



Revolutionizing Agricultural Supply Chains Through Direct Farmer-Consumer Connectivity

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Abstract

Many developing economies have an agricultural supply chain that is typified by numerous intermediaries, lack of price efficiencies, and poor transparency, a problem that usually leads to diminished farmer incomes and consumer increased prices. This research paper will look at how direct farmer-consumer connectivity may be a revolutionary way of overcoming such challenges. Through digital platforms, local market models, and community-supported agriculture systems, direct relationships can accelerate supply chains, result in better prices to farmers, and fresh and affordable foods to consumers.

The research is grounded on the secondary data used in the form of academic literature, government reports, policy documents, and case studies of current farmer-consumer models. A qualitative analysis of these resources reveals the effectiveness, opportunities, and limitations of direct connectivity initiatives, both in rural and urban settings, in the research. It also examines how technology, logistics and policy assistance contribute to such systems.

The results indicate that direct farmer-consumer models result in boosted farmer incomes, less post-harvest losses, and enhanced supply chain transparency. Nevertheless, issues like digital illiteracy, infrastructural disparities, and scalability limits are still a major setback. This paper finally ends by stating that consolidated policy frameworks, technological interventions and stakeholder collaboration are necessary in order to reinforce direct agricultural marketing systems. The paper advances the existing body of knowledge on sustainable and inclusive agricultural supply chains, by illuminating the feasibility of disintermediation approaches, driven by the secondary data findings.

1.INTRODUCTION

In most developing nations, agriculture is one of the main staples of the economy especially in India where a huge percentage of the society relies on agriculture as a means of livelihood. Regardless of its significance, the agricultural industry has remained to have structural challenges that remain unresolved particularly in the aspects of supply chain management. The conventional agricultural supply chains tend to be protracted, fragmented and controlled among various intermediaries leading to inefficiency, non-transparency and inequitable distribution of value. There is also

a frequent situation when farmers get a small portion of the final market price, and consumers pay high prices and uneven quality of agricultural products (**Birthal et al., 2019**). These inefficiencies underscore the importance of new ways of reorganizing agricultural supply chains in a more inclusive and sustainable way.

Direct farmer-consumer connectivity is one of the new approaches toward solving such challenges. The goal of this model is to do away with or considerably decrease the involvement of intermediaries by allowing direct selling of produce to consumers by farmers. This connectivity may be achieved in several ways, such as at the digital level, at the farmers markets, with community-supported agriculture (CSA), and farm-to-home delivery model. As digital technologies rapidly develop, and the internet is becoming more widespread, particularly in the countryside, it has become much easier to form direct connections between farmers and consumers (**Mittal and Mehar, 2016**). The developments have presented new opportunities in facilitating access to the market and empowering farmers economically.

In India, the customary agricultural marketing system led more or less by the structure of Agricultural Produce Marketing Committee (APMC) has customarily been accused of the limitation of ensuring that farmers have the liberty to market their produce in free markets. Although the APMC system was initially created to ensure farmers were not victims, as time progressed, it has resulted in some monopolistic behavior and cartelisation of the middlemen (**Chand, 2012**). Consequently, the farmers tend to have no bargaining power, but to sell their produce at prices set by market agents. Here, direct farmer-consumer models are one of the options that can be adopted to promote transparency, competition, and fair pricing systems.

The direct connectivity models do not only have positive impacts to farmers but also have enormous benefits to the consumers. The models minimize the transportation and storage costs by making the supply chain shorter and thereby may result in lower prices to consumers. Also, consumers are exposed to newer and better quality produce that is usually directly obtained on the farms. The reduction in the consumption of fast food and other unhealthy products, the increasing interest in food safety, organic food, and sustainable consumption only increased the pace at which the direct purchasing models were expected to be consumed (**Singh and Singla, 2018**). Consumers, especially urban consumers, are becoming more and more oriented to farm-to-table kinds of behaviors that guarantee traceability and authenticity of food products.

