

STUDY OF CHANGE IN PERCEPTION OF THE MARKETING METHOD OF SMALL AND MEDIUM FARMERS THROUGH AHP ANALYSIS

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ABSTRACT

Types of agriculture risks which a farmer faces are production risk, price or market risk, financial and credit risk, institutional risk, technology risk, input price risk, post-harvest risk and personal risk (Devi Prasad Juvvadi). Input and output price volatility is an important reason for market risk in agriculture. Lower prices of the products received by farmer forces him not to completely depend on farming income. So, one cannot ask a farmer to grow more from the same area until he gets a fair price. Farmers are not getting enough price to survive on their own by marketing their products through traditional Agricultural Produce Marketing Committee (APMC) channel. National Sample Survey Organisation (NSSO) reported that, given the choice, 40 per cent of the farmers wish to leave agriculture (Murray, 2009), it may be a future risk to the food security of India. As a result, government has given permission to sell the products through different channels in the market. In this study, selection of appropriate channels of marketing, considering long-term relation is studied using Analytic Hierarchy Process (AHP) tool. In this work 20 attributes (quantitative and qualitative) along with six marketing channels with a single market-oriented perspective on four groups of farmer is studied. Study is carried out on 80 farmers whose major income comes from farming. Here, different channels of marketing are ranked and how a small and medium farmer selects the appropriate marketing channel is presented. It was observed that the farmers no longer have faith in traditional means of selling their products through APMC. It can be a lesson for other small and medium farmers to change their thought procedure and use alternate marketing channels to sell their products and become sustainable in the farming profession. The deficiencies and urge of the farmer to remain in this business in a sustainable way is presented, from which policymakers can take an appropriate message from the study.

Keywords: Agriculture Marketing, Analytic Hierarchy Process.

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Introduction

National Commission on Agriculture defines agricultural marketing as a process which starts with a decision to produce a saleable farm commodity, and it involves all the aspects of market structure or system, both functional and institutional, based on technical and economic considerations, and includes pre and post-harvest operations, assembling, grading, storage, transportation and distribution. Prices of agriculture products are generally sensitive to supply and demand shocks. In India, agriculture marketing involves middlemen, commission agents who keep their margins and move the produce further. Further, it is not exactly the marketing, but can be called it as 'distributive handling' of agricultural produce. However, with liberalisation, privatisation and globalisation, the economic scenario in India has changed drastically and tremendously. It has emerged with alternative marketing channels where farmer can sell his produce to customer. It is a popular political move to purposefully lower cost of agriculture products to secure food security of common man by all the governments since Independence. An Indian rural population which was 72.19 per cent in the year 2001 reduced to 68.84 per cent as per 2011 Indian census report (NSSO). In India, 44 per cent rural families own land and 56 per cent have no land. The survey found that 40 per cent of the total rural land is unirrigated. As many as 58 per cent of rural households are engaged in farming, which, in turn contributes not even 60 per cent to their average total monthly income. Thus, a mere 39.5 per cent of rural households today are dependent on agriculture as the source yielding

the maximum share of their income. Hence, remaining 60 per cent households are dependent on other activities and realising that agriculture will meet their monthly income (NSSO). After information and technology revolution in India, agriculture sector has seen much change because of easy accessibility of market information to farmer. It is now possible for a farmer to seek different alternatives to sell his produce. In this paper, the work done is to understand the issues of marketing of agriculture products in India through different channels, using analytical hierarchy process. The major research questions regarding the role of different marketing channels include: How far new alternative marketing channels have a scope for improvement over existing channels? How relevant and appropriate are the new marketing channels in the current context of socio-economic base of small farmers? What is competitive edge of new marketing channels over existing channels? What kind of policy treatment is needed to grow the potential marketing channels to create an impact on livelihoods of small farmers? While there are some unresolved questions in the current design and context, the alternative channels of marketing agri-produce of small and marginal farmers nevertheless appear to be a powerful vehicle to empower small farmers and improve their quality of life, leading to better development in rural India. It is an appropriate time to assess the functioning of alternative marketing channels and their impact on small and marginal farmers in India. It is observed that farmers are using more than one such marketing

channel to sell their entire produce whereas, an alternate channel could earn more price for their produce. The study attempts to understand the current mode of operation and effectiveness of alternative marketing channels with reference to small and marginal farmers in current area of study. This, in turn, helps review of design in the and the amendment and policy mechanics that may be necessary to make an effective institutional arrangement of the small and marginal farmers leading to the development of small products in area.

Relevance

Faster industrialisation and the economic development in the urban area created more job opportunities as a result of which the rural population is migrating to urban areas in order to earn their livelihood. Because conversion into urban area is not growing at the same rate in all regions, the major portion of Indian population still resides in rural India. In this study, it is observed that farmers have shifted from subsistence agriculture to more specialised and commercialised production systems which is considered to be a key factor for their economic security. So, the farmers who are getting their complete income from farm activity which includes cultivation and animal husbandry are also considered in the study. The study looks at how the farmers have changed their thinking of selling their products into the traditional APMC system to earn more returns along with the catalyst attributes which makes the farmers think in an alternate way. Here the questionnaire is designed to get the relevant information of the way farmers

