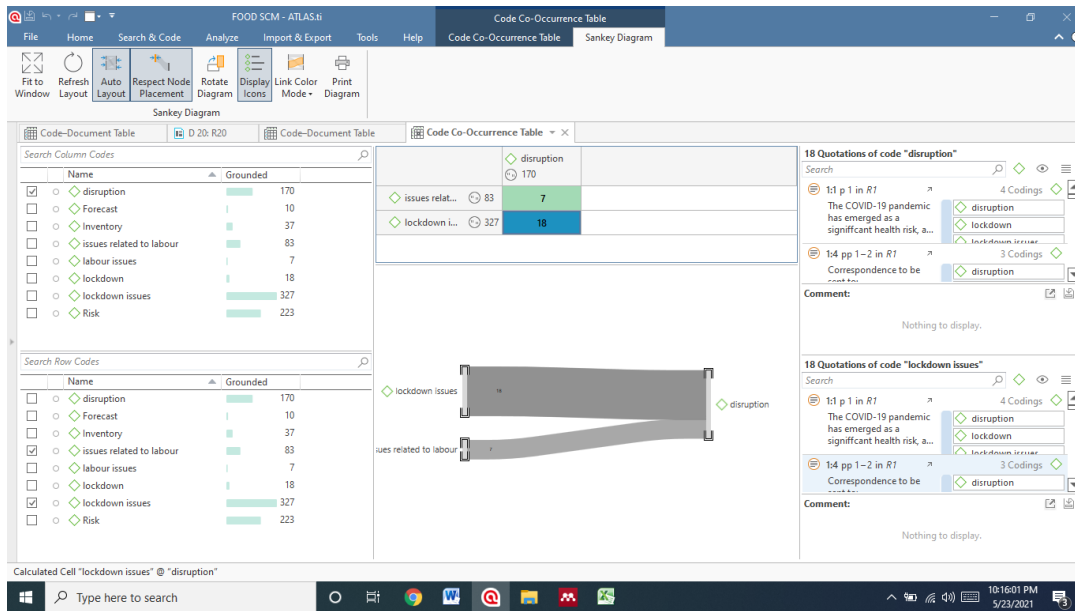


Figure 7. Output from the software depicting the relationship between disruptions, lockdown and labour issues

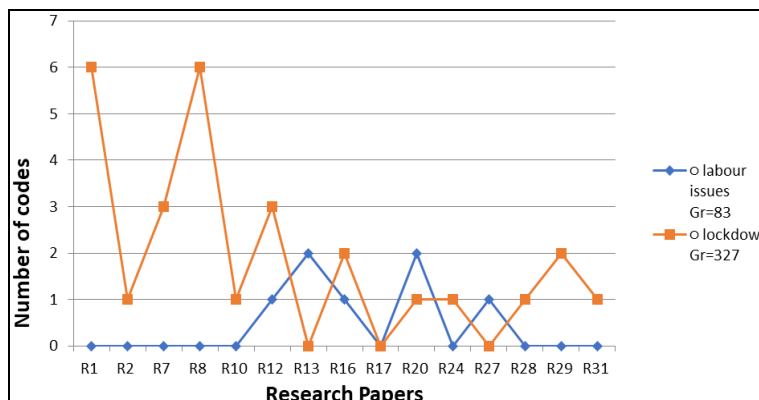


Figure 8. Graph depicting coding trend for labour and lockdown

According to Workie et al., 2020, the lockdown has severely impacted the income and availability of food items due to disruptions that have affected the food supply and buying patterns, thereby indicating that disruption and lockdown affect food supply chains.

In underdeveloped and developing countries, temporary employment is frequent, especially for processing and transporting harvest, affecting supply chains. Restrictions imposed by lockdown can affect migrant labour's availability, leading to disruption in production and the entire SCM. Shortage of labour due to Covid-19 has shown a lot of impact on food production processes at the farm level, leading to delaying the final product availability and disrupting the processes (Stephens et al., 2020). Due to constraints in movements, producers had to face a shortage of agricultural inputs (Aday & Aday, 2020b). Shortage of agricultural labourers can severely disrupt field operations, considerably reduce agricultural production and increase food insecurity at local levels (Savary et al., 2020). The shortage of labour due to lockdown restrictions in India has severely disrupted certain food items supply chain, raising the whole sale and retail price of common used food commodities like pulses, flour, and vegetables (Cariappa et al., 2021).

As we can see from the systematic literature review, most papers have considered disruptions as a significant problem and risk for food supply chains. Disruptions have been identified and studied in the selected research papers, which also state that lockdown and shortage of labour are essential concerns during the Covid-19 crisis for food SCM disruption.

