CHALLENGES OF DEVELOPING SUSTAINABLE AGRI-RETAIL SUPPLY CHAIN- A DEMATEL APPROACH

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ABSTRACT

There is growing pressure on business and governments to pay more attention to the environmentaland resources consequences of the ever-increasing production, distribution and consumption of agro-based products. Major issues in the sustainable development agenda include how to ensure the involvement of producers, particularly small farmers, in sourcing network as well as in the institutional initiatives that help them to meet the stringent food safety and quality regulations. Corporates, especially in retailing, could play a critical role in creating sustainable agri-food chains. DEMATEL approach is used to understand the cause and effect relationship of challengeson each other there are many challenges like Sustainability, Infrastructure, Wastage, Supply Constraints, Price, Laboratory Facilities and Limited Resources to overcome these challenges anddevelop the sustainable agri retail supply chain.

INTRODUCTION

In addition to facilitating producers' access to markets, agri-food supply chains and networks alsohave an impact on the economic, social, and environmental sustainability of rural communities. The complete network of operations, from farm-level production through processing, distribution,and consumer retailing, is referred to as the agri-food supply chain. The phrases "supply chain," "value chain," "commodity chain," and "agri-food system" are all interchangeable, according to Chen, Shepherd, and da Silva (2005), with minor distinctions in meaning depending on the focusand context. Businesses and governments are under increasing pressure to focus more on the effects of the continuous expansion of agro-based product production, distribution, and consumption on the environment and resource use. The sustainability of agri-food supply chains has come under intense scrutiny due to the present population and consumption patterns (Global Footprint Network,2012). How to guarantee small farmers and other producers are included in these rigorous sourcing networks, as well as institutional measures that assist them in meeting the

strict food safety and quality rules, are major concerns in the sustainable development agenda. Increased export to developed countries is possible, especially when using a demand-driven strategy. To do this, though, requires not just knowledge of the industry and consumer trends, but also adherence to standards for food safety and increased efficiency. By implementing the most recent advancements in post-harvest technology, scenario analysis, protocols, quality certification, and branding, added value in terms of resilience, innovation, local processing, chain certification, and can make a significant difference. Despite the fact that technology is available, establishing a plan, making investments, and coordinating the chain's vital partnerships are what really matter. Food demand and resource usage increase as the population grows. The same is true for developing nations with booming economies, which have dramatically raised global living standards while placing a great deal of strain on the environment and natural resources. This affects the production and supply of food and highlights problematic elements such as fluctuations in food prices, growth issues brought on by climate change, food waste, and food security, as well as ineffective governmental initiatives. The 1991 Food Summit Meeting defined food security as the condition in which every person on earth has physical, social, and economic access to enough wholesome food at any time to lead active, healthy lives. One of the greatest manufacturing industries in many developing and wealthy nations is the food business. Although systems for food production and delivery are typically set up effectively, establishing and maintaining sustainable supply chains is difficult because of consumer behavior and habits that view food as a way of life. This results in a lack of understanding of how the usage of food resources in relation to water and energy is interconnected. Food waste and sustainability are significantly impacted by poorly managed food supply chain phases, such as production, processing, transportation, and consumption. Companies can improve their performance and become more sustainable by implementing policies related to the growth of trust and the caliber of relationships both inside and outside of enterprises. The agri-food and agriculture-based products supply chain networks have become more complex due to a notable growth in food standards requirements, growing industrialization of agricultural-based products, and formation of customer and governmental food safety concerns (Chen, 2006; Lowe et al., 2008; Svensson and Wagner, 2012). Concerns about food safety, the unsustainable use of natural resources, and other issues have increased due to these complex agri-food supply chains environments (Food Ethics Council, 2004; Sharma, 2011).

LITERATURE REVIEW

Enablers to Implement Sustainable Initiatives in Agri-food Supply Chains

The idea of sustainability and supply has become more important as a result of the fast industrialization of agriculture, rising global food demand, and growing worries about the quality and safety of food (Mangla et al., 2012). The agriculture and agri-food sector is becoming increasingly dependent on chain transparency. The addition of sustainability performance targets directs efforts to balance ecological, economic, and societal aspects of agri-food businesses in addition to focusing on the efficient exploitation and consumption of natural resources. Business managers who frequently have low earnings and face strict demands from big, strong clients and merchants now have to deal with the management of sustainability. The essential facilitators for executing sustainable efforts for agri-food