do the marketing of their products in Pune district. is analysed using various qualitative and quantitative variables which are further studied to understand the ranking of various marketing channels available. The study has found that the farmers now almost invariably are selling their products in the nearby primary markets, rather than to village traders. A farmer's choice is now becoming market-oriented with quality and market acceptance constituting the same importance as the yield. The typical market intermediary provides hardly any special value adding or developmental services in return for the commissions and margins. Various studies have examined the impact of alternative markets on small farmer. In the studied literature, very minimal work is observed related to the impact of alternative marketing on small farm holding farmers. There are no significant price differences between traditional supermarkets and direct farmer to consumer retail outlets (supermarkets) in North Carolina (Natalie H. Valpiani). Farmer's choices of selling their produce depends upon the distance to the milk collection centre and information access attribute in Kenya dairy supply chain (Walter O M et al). As a strategy to safeguard their investments and to maximise their incomes in the long-term, small farm holders select multiple marketing channels. While doing so, farmer's bargaining power and their physical distance from markets were identified as major determinants of marketing channel selection (Djalaou D A A et al). The comparative study of digital coffee-trading platform in India with those weekly physical auctions run by the Indian Coffee Traders Association (ICTA) is done in coffee

producing regions of India (Rajiv Bankar, et al.). It was observed that the primary participants (originators of the transactions) will obtain better prices on the digital platform. Collective action through farmer groups and NGOs can play a critical role for smallholders, not only to get a better price for their products, but also to adapt to the changing global supply chains (Helen Markelova, et al, Clare Narrod A et al). However, no recent studies are available in India which take a comprehensive look at the selection of various marketing channels by small farmers and its efficiency through field-based research.

Methodology

The study involves survey to collect the important qualitative and quantitative attributes and its information. The study is conducted in Pune city of Maharashtra State to examine the impact. Different stakeholders involved are farmers, government agriculture officers, producer company organisations, farmers' club, private agri-marketing players, academicians, etc. We have examined only those marketing channels which are functioning and accepted to give us time for discussion. Decision making in agriculture practice depends upon internal and external factors in economic, environmental, social and technological limits. In the field of agriculture, many times there is a requirement of taking appropriate decisions on the selection of particular practices (technologies). For example, selection of input element like fertiliser, seeds, pesticides, watering system, harvesting methods, farming system, storage system, post-processing systems, etc. To become a competitor in the market, a farmer needs to go through

multi-objective thinking in selection of these practices. One cannot rely to grow more and more if he is not assured about the returns from the products sold. Completely depending upon the traditional method of selling of products is no longer going to help the farmer to get enough returns. In order to identify the important attributes affecting farmers' marketing decisions, a structured questionnaire was conducted on a group of farmers. The primary data for this study are obtained from survey of vegetable producers. The survey was conducted between November and December 2016 with 120 respondents, who operated in and around Pune city of Maharashtra State. The survey used face-to-face interviews to administer the questionnaire in order to ensure adequate responses. The major criteria to select the alternative marketing channel are higher price, complete selling of products and sale on farm. The alternative marketing channel representative often discusses with the farmer to maintain regular supply of product, but cannot ensure 100 per cent buying of products. Prices at APMC vary due to supply and demand unbalance and are very difficult to predict. Farmer becomes skeptical on taking decision to sell products whether to APMC or to alternate channels. At APMC, products are sold in a wholesale lot and take minimum time, also get the cash money on same day so that the farmer can return home on the same day. Following assumptions are considered in this study.

Guidelines for Purposive Sampling

Small farmers have land size in the range of one to three acres while medium farmers' size of land is in between four to six acres. The same

farmer is not using more than two channels of marketing. The entire farmers' families get income from products of farm and animals. APMC is the default backup for every farmers/farmer group. Both types of farmers are producing same crop (vegetables, brinjal, tomato and spinach are sold round the year) and use 'staggered' pattern of farming. Following combinations of selling of products through various marketing channels is considered in this study.

1. APMC market (M1)
2. Self selling of products (farmers' market/*mandi* in urban area) and APMC (M2)
3. Farmer Producer Company (FPO) and APMC (M3)
4. Online store and APMC (M4)
5. Retail outlet (supermarket) and APMC (M5)
6. Weekly *bazaar* (rural *Haat*) and APMC (M6)

Here APMC, online store, retail outlet (super market), FPO and online store are the markets where farmers sell their products through wholesale marketing method. While selling the products (in *mandi*/farmer's market) and weekly *bazaar* are direct methods of marketing the products. Instead of the smaller per cent derived from wholesale marketing arrangements, farmers can capture 100 per cent food prices paid by consumer through marketing directly to the end consumers. Working mechanism of such markets is presented in following section:

APMC: It is the provision made by every State government to ensure that farmers should get

their own market to sell whatever quantity and quality of product they produce. Earlier it was mandatory to bring all food produce to a market yard and then sell them through auction. Wholesale and retail traders (e.g. shopping mall owners) and food processing companies cannot buy produce directly from a farmer due to the restrictions imposed by the APMC Act. Now these Acts are amended and anybody can take license and get products directly from farmers. The marketing system and marketing institutions were plagued by inefficiencies, bureaucratic control, and politicisation (S Chand). The various problems facing the agricultural marketing system were summarised by the Twelfth Plan Working Group on Agricultural Marketing (Planning Commission 2011).

- Too many intermediaries, resulting in high cost of goods and services
- Inadequate infrastructure for storage, sorting, grading, and post-harvest management
- Private sector unwilling to invest in logistics or infrastructure under prevailing conditions
- Price-setting mechanism not transparent
- Ill-equipped and untrained *mandi* staff
- Market information not easily accessible
- Essential Commodities Act (ECA) impedes free movement, storage and transport of produce

As a result, farmers are looking for alternate marketing channels for selling their products. However, major percentage of farmers

are still dependent on APMC market and found it is reliable and an easy source to market the products irrespective of the difficulties they are facing.

