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Proceeding Paper

Supply Chain for Farmers in an Unprecedented Second Wave of the COVID-19 †

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Abstract: The outbreak of COVID-19 challenged the sustainability of global agri-food markets. Through this research, the authors have made sincere efforts to recognize and remove/improve the potential factors that contribute towards an inefficient agro-based supply chain. COVID-19 has brought in much urgency to evaluate the existing Supply Chain and to propose a valid solution. In this particular re-search, the involvement of intermediaries is the point of focus. Also, the profit margin of the farmer is hugely affected due to intermediaries. The current supply chain must be optimized, and this leads to easier flow from each phase of the supply chain. Surveys were conducted and the farmers' problems and expected solutions are highlighted in this research. Farmers in northern states of India experienced more significant disruptions than those in other states because of decreased availability of foods, due to lack of diversity in crops. This research ex-amines the existing Supply Chain of Wheat crops and optimization of the respective Supply Chain to save farmers more revenue. Through this research, the authors have attempted to observe and explore the problems faced by the farmers and consumers due to the inefficient supply chain infrastructure prevalent in India because of the onslaught of COVID-19 and find an efficient solution. Due to the lack of adequate infrastructure, storage facilities, and old food processing and supply chain technology almost 30–35% of the agricultural produce in India is wasted. A scientific solution to the existing problems is also presented after analyzing the existing supply chain and crop selection of farmers.

Keywords: agri based supply chain; crop selection; intermediaries in markets; storage facilities

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1. Introduction

The COVID-19 has brought in much urgency to evaluate the existing Supply Chain and to propose a valid solution. The prices of the crops were drastically affected and many farmers were not able to make ends meet. The Supply Chain of the Farmers has many unnecessary complications in it [1]. In this particular research, the involvement of intermediaries is the point of focus. Intermediaries involvement leads to higher prices of the crops to the end customer. Also, the profit margin of the farmer is hugely affected. In this research, we have directly interviewed farmers, customer and drivers about the condition during pre-covid and during covid. The current supply chain must be optimized, and this leads to easier flow from each phase of the supply chain [2,12] Explained why importing quality controls across the whole food supply chain is a must for attaining sustainable control. Working together during COVID-19 is necessary. This study emphasizes the need for optimization to ensure a smoother flow and reduced dependency on intermediaries.

Farmer cannot be fully benefitted by just minding his duties [3]. Carried an investigation on how collaboration in food supply chains leads to innovation and that in turn leads to sustainability with a case study [4]. Studied the farmers markets in Bangalore during lockdown. Surveys were conducted and the farmers' pros and cons were depicted. In a study [5], a method for increasing revenue for farmers and other parties was described. They have explained the co-ordination problem when consumer demand is uncertain. This also explains that revenue sharing factor can co-ordinate the agricultural supply chain and by adjusting the profits of the parties can be increased. Phone surveys were conducted [6] and the results concluded that Farmers experienced greater disruptions as a result of decreased market availability of foods. The COVID-19 problem has revealed India's agriculture and food markets' fragility. Small and marginal farmers make up to 90% of India's agricultural sector [7], and they are particularly exposed to economic shocks like covid. Farmers were drastically affected by COVID-19 and people who were expecting 700 to 800 thousand Indian rupees as profit on their crops were finding it hard to get their initial investment back [8]. In the early months of the pandemic, China and then Italy took a number of steps to ensure food security [9]. Many articles were written on measures for farmers during COVID-19. Some of them suggest that (1) Redirect farm supply chains to local areas, (2) Move away from cash crops, (3) Increasing allocations for direct transfers and (4) Set up mobile food vans would help farmers get through this pandemic [10]. Although some came to existence and some did not, many did help farmers to some extent. It is necessary to develop an innovative model which could increase the profit margin of farmers [13].

2. Methodology

In this study, the inefficiencies of the past and continuing agricultural supply chain management structure is investigated. The study is focused on scrutinizing the current agricultural supply chain management framework and innovate and reduce the shortcomings in the proposed framework [11]. The survey mainly focuses on the farmers and consumers of rural and semi-urban areas.

Step 1: The analysis of various research papers and supply chain management frameworks/structures which are prevalent today. Step 2: Highlighting the shortcomings of the current framework of the agro-based SCM., highlighting the issues faced by the members of the supply chain management (farmers, drivers, customers, government) pre-COVID-19 and during COVID-19, conducting surveys on the current SCM framework, agriculture, etc. With a set questionnaire to get insights into the situation and needs of the farmers. Step 3: Devising a new innovative SCM framework that is more efficient and less complex than the prevailing frameworks. Step 4: Again, conducting a survey to get feedback on our framework. Modifying and altering it according to the market situation and farmers' needs. Step 5: Planning and implementation. The research adopts a comprehensive approach, combining literature review, surveys, personal interview, and data collection. The focus is on farmers, and consumers in rural and semi-urban areas. The study limited by COVID-19 restrictions, relying on secondary sources.