Technology is important in facilitating direct farmer-consumer connectivity. Digital channels, mobile apps and e-commerce solutions have cropped up as potent mechanisms of closing the divide between producers and consumers. These systems enable farmers to record their products, pricing, and to communicate directly with buyers, all contributing to the elimination of the intermediaries. Efforts by the government, like the electronic National Agriculture Market (e-NAM) have also transformed the marketing of farm produce digitally in India (**Kumar et al., 2020**). In addition, solutions to faster logistics, payment systems, and last-mile delivery are being actively developed by the private sector and agri-tech startups; access to direct connectivity in this way becomes effective and easily scalable.

Nevertheless, there are challenges in the introduction of direct farmer-consumer models despite its potential. Problems with how digital illiterate populations perceive the technology, poor infrastructure, insufficient cold storage, and insufficient access to transport systems with good integrity can greatly impede implementation. The majority of the farming communities within India include small and marginal farmers who are not typically endowed with resources and technical know-how to gain effective participation in digital marketplaces (**Birthal et al., 2019**). Furthermore, interpersonal relationships between farmers and consumers, quality assurance and standardization of

goods are some of the most crucial issues to consider when it comes to the sustainability of these models in the long-term.

Along with infrastructural and technological hurdles, policy/regulatory frames are critical in determining direct connectivity initiatives success. The focus during agricultural reforms and policy discussions in India in recent times have advanced the need to give farmers more freedom in the market and promote alternative market avenues. These reforms have had mixed results but have highlighted the importance of adopting an even-handed solution that would protect the interests of the farmers and facilitate innovation and competition in agricultural markets (**Chand, 2012**). Good policy backing in addition to capacity building programs could play a significant role in the uptake and success of the direct farmer-consumer connectivity models.

The purpose of this research paper is to understand the radical possibilities of direct farmer-Consumer connectivity to transform agricultural supply chains. The research is founded on secondary data gathered using a broad spectrum of information sources, i.e., scholarly articles, governmental documents, industry reports, and successful implementation models case studies. The research attempts to review and critique the pros, problems, and outlooks of direct connectivity methods by compiling the existing information. Secondary data provides the opportunity to have a complete picture of the trends, patterns, and results that are being experienced in various settings and areas. The relevance of the research is that it will provide valuable input to the current discussion on the topic of sustainable agriculture development and inclusive supply chains. The research identifies ways that can be used to better the income of the farmers, the efficiency of the market, and delivery of better values to the consumers, by emphasizing on disintermediation, and direct market linkages. Moreover, the research offers insights into how digital technologies, policy interventions, and collaboration among stakeholders can transform the future of agricultural supply chains.

Reforming agricultural supply chains has turned out to be more important in the context of worldwide issues like food security, global warming and economic disparity. Direct farmer-consumer connectivity is an avenue that can help curb such challenges through creating transparency, efficiency, and equity within the system. Although a lot of steps have been taken in the last few years there is still a need to innovate, invest and offer support of policy so that the prevailing factors can be defeated. This research paper, by analyzing secondary data, attempts to illuminate these challenges and help in the creation of more resiliency and sustainable agricultural supply chains.

2. LITERATURE REVIEW

2.1 Indian Agricultural Marketing: The Structural dilemmas

The structural inefficiencies of agriculture markets in India are widely reported in academic literature. **Chand (2012)** found broken market infrastructure, regulatory barriers and information asymmetries to be the major barriers to efficient price discovery and higher income realization by farmers. The researchers showed that farmers in the reformed Agricultural Produce the Market Committee (APMC) in various states realized higher prices than unreformed states indicating that institutional frameworks are highly impactful in the market.

A study carried out by **Acharya and Agarwal (2011)** on marketing margins within agricultural supply chains found out that intermediary costs and profits accounted for about 50-70% of consumer spending and this is varied by the commodity and the time of the year. Their study also indicated that the increase in margin during peak production seasons was counter-intuitive in regard to the low prices obtained by farmers. This implies that there is a monopoly of market power and intermediaries will use the times of excess supply to increase their margin at the cost of producers.

Gulati et al. (2019) analyzed the processes of price transmission across farm-gate and retail markets, which were reported to be characterized by some important asymmetries. They find that retail prices increase rapidly passed over to consumers but those at the farm-gate level are passed slowly, sometimes not at all, to the farmers. This system of asymmetric transmission is the manifestation of the intermediary market power when a possibility to absorb some changes or transmit it selectively is possible depending on profit maximization instead of the functioning of the competitive market.