Weekly Bazaar (Rural Haat Markets): This activity of giving direct access between farmer and consumer is initiated by MSAMB and is managed by village Panchayats. There are 3500 Rural *Haats* in Maharashtra. These are organised once or twice in a week. The *Haats* have basic infrastructure facilities like sheds for sellers and pathways for buyers sponsored by MSAMB.

Farmers' Market: The success of weekly bazaar marketing channel has motivated the government to start such initiatives in urban areas and it is now gradually growing in urban area due to efforts by MSAMB. In urban areas, farmers participate to sell their products directly to customers. Farmers are participating through farmers' group or farmer producer companies and SHGs. The prices of the produce in the market are less than nearby local vegetable vendors. Here, other than vegetables and fruits, staples, legumes, processed products and milk products are made available in the market. However, these markets are held in dusty places and conditions are most unhygienic. The response to this market is good only on weekends due to the people's (customers) convenience on these days. Here, instead of a middle man, the farmers themselves can sell their products on retail or wholesale basis directly to the customers. The farmers are directly involved and need more bargaining (negotiating) skills to sell products in limited time. Small farmers from nearby areas are mostly involved in

this market. Twenty such markets are running in different places in Pune city. Farmers are also involved through SHGs, farmer groups and Farmer Producer Companies.

Online Store and Retail Outlet (Supermarket): Due to relaxation of APMC rules and motivation from the State government programmes to sell the agro-produce direct to customer, many entrepreneurs have emerged. So, retail market outlets in malls were started in many parts of the city. Initially it was observed that these malls had directly made contracts with farmers and asked them to supply regular agro-products. However, this relationship was no longer continued because of so many issues written below. Presently such malls are again dependent on middlemen who take care of all the needed supply of products to malls, while some malls are in continuation of contract with some farmers. Success of e-commerce business entered in agro-products, and increased penetration of smart phones and internet accelerated this move. List of all online retail stores are given in Table 2.1. At present in Pune city, 21 online store websites are providing service to the customers. Nine of these stores have mobile applications. All of them are providing fresh vegetables, fruits and grocery to customers. All of them are getting supply of vegetables from contracted farmers paving a path to middleman. Following are the problems faced by other marketing channels to procure direct agro-produce from the farmer:

1. Unable to buy all products
2. Cannot give higher price as expected by the farmer

3. Cannot keep faith on farmer for regular quality and quantity of produce supply
4. Unable to go on farm to collect the produce due to remote distance, affecting shelf life of produce, improper communication with farmer for timing of harvest and unpredicted breakdown maintenance of vehicle carrier. All these affect the advance assurance time of delivery given to customer.
- For competing with local retail shops on price base, supermarket chains are open to buy products from other than local small holder farmers, causing more competition of price among the farmers.
- Smallholder farmers get such market information normally from informal networks (traders, friends and relatives).

Table 1: List of Online Retail Stores in Pune

Website	App	Vegetables and fruits	Grocery	Working Status
www.zopnow.com	Yes	Yes	Yes	Yes
www.bigbasket.com/	Yes	Yes	Yes	Yes
biggmart.com/	Yes	Yes	Yes	Yes
www.punexpress.com/	No	Yes	Yes	Yes
www.onlinesabjiwala.com/	No	Yes	Yes	Yes
shop.peppertap.com	Yes	Yes	Yes	Yes
www.buyizy.com/	No	Yes	Yes	Yes
www.naturesbasket.co.in/	Yes	Yes	Yes	Yes
baniyababu.com/	Yes	Yes	Yes	Yes
www.punesubji.com/	No	Yes	Yes	Yes
https://www.grofers.com/	Yes	Yes	Yes	Yes
www.organicgarden.co.in/	No	Yes	Yes	Yes
www.wowkirana.com	No	No	Yes	Yes
shopezzy.com/	Yes	No	Yes	Yes
www.rabimart.com/about_us	No	Yes	Yes	Yes
www.greentokri.com/	No	Yes	Yes	Yes
www.milestores.com/	No	No	Yes	Yes
http://www.farmfreshpune.com	No	Yes	No	Yes
http://www.shopping.merakisan.com	Yes	Yes	Yes	Yes
http://www.way2bazaar.com	No	Yes	Yes	Yes
http://www.greenbasketstore.com/	No	Yes	Yes	Yes

Farmer Producer Organisation (FPO): The main bottlenecks of smallholders farmers are lack of insight into market opportunities in relation to their own strengths and weaknesses, lack of proper group action and shortcomings in the enabling environment. FPOs can provide improved access to smallholders in human, social and economic resources. There are opportunities for smallholders through FPOs to deliver produce to interested parties provided that they meet the procurement requirements in terms of quality, quantity and delivery discipline. FPOs will sell their products to malls, farmers' market, restaurant, etc.

Sample Selection

Purposive sampling method is used to select the sample of farmers for this study. Majority of the farmers who are supplying vegetables to Pune APMC area are from the four regions shown in Figure 1. In this study, the farmers from all the four regions are included. It is also ensured that in a selected sample, farmers use all the type of marketing channels. In the study region, eight places are selected and from each place, 15 farmers are identified and interviewed. In a total of 120 farmers, only 80 farmers took part in this study. Cluster analysis method is used to form four groups based upon two characteristics; one is size of land and second, distance from the APMC, Pune. Table 2 shows the distribution of the farmers with above two characteristics.

