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A NEW METHOD FOR ASSESSING THE MARKETING EFFICIENCY OF AGRICULTURAL MARKETING CHANNELS

Purpose. *This study aims to introduce a new method for assessing the efficiency of agricultural marketing channels. This innovative method rectifies the deficiencies inherent in earlier methods by encircling all channel participants in evaluating marketing efficiency, thereby delivering a more detailed assessment.*

Methodology / approach. *The present study first identified the shortcomings of the old methods based on a literature review and then attempted to propose a new method for calculating marketing efficiency by overcoming these issues. The efficiency of marketing channels is calculated based on primary data collected from two randomly selected agriculture markets in Delhi, marketing cooperative societies operating in Delhi, and their respective intermediaries, flour mills, and consumers in the channel. The study's sample size is 179 respondents, including all the channel members. After that, a comparison is made between traditional methods and the proposed method.*

Results. *Results of this study show that the proposed method gives a better idea of the efficiency of marketing channels than the old methods, namely the Acharya's approach, the Shepard's method and the input-output approach. These methods ignore the crucial role of producers, focusing on overall margins and costs. They can call a channel efficient even if producers receive minimal benefits, necessitating a revised approach. The proposed method has two parts: (1) the ratio of overall channel benefit to cost, excluding consumers, to avoid misleading results, indicating higher benefits for channel members; (2) the ratio of the net price received by farmers to the price paid by consumers, reflecting farmer earnings. By separating marketing margins and costs, the proposed method simplifies previous complexities. Using the channel benefit-to-cost ratio and the farmer's price-to-consumer price ratio, this method offers an accurate and comprehensive assessment, addressing flaws in Acharya's approach.*

Originality / scientific novelty. *The proposed method is the only method that takes care of every channel member rather than just focusing on producers / farmers. This method considers factors such as the price received by farmers (gross and net), marketing margins, marketing costs, and the price paid by consumers. Unlike old methods, this method focuses on adding value per channel, not on the number of intermediaries.*

Practical value / implications. *The proposed method facilitates an effortless comparison of marketing efficiency for all channel members, especially farmers. Its simplicity makes it a valuable tool for policymakers to formulate effective strategies for enhancing overall channel efficiency. Researchers can also use this method in efficiency-focused studies related to agriculture and its products, gaining a comprehensive understanding of agricultural marketing channels.*

Key words: *agricultural marketing, marketing efficiency, method to measure marketing channel efficiency, agricultural marketing channels, marketing cooperatives.*

1. INTRODUCTION

Agriculture has consistently been crucial for developed, developing, and least developed nations (Singh, 2020; Acharya & Agarwal, 2019). The agricultural sector has the potential to boost a country's economy significantly. It is the backbone for nearly all developing and underdeveloped nations, as a large portion of the population depends on agriculture, directly or indirectly (World Bank, 2023; FAO, 2023). India is no exception, with over 60 % of its population engaged in agriculture and related activities (Ministry of Statistics and Programme Implementation, 2020). Although a large portion of the population is engaged in agriculture, its contribution to GDP is not proportionate (Acharya & Agarwal, 2019). As suggested by Puri & Misra (2015), there are several reasons for this disparity, including feudal production relations, usurious capital, rural indebtedness, labor market dualism, outdated farming techniques, fluctuations and instability in crop output, sectoral diversities and challenges. The government should develop strategies to enhance infrastructure, communication, management training, better marketing channel networks, and access to new markets to achieve economic development (Singh, 2020). Researchers unanimously agree that inefficient marketing channels are a significant reason for the low performance of agriculture sector (Singh, 2020; Kucher et al., 2021; Shrivastava & Pal, 2019; Rehman et al., 2012). Marketing channels are crucial for the success of any sector because they represent the chain of intermediaries through which products move from producers to consumers (Zhai et al., 2023), thereby impacting the whole sector. Simply put, efficient agricultural marketing channels are essential for the success of the agriculture sector. Efficiency means the ability of the market to perform effectively the function assigned to it (Jasdanwalla, 1966). An efficient marketing structure acts as a powerful mediator of change and a crucial means of boosting the income levels of producers / farmers while enhancing consumer satisfaction. Moreover, an effective marketing system can improve the overall quality of life for the masses (Acharya & Agarwal, 2019).

Three key components can characterize an efficient marketing channel. Firstly, it involves the efficiency with which marketing services are executed. Secondly, it considers the costs associated with these services. Thirdly, it examines how these costs and the service provision methods impact production and consumption (Clark, 1954). An efficient marketing channel ensures fair prices for all its members and helps maintain price balance throughout the entire channel (Acharya & Agarwal, 2019). Various factors, including economic status, education level, farming experience, landholding size, and the type of marketing arrangement, influence marketing efficiency (Koner & Laha, 2024).

India's agricultural sector operates within a highly regulated and controlled market, primarily focusing on food grains. Poor, uninformed, and uneducated farmers manage a significant portion of this sector. Consequently, there are inherent tensions between efficiency and equity, and between efficiency and sustainability, which impact the sector's progress (Ghosh, 2013). Hence, there is a pressing need to evaluate the efficiency of various agricultural marketing channels to enable the

implementation of corrective or innovative measures for enhancing or maintaining their efficiency. However, conventional methods for measuring efficiency are fraught with flaws. These methods often simply count the intermediaries involved without considering the unique nature and value of each channel. Such an approach lacks logical reasoning and tends to overlook the pivotal role of producers and farmers in the marketing process. Additionally, some methods focus solely on total margins and costs, neglecting the contributions of individual channel members. Consequently, these shortcomings lead to inaccurate assessments of marketing efficiency. In response to the complex and varied nature of agricultural marketing channels, researchers have attempted to introduce new and innovative metrics for measurement, aiming to overcome the limitations of existing approaches. Given the diverse and region-specific nature of agricultural marketing channels, continuous innovation in measurement methods is essential. The metrics available in the literature are utilized in diverse circumstances for varied purposes. This study builds on existing research in agricultural marketing channels by proposing a novel and comprehensive method for measuring efficiency. Unlike traditional approaches, the new method takes a holistic view, assessing the overall benefit of the channel rather than focusing narrowly on efficiency. It avoids simply listing intermediaries, instead analysing the contributions of each channel member and their collective value in the marketing process. This prompts us to formulate the following research question (RQ): does the proposed method offer a more effective comparison of agricultural marketing channel efficiency than traditional methods?