Conclusion

The Covid-19 crisis generated chaos and a sense of uncertainty across the globe. It has transformed the way people live and conduct their livelihood activities. Every sphere of human life has been drastically affected by the pandemic, and food supply chains were not left untouched. They faced several kinds of challenges, and it wasn't easy to manage the entire food production system and supplies. The current work wanted to study the significant risks or challenges faced by food SCM during the Covid-19 discussed by academic literature. For this purpose, a systematic literature review was conducted for thirty-one research papers published in reputed journals coded through qualitative software Atlas ti 9.0, revealing that disruptions in the food supply chain are the major challenge compared to other commonly known difficulties of food supply chain forecasting and inventory. After finding out about the significant challenge, further analysis was conducted to see the critical reasons for disruption during Covid-19. Coding through the software also revealed that lockdown and unavailability of labour were the foremost causes of disruptions for food SCM.

Recommendations & Directions for Future Research

Since Covid-19 is a pandemic affecting food security and people's lives, the government should take care of policies that can stop or deal with disruption for a long time because short-term policy planning is not effective in Covid-19, which does not seem to end soon. Secondly, strong arrangements should be made to deal with labour shortage and crisis generated due to the unavailability of labour during the harvest and sowing seasons. "Governments also should establish and operate emergency provisioning strategies to support production. Temporary input subsidies programs should protect the regions most affected by the outbreak. Timely support is essential for planting season for the next spring" (Aday & Aday, 2020b).

Future research can study other supply chain risks apart from disruption, forecasting and inventory to see if they have a similar impact like a disruption on food supply chains. Food SCM can be studied and compared with the help of well-established frameworks like that of Chopra & Sodhi, 2004.

References

- Aday, S., & Aday, M.S. (2020a). Impact of COVID-19 on the food supply chain. *Food Quality and Safety*, 4(4), 167-180. <https://doi.org/10.1093/fqsafe/fyaa024>
- Aday, S., & Aday, M.S. (2020b). *Impacts of COVID-19 on Food Supply Chain*. 1-14.
- Alam, G.M.M., & Khatun, M. N. (2021). Impact of COVID-19 on vegetable supply chain and food security: Empirical evidence from Bangladesh. *PLoS ONE*, 16 (3 March 2021), 1-12. <https://doi.org/10.1371/journal.pone.0248120>
- Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959-975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Barcaccia, G., D'Agostino, V., Zotti, A., & Cozzi, B. (2020). Impact of the SARS-CoV-2 on the Italian Agri-Food Sector: An Analysis of the Quarter of Pandemic Lockdown and Clues for a Socio-Economic and Territorial Restart. *Sustainability*, 12(14), 5651. <https://doi.org/10.20944/preprints202007.0095.v1>
- Barman, A., Das, R., & De, P.K. (2021). Impact of COVID-19 in food supply chain: Disruptions and recovery strategy. *Current Research in Behavioral Sciences*, 2(January), 100017. <https://doi.org/10.1016/j.crbeha.2021.100017>
- Béné, C. (2020). Resilience of local food systems and links to food security - A review of some important concepts in the context of COVID-19 and other shocks. *Food Security*, 12(4), 805-822. <https://doi.org/10.1007/s12571-020-01076-1>
- Brewin, D.G. (2020). The impact of COVID-19 on the grains and oilseeds sector. *Canadian Journal of Agricultural Economics*, 68(2), 185-188. <https://doi.org/10.1111/cjag.12239>
- Cariappa, A.A., Acharya, K.K., Adhav, C.A., Sendhil, R., & Ramasundaram, P. (2021). Impact of COVID-19 on the Indian agricultural system: A 10-point strategy for