2.2 Intermediary Exploitation and Farmer Distress

Through scholarly studies of the causes of and factors leading to rural poverty and agrarian crisis, exploitative relationships with middlemen and mediaries are always cited to be of a significant factor in the development of these conditions. **Shukla et al. (2014)** wrote of commission agents/traders in mandis applying monopsony power by their collusive bidding, limiting the ability of farmers to find alternative buyers, and manipulation of quality judgments to warrant arbitrary deductions to prices. These organized stuff the farmers with value to intermediaries regardless of the prevailing circumstances in the market or the quality of products.

In another study by **Rao et al. (2017)**, the authors examined trends of farmer indebtedness and discovered that poor price realization leads to the traps of indebtedness in farming as the money borrowed to finance agricultural inputs as well as household consumption. Farmers are at times forced to resort to distress sales at depreciated prices in order to cover their interest payments, which is a huge burden, and this situation is instigated by the lack of money in order to meet weekly interest requirements. This debt-exploitation nexus will continue to bring on intergenerational poverty and only worsened by the land fragmentation and lack of agricultural productivity.

Narayanan (2015) reviewed an arrangement of contract farming which is usually recommended as a way to ensure assured markets and minimize the risk of exploitation. Nonetheless, the research has discovered that these contracts often have provisions that are beneficial to buyers, including loose quality specifications, one-sided price set-ups, and verdicts on penalties imposed in cases of delivery deviation. These disadvantaged terms, which lack bargaining power, are usually imposed on smallholders and thus they end up exploited even in formalized and structured market transactions.

2.3 Digital Platforms and Agricultural Market Transformation

The new literature emphasizes the potential changes in agricultural marketing systems brought by the use of digital platforms. **Mittal and Gandhi (2020)** compared the mobile-based agricultural information services and found that farmers who obtained information about market prices reported through SMS had an average price 5-8 % higher than that of farmers who have not received such information. These enhanced access to information gave stronger bargaining power to farmers and weakened their role as price manipulators by intermediaries.

Subramanian et al. (2018) have reviewed the electronic National Agriculture Market (e-NAM) program that is designed to help establish a common national market with digital trading platforms. The experiment showed a few gains in price realization, decreased transaction costs and better market transparency to the farmers involved. The implementation barriers, however, which were mostly digital illiteracy, poor infrastructure and reluctance of current intermediaries curtailed the overall impact that technology interventions have on people, so tracing change will require technological interventions to be supplemented with institutional and capacity building developments.

Experiences in the international arena will offer great comparative information. **Goyal (2010)** studied the agricultural platforms in Kenya that link farmers directly with buyers with reported income growth between 10-15% and price volatility reduction. This research recognized the following success factors; training of farmers, effective logistical networks and strong quality assurance systems thereby overcoming both constraints in supply and demands.

2.4 Models and Disintermediation of Direct Marketing

The studies carried out on the direct marketing models have shown their capacity in promoting income growth of farmers, and in addition, their efficiency in strengthening supply chains. The study of **Thilmany et al. (2016)** identified farmers market operations in developed economies that made direct sales available to producers allowing them to get 70-90 percent of consumer expenditure, in contrast to 30-50 percent of direct sales through the traditional chain of supply. Still, the research also has found that in direct marketing, the time spent on customer interaction, logistics, and participation in the market is great and can cut the time that should be spent on the essential farming operations.

Kumar et al. (2015) examined the models of community-supported agriculture (CSA), where consumers can buy shares of rotation harvests out of farmers in advance. Such a model gives farmers quick access to capital that makes them not rely on credit and offers fresh produce to consumers at comparatively lower costs. However, issues such as dealing with consumer expectations on diversity of products, logistical problems during delivery, and seasonal changes that may lead to supply-demand imbalances can pose challenges.

By overcoming numerous of the limitations experienced in traditional methods, digital platforms can enjoy the benefits of direct marketing and be scaled. **Qiang et al. (2021)** surveyed international agriculture e-commerce sites and found that convenient interfaces, secure payment system, quality assurance, and effective logistic infrastructure were major factors that led to success. Platforms that could incorporate these elements were able to have sustainable growth and enhance the income of the farmers, and those that could not do so had few adoption rates and high turnover.