2. LITERATURE REVIEW

2.1. Concept of marketing channels. Marketing channels are alternative routes through which product flows from producers to consumers (Kohls & Uhl, 1980). Marketing channels can be described as products transferring from producers to consumers. The length of the marketing channel varies by product, quantity, consumer demand, and regional specialisation; other factors, such as the existence of different markets, also affect the length of the marketing channel (Acharya & Agarwal, 2019). A marketing channel is an array of exchange relationships that create customer value in acquiring, consuming, and disposing of products and services. The market must generate exchange relationships in order to use them as a way of serving markets. Marketing channels are routes to the market that are used to sell products and services to consumers and business buyers (Coughlan, 2017). We can say that the number of intermediaries and how they execute the delivery process makes a particular marketing channel different. Marketing channels are different but possess similar routes, as the main purpose of every marketing channel is to deliver the product to customers. Usually, there is more than one marketing channel available for any product, but the criteria for identifying the best marketing channel is efficiency.

2.2. Marketing channel efficiency. The concept is very broad and complex; therefore, no definition encompasses all its theoretical and practical implications.

Different researchers have described efficiency differently. Kohls & Uhl (1980) describe marketing efficiency as the ratio of market output or satisfaction to marketing input or cost of resources. An increase in this ratio represents improved efficiency and vice-versa. Jasdanwalla (1966) defines marketing efficiency as the competency with which a market completes its designated function. Acharya & Agarwal (2019) defined efficient marketing as a task that focuses on reducing the cost of accomplishing the desired objective without reducing customer satisfaction. In other words, it is either to reduce the cost without compromising the output or customer satisfaction or to increase the customer satisfaction or output without changing the cost. Additionally, efficient marketing achieves higher output or customer satisfaction at a higher cost. According to Zusman & Etgar (1981), the risk aversion of channel members and the cost of monitoring and enforcement affect the efficiency of marketing channels. While marketing efficiency focuses on optimising individual marketing activities to achieve specific objectives, marketing channel efficiency evaluates the effectiveness of the entire distribution network in delivering value to consumers and ensuring a seamless flow of products from the manufacturer to the end customer. Marketing channel efficiency looks at every channel member involved. Marketing channel efficiency depends on factors such as the type of market, type of commodity, availability of market information, marketing costs and marketing margins, prices paid by the consumers, and prices received by farmers (Acharya & Agarwal, 2019). Conflict among the channel members affects channel efficiency (Rosenbloom, 1973). A significant number of researchers believed that the length of marketing channels is negatively proportionate to the efficiency, which means that channels with fewer intermediaries are more efficient than those with more intermediaries (Olmos et al., 2024; Villacis et al., 2024; Thakur et al., 2023; Passah & Tripathi, 2018). This is because more intermediaries results in high marketing cost and take away high marketing margin thereby reducing the channel's efficiency (Kuswardhani et al., 2019). The studies on agriculture marketing literature provide insights into factors that negatively impact market channel efficiency. Some of these issues identified from the literature are improper methods of sale and lack of infrastructural facilities (Saadat & Gupta, 2018); inexperience and untrained farmers; full or seasonal unavailability of regulated markets; lower prices (Arida et al., 2023), high competitions, unstable supply of products and lack of market information (Anrooy, 2003), post-harvest losses (Bhat & Venkatram, 2019); poor marketing practices, lack of infrastructural facilities, and less focus on selling and production of minor crops especially fruits (Roy, 2014); the volume of handling and dependence on bulk suppliers (Mandal et al., 2011). Regulated marketing channels are more efficient; the net returns are high in regulated marketing channels. However, the major constraints are the fewer regulated and closed markets during peak times (Anrooy, 2003). Simultaneous pricing and marketing effort decisions are optimal only for sufficiently high levels of efficiency of the manufacturer's marketing efforts; therefore, marketing efficiency cannot be achieved with simultaneous decision-making (Karray, 2013).

These researchers analysed the marketing efficiency of different channels, and each researcher analysed one or more different crops. There is consensus among researchers that more intermediaries lead to less efficiency. Therefore, to make marketing channels efficient, we must modify them by eliminating unnecessary intermediaries. Emphasis should be placed on incorporating or using cooperative societies to make marketing channels efficient (Saadat & Gupta, 2018). The suggestions offered by researchers to improve channel efficiency include a fair and transparent system with more focus on mutual relationships, personal trust, and strong relationships among channel members (Wang et al., 2022); volume of handling should be increased via organised retail chain including digital retail stores (Nedumaran et al., 2020; Mandal, et al., 2011), labeling (Levkina & Petrenko, 2019; Arida et al., 2023), supermarket involvement, the sequential play of pricing (Karray, 2013), minimum spoilage, transparent method of sale and good infrastructural facilities (Saadat & Gupta, 2018).

2.3. Methods of measuring marketing efficiency. The term used to define the efficiency of a marketing channel is marketing cost, simply the money we spend on marketing and selling products at the next level. The second one is marketing margin, which is the difference between the costs we pay and the costs we receive. The third one is the producer's price, which means that the producer or farmer receives the net price at the time of the first sale. The fourth component is the producer's share in the consumer's price, representing the farmer's received price as a percentage of the consumer or retail price. The fifth aspect involves calculating the price spread for agricultural produce, defined as the disparity between the consumer's payment and the producer's received price for an equivalent quantity of farm produce. The price spread is usually known as farm retail spread or gross marketing margin, and it helps measure channel efficiency irrespective of the method chosen. The following is a brief description of methods for measuring marketing efficiency.

2.3.1. Existing methods and their problems.

2.3.1.1. The ratio of output to input. This ratio indicates efficiency, and theoretically, it is defined as the ratio of output to input (Kohls & Uhl, 1980). In the formula below, *E* indicates marketing efficiency, *O* represents the output of the marketing system, and *I* represents the input of the marketing system. The number 100 is to simply convert the ratio into a percentage so that interpretations can be made easily.

$$E = \frac{O}{I} \cdot 100. \quad (1)$$

A higher value of *E* indicates higher efficiency and vice-versa. In marketing channel terminology, *O* is the "value added" by the marketing channel / system, and *I* is the real / actual marketing cost, which also includes fair margins of intermediaries. This method has its limitations. Calculation of value added is not easy mainly because of the market imperfections. This means this method does not consider the market conditions prevailing in the marketing channel.

Drawbacks in this approach. The traditional approach, which is the output to

input ratio, does not account for the producer's share (farmer), and hence, it may lead to misleading conclusions about the efficiency of a particular marketing channel. Simply put, this method considers the channel as a whole. It calculates the overall output and input results, which is why it sometimes indicates a particular channel to be efficient even if the producer (farmer) in that channel is getting the minimum amount (Acharya & Agarwal, 2019). This method is, therefore, not advisable when it comes to measuring the efficiency of agricultural marketing channels because the channel in which the producer is getting a reasonable amount might be considered as efficient than those channels in which the producer is getting less (Passah & Tripathi, 2018; Saadat & Gupta, 2018).