supply chains are identified and examined in this article(A-FSCs) (Luthra et al., 2012). Following a thorough literature research and period of expert engagement, ten significant sustainability driven enablers were taken into consideration. A framework based on fuzzy Decision Making Trial and Evaluation Laboratory (DEMATEL) and Interpretive Structural Modeling (ISM) was then used to investigate the identified enablers. The ISM approach made it possible to understand the contextual linkages among the enablers and to categorise the enablers according to their capacity for drive and reliance (Kumar et al., 2012). The fuzzy DEMATEL approach helped identify the enablers who influenced and were influenced by others, as well as organise them into cause and effect categories. The proposed research paradigmis focused on and put to the test using an empirical case study from an Indian retail supply chain for vegetables and fruits. The study makes it easier for scholars and practitioners of professional management to identify and investigate the catalysts for actually implementing sustainability- oriented initiatives in the agri-food business sector.

Evaluating Barriers and Drivers to Sustainable Food Supply Chains

The demand for agricultural and/or food items in general is currently rising steadily along with theconsumption of natural resources, which creates difficulties for the supply chain management of key food goods. Using multicriteria decision-making (MCDM) methodologies, the current study identifies and ranks the drivers and barriers of the agriculture sustainable supply chain (Mohseni et al., 2022). With the aid of the opinions of industry experts, we identify six drivers and seven barriers. To combine the rankings, we use ranking techniques such as TOPSIS-AHP, AHP, and COPRAS-AHP as well as Borda rule and Copeland method. The findings show that economic sustainability is more significant than environmental and social sustainability. The most significantimpediments were identified to be consumer mistrust, manager ignorance and lack of awareness, and issues with performance reviews (Baghizadeh et al., 2022). Moreover, the most significant drivers were found to be entering the global market, exporting goods, generating sustainable goodsas a competitive advantage, and informing the community through the media. The study also demonstrates that with the assistance of governments and suppliers, public knowledge anddemands may push the food supply chains toward sustainable goals. One of the greatest manufacturing sectors in many developing and developed nations is the food business (Pahl et al.,2022). Although systems for food production and delivery are typically set up effectively,establishing and maintaining sustainable supply chains is difficult because of consumer behaviourand habits that view food as a way of life. This results in a lack of understanding of how dietary use of resources, including water and energy, is related to one another.

Challenges of creating sustainable agri-retail supply chains

Businesses and governments are under increasing pressure to focus more on the effects of the continuous expansion of agro-based product production, distribution, and consumption on the environment and resource use. How to ensure producers, especially small farms, are included in sourcing networks and institutional initiatives that support them in adhering to the strict standardsfor food safety and quality are major challenges on the sustainable development agenda. Corporates, particularly those involved in retailing, could be crucial in developing sustainable agri-food chains (Naik et al., 2018).

Emerging issues and Challenges in Agri-Food Supply Chain

Consumer demand for safe and high-quality meals, together with free trade policies and globalisation, have put pressure on many stakeholders (important players) involved in the agri- food supply chain. Socioeconomic and environmental elements have a significant impact on the supply chain's success and play a significant role in it. Globally, numerous methods and theoretical frameworks have been put forth to make the agri-food supply chain efficient and successful. However, there are still a number of gaps and new problems in the supply chain that must be resolved in order to achieve successful sustainable food production. An effort has been made to identify, emphasise, and discuss the current global environment, difficulties encountered along the

agri-food supply chain, and potential outcomes in this chapter (Bhat et al., 2015). Failure to make significant efforts by the concerned stakeholders (from staff members participating in farm up to table) to comprehend the underlying concerns and problems will continue to pose a threat to the success of the agri-food supply chain. Among the players (stakeholders) in supply chain management, linkages, partnerships, belief, teamwork, and transparency are some of the crucial characteristics. As long as unethical trading psychology exists, food scams should also be anticipated in the near future on the global market (Joudu et al., 2015). Emerging technologies like traceability and block chain, food regulations and legislation, conceptual models, and other factors are anticipated to, at the very least, somewhat, contribute to the smooth operation of the agri-food supply chain. In the next days, market-driven agriculture and food production must be prioritised while taking consumer desires into consideration.