3. Major Issues in the Existing Frameworks

The inefficiencies of the current supply chain structure are highlighted, with a focus on various stages and the involvement of intermediaries. Major problems include poor credit facilities, convoluted marketing channels, and inadequate information dissemination.

4. Data Collection

Data and resources regarding the present study were collected from respondents through a structured set of questionnaires and interviews. The collected data is observed, analyzed, and tabulated considering the objective of studies using simple statistical tool

such as frequency and percentages. All the major constraints faced by the farmers are listed in Table 1.

Table 1. Constraints faced by farmers.

S. No	Constraints	Frequency	%
1	Poor credit provisions	39	65.00
2	Contorted marketing channels	41	68.30
3	Faulty processing structure	8	12.50
4	Costly transportation charges	33	55.80
5	Inefficient transportation infrastructure	14	23.30
6	Practice of heavy loadings	17	27.50
7	Wasteful and poor storage	22	35.80
8	Incomplete information on agricultural practices	11	18.30
9	Small farmers lacking technical knowledge	13	22.50
10	Incompetent packaging culture	18	30.00
11	Unavailability of updated market information	20	33.33

In Table 2, data collected from the farmers on their suggestion to overcome these constraints are portrayed.

Table 2. Solutions to the constraints faced by farmers.

S. No	Suggestions by Farmers to Overcome Constraints	Frequency	%
1	Provision of credit facilities for the growers	26	44.20
2	Reduction of middlemen in the current SCS	37	65.00
3	Processing industries should be developed	17	29.20
4	Transport charges should be minimal	27	48.30
5	Transportation should be more efficient	11	18.30
6	Third party transporters should avoid heavy loads	10	17.50
7	Cold storages at farm gates	21	34.20
8	Provision of training for efficient agricultural doings	10	16.70
9	Updated market information should be shared with the growers N = 60	40	66.70

From the presented tables, we can conclude that there is an urgent need to remove the unwanted intermediaries from the system and to develop strategies such as minimal transport charges, adequate credit facilities to the farmers, information sharing on market rates which can cut down cost from the supply chain structure, so that customers don't have to pay more money to acquire the produce.

Table 3 shows the preferred marketing channels by the farmers for the sale of wheat. From the data collected we can conclude that majority of the farmers have been traditionally selling their crops through commissioning agents (37 votes; 61.67%) followed by local markets (10 votes; 16.7%) and the lowest voted channels are cooperative marketing societies (2 votes; 3.33%) and supermarkets (3 votes; 5.00%). The main reasons behind farmer's not selling their produce through cooperative marketing society and supermarkets can be lack of market information, which also constitutes for major problem farmers are facing in Table 1, and the traditional supply chain structure is devised in a way that it does not provide small farmers with a lot of options of marketing channels to choose from. So, under compulsion these farmers are forced to sell through any channel that is easily accessible to them, thereby losing lot of revenue. As it may be noted that the selling price for a consumer is Indian rupees 39.9 per kilogram and farmer may get only Indian rupees 12 which is not even 30% of the total share.

Table 3. Share of intermediaries in the consumer rupee.

S. No	Chain for Marketing	MSP/kg (Rs.) (for Farmers) 2020	Absolute Price/kg (Rs.) [APMC, Ranchi, Jharkhand]	Share %
1	**Farmers**	**18.75**	**12.00**	**29.90**
2	**Pre-harvest contractor**	**-**	**6.75**	**17.00**
3	**Commission agent**	**-**	**9.50**	**23.80**
4	**Processing & refining**	**-**	**4.65**	**11.65**
5	**Wholesaler**	**-**	**3.00**	**7.50**
6	**Retailer**	**-**	**4.00**	**10.05**
7	**Consumer price**	**-**	**39.90**	**1000**

Hence it is of paramount importance to devise a supply chain that would increase the profit to the farmers significantly. A new framework is suggested involving government support and a streamlined process. Farmers would receive proper equipment and training and credit facilities and direct access to markets.

5. Frameworks

It is a system aimed at regularizing market cost of a crop and providing the farm-ers their fair share of dues. This system is devised after proper market study of current channels and aims to fill the gaps in current supply chain and an ideal sustaina-ble supply chain. Here, the government has a more active role to play as it ensures a good harvest by providing farmers with the equipment and proper knowledge for a good harvest. They also provide with interest free loans so that a farmer can support his family for the initial 6 months without being completely dependent on the harvest. Once harvest is done the farmers sell to the collection points setup by the government at maximum selling price, they can also put their produce up for auction at E-mandi platforms and get a desired rate. The produce collected at government points is then transported to storage units setup by the food corporation of India where 20% is separated for reserve for natural calamities. 80% of the stock is opened for booking to mills, wholesalers, dealers etc. Suggested frame work is presented in Figure 1.