- post-pandemic recovery. *Outlook on Agriculture*, 50(1), 26-33.
<https://doi.org/10.1177/0030727021989060>
- Chopra, S., & Sodhi, M.M.S. (2004). Managing risk to avoid: Supply-chain breakdown. *MIT Sloan Management Review*, 46(1).
- Chowdhury, P., Paul, S.K., Kaiser, S., & Moktadir, M.A. (2021). COVID-19 pandemic related supply chain studies: A systematic review. *Transportation Research Part E: Logistics and Transportation Review*, 148(August 2020), 102271.
<https://doi.org/10.1016/j.tre.2021.102271>
- Davis, K.F., Downs, S., & Gephart, J.A. (2021). Towards food supply chain resilience to environmental shocks. *Nature Food*, 2(1), 54-65.
<https://doi.org/10.1038/s43016-020-00196-3>
- FAO. (2020). Impacts of coronavirus on food security and nutrition in Asia and the Pacific: Building more resilient food systems. In *Impacts of coronavirus on food security and nutrition in Asia and the Pacific: Building more resilient food systems* (Issue June).
<https://doi.org/10.4060/ca9473en>
- Galanakis, C.M. (2020). The food systems in the era of the coronavirus (CoVID-19) pandemic crisis. *Foods*, 9(4), 1-10. <https://doi.org/10.3390/foods9040523>
- Gou, X., & Lam, J.S.L. (2019). Risk analysis of marine cargoes and major port disruptions. *Maritime Economics and Logistics*, 21(4), 497-523.
<https://doi.org/10.1057/s41278-018-0110-3>
- GU, H. ying, & WANG, C. wei. (2020). Impacts of the COVID-19 pandemic on vegetable production and countermeasures from an agricultural insurance perspective. *Journal of Integrative Agriculture*, 19(12), 2866-2876. [https://doi.org/10.1016/S2095-3119\(20\)63429-3](https://doi.org/10.1016/S2095-3119(20)63429-3)
- Hobbs, J.E. (2020). Food supply chains during the COVID-19 pandemic. *Canadian Journal of Agricultural Economics*, 68(2), 171-176.
<https://doi.org/10.1111/cjag.12237>
- Kamal, M.M., & Irani, Z. (2014). Analysing supply chain integration through a systematic literature review: A normative perspective. *Supply Chain Management*, 19, 523-557. <https://doi.org/10.1108/SCM-12-2013-0491>
- Mahajan, K., & Tomar, S. (2020). *Here Today, Gone Tomorrow: COVID-19 and Supply Chain Disruptions**. 2.
- Mahajan, K., & Tomar, S. (2021). COVID-19 and Supply Chain Disruption: Evidence from Food Markets in India†. *American Journal of Agricultural Economics*, 103(1), 35-52. <https://doi.org/10.1111/ajae.12158>
- Mayurnikova, L.A., Koksharov, A.A., & Krapiva, T.V. (2020). Food safety practices in catering during the coronavirus COVID-19 pandemic. *Foods and Raw Materials*, 8(2), 197-203.
<https://doi.org/10.21603/2308-4057-2020-2-197-203>
- Oduwayo, A.O., & Victor, A.C. (2020). COVID-19 and Supply Chain Disruption: A Conceptual Review. *Asian Journal of Economics, Business and Accounting*, November, 40-47.
<https://doi.org/10.9734/ajeba/2020/v19i230301>
- Okoli, C. (2015). Communications of the Association for Information Systems A Guide to Conducting a Standalone Systematic Literature Review Recommended Citation Okoli, Chitu (2015) "A Guide to Conducting a Standalone Systematic Literature Review C ommunications of the A I S ssoiation for nformation ystems A Guide to Conducting a Standalone Systematic Literature Review. *Communications of the Association for Information Systems*, 37, 43.
<http://aisel.aisnet.org/cais/vol37/iss1/43>
- Paganini, N., Adinata, K., Buthelezi, N., Harris, D., Lemke, S., Luis, A., Koppelin, J., Karriem, A., Ncube, F., Aguirre, E.N., Ramba, T., Raimundo, I., Sulejmanović, N., Swanby, H., Tevera, D., & Stöber, S. (2020). Growing and eating food during the COVID-19 pandemic: Farmers' perspectives on local food system resilience to shocks in Southern Africa and Indonesia. *Sustainability (Switzerland)*, 12(20), 1-26.
<https://doi.org/10.3390/su12208556>
- Petetin, L. (2020). The CoviD-19 crisis: An opportunity to integrate food democracy into post-pandemic food systems. *European Journal of Risk Regulation*, 11(2), 326-336. <https://doi.org/10.1017/err.2020.40>
- Popović, J., Kvirgić, G., Ćorić, G., Avakumović, J., & Milošević, D. (2020). Uncertainty in SMEs' assessment of Coronavirus pandemic risk impact on agri-food sector in Western Balkans. *Ekonomika Poljoprivrede*, 67(2), 445-460.
<https://doi.org/10.5937/ekoPolj2002445P>
- Pulighe, G., & Lupia, F. (2020). Food first: COVID-19 outbreak and cities lockdown a booster for a wider vision on urban agriculture. *Sustainability (Switzerland)*, 12(12).
<https://doi.org/10.3390/su12125012>
- Richards, T.J., & Rickard, B. (2020). COVID-19 impact on fruit and vegetable markets. *Canadian Journal of Agricultural Economics*, 68(2), 189-194.
<https://doi.org/10.1111/cjag.12231>
- Rizou, M., Galanakis, I.M., Aldawoud, T.M.S., & Galanakis, C.M. (2020). Safety of foods, food supply chain and environment within the COVID-19 pandemic. *Trends in Food Science and Technology*, 102, 293-299.
<https://doi.org/10.1016/j.tifs.2020.06.008>
- Savary, S., Akter, S., Almekinders, C., Harris, J., Korsten, L., Rötter, R., Waddington, S., & Watson, D. (2020). Mapping disruption and resilience mechanisms in food systems. *Food Security*, 12(4), 695-717.
<https://doi.org/10.1007/s12571-020-01093-0>
- Singh, S., Kumar, R., Panchal, R., & Tiwari, M.K. (2021). Impact of COVID-19 on logistics systems and disruptions in food supply chain. *International Journal of Production Research*, 59(7), 1993-2008.
<https://doi.org/10.1080/00207543.2020.1792000>
- Sowinski, L.L. (2020). *Feeding the future food supply chains*. 28-31.
- Stephens, E.C., Martin, G., van Wijk, M., Timsina, J., & Snow, V. (2020). Editorial: Impacts of COVID-19 on agricultural and food systems worldwide and on progress to the sustainable development goals. *Agricultural Systems*, 183(May), 102873.
<https://doi.org/10.1016/j.agsy.2020.102873>
- Szegedi, K. (2021). *COVID-19 has broken the global food supply chain. So now what?* Deloitte.