2.3.1.2. Shepherd's approach. According to this approach, marketing efficiency can be evaluated as the ratio of the total value of goods marketed to the marketing cost (Shepherd, 1965). As per the Shepherd's approach, a higher ratio means higher efficiency and vice-versa. This approach eliminates the problem of measurement of value addition; thus, this approach is better than the traditional output-input approach.

Drawbacks in this approach. This method suffers from two main drawbacks. The first problem with this approach is that it does not unequivocally take into account the net price received by the farmers in calculating the marketing efficiency, which may lead to misinterpretation about the efficiency of marketing channels similar to the output to input approach. The second problem is that this approach assumes that marketing cost includes some fair intermediary margins. However, if the margins retained by the intermediaries are excessive, it is often argued that these should not be treated as a part of marketing cost. This confusion complicates this approach in practical application (Acharya & Agarwal, 2019).

2.3.1.3. Acharya's approach. This approach suggests that the ideal measure of marketing efficiency when it comes to the comparison of alternate markets / channels, should be one that takes into account total marketing cost, net marketing margins, prices received by the farmer, and the price paid by the consumer. Furthermore, the measure should reflect the following relationship between these variables and the assumption that 'other things remaining the same' is implicit. This method suggested that the higher the total marketing cost, the lower the efficiency; the higher the net marketing margins, the lower the efficiency; the higher the prices paid by the consumer, the lower the efficiency; and the higher the prices received by the farmers, the higher the efficiency.

Acharya's modified method. The four variables in the equation (Total marketing cost + Net marketing margins + Prices received by the farmer = Prices paid by the consumer) are related; any three could be used to determine a measure to compare marketing efficiency. Therefore, the modified method is suggested by Acharya as:

$$MME = FP : (MC + MM), \quad (2)$$

where *MME* is a modified measure of marketing efficiency;
FP is the price received by farmers;
MC is marketing cost;
MM is marketing margins.

Acharya's measure of marketing efficiency can also be stated as (Acharya & Agarwal, 2019):

$$MME = [RP : (MC + MM)] - 1 \{this\ is\ because\ RP = FP + MC + MM\}, \quad (3)$$

where *RP* is the retailer's sale price or consumer's purchase price;

FP is the price received by farmers.

Drawbacks in this approach. Acharya's method is quite popular, and its modified measure of marketing efficiency is used worldwide to measure the efficiency of marketing channels for agricultural commodities. However, this method also has some drawbacks. Higher marketing costs and margins do not always mean something is wrong with the marketing channel. Several factors, like place of production, time, product form, etc., may increase marketing costs (Acharya & Agarwal, 2019). Therefore, this method lacks a true reflection of the efficiency of the marketing system as it always makes the marketing channel with fewer intermediaries more efficient than the marketing channels with more intermediaries.

2.4. Research gap. The identified gap in this study revolves around a common oversight in existing research methodologies. Rather than considering the nature of the marketing channel and its value, the emphasis has been on the sheer number of middlemen involved, which supposedly determines efficiency. However, this perspective lacks logical validity. The commonly held notion that an increased number of channel members correlates with reduced efficiency is challenged by this study. Contrary to this belief, certain channels with a higher count of intermediaries have demonstrated greater efficiency compared to those with fewer middlemen. This challenges the oversimplified assumption that more intermediaries invariably lead to decreased efficiency. Furthermore, the study brings attention to a critical flaw in current methods. These approaches overlook the pivotal role producers and farmers play in marketing. Some methods focus only on the margin and cost rather than channel members. Despite their significance, the methods might label a marketing channel as efficient based solely on overall metrics, even if the primary contributors, the producers / farmers, receive minimal benefits. In essence, the existing methods fall short of providing an accurate representation of marketing efficiency. Modifications are necessary in these approaches.

To address the identified research gap, this study attempts to create an innovative approach to measuring the efficiency of marketing channels, aiming to simplify the intricacies found in traditional methods. The primary goal of this research is to develop a method that is not only accessible to the general public but also takes into consideration the involvement of every participant within the marketing channel when assessing efficiency. The proposed method diverges from conventional practices that rely solely on the number of intermediaries to determine efficiency. Instead, it seeks to provide a more comprehensive analysis by incorporating the contributions of every channel member and evaluating the overall value they bring to the marketing process. This shift ensures a more nuanced and accurate depiction of the efficiency of marketing channels. Additionally, the proposed method deliberately assigns distinct importance to the two key stakeholders

in the channel: producers and consumers. As such, it recognises the pivotal roles played by these primary participants and aims to reflect their influence in the efficiency calculation. The study aspires to offer a user-friendly, inclusive, and refined methodology that captures the actual dynamics of marketing channel efficiency.

3. METHODOLOGY

3.1. Proposed method. Considering the shortcomings and problems of the previous methods, this research proposes a new method of measuring marketing efficiency. In this method, we have considered the price received by the farmer, marketing margins, marketing costs, and prices paid by the consumers. We have formulated these measures into the formula to make logical calculations. The proposed formula is as follows:

$$MCE = \frac{GPf+TMM}{TMC} + \frac{NPf}{Pc}, \quad (4)$$

where *MCE* is the measure of marketing channel efficiency;
GPf is the gross prices received by the farmers;
TMM is total marketing margins of intermediaries;
TMC is total marketing costs;
NPf is the net prices received by the farmers;
Pc is the prices paid by the consumers.

Marketing cost of *i*-th middlemen = Total amount middlemen spent on marketing activities.

Marketing margin of *i*-th middlemen = Selling price – (Purchase price + Marketing costs).

The equation has two parts; the first part is adapted from the traditional Shepherd's method. The first part of the equation is the ratio of overall channel benefit to overall channel cost; is the ratio, which explains the returns of all channel members compared to marketing costs. Consumers are separated from this half of the equation because the prices received by farmers, total marketing margins, and total marketing costs are the amount consumers pay, which will mislead the ratio. The higher ratio explains higher channel member benefits. The second part of the equation is the ratio of the net price received by farmers to the price paid by the consumers. The second part reflects what the farmers get from the price paid by consumers. A higher ratio indicates higher farmer benefits. It is simply the producer's share in the consumer's price, but it is not being converted into percentage form. This ratio is used because if the prices received by farmers and those paid by consumers were taken separately, the problem with Acharya's method would continue. This is because not all types of decrease in the farmers share the indicator of inefficiency and vice-versa. Similarly, higher prices paid by the consumer only sometimes indicate lower marketing channel efficiency because sometimes consumer demand makes them pay more (Acharya & Agarwal, 2019). Therefore, it is necessary to include what the producer gets from the consumers' price to measure the channel efficiency

correctly. Overall, the equation explains what farmers get, what consumers pay, what intermediaries get, and what marketing costs are. If consumer demands are not changing and the value addition is stagnant as well, then the result of this method, just like Acharya's method, will indicate that the channel in which prices received by the farmer are the highest, and prices paid by the consumers are the lowest will be the most efficient channel. The marketing margin in the proposed method is the amount that belongs to the middlemen, who get it after paying all the marketing costs. Marketing costs, on the other side, are the total amount spent on all the marketing activities by the middlemen. This method classifies marketing margins and costs separately, and by doing this, it can successfully do away with the complexities of Shepherd's method. Additionally, by using the channel benefit to channel cost ratio, this method will present the actual value of the whole channel, and by using the ratio of farmer's price to consumer's price, this approach seeks to eliminate the problems in Acharya's method.