Small farmer near to Pune APMC (Group A)

The farmers who had land equal to and less than two acres and are within reach of 80 kms are added in this group. This group is formed with 20 farmers.

Small farmer far from Pune APMC (Group B)

The farmers who had land equal to and less than two acres and are more than 80 kms from APMC are added in this group. This group is formed with another 20 farmers.

Medium farmer near to Pune APMC (Group C)

The farmers who had land size greater than two acres and less than five acres and are within reach of 80 kms are added in this group. This group is formed with another 20 farmers.

Medium farmer far from Pune APMC (Group D)

The farmers who had land size greater than two acres and less than five acres and are more than 80 kms from APMC are added in this group. This group is formed with another 20 farmers.

Attributes and Their Measurements

The general hypothesis, upon which this analysis is based, is that a farmer's decision of selecting vegetable marketing channel is influenced by a number of transaction cost variables, but may also be influenced by the socio-economic characteristics of the farmer. A brief discussion of the attributes used in this study are presented below:

Internal Category: This factor represents the attributes which are in direct command of farmers and can be controlled by him.

External Category: This factor represent the attributes which has less or no control by farmer.

Mixed Category: This represent the attributes which has partial control on internal as well external attributes.

Future Plan: This attribute measures farmers' decision to remain in farming for small and long term. Some of the farmers realised that farming is their only way of life and had enough potential to allow their children to continue in this profession. While those who feel farming is no longer profit-making will think only for short-term planning and do not want to continue in this profession. Farmers are accessing information from different mass and inter-personal communication media that provide information about different marketing channels. Market information of online and retail outlet stores is known to very few farmers because of their limited presence in the city. Here, the attribute is measured based upon the farmers' urge to get information on different modules.

Price Fluctuation: Satisfactoriness and unsatisfactoriness on the received price from different marketing modules were measured in this attribute. It was observed that price fluctuation occurred after an interval of 15 days and its oscillations had direct impact on the decision making. Changes in supply and demand of particular commodity have often had favourable and unfavourable benefit to farmer. The most adverse effect is found at APMC, if the supply is excessive and few of the marketing channels in such circumstances will take advantage to buy products from the APMC market. It results in farmer incurring big loss, causing less/no returns. However, some

marketing channels will give confidence to farmer to sustain in such situations.

Quantity Sold: It is already mentioned in the assumptions that APMC is the only place where farmers can sell their complete products. In all the other marketing channels farmers cannot sell all their products. This attribute is measured as the ratio of products sold to APMC and other marketing channels.

Payment Delay: Farmers expect their payments to be made once they hand over their products to the market. It was observed that some of the marketing channels delay the payment of farmers for more than 45 days. So, this is an important criterion in selecting marketing module.

Negotiation Skill: In some marketing channels, there is a need to do marketing of their products directly to the end customer and sometimes to the middle man. Better the negotiation skill, price realisation will be satisfactory.

Transport Availability: Farmers living in remote areas experienced difficulty to bring products with right quality and quantity. The farmers in such areas use shared pickups to bring their products into the market, while farmers in nearby area can keep own pickups to bring products in market. In some marketing modules, to minimise per unit product, such players have their own transport pickups which directly go into the farm that proved to be an advantage to farmer.

Extent of Investment: Farmers have done significant investment on farms to get quality

and quantity products round the year by investing more on new technologies, seed variety, water management, packaging, etc. It was observed that ability to invest more on farm is observed among the farmers who are selling products to other marketing channels.

Agriculture Experience: More experienced farmer found it is easy to do the quality and quantity production based upon market requirement. Taking part in other marketing channels except APMC was managed by only experienced farmers. Such farmers could supply assured and continuous supply to such markets.

Number of Labour (Excluding Family Members): Farmer can utilise labour to a great extent to sell the vegetable products round the year. To make available vegetable products two or three days every week and to sell in the market requires intense labour for farm management. If adequate labourers are available, marketing of vegetables can be done professionally rather than directly selling products in APMC market.

Number of Family Members Involved: Quality and overall production of vegetables will increase if all the members of family take part in farming. In the case of small farmers, it is observed that in such farms every person from the family is involved in every activity of farming. So, external labour expenses are less and profit is more. In the case of medium farmers, the need of labour is more and less family members are involved in farming activity.

Farm Size: The farm size plays an important role because it was found that medium farmers

practise open production method to get more yield in a given acre, not considering market forecasting and demand. While many of the small farmers utilise past experience and sell products round the year and not go for more yield, focus should be on selling the products to get more profit by using at least two marketing channels.

Technical Assistance: In some marketing methods, technical guidance is sought to grow high quality products like organic vegetables. Technical assistance is good for new farmers to start farming and to get into a contract with market leaders.

Market Size and Growth: If the market is growing and buys all the products of farmers are bought, then there is no need to go for alternate marketing. However, if market is not ready to grow, farmers' have to seek an alternate market to sell all the products. Sometimes, retail market, online store and FPO may shut down so it is very difficult to keep faith on such markets for long-term.

Competitive Environment: As number of farmers with the same commodity increases, the cost of products goes on decreasing. In case of the supply to retail market, FPO or online stores, at times, the rates are fixed round the year, but if there is an imbalance between quantity and quality, then the buyer will go for other sources to fulfill the demand and hence earlier fixed rates will change.