Blockchain Adoption for Sustainable Supply Chain Management: Economic, Environmental, and Social Perspectives

The attention of scholars has switched from economic to socio-environmental issues as a result of the quickening rate of environmental deterioration and depletion of natural resources (Munir et al.,2022).With the ability to completely rebuild the supply chain for sustainable practises, blockchain is a revolutionary technology. Blockchain is a type of distributed ledger that offers a digital database for keeping track of all supply chain transactions. Examining the literature pertinent to blockchain for sustainable supply chain management is the major goal of this study (Hussain et al., 2022). The effectiveness of the governance, social equity, and environmental sustainability of the blockchain-based supply chain are the main topics of this review. A total of 136 publications were analysed and categorised in accordance with the triple bottom-line characteristics of sustainability using a systematic evaluation of the literature. The adoption of blockchain in various industries, including the textile, shipping, agriculture and food, manufacturing, automotive, and pharmaceutical sectors, has been critically analysed (Shahbaz et al., 2022). This study has not only examined the economic, environmental, and social effects of blockchain, but it has also highlighted new advancements in a circular supply chain, along with the crucial success elements for each. Future study directions are also offered, along with discussion of research areas and gaps in the existing body of work. The results of this study demonstrate that, from a sustainability standpoint, blockchain has the power to completely transform the whole supply chain (Qamar et al., 2022). Blockchain will help to achieve social and environmental sustainability through resource efficiency, accountability, smart contracts, trust building, and fraud prevention in addition to improving the economic

sustainability of the supply chain through effective traceability, enhanced visibility through information sharing, transparency in processes, and decentralisation of the entire structure (Masood et al., 2022). Managers and practitioners will find the study useful for understanding the adoption process of blockchain and for increasing the likelihood that it will be successfully implemented to create a sustainable supply chain network.

OBJECTIVE OF STUDY

This study has been carried out by keeping few objectives in mind:

• To find out the cause and effect relationship of different challenges in developing agri retail supply chain using DEMATEL approach.

• To find out different factors effecting agri retail supply chain.

RESEARCH METHODOLOGY

This study has applied DEMATEL (Decision-Making Trial And Evaluation Laboratory approach) to establish a relationship among various challenges for developing sustainable agri-retail supply chain.

We collect the sample of people to analyze the cause and effect of challenges on developing agri retail supply chain using MS Excel.

Challenges for developing sustainable agri-retail supply chain-

• Sustainability

• Infrastructure

• Wastage

• Supply Constraints

• Limited Resources

• Laboratory Facilities

• Price

DEMATEL Approach

The decision making trial and evaluation laboratory (DEMATEL) is regarded as an efficient technique for locating the causal links in a complex system. It focuses on assessing the interdependencies between elements and identifying the crucial ones using a visual structural model.

Step 1: Data collection and finding out the average matrix from that data

Data is collected from experts which is use to find out the cause and effect relationship data from various experts is combine to find out the average matrix as shown in figure 1.

	A	B	C	D	E	F	G
A	0	1	1.777778	1.111111	0.777778	1.222222	1.444444
B	1.222222	0	0.888889	1.666667	1.555556	1.555556	1.222222
C	1.333333	1.888889	0	1.222222	1.666667	1.444444	1.444444
D	1.111111	1.111111	1.555556	0	0.777778	1.444444	1.444444
E	2	1.222222	0.777778	1.444444	0	0.888889	0.888889
F	1.555556	1.111111	2	1.222222	1.444444	0	1.666667
G	1.666667	1.777778	1.222222	1.444444	1.222222	1.555556	0

Figure 1: Average matrix

Step 2: Cause and Effect Relationship

To find out cause and relationship we calculate the normalized initial direct relation matrix then derive the total relation matrix then we get the cause and effect relationship matrix in which negative represents the effect and positive indicated the cause.

	Ri	Ci	Ri+Ci	Ri-Ci	Identify
Sustainability	8.826941	10.25729	19.08423	-1.43035	Effect
Infrastructure	9.449643	9.504871	18.95451	-0.05523	Effect
Wastage	10.40066	9.693876	20.09454	0.706787	Cause
Supply Constraint	8.943463	9.483964	18.42743	-0.5405	Effect
Price	8.432887	8.798461	17.23135	-0.36557	Effect
Laboratory Facilities	10.47757	9.534689	20.01226	0.942885	Cause
Limited Resouces	10.29282	9.550843	19.84366	0.741978	Cause

Figure 2: Cause and Effect realtionship matrix

Step 3: Threshold(Alpha) value

	A	B	C	D	E	F	G
A	1.241923776	1.256875	1.344048	1.258462	1.14996	1.277359	1.298313
B	1.451164004	1.230065	1.350153	1.388125	1.287475	1.383983	1.358679
C	1.594829677	1.532946	1.380927	1.475838	1.415724	1.499723	1.500676
D	1.368407595	1.280248	1.341281	1.163981	1.16389	1.311733	1.313921
E	1.371665623	1.215351	1.206376	1.235559	1.01296	1.193955	1.197021
F	1.624261464	1.481386	1.579982	1.482925	1.405784	1.371744	1.531492
G	1.605035657	1.508001	1.49111	1.479074	1.362668	1.496192	1.350742
Threshold(Alpha) value	1.363755						

Figure 3: Threshold(Alpha) value

Threshold value is used to find out the effect of challenegs on each other challegnes whose valueare more than threshold value then those challenges effect each other.