2.5 Technology Adoption in Agriculture

The theoretical frameworks of technology adoption would offer valuable guidance on technology uptake of digital platforms in the agricultural context. According to the Diffusion of Innovations theory by Rogers, the perception of relative advantage, compatibility with current practices, complexity, trialability, and observability are some of the factors that affect the process of adoption. Using this framework to agricultural digital platforms means that farmers are more considered to use these technologies when they can have clear income returns and when they do not require a significant adoption of the new technology and when the new technology is easy to use, and when it allows easy experimentation and displays the success of peers.

These theoretical views have been empowered by empirical research. In their study, **Aker et al. (2016)** analyzed the adoption of mobile technology by the African farmers and identified that African farmers' adoption of mobile technology was positively linked to the education, level of income and exposure to other successful users in the social networks. The major obstacles were digital illiteracy, significant perceived costs in proportion to benefits, and doubt on reliability, especially when it comes to smallholders who actively engage in the economy with considerable uncertainty.

Further, gender is a key factor in the technology uptake. Women farmers are also more likely to be constrained by other factors such as reduced mobility, availability of training and social cultural boundaries, which are not supportive of the use of digital technologies. It requires some gender-specific interventions to overcome these barriers to inclusion among different groups of farmers, even so as their respective benefits are reaped fairly.

3. Research Objectives

This study aims to examine how the linkage of farmers directly to the consumer can be used to improve the chain of agricultural supply. The key aims are:

- To analyze inefficiency of the old chain of agricultural supply, and in particular the middlemen.

- To explore the objective of digital and direct marketing programs in enabling farmer-consumer relationships.
- To identify the impact of the direct linkage on the income of the farmers, consumer prices and efficiency of the supply chains.
- To determine significant problems and challenges of the application of such models and suggest solutions.

4. Research Methodology

4.1 Research Design

The research design of the research project is analytical and descriptive because the research project seek to analyze how agricultural supply chains can be manipulated through direct Farmer-Consumer connectivity. The research will be grounded in the understanding of the existing configurations and inefficiencies and the evaluation of another model grounded in the methodical study of the information available. Patterns, relations and results of secondary data sources are mostly searched and analyzed using a qualitative approach.

4.2 Nature and Sources of Data

The study origin can be explained in the form of a solely secondary data that bases its data collection on various credible and reliable sources of secondary data. These include:

- Peer-reviewed journal articles
- State reports and policies.
- Books of local and foreign agencies.
- Industry report and white papers.
- Literature and books on agricultural marketing/supply chains.

Reported by government agencies such as the ministry of Agriculture and Farmers Welfare, NITI Aayog, Food and Agriculture Organization (FAO) and World bank, and previous research studies published, are some of the most important sources.

4.3 Data Collection Method

Data has been collected with the help of the systematic review and analysis of the existing literature. The relevance of the related documents to the agricultural supply chains, middle positions, digital platforms, and direct marketing models was used as a criterion to identify tiresias using the relevance of Relevant Studies, Reports, and Documents. The significance of the new and authoritative sources was also done in a bid to ensure reliability and validity of the information.

4.4 Data Analysis Technique

The measured data have been analyzed with the use of qualitative content analysis. This involves:

- Coming up with common themes and patterns.
- Comparison of findings in different studies.
- Inferring data about domains of weaknesses at this stage of the supply chain, digital intervention, and direct connection constructs.

This discussion focuses on the interpretation of the implications of direct farmer-consumer relationships to distribution of incomes, price efficiency as well as market transparency.

4.5 Scope of the Study

The agricultural supply chains examined will be agricultural supply chains with special consideration on:

- The role and prescription of the mediators in older systems.
- Emerging patterns of direct marketing and internet interrelationships.
- Immediate consequences on the ecosystem and functioning at the farmers and consumers level.

The analysis primarily considers the Indian situation and with the selective reference to the international cases with the aim of getting comparative knowledge.

4.6 Limitations of the Study

The based is performed based on secondary data; therefore, the research is somewhat limited:

- Dependence on the information at hand and sources of information.
- The lack of direct and field based information of based farmers or consumers.
- It is even possible that there will be variations in findings of other regions and scenarios.