Networking: It is very important to keep contact with the buyers to market the products.

Networking will be possible through participating in farmers' meetings, exhibitions, government functionaries, farmer friends, NGO, etc. Social communication apps, internet will also help them to be in good network.

Demand Fluctuation: Except APMC, the demand on the other marketing channels goes on changing depending upon their earlier sale. As the number of customers are fluctuating in these market places, the demand for products also change. For example, demand on week days for the products is high, as many customers will visit on these days to such markets. So, farmers should be cautious about such trends to get more benefit out of such markets.

Use of AHP

AHP is a multi-criteria decision making technique used in variety of problems for selection of alternative techniques for logistic, business, environment, agriculture, manufacturing, marketing, service, health care etc deals (Ho W.). The AHP methodology has been accepted by the international scientific community as a robust and flexible multi criteria decision making tool for solving complex decision problems (Elkarmi & Mustafa, 1993; Srdjevic, 2005).

AHP can be carried out in four steps: 1) Defining the problem and finding out the knowledge required for further analysis, 2) Structuring a complex decision as a hierarchy of goals, attributes and alternatives as shown in figure 3, 3) Pair-wise comparison of elements at each level of the hierarchy with respect to each criterion of the preceding level, and 4) Vertically

synthesising the judgments over different levels of the hierarchy. Problem modeling is a similar with other MCDM methods like ELECTRE, MacBeth, SMART, PROMETHEE, UTA and so on (Belton and Stewart, 2002; Figueira et al, 2005). As explained earlier, in sample selection 86 farmers are divided into four groups using cluster criteria. It becomes erroneous assignment if AHP is applied to all the 86 farmers. So it is implemented on four groups which comprise farmers with criteria as explained before and shown in Table 3. Farmers are assembled at a place and questions were asked as written in questionnaire. Detailed methodology of AHP analysis is explained in the further section.

Hierarchical Representation of the Problem

The objective of the problem be viewed as ranking of six alternative marketing practice M1, M2...M6 by farmer. Hierarchical presentation of the attribute characterising the marketing alternative is shown in Figure 3. The attributes at level 1 (C1, C2 and C3) are most important attributes characterising the marketing alternatives. These attributes are further characterised by attributes at level 2 (A1, A2...A17). Level 2 then contains the marketing alternative methods (M1, M2...M6). For arriving at the ranking of alternative marketing practices by groups of farmers, attribute weights and normalised attribute values are needed.

Attribute Weight by Pair-wise Comparison

Relative importance of pair-wise comparison is carried out on a scale shown in Table 4. Pair-wise comparison is done in two parts, in first part pair-wise comparison of attributes is

done with respect to the objective of problem as shown in Table 5 and 9, while in second part the pair-wise comparison of alternative marketing method is done with respect to qualitative attribute. The attributes may be qualitative or quantitative, each of them are synthesised differently to get attribute weight. The nature of quantitative attribute whether it is cost or benefit with respect to objective of problem is shown in Table 6. Values of quantitative attributes for group A farmers are shown in Table 7. The normalisation of the values of Table 7 are done based upon the nature of attributes whether it is cost of benefit using the following formula 1 and 2. The normalised values of quantities using above formula are shown in Table 8.

$$\text{For Benefit attribute } P_{ij} = \frac{t_{ij} - t_i^{\min}}{t_i^{\max} - t_i^{\min}} \quad (1)$$

$$\text{For Cost attribute } P_{ij} = \frac{t_i^{\max} - t_{ij}}{t_i^{\max} - t_i^{\min}} \quad (2)$$

For arriving at attribute weight, first the relative weights of the main attributes at level 1 (C1, C2 and C3) with respect to the objective is

estimated as shown in Table 5. It is done by pair-wise comparison of attributes with respect to the objective. Question was asked as given in appendix to fill the answer for the question to get the attribute values in Table 5. The mean of the responses collected was taken to fill the data in the Table 5. The priority vector was calculated by finding eigenvalue for the matrix and then normalised to get priority vector which is written in the last column of Table 5. In pair-wise calculation of qualitative and quantitative attributes, the consistency of the answers given by farmers are checked by consistency index. The consistency index can be found using the formula 3. Here 'n' is number of row or column in the pair-wise matrix. If the value of the consistency index is less than 0.1, the consistency of the answers are approved.

$$\text{CI (Consistency Index)} = \frac{\text{maximum Eigen value} - n}{n - 1} \quad (3)$$

This priority vector representing the weight for the attributes is added for calculating final ranking as shown in Table 11. Similar work is carried out for remaining groups and not repeated here due to space constraint.

Table 2: Distribution of Sample Farmers Taken from the Villages/Places.