This method can be worked out with or without calculating price spread because what is needed is the marketing margin and marketing costs of all the intermediaries along with the price received by the farmer and paid by consumers for a predefined quantity of the produce. However, it is advisable to work out the price spread. Total marketing costs are calculated as the sum of the total amount that all the middlemen spent on marketing activities. The total marketing margin is the summation of the marketing margin derived by all the intermediaries. For a single middleman, it can be worked out as: Marketing margin = Selling price – (Purchase price + Marketing costs). After that, we need to know the amount paid by the consumer. When we have worked out all these terms, we can simply put these into the formula given above. A higher value will indicate higher efficiency.

This method is based on the following assumptions:

- the variety of the crop or produce being determined for marketing efficiency is the same quality / variety across all channels;
- marketing margin and marketing costs should be treated as separate things;
- wastage during marketing is included in marketing costs.

3.2. Population and data sources. The population under study for this research is characterized by two distinct characteristics:

- they sell their produce in agriculture and cooperative-based markets in Delhi;
- they sell wheat either in unprocessed or processed form.

Delhi, the capital city of India, has been selected purposely as the study area for this research. In Delhi, farmers from four central agricultural states of India, namely Punjab, Haryana, Rajasthan, and Uttar Pradesh, supply their produce in various markets. Additionally, it has many marketing channels providing nearly all crop types. Wheat has been selected for this study because it is widely produced and consumed food grain in and around the study area.

3.3. Sample selection and survey administration. Marketing channels for wheat were identified through a pilot survey. All the markets and channels were listed, and two markets, namely Narela market (Mandi) and Azadpur market (Mandi), were

selected randomly using the chit system. The data was collected in five months, from August 2020 to December 2020. The selection of different respondents is explained below.

Farmers. Farmers who sell their produce were selected through convenience sampling from these two markets and interviewed using a structured questionnaire. A total of 60 farmers, 10 from every channel, were interviewed.

Middlemen. Wholesalers and retailers directly purchasing from these markets (Mandis) were selected using systematic sampling, wherein the first number was selected at random, and subsequent respondents were selected at equal intervals and interviewed personally using a structured questionnaire. Using this technique, 15 wholesalers from three channels were selected (the other channels are cooperative-based without wholesalers) and interviewed, and 40 retailers, 10 from each channel, were selected and interviewed.

Flour mills. The purchasers from Mandis were traced from wholesalers (in the sample), and four respondents from flour mills (two from each flour mill) were selected and interviewed.

Cooperative societies. A list of cooperative societies was compiled from the NAFED website, and they were contacted six marketing cooperatives responded positively and were included in the sample. A single respondent from each cooperative society was interviewed.

Consumers. The consumers in this study were drawn from markets in the sample and retail shops outside the markets through purposive sampling. The total consumers in this sample are 60, that is, 10 from each channel.

3.4. Data cleaning. Before data analysis, an editing and cleaning exercise was carried out to identify responses requiring modification or deletion. At the end of this exercise, three responses from farmers were deleted, one from a wholesaler was deleted, two from consumers were deleted, and one clarification was made from a cooperative society, and the data was modified accordingly. The final sample size at the end of this exercise was 179. The respondents' distribution concerning the channel type and position is illustrated in Table 1.

Table 1

Distribution of respondents

Indicators	Channel A	Channel B	Channel C	Channel D	Channel E	Channel F	Total
Farmers	10	9	10	10	9	9	57
Wholesalers	4	5	5	-	-	-	14
Retailers	10	10	-	10	-	10	40
Flour mills	-	2	-	2	-	-	4
Cooperative societies	-	-	-	2	2	2	6
Consumers	10	8	10	10	10	10	58
Total	34	34	25	34	21	31	179

Source: field survey 2020, NCT Delhi.

4. RESULTS

4.1. Socio-economic profile of the respondents. Table 2 represents the socio-economic profile of the respondents. The dataset includes responses from 179 individuals representing various occupations, genders, age groups, educational levels, and income levels. The respondents are predominantly male, constituting 73.2 % of the total, while females comprise 26.8 %. Regarding age distribution, the largest group of respondents falls within the 40 to 55 age range, accounting for 32.4 %. This is followed by those aged less than 25 years (26.3 %), above 55 years (21.8 %), and those between 25 to 40 years (19.6 %). Occupationally, the sample is diverse, with the most significant segments being farmers (31.8 %) and consumers (32.4 %).

Table 2

Socio-economic profile of the respondents

Category	Subcategory	Number	Percentage, %
Occupation	Farmers	57	31.8
	Wholesalers	14	7.8
	Retailers	40	22.3
	Flour mill senior managers	4	2.2
	Cooperative societies' heads	6	3.4
	Consumers	58	32.4
Gender	Male	131	73.2
	Female	48	26.8
Age	Less than 25 years	47	26.3
	25 to 40 years	35	19.6
	40 to 55 years	58	32.4
	Above 55 years	39	21.8
Educational level	No formal education	54	30.2
	Up to high school education	38	21.2
	Up to intermediate	29	16.2
	Graduates	34	19.0
	Post graduates	24	13.4
Income level (per annum)	Up to 10 lakhs	76	42.5
	10 to 20 lakhs	46	25.7
	20 to 30 lakhs	44	24.6
	More than 30 lakhs	13	7.3

Source: field survey 2020, NCT Delhi.