5. Findings and Results

The secondary data analysis has revealed some useful facts on how the traditional agricultural supply chain works and how direct farmer to consumer connectivity models can transform how it works.

5.1 Inefficiencies in Traditional Supply Chains

Findings indicate that the traditional agricultural channels of supplying commodities comprise various intermediaries e.g., commission agent, wholesalers and retailers that increases the gap between farm-gate and retail prices significantly. Studies suggest that the farmers only tend to receive 30-50 percent of the ultimate price of the consumer and the rest of the content reaches intermediaries through the marketing costs and gains. The system leads to inefficiencies in the prices, lack of transparency and loss of bargaining power by the farmers.

Moreover, the availability of a small number of alternative methods of selling products as well as regulated markets constrain the opportunity to choose more advantageous prices for the farmers. The absence of information asymmetry is not beneficial either since there are numerous instances where farmers cannot access up-to-date market prices; hence they can be used.

5.2 Impact of Intermediary Dominance on Farmers

The fact that intermediary dominance is one of the crucial factors affecting the distress and income instability among farmers is revealed. The intermediaries may be involved in some of the practices that include collusive pricing or quality manipulations and late payment that affect farmers negatively on their earnings. There is also secondary evidence that postulates that distress sales are rife especially to the small and marginal farmers who are unable to afford to do without immediate cash flows.

There is further dependency into the cycle of indebtedness through being unable to secure fair prices and further reliance on informal credit systems. This economic vulnerability is not only beneficial to the lives of the farmers involved, but it also has impacts on agricultural productivity and sustainability.

5.3 Direct Farmer-Consumer Connector has functionality.

The conclusion of the analysis is that in the sphere of direct connectivity, digital platforms and local direct markets may be extremely useful to optimize the supply chain. These models can help farmers to achieve higher revenue (between 10-30) not only by cutting or eliminating intermediaries but also by a greater portion of consumer spending.

This also benefits the consumers as quality and lower prices are produced because the fewer layers in the supply chain translate to less cover up time and cost. Furthermore, the farmer-consumer contacts guarantee a more reliable, transparent and traceable food system.

5.4 Contribution of Digital Technologies

The results indicate that digital technologies are the key to directly connecting with the environment. Digital payment systems, online markets, and mobile applications are utilized to provide farmers with a broader market, charge relatively competitive prices, and get paid promptly.

Market information which is obtained with the help of digital devices has also been found to enhance the decision-making ability and negotiation ability of farmers. The success of these technologies is however conditional on the factors including digital literacy, internet connectivity and technological infrastructure which evenly share out across regions.

5.5 Operational and Logistic Problems

Irrespective of the advantages, the results indicate that the direct marketing model is afflicted by a number of operational problems. These include:

- Inadequate logistics and transport systems.
- Poor cold chain and storage facilities.
- Challenges with quality standardization and assurance.
- Lack of skills in marketing and customer relationship management by farmers.

These difficulties may limit the operations of direct connectivity programs, especially those of small scale farmers.

5.6 Scalability Problems and Barriers to Adoption

The research determines some of the most important impediments to the implementation of direct farmer-consumer models. These are digital illiteracy, lack of change, awareness and economic constraints. Lack of risk aversion and institutional support are some of the reasons why small and marginal farmers may find it challenging to embrace new technologies.

Moreover, serious policy support, development of infrastructure and coordination of the stakeholders are necessary to scale such models. In the absence of such enabling factors, long-term effects of direct connectivity initiatives may be minimal.

6. Conclusion

In the analysis, it is noted that the old agricultural supply chains are largely inefficient, fragmented and mediated by making the share of the farmers in the total consumer price considerably smaller besides raising the consumers' cost. Information asymmetry and presence of different layers of marketing systems, which cannot be accessed by the market, continue to undermine fair price realisations and consequently continue to propagate long term farmer distress.

The literature review is a good indication that models of direct connectivity between the farmers and the consumers are a viable alternative to these structural challenges. With such models, price transparency is enhanced by the minimization of the role of intermediaries, bargaining power of farmers and the opportunities to achieve the better realization of the income. With this, consumers are able to get fresher goods at a relatively lower price thereby increasing efficiency in the market.