Village Name	Distance from Pune market	No. of farmers interviewed
Lonikalbhora	23 kms	10 (7S+3M)
Koregaon Bhima	32 kms	12 (9S+3M)
Narayangaon	77 kms	10 (7S+3M)
Bhor	61 kms	10 (7S+3M)
Satara	120 kms	13 (9S+4M)
Solapur	253 kms	10 (7S+3M)
Nashik	213 kms	11 (7S+4M)
Ahmednagar	121 kms	10 (7S+3M)

S = small farmer ; M = medium farmer

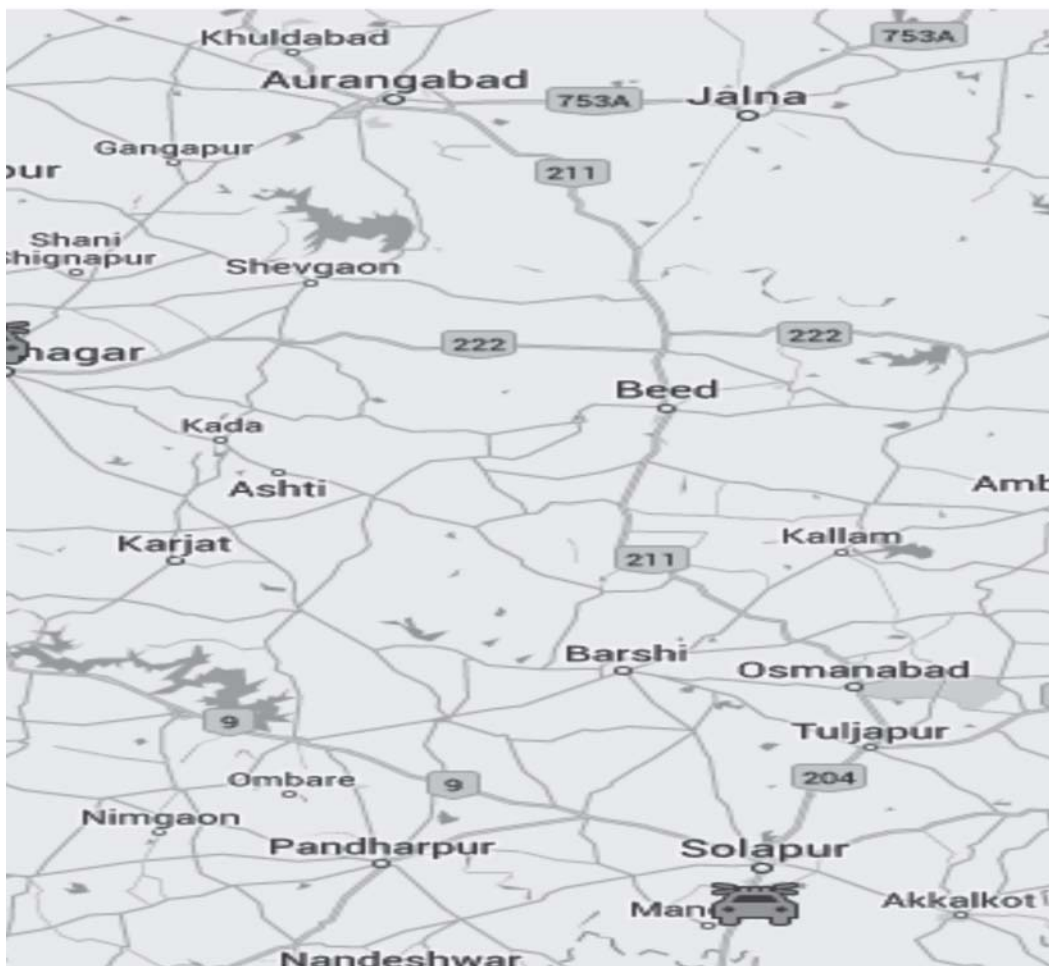


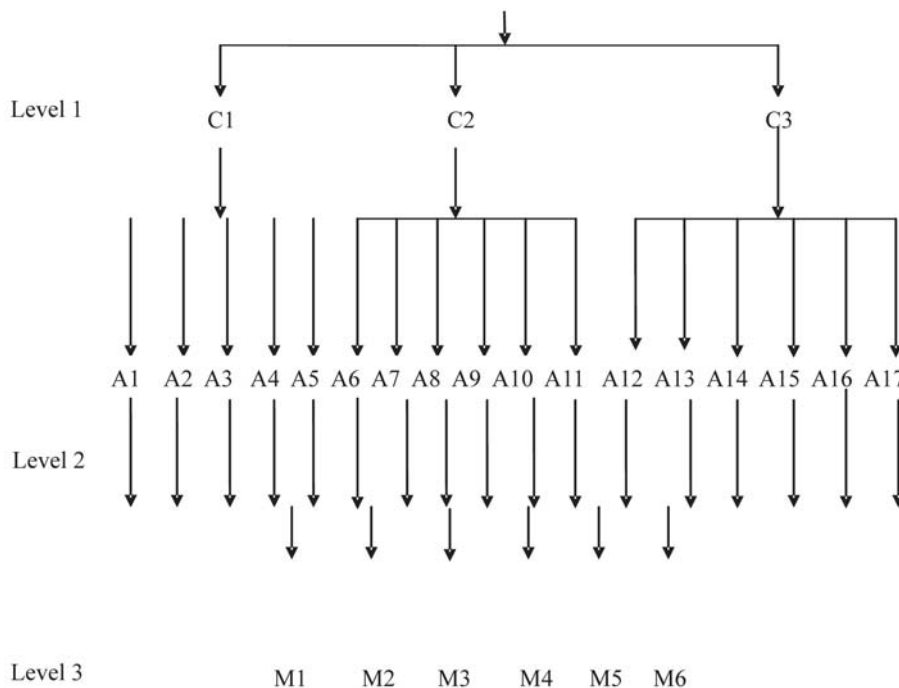
Figure 2: Geographic Location of the Villages/Places Under the Study (Google Map)

-  Loni Kalbhor
-  Gultekdi Market Yard
-  Narayangaon
-  Satara
-  Solapur
-  Nashik
-  Ahmednagar
-  Koregaon Bhima
-  Bhore