Retailers constitute 22.3 % of the respondents, while wholesalers, flour mill senior managers, and cooperative societies' heads comprise 7.8 %, 2.2, and 3.4 %. Educational attainment among the respondents varies significantly, with 30.2 % having no formal education. Those with education up to high school for 21.2 %, while 16.2 % have reached the intermediate level. Graduates comprise 19.0 % of the respondents, and postgraduates account for 13.4 %. Regarding income levels, a substantial proportion of respondents (42.5 %) have an annual income of up to 10 lakhs. Those earning between 10 to 20 lakhs per annum represent 25.7 %, while 24.6 % fall within the 20 to 30 lakhs range. A smaller percentage of the population,

7.3 %, earns more than 30 lakhs annually. This diverse and detailed dataset provides a comprehensive overview of the demographic and socio-economic profiles of the respondents, reflecting a broad spectrum of the population.

4.2. Description of the identified channels. Figure 1 represents the identified marketing channels in this study.

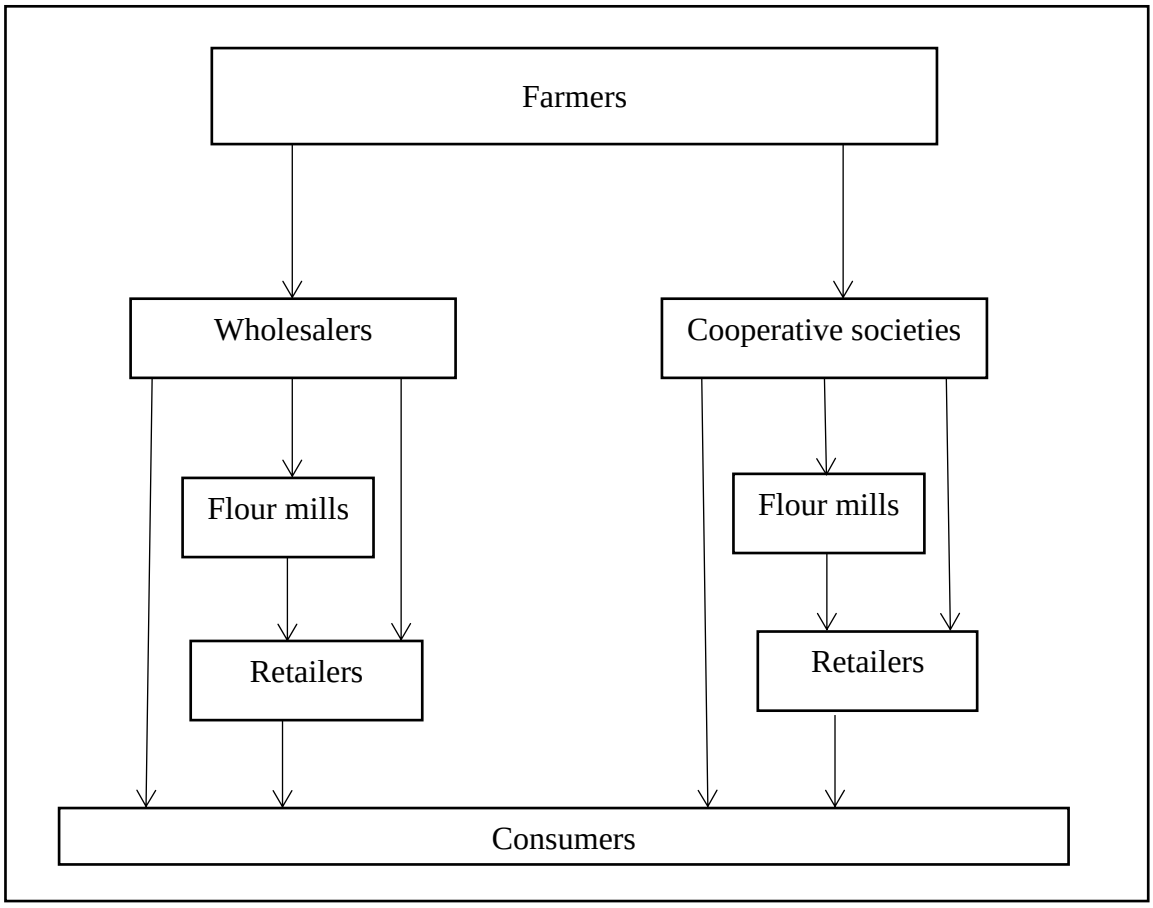

Figure 1. Identified marketing channels

Source: field survey, NCT Delhi.

The channels are as follows:

Channel A (Farmers → Wholesalers → Retailers → Consumers): in this channel, farmers bring their wheat to the markets (Mandis) and sell it to wholesalers. The wholesalers then sell the wheat to retailers, where consumers purchase the product.

Channel B (Farmers → Wholesalers → Flour millers → Retailers → Consumers): here, farmers bring their wheat to the markets (Mandis) and sell it to wholesalers. The wholesalers then sell the wheat to flour millers, who process and sell it to retailers. Consumers buy processed wheat from these retailers.

Channel C (Farmers → Wholesalers → Consumers): in this model, farmers bring their wheat to the markets (Mandis) and sell it to wholesalers. Consumers directly purchase the wheat from these wholesalers.

Channel D (Farmers → Cooperative societies → Flour millers → Retailers → Consumers): farmers pool their wheat in cooperative societies, which then sell the

produce to flour millers. The flour millers sell the processed wheat to retailers, and the retailers sell it to consumers.

Channel E (Farmers → Cooperative societies → Consumers): in this channel, farmers pool their wheat in cooperative societies, selling the produce directly to consumers through their retail outlets.

Channel F (Farmers → Cooperative societies → Retailers → Consumers): farmers pool their wheat in cooperative societies, which then sell the produce to retailers. The retailers, in turn, sell the wheat to consumers.

At the next stage, the data was analysed. The data was compiled and arranged in the format of channels, and price spread analysis was carried out (Table 3). Price spread has been used for efficiency calculations for traditional and proposed methods.

Table 3

Price spread analysis, Rupees per quintal

Particulars	Channel A	Channel B	Channel C	Channel D	Channel E	Channel F
Price received by the producer	1725	1725	1725	1820	1870	1850
Producer's cost of marketing	200	200	200	180	130	150
Wholesaler's cost	100	100	130	-	-	-
Wholesaler's margin	100	110	160	-	-	-
Cooperative societies' cost	-	-	-	55	100	50
Cooperative societies' margin	-	-	-	70	90	60
Flour millers' cost	-	235	-	235	-	-
Flour miller's margin	-	380	-	380	-	-
Retailer's cost	100	100	-	100	-	100
Retailer's margin	75	150	-	150	-	180
Consumer's purchase price	2300	3000	2215	2990	2190	2390

Source: authors' calculations from data collected through field survey, NCT Delhi.

With the help of price spread, we have calculated the information required to calculate marketing channel efficiency (Table 4). After that, the efficiency of marketing channels is calculated using existing methods (Table 5).