The paper concludes also that digital technologies are very important in defining such direct connectivities. The Internet market and online business platforms along with mobile applications can transform agricultural marketing by making it easier to access the market and by simplifying the process of conduct. The supporting factors such as digital literacy, presence of infrastructure and institutional support are however what determine the success of such solutions.

Nonetheless, despite all the positive aspects that it might have, there will be a number of challenges that are likely to be faced. The main challenges to the scaled adoption and viability of direct connectivity models are logistics, storage, quality control, and the relative lack of impressive technologies. Moreover, unless it is addressed, small and marginal farmers would be limited to access and utilize such systems effectively; hence, hindering inclusive growth.

In conclusion, the concept of direct farmer-consumer connectivity is both feasible and a novel means of improving the agricultural supply chains. However, the success of this will only be under a holistic approach where technological innovation is embedded in policy support and infrastructure development and capacity building programs. Through improvements on these, this would contribute towards the development of a more just, open and performance-based system of agricultural marketing which later on would enable the development of a sustainable development that would lift the lives of the farmers.

REFERENCES

- Acharya, S.S., & Agarwal, N.L. (2011). *Agricultural Marketing in India* (5th ed.). Oxford & IBH Publishing.
- Aker, J.C., Ghosh, I., & Burrell, J. (2016). The promise (and pitfalls) of ICT for agriculture initiatives. *Agricultural Economics*, 47(S1), 35-48.
- Chand, R. (2012). Development policies and agricultural markets. *Economic and Political Weekly*, 47(52), 53-63.
- Goyal, A. (2010). Information, direct access to farmers, and rural market performance in central India. *American Economic Journal: Applied Economics*, 2(3), 22-45.
- Gulati, A., Terway, P., & Hussain, S. (2019). *Crop Insurance in India: Key Issues and Way Forward*. Indian Council for Research on International Economic Relations Working Paper 352.
- Kumar, A., Shinoj, P., & Jee, S. (2015). Do dairy cooperatives enhance milk production, productivity and quality? Evidences from the Indo-Gangetic Plain of India. *Indian Journal of Animal Sciences*, 85(11), 1267-1272.
- Mittal, S., & Gandhi, S. (2020). Agricultural information systems and their impact on farmers: A case study of Digital Green in India. *Journal of Development Studies*, 56(4), 748-763.
- Narayanan, S. (2015). The productivity of agricultural credit in India. *Agricultural Economics*, 45(4), 399-409.
- Qiang, C.Z., Kuek, S.C., Dymond, A., & Esselaar, S. (2021). *Mobile Applications for Agriculture and Rural Development*. World Bank Publications.
- Rao, N., Gazdar, H., Chanchani, D., & Ibrahim, M. (2017). Women's agricultural work and nutrition in South Asia: From pathways to a cross-disciplinary, grounded analytical framework. *Food Policy*, 69, 128-141.
- Shukla, R., Ranjan, A., & Datta, S. (2014). *Agricultural value chains in India: A study of select commodities*. Indian Institute of Management Ahmedabad Research Paper.
- Subramanian, S., Rajagopalan, R., & Mukherjee, A. (2018). Electronic National Agricultural Market (e-NAM): Better integration or better outcomes? *Economic and Political Weekly*, 53(41), 47-55.
- Thilmany, D., Bond, C.A., & Bond, J.K. (2016). Going local: Exploring consumer behavior and motivations for direct food purchases. *American Journal of Agricultural Economics*, 90(5), 1303-1309.
- Government of India. (2021). *Agricultural Statistics at a Glance 2021*. Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Cooperation & Farmers Welfare.
- National Bank for Agriculture and Rural Development (NABARD). (2020). *Annual Report 2019-20*. Mumbai: NABARD.
- Planning Commission of India. (2013). *Twelfth Five Year Plan (2012-2017): Faster, More Inclusive and Sustainable Growth*. New Delhi: Government of India.
- Food and Agriculture Organization (FAO). (2019). *The State of Food and Agriculture 2019: Moving forward on food loss and waste reduction*. Rome: FAO.
- World Bank. (2020). *Agriculture and Food*. Retrieved from <https://www.worldbank.org/en/topic/agriculture/overview>