Table 3: Various Farmers Involved in Formation of Group for AHP Study

Group	Group details	No. of farmers	No. of farmers using different marketing methods					
			M1	M2	M3	M4	M5	M6
Group A	Small farmers from areas close to market (distance < 80 km)	30	4	5	4	5	6	6
Group B	Medium farmers from areas close to market (distance < 80 km)	12	2	1	3	2	3	1
Group C	Small farmers from areas remote to (distance > 80 km) market	30	5	4	4	6	6	5
Group D	Medium farmers from areas remote to market (distance > 80 km)	14	2	2	3	3	2	2

Level 0 Objective: Ranking of marketing channels of small and medium scale farmers



Level 1 Attribute	
C1	Internal category
C2	External category
C3	Mixed category
Level 2 Attribute	
A1	Farm Size (acre)
A2	Quantity sold (kg/kg)
A3	Agriculture experience (year)
A4	No. of labour (excluding family members) (no.)
A5	No of family members involved (no.)
A6	Technical assistance
A7	Extent of investment
A8	Price fluctuation
A9	Payment delay
A10	Market size and growth
A11	Transport availability
A12	Demand fluctuation
A13	Competitive environment
A14	Networking
A15	Negotiation skill
A16	Future plan
A17	Contact with information sources

Figure 3: Hierarchical Representation of the Problem of Ranking of Alternatives in Agriculture Marketing

Table 4: Scale of Relative Importance for Pair-wise Comparison

Pair-wise Ratio	Relative importance of attribute 'i' with respect to attribute 'j'	Explanation
1	Equal importance	Two attributes contribute equally to the objective
3	Moderate importance	Experience or judgement favours one attribute slightly than the other
5	Essential or strong	Experience or judgement favours one attribute strongly on the other
7	Very strong importance	An attribute dominance is demonstrated in practice
9	Extreme importance	An attribute dominance is affirmed to highest possible order
2,4,6,8	Intermediate judgements	Further sub-division between two adjacent is needed
	Reciprocals of above	If attribute 'i' has one of the above numbers assigned to it when compared to attribute 'j', then 'j' has the reciprocal value when compared with 'i'

Table 5: Pair-wise Comparison of Attributes at Level 1

	C1	C2	C3	PV
C1	1.00	0.50	0.30	0.161
C2	2.00	1.00	2.00	0.480
C3	3.33	0.50	1.00	0.359

$\lambda = 3.16$ CI = 0.08

Table 6: Nature of Qualitative Attribute in Economic/Growth-oriented Perspective

Attribute	Nature of Attribute (Cost/Benefit)
Farm size (acre)	Cost
Quantity sold (kg/kg)	Benefit
Agriculture experience (year)	Benefit
No. of labour (excluding family members) (No.)	Cost
No. of family members involved (no.)	Benefit

Table 7: Quantitative Attributes for Group 'A' Farmers

Attributes	M1	M2	M3	M4	M5	M6
A1	2.5	2.7	2.4	2.5	2.4	2.6
A2	1	0.7	0.5	0.3	0.3	0.4
A3	3	6	5	4	4	4
A4	2	2	1	1	1	1
A5	3	5	5	3	3	3

Table 8: Normalised Values of Quantitative Attributes for Group 'A' Farmers

Attributes	M1	M2	M3	M4	M5	M6
A1	0.67	0.00	1.00	0.67	1.00	0.33
A2	1.00	0.57	0.29	0.00	0.00	0.14
A3	0.00	1.00	0.67	0.33	0.33	0.33
A4	0.00	0.00	1.00	1.00	1.00	1.00
A5	0	1	1	0	0	0

Table 9: Pair-wise Comparison of Attributes at Level 2 for Alternative Agriculture Marketing Channel for Group 'A' Famers

	A1	A2	A3	A4	A5	PV
A1	1.00	0.20	0.50	0.50	0.20	0.069
A2	5.00	1.00	2.00	2.00	2.00	0.362
A3	2.00	0.50	1.00	1.00	1.00	0.174
A4	2.00	0.50	1.00	1.00	0.50	0.150
A5	5.00	0.50	1.00	2.00	1.00	0.244

$\ddot{e}_{max} = 5.10$ CI = 0.02

A12	A13	A14	A15	A16	A17	PV	A6	A7	A8	A9	A10	A11	PV		
A12	1.00	1.00	0.50	0.50	1.00	1.00	0.132	A6	1.00	2.00	1.00	1.00	1.00	0.177	
A13	1.00	1.00	1.00	1.00	1.00	1.00	0.161	A7	0.50	1.00	0.50	2.00	1.00	0.50	0.132
A14	2.00	1.00	1.00	2.00	1.00	1.00	0.206	A8	1.00	2.00	1.00	2.00	1.00	0.50	0.181
A15	2.00	1.00	0.50	1.00	0.50	1.00	0.149	A9	1.00	0.50	0.50	1.00	0.50	1.00	0.116
A16	1.00	1.00	1.00	2.00	1.00	2.00	0.208	A10	1.00	1.00	1.00	2.00	1.00	2.00	0.205
A17	1.00	1.00	1.00	1.00	0.50	1.00	0.144	A11	1.00	2.00	2.00	1.00	0.50	1.00	0.190

$\ddot{e}_{max} = 6.22$ CI = 0.04 $\ddot{e}_{max} = 6.38$ CI = 0.08

Table 10: Pair-wise Comparison of Marketing Channels with Respect to Their Qualitative Attributes for Group 'A' Famers