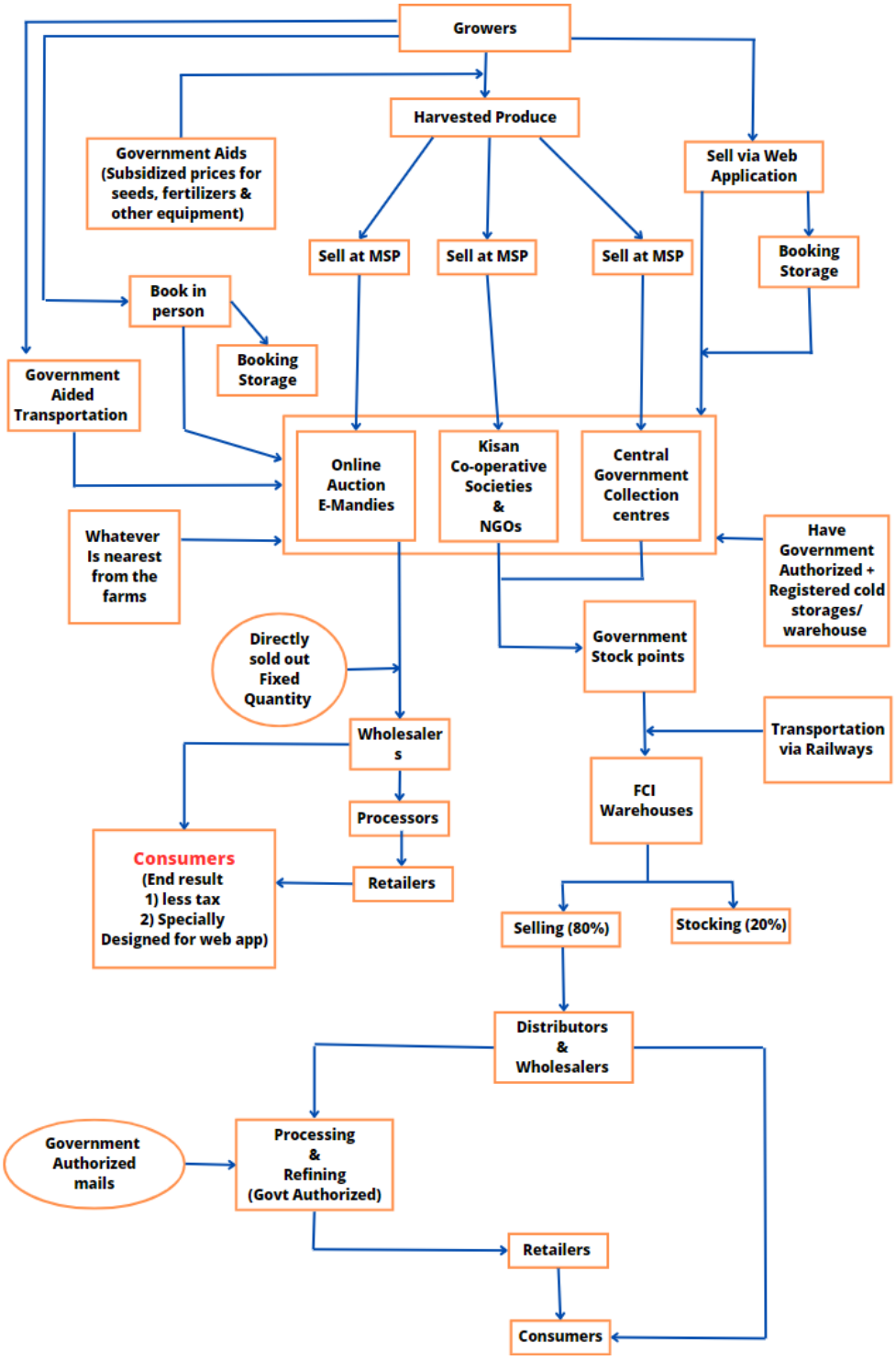

Figure 1. Suggested framework.

6. Conclusions

The study sheds light on the challenges within India's agro-based supply chain, particularyly during the pandemic. The results of the study and the model proposed will help the farmers and consumers to face any natural calamity that is of the nature of the pandemic the world faced. The frame work produced increases the share of farmers upto 50% of the consumer price. The paper succeeds in not only providing the farmers a fair share of the market but also in controlling market inflation, corruption, tax evasion as observed in current existing systems. Extensive survey analysis on different stages of supply chain

helped us highlighting the issues. These were further understood by studying existing literature and talking to APMC officials in various regions. From quantitative and qualitative studies, we were able to device a new supply chain which addressed all the highlighted issues, which resulted in controlled market price with a fair share going to the farmers.

7. Limitations to the Study

This paper is prepared based on surveys conducted, existing literature available and data collected from government authorities. **This study is limited to only certain geographical locations in India**.

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