<https://www2.deloitte.com/ch/en/pages/consumer-business/articles/covid19-has-broken-the-global-food-supply-chain.html>

Udmale, P., Pal, I., Szabo, S., Pramanik, M., & Large, A. (2020). Global food security in the context of COVID-19: A scenario-based exploratory analysis. *Progress in Disaster Science*, 7, 100120. <https://doi.org/10.1016/j.pdisas.2020.100120>

Workie, E., Mackolil, J., Nyika, J., & Ramadas, S. (2020). Deciphering the impact of COVID-19 pandemic on food security, agriculture, and livelihoods: A review of the evidence from developing countries. *Current Research in Environmental Sustainability*, 2, 100014. <https://doi.org/10.1016/j.crsust.2020.100014>

Xu, Z., Elomri, A., El Omri, A., Kerbache, L., & Liu, H. (2021). The compounded effects of COVID-19 pandemic and desert locust outbreak on food security

and food supply chain. *Sustainability (Switzerland)*, 13(3), 1-17. <https://doi.org/10.3390/su13031063>

Zhu, Q., & Krikke, H. (2020). Managing a sustainable and resilient Perishable Food Supply Chain (PFSC) after an outbreak. *Sustainability (Switzerland)*, 12(12), 1-12. <https://doi.org/10.3390/su12125004>

Zollet, S., Colombo, L., De Meo, P., Marino, D., McGreevy, S.R., McKeon, N., & Tarra, S. (2021). Towards territorially embedded, equitable and resilient food systems? Insights from grassroots responses to covid-19 in italy and the city region of rome. *Sustainability (Switzerland)*, 13(5), 1-25. <https://doi.org/10.3390/su13052425>

Zurayk, R. (2020). Pandemic and Food Security: A View from the Global South. *Journal of Agriculture, Food Systems, and Community Development*, 9(3), 1-5. <https://doi.org/10.5304/jafscd.2020.093.014>

Annexure 1. List of Research Papers used for Systematic Literature Review (SLR)