Scatter Plot of cause and effect relatonship

This graph help to understand the cuase and effect through graph point above base line show thecause and point below base line shows effect on developing agri retail supply chain.
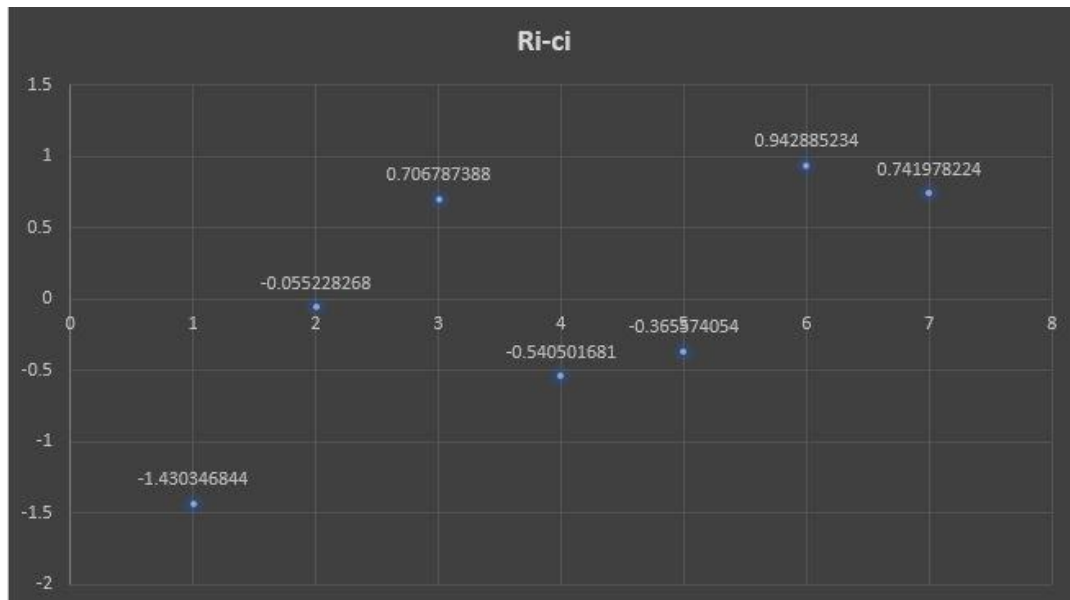
Graph 1: Scatter plot of cause and effect relationship

CONCLUSION

The demand of food increasing on the daily basis so to provide better food to everyone need a proper agri retail supply chain then only better food reach to everyone for this there are many challenges to overcome like Sustainability, Infrastructure, Wastage, Supply Constraint, Price, Laboratory Facilities, Limited Resources etc. to overcome these challenges we use the DEMATELapproach to find out the cause and effect relationship of these parameters and accordingly take decision to improve these parameters so that supply of food increase. DEMATEL approach help us to find out the impact of one factor on other factor like Sustainability, Infrastructure, Supply Constraint and Price effecting the agri retail supply chain while Wastage, Laboratory Facilities and Limited Resources are causing the agri retail supply chain. Wastage need to reduce then onlysupply chain improve. Sustainable food system can result from significantly increased andcoordinated global efforts to build climate-resilient agricultural production systems that useresources efficiently, cut back on greenhouse gas emissions, create waste-free supply chains, guarantee adequate nutrition, promote healthy eating habits, and pay special attention to the needsof the most vulnerable and poor. The Indian government is aware of the necessity to link domesticand international markets with agricultural production in order to give farmers the opportunity to engage in production that is driven by the market. The state is attempting to encourage private investment in market ownership, establishment, and management. Technological advancement also help to develop a sustainable agri retail supply chain for this Blockchain is the latest technology through which we improve agri retail supply chain because blockchain provides the traceability, transparency, decentralization, visibility, smart contracts, accountability, immutability, and cybersecurity all these thing help to develop a sustainable agri retail supply chain.

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