Table 4

Input information for efficiency calculations, Rupees per quintal

Particulars	Channel A	Channel B	Channel C	Channel D	Channel E	Channel F
Consumer's purchase price	2300	3000	2215	2990	2190	2390
Total marketing costs	400	635	330	570	230	300
Total net marketing margins	175	640	160	600	90	240
Net price received by farmers	1725	1725	1725	1820	1870	1850
Total value added (1–4)	575	1275	490	1170	320	540

Source: authors' calculations based on field survey, NCT Delhi.

4.3. Efficiency calculations using existing methods. Table 5 shows the efficiency calculations using commonly used existing methods. The results are as follows:

Conventional method. Results from the conventional method show that channel D is the most efficient channel, followed by channel B, channel F, channel C, channel A, and channel E. The conventional method is not directly concerned with the net price received by farmers, marketing margins of middlemen, marketing costs, and price paid by consumers. It is only an indication of the ratio of value added to total cost, which is insufficient to depict the true image of channel efficiency. For instance, the net price received by farmers in channel D is less than the net price received by farmers in channel E, yet this method concludes channel D is the most efficient.

Table 5

Efficiency calculations using existing methods

Methods	Formula	Channel A	Channel B	Channel C	Channel D	Channel E	Channel F
Conventi-onal method	Efficiency = Total value added : Total marketing costs	575 / 400	1275 / 635	490 / 330	1170 / 570	320 / 230	540 / 300
Ratio		1.44	2.01	1.48	2.05	1.39	1.80
Shepherd's method	Efficiency = Consumer's purchase price : (Total marketing costs + + Total net marketing margins)	2300 / 575	3000 / 1275	2215 / 490	2990 / 1170	2190 / 320	2390 / 540
Ratio		4.00	2.35	4.52	2.56	6.84	4.43
Acharya's method	Efficiency = Total value added : (Total marketing costs + + Total net marketing margins)	1725 / 400+175	1725 / 635+640	1725 / 330+160	1820 / 570+600	1870 / 230+90	1850 / 300+240
Ratio		3.00	1.35	3.52	1.56	5.84	3.43

Source: authors' calculations based on field survey, NCT Delhi.

Shepherd's method. This method indicates that the most efficient channel is channel E, followed by channel C, channel F, channel A, channel D, and channel B (least efficient). Analysis shows that this method does not unequivocally take into account the net price received by the farmers when calculating marketing efficiency, which may lead to misinterpretations about the efficiency of marketing channels. Therefore, this method fails to depict the true picture of channel efficiency.

Acharya's method. As per this approach, the sequence of efficient channels from most to least is channel E, channel C, channel F, channel A, channel D, and channel B. This sequence is the same as Shepherd's analysis; thus, this method also indicates that channel E is the most efficient channel, and this channel has the lowest consumer purchase price and highest net price received by farmers among all the

channels. This method is better than the rest of the existing methods because it considers the price paid by the consumer, the price received by the farmers, total marketing cost, and net marketing margins.

4.4. Efficiency calculations using the proposed method. The results from our proposed method show that the sequence of efficient channels from most to least efficient is channel E – channel F – channel C – channel A – channel D – channel B (Table 6). Unlike existing methods, this method measures the ratio of channel benefit to channel cost and the ratio of the net price received by the farmer to the price paid by consumers. The first ratio explains the overall channel performance, and the second ratio explains what the farmer gets from the price paid by the consumer. Together, these ratios provide a comprehensive view of marketing efficiency. According to the analysis, it is clear that the sequence of performance is based on each member of the marketing channel together with the overall performance of the channel.

Table 6

Efficiency calculation using proposed method

Method	Formula	Channel A	Channel B	Channel C	Channel D	Channel E	Channel F
Proposed method	$MCE = \frac{GPf + TMM}{TMC} + \frac{NPf}{Pc}$	5.25+0.75	4.03+0.57	6.31+0.77	4.56+0.60	9.08+0.85	7.46+0.77
Ratio		6.00	4.60	7.08	5.16	9.93	8.23

Source: authors' calculations based on field survey, NCT Delhi.

This method does not fully confirm that higher total marketing costs reduce efficiency, higher net marketing margins reduce efficiency, higher prices paid by the consumer reduce efficiency, and higher prices received by farmers increase efficiency; instead, it considers each member of the marketing channel along with the overall performance of the channel, because higher marketing costs and higher marketing margins do not always mean that there is something wrong with the marketing channel. After all, there are a number of factors, such as production location, production time, product form, etc., that can cause a high share of marketing costs that has nothing to do with the efficiency of the marketing system. Similarly, when it comes to the price paid by the consumer, we cannot rely on the statement that the higher the prices paid by the consumer, the lower the efficiency of the marketing channel (Acharya & Agarwal, 2019). Moreover, not all types of decrease in the farmer's share are indicators of inefficiency because as there is a rise in the standard of living, the consumer will demand more customised products and better marketing service, increasing the costs and reducing the price received by farmers.

5. DISCUSSION

This section compares the efficiency results provided by old methods with the efficiency results of the proposed method. Figure 2 shows a comparison of the sequence of efficiency provided by the old methods and the proposed method. This section starts the comparisons by first comparing the conventional method with the

proposed method, followed by comparing Shepherd's analysis with the proposed method, and Acharya's method with the proposed method.

Proposed method	Conventional method	Shepherd's method	Acharya's method
Channel E **(Farmers – Cooperative societies – Consumers)** ⇩ Channel F **(Farmers – Cooperative societies – Retailers – Consumers)** ⇩ Channel C **(Farmers – Wholesalers – Consumers)** ⇩ Channel A **(Farmers – Wholesalers – Retailers – Consumers)** ⇩ Channel D **(Farmers – Cooperative societies – Flour millers – Retailers – Consumers)** ⇩ Channel B **(Farmers – Wholesalers – Flour millers – Retailers – Consumers)**	Channel D **(Farmers – Cooperative societies – Flour millers – Retailers – Consumers)** ⇩ Channel B **(Farmers – Wholesalers – Flour millers – Retailers – Consumers)** ⇩ Channel F **(Farmers – Cooperative societies – Retailers – Consumers)** ⇩ Channel C **(Farmers – Wholesalers – Consumers)** ⇩ Channel A **(Farmers – Wholesalers – Retailers – Consumers)** ⇩ Channel E **(Farmers – Cooperative societies – Consumers)**	Channel E **(Farmers – Cooperative societies – Consumers)** ⇩ Channel C **(Farmers – Wholesalers – Consumers)** ⇩ Channel F **(Farmers – Cooperative societies – Retailers – Consumers)** ⇩ Channel A **(Farmers – Wholesalers – Retailers – Consumers)** ⇩ Channel D **(Farmers – Cooperative societies – Flour millers – Retailers – Consumers)** ⇩ Channel B **(Farmers – Wholesalers – Flour millers – Retailers – Consumers)**	Channel E **(Farmers – Cooperative societies – Consumers)** ⇩ Channel C **(Farmers – Wholesalers – Consumers)** ⇩ Channel F **(Farmers – Cooperative societies – Retailers – Consumers)** ⇩ Channel A **(Farmers – Wholesalers – Retailers – Consumers)** ⇩ Channel D **(Farmers – Cooperative societies – Flour millers – Retailers – Consumers)** ⇩ Channel B **(Farmers – Wholesalers – Flour millers – Retailers – Consumers)**

Figure 2. Comparison of the efficiency of marketing channels according to the old methods and the proposed method

Source: field survey NCT Delhi, authors' calculations.