SL. No	Journal Name	Publisher Name	Title of the Paper	Reference
R1	American Journal of Agricultural Economics	Wiley	Covid-19 and Supply Chain Disruption: Evidence From Food Markets in India	(Mahajan & Tomar, 2021)
R2	Asian Journal of Economics, Business and Accounting	Asian Journal of Economics, Business and Accounting	COVID-19 and Supply Chain Disruption: A Conceptual Review	(Odunayo & Victor, 2020)
R3	Canadian Journal of Agricultural Economics	Wiley	The impact of COVID-19 on the grains and oilseeds sector	(Brewin, 2020)
R4	Canadian Journal of Agricultural Economics	Wiley	Food supply chains during the COVID-19 pandemic	(Hobbs, 2020)
R5	Canadian Journal of Agricultural Economics	Wiley	COVID-19 impact on fruit and vegetable markets	(Richards & Rickard, 2020)
R6	Current Research in Behavioral Sciences	Elsevier	Impact of COVID-19 in food supply chain: Disruptions and recovery strategy	(Barman et al., 2021)
R7	Current Research in Environmental Sustainability	Elsevier	Deciphering the impact of COVID-19 pandemic on food security, agriculture, and and livelihoods: A review of the evidence from developing countries	(Workie et al., 2020)
R8	Discussion paper series in economics	Ashoka University	Here Today, Gone Tomorrow: COVID-19 and Supply Chain Disruptions	(Mahajan & Tomar, 2020)
R9	Economics of Agriculture	BSSAE	Uncertainty in SMES' Assessment of Coronavirus Pandemic Risk Impact on Agri-Food Sector in Western Balkans	(Popović et al., 2020)
R10	European Journal of Risk Regulation	Cambridge University Press / European Journal of Risk Regulation	The Covid-19 crisis: An opportunity to integrate food democracy into post-pandemic food systems	(Petetin, 2020)
R11	Food quality and Safety	Oxford University Press	Impact of Covid 19 on Food supply chain	(Aday & Aday, 2020a)
R12	Food Security	Springer	Resilience of local food systems and links to food security - A review of some important concepts in the context of COVID-19 and other shocks	(Béné, 2020)
R13	Food Security	Springer	Mapping disruption and resilience mechanisms in food systems	(Savary et al., 2020)
R14	Foods	MDPI	The Food Systems in the Era of the Coronavirus (COVID-19) Pandemic Crisis	(Galanakis, 2020)
R15	Foods and Raw Materials	FRM	Food safety practices in catering during the coronavirus COVID-19 pandemic	(Mayurnikova et al., 2020)
R16	International Journal of Production Research	Taylor & Francis	Impact of COVID-19 on logistics systems and disruptions in food supply chain	(Singh et al., 2021)
R17	Journal of Agriculture, Food Systems, and	JAFSCD	Pandemic and food security: A view from the Global South	(Zurayk, 2020)

	Community Development			
R18	Journal of Integrative Agriculture	Elsevier	Impacts of the COVID-19 pandemic on vegetable production and countermeasures from an agricultural insurance perspective	(Gu & Wang, 2020)
R19	Nature Food		Towards food supply chain resilience to environmental shocks	(Davis et al., 2021)
R20	Outlook on Agriculture	Sage	Impact of COVID-19 on the Indian agricultural system: A 10-point strategy for post-pandemic recovery	(Cariappa et al., 2021)
R21	PLOS ONE	PLOS ONE	Impact of COVID-19 on vegetable supply chain and food security: Empirical evidence from Bangladesh	(Alam & Khatun, 2021)
R22	Progress in Disaster Science	Elsevier	Global food security in the context of COVID-19: A scenario-based exploratory analysis	(Udmale et al., 2020)
R23	Sustainability	MDPI	Impact of the SARS-CoV-2 on the Italian Agri-Food Sector: An Analysis of the Quarter of Pandemic Lockdown and Clues for a Socio-Economic and Territorial Restart	(Barcaccia et al., 2020)
R24	Sustainability	MDPI	Food First: COVID-19 Outbreak and Cities Lockdown a Booster for a Wider Vision on Urban Agriculture	(Pulighe & Lupia, 2020)
R25	Sustainability	MDPI	Growing and Eating Food during the COVID-19 Pandemic: Farmers' Perspectives on Local Food System Resilience to Shocks in Southern Africa and Indonesia	(Paganini et al., 2020)
R26	Sustainability	MDPI	Managing a Sustainable and Resilient Perishable Food Supply Chain (PFSC) after an Outbreak	(Zhu & Krikke, 2020)
R27	Sustainability	MDPI	The COVID-19 Induced Disruptions across Groundnut Value Chain: Empirical Evidence from South India	(Mahajan & Tomar, 2021)
R28	Sustainability	MDPI	The Compounded Effects of COVID-19 Pandemic and Desert Locust Outbreak on Food Security and Food Supply Chain	(Xu et al., 2021)
R29	Sustainability	MDPI	Towards Territorially Embedded, Equitable and Resilient Food Systems? Insights from Grassroots Responses to COVID-19 in Italy and the City Region of Rome	(Zollet et al., 2021)
R30	Transportation Research Part E	Elsevier	COVID-19 pandemic related supply chain studies: A systematic review	(Chowdhury et al., 2021)
R31	Trends in Food Science & Technology	Elsevier	Safety of foods, food supply chain and environment within the COVID-19 pandemic	(Rizou et al., 2020)