5.1. Conventional vs proposed method. The conventional method (the output to input ratio) returns the efficiency sequence as follows: channel D (most efficient) – channel B – channel F – channel C – channel A – channel E (least efficient). Although channel D is the most efficient channel, the net price received by farmers in this channel is less than the net price received by farmers in channel E. The consumer's purchase price in the most efficient channel (D) is also more than the least efficient channel (E). Similarly, if we compare channel B with channel F, the net price received by farmers in channel B is less than that of farmers in channel F.

On the other hand, the results of the proposed method show that the sequence of efficient channels from the most to the least efficient is as follows: channel E – channel F – channel C – channel A – channel D – channel B. This method indicates channel E as the most efficient channel, as it has the lowest consumer purchase price and highest net price received by farmers among all the channels. Additionally, it has the lowest marketing costs and lowest marketing margins. Similarly, per the proposed method, the least efficient channel is B, which has the lowest net price received by farmers, the highest net price paid by the consumer, the highest marketing cost, and the highest marketing margin. According to the conventional method, channel D is the most efficient channel; according to the proposed method, channel E is the most efficient. After comparing these two channels, it becomes clear that channel E is more efficient than channel D because in channel E consumers pay less, farmers receive more, intermediaries receive satisfactory but not excessive payments, and marketing costs are lower. The conventional method shows channel D as the most efficient because it changes the form of product utility. Therefore, the value added is more, but this does not reflect the true picture because this method does not focus on the costs and returns of farmers, consumers, and intermediaries.

As per the conventional method, channel B is the second most efficient channel. On the other hand, the proposed method identifies channel F as the second most efficient channel. Comparisons between channel B and channel F show that in channel F, the price paid by consumers is less, the net price received by farmers is more, intermediaries do not get excessive payments, and marketing costs are lower. In channel F, cooperative societies act as intermediaries, keeping very low margins themselves; thus, benefiting both the producer and consumers. Although, channel B changes the form of the product's utility, the overall benefit is more in channel E than in channel B.

The third most efficient channel, according to the conventional method, is channel F, and according to the proposed method – channel C. The proposed method has already put channel F in second place in terms of efficiency, and channel C in third place. As shown in Figure 2, the overall performance sequence of the proposed method, if we compare channel F and channel C, the results show that in channel F farmers receive a higher price than in channel C. However, consumers have to pay more than channel C. Intermediaries receive a higher price in channel F than in channel C, and marketing costs in channel F are lower than in channel C. In terms of total channel benefit, channel F is more efficient than channel C because consumers

have to go to the wholesale market (Mandi) to buy products in channel C.

Additionally, channel F consists of cooperative societies, which are eventually formed for the benefit of the farmers. Their marketing margin (Rs 60/quintal) is less than the margin of wholesalers in channel C. However, the overall marketing margin in channel F increases due to the presence of retailers (Rs 180/quintal), making the purchase easy for consumers. Channel benefit is greater in channel F than in channel C; thus, channel F is more efficient than channel C.

The fourth efficient channel, according to the conventional approach, is channel C, and according to the proposed method, it is channel A. The proposed method already placed channel C as more efficient than channel A, which is why the proposed method places channel C as the third most efficient channel and channel A as the fourth most efficient channel. Still, when comparing channel C and channel A, the comparisons show that consumers have to pay less in channel C than channel A, marketing cost is less in channel C than channel A, farmers receive the same price in both channels, but intermediaries get more in channel A. Although this price is less than what consumers save in channel C, the overall channel benefit is more than in channel C than channel A.

The fifth most efficient channel according to the conventional method is channel A, according to the proposed method, channel D. Comparisons between these two channels show that consumers must pay more in channel D than in channel A. However, farmers get more in channel D, marketing cost and marketing margin both are high in channel D than channel A. Although channel D changes the form of utility and the difference between the price paid by consumers in channel D and channel A is Rs 690, the difference between the price received by intermediaries in these channels is 425, and the difference between the price received by farmers in these channels is Rs 75. Therefore, channel A is more efficient than channel D, but the proposed method already placed channel A prior to channel D in its efficiency sequence.

The least efficient channel according to the conventional method is channel E, according to the proposed method, channel B. Channel E has the lowest consumer purchase price and highest net price received by farmers among all the available channels. Additionally, it has the lowest marketing costs and lowest marketing margins. Similarly, according to the proposed method, the least efficient channel is B. Channel B has the lowest net price received by farmers, the highest net price paid by the consumer, the highest marketing cost, and the highest marketing margin. Therefore, channel E is much more efficient than channel B.

5.2. Shepherd's method vs proposed method. It should be noted, the Shepherd's method calculates marketing efficiency by calculating the consumer's purchase price ratio to total marketing cost. This method gives the efficiency sequence: channel E (most efficient) followed by channel C, channel F, channel A, channel D, and channel B (least efficient). Shepherd's analysis and the sequence of the proposed method are almost the same, except that Shepherd's method considers channel C as more efficient than channel F, and the proposed method contradicts this and considers

that channel F is more efficient than channel C. However, if we consider channel F, the farmer is getting more expensive than channel C. The value addition is also more than that of channel C. Although, in channel C, the consumer's purchase price is lower than channel F, the value addition is more in channel F than channel C. After comparing the results of the proposed method with Shepherd's method, it is found that the sequence of the proposed method is more acceptable, because this method comprehensively takes into account the consumer's purchase price, the net price received by farmers, marketing costs and marketing margin.

5.3. Acharya's method vs proposed method. According to Acharya's method, the sequence of efficient channels from most to least is channel E, channel C, channel F, channel A, channel D, and channel B and according to the proposed method the efficiency sequence from most to least efficient is channel E, channel F, channel C, channel A, channel D, channel B. Acharya's method and the efficiency sequence of the proposed method are almost the same except for the position of channel C and channel F. The proposed method considers channel F to be more efficient than channel C.

If we compare channel F and channel C, the results show that in channel F, the farmer receives a higher price than in channel C. Value added is also greater than in channel C. In channel C, the consumer's purchase price is lower than in channel F, but value added is greater in channel F than in channel C. If the total benefit of the channel is taken into account, channel F is more efficient than channel C because in channel F farmers receive a higher price than channel C. However, consumers have to pay more price than channel C. Intermediaries get a higher price in channel F than in channel C and the marketing cost in channel F is less than channel C. The overall channel advantage is greater in channel F than in channel C. Moreover, channel F got cooperative societies as one of the intermediaries and researchers like (Saadat & Gupta, 2018) stated that marketing channels having cooperatives are more efficient thus channel F is more efficient than channel C. Therefore, the efficiency sequence provided by the proposed method seems to provide a more comprehensive picture than the efficiency sequence provided by Acharya's narrow-focus approach.

Therefore, this study provides an answer to the research question about the better performance of the proposed method than traditional methods. After comparing the results of all methods, it becomes obvious that the results driven by the conventional approach are not ideal and cannot show the correct efficiency sequence. The results of Acharya's method and Shepherd's method are the same. The consistency of efficiency that both of these methods provide is more idyllic than the conventional method. Although Acharya's modified method outperforms Shepherd's method, these two methods present the same results if marketing cost is considered in a broader sense, including the marketing margins of intermediaries. The efficiency sequence provided by the proposed method is slightly different from that of Acharya's and Shepherd's methods, but completely different from the sequence provided by the conventional method. The proposed method's sequence is more idyllic than the sequence provided by Acharya's and Shepherd's methods, as it marks

the most efficient channel in which the added value is the greatest. Thus, the proposed method compares efficiency of the agricultural marketing channel more effectively than traditional methods.

6. CONCLUSIONS

The comparison shows that the proposed method gives a better idea of the efficiency of the marketing channel compared to the old methods. The proposed method eliminates the complexities and shortcomings of the previous methods. Moreover, this method considers factors such as the price received by farmers (gross and net), marketing margins, marketing costs, and the price paid by consumers. This method is better than the conventional method because the conventional method calculates the overall output and input results and is not concerned with channel members in particular, which is why it sometimes indicates a particular channel to be efficient even if the producer (farmer) in that channel is getting the minimum amount, or the consumer is paying excessive amount but the proposed method considers the ratio of overall channel benefit to channel cost along with the ratio of price received by farmers to price paid by consumer which gives a comprehensive view of the channel efficiency. It is evident by the results that according to the proposed method, the efficiency sequence from most to least is channel E (9.93) – channel F (8.23) – channel C (7.08) – channel A (6.00) – channel D (5.16) – channel B (4.60). According to the conventional method of output-input, the efficiency sequence from most to least is channel D (2.05) – channel B (2.01) – channel F (1.80) – channel C (1.48) – channel A (1.44) – channel E (1.39).

Shepherd's method gives the efficiency sequence from most to least as follows: channel E (6.84) – channel C (4.52) – channel F (4.43) – channel A (4.00) – channel D (2.56) and channel B (2.35). The proposed method is better than this method because Shepherd's method clearly does not take into account the net price received by the farmers in calculating the marketing efficiency, which may lead to misinterpretation about the efficiency of marketing channels. However, the proposed method considers everything, ranging from the price received by farmers (gross as well as net), marketing margins, and marketing costs, to the price paid by consumers. Shepherd's method assumes that marketing cost includes some fair intermediary margins. However, if the margins retained by intermediaries are excessive, they should not be considered as part of marketing cost. According to the proposed method, it is clear that marketing costs and margins are different.

According to Acharya's method, the sequence of efficient channels from most to least is channel E (5.84) – channel C (3.52) – channel F (3.43) – channel A (3.00) – channel D (1.56) – channel B (1.35). However, Acharya's method does not take into account the fact that higher marketing costs and higher marketing margins do not always mean that there is something wrong with the marketing channel. It just presents the results based on marketing margin and cost, which generally makes marketing channels with more intermediaries less efficient and vice-versa. The proposed method eliminates all the complexities that exist with Acharya's method as

this method does not completely supports that higher total marketing cost, higher net marketing margins, higher prices paid by the consumer lower efficiency, and higher prices received by the farmers higher the efficiency, instead considers every member of the marketing channel along with overall channel performance.

Taking all this into account, the proposed method calculates the efficiency by first looking at the overall channel benefit along with the net price received by farmers from the price paid by consumers. The channel benefit to channel cost ratio helps indicate overall channel benefit. The net price received by farmers from the price paid by the consumer indicates what the farmer is getting from what the consumer has paid.

The new method will guide all channel members, from farmers to consumers, agriculture marketing institutions, agriculture and marketing officers, and researchers. Marketing institutions / agricultural marketing officers can better understand the marketing channel efficiency, which will help identify and promote efficient channels among farmers. Since the literacy of surveyed farmers is usually low, they do not understand efficiency, so they choose the most convenient channels. They rely on consultants for most production and distribution functions. Therefore, officers working with marketing institutions can determine the efficiency of channels and recommend the best channel available to farmers that will benefit all the channel members. This method can be integrated with farmer-friendly applications so that along with getting farming-related information, the farmers can also learn about the efficient marketing channels. Channel members such as intermediaries, who are sufficiently literate, can determine the efficiency of this method and choose the most profitable channel for them. Intermediaries can choose the channel to get more prices at a low cost. Consumers can assess the efficiency and choose the channel where the cost is less, but the quality is the same or better.

7. LIMITATIONS AND FUTURE RESEARCH

The proposed method provides researchers with a valuable tool to understand comprehensively the efficiency of marketing channels in agricultural areas. It overcomes the limitations of previous methodologies. The new method can be applied to performance-oriented research focusing on agriculture and related products, offering a sophisticated perspective for scientific research in this field. Although the current approach is as well designed and implemented as possible, it has its drawbacks. Firstly, if the quality or variety of the crop or produce being assessed for marketing efficiency is inconsistent across all channels, the method will yield inaccurate results. In addition, this method considers marketing margin and costs separately, which can lead to confusion when measuring performance. The method includes losses incurred during marketing in marketing expenses, but does not include any other provisions for accounting for losses. In addition, the efficiency of marketing channels is affected by numerous qualitative factors, such as mutual trust, knowledge, and conflicts among channel members. Due to time and effort constraints, the proposed method does not take these factors into account. Future

research can address this by adding some qualitative variables to gain a clearer understanding of marketing channel performance. Marketing efficiency is a complex phenomenon; therefore, innovations in computing methods must evolve.

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