A6	M1	M2	M3	M4	M5	M6	PV	A7	M1	M2	M3	M4	M5	M6	PV
M1	1.00	0.14	0.14	0.14	0.14	0.14	0.03	M1	1.00	0.14	0.14	0.14	0.14	0.14	0.03
M2	6.99	1.00	1.00	2.00	2.00	2.00	0.27	M2	6.99	1.00	0.50	0.50	0.50	0.50	0.12
M3	6.99	1.00	1.00	2.00	1.00	0.50	0.19	M3	6.99	2.00	1.00	2.00	1.00	1.00	0.24
M4	6.99	0.50	0.50	1.00	0.50	0.50	0.12	M4	6.99	2.00	0.50	1.00	1.00	1.00	0.19
M5	6.99	0.50	1.00	2.00	1.00	1.00	0.18	M5	6.99	2.00	1.00	1.00	1.00	1.00	0.21
M6	6.99	0.50	2.00	2.00	1.00	1.00	0.21	M6	6.99	2.00	1.00	1.00	1.00	1.00	0.21
$\ddot{e}_{max} = 6.2$ CI = 0.04								$\ddot{e}_{max} = 6.09$ C.I. = 0.01							
A8	M1	M2	M3	M4	M5	M6	PV	A9	M1	M2	M3	M4	M5	M6	PV
M1	1.00	0.25	0.25	0.25	0.25	0.25	-0.33	M1	1.00	2.00	2.00	2.00	2.00	2.00	0.28
M2	4.00	1.00	1.00	1.00	1.00	1.00	0.27	M2	0.50	1.00	2.00	2.00	2.00	2.00	0.22
M3	4.00	1.00	1.00	1.00	1.00	1.00	0.27	M3	0.50	0.50	1.00	0.50	0.50	0.50	0.09
M4	4.00	1.00	1.00	1.00	1.00	1.00	0.27	M4	0.50	0.50	2.00	1.00	0.50	0.50	0.11
M5	4.00	1.00	1.00	1.00	1.00	1.00	0.27	M5	0.50	0.50	2.00	2.00	1.00	0.50	0.14
M6	4.00	1.00	1.00	1.00	1.00	1.00	0.27	M6	0.50	0.50	2.00	2.00	2.00	1.00	0.17
$\ddot{e}_{max} = 6$ CI = 0								$\ddot{e}_{max} = 6.27$ C.I. = 0.05							

A10	M1	M2	M3	M4	M5	M6	PV	A11	M1	M2	M3	M4	M5	M6	PV	
	M1	1.00	0.25	0.25	0.25	0.25	0.25	0.05	M1	1.00	0.25	0.25	0.25	0.25	0.25	0.05
	M2	4.00	1.00	2.00	2.00	2.00	2.00	0.29	M2	4.00	1.00	0.50	0.50	0.50	0.50	0.12
	M3	4.00	0.50	1.00	0.50	0.50	0.50	0.11	M3	4.00	2.00	1.00	1.00	1.00	1.00	0.21
	M4	4.00	0.50	2.00	1.00	0.50	0.50	0.14	M4	4.00	2.00	1.00	1.00	1.00	1.00	0.21
	M5	4.00	0.50	2.00	2.00	1.00	2.00	0.23	M5	4.00	2.00	1.00	1.00	1.00	1.00	0.21
	M6	4.00	0.50	2.00	2.00	0.50	1	0.18	M6	4.00	2.00	1.00	1.00	1.00	1.00	0.21
	$\ddot{e}_{\max} = 6.27$		CI = 0.05		$\ddot{e}_{\max} = 6.05$		CI = 0.01									
A12	M1	M2	M3	M4	M5	M6	PV	A13	M1	M2	M3	M4	M5	M6	PV	
	M1	1.00	0.25	0.25	0.25	0.25	0.25	0.05	M1	1.00	0.50	0.50	0.50	0.50	0.50	0.09
	M2	4.00	1.00	2.00	2.00	2.00	2.00	0.29	M2	2.00	1.00	1.00	1.00	1.00	1.00	0.18
	M3	4.00	0.50	1.00	2.00	2.00	2.00	0.23	M3	2.00	1.00	1.00	2.00	2.00	2.00	0.25
	M4	4.00	0.50	0.50	1.00	2.00	2.00	0.18	M4	2.00	1.00	0.50	1.00	2.00	2.00	0.20
	M5	4.00	0.50	0.50	0.50	1.00	2.00	0.14	M5	2.00	1.00	0.50	0.50	1.00	1.00	0.14
	M6	4.00	0.50	0.50	0.50	0.50	1.00	0.11	M6	2.00	1.00	0.50	0.50	1.00	1.00	0.14
	$\ddot{e}_{\max} = 6.27$		CI = 0.05		$\ddot{e}_{\max} = 6.16$		CI = 0.03									
A14	M1	M2	M3	M4	M5	M6	PV	A15	M1	M2	M3	M4	M5	M6	PV	
	M1	1.00	0.50	0.50	0.50	0.50	0.085	M1	1.00	0.50	0.50	0.50	0.50	0.50	0.087	
	M2	2.00	1.00	2.00	2.00	2.00	0.270	M2	2.00	1.00	3.00	3.00	3.00	3.00	0.354	
	M3	2.00	0.50	1.00	2.00	2.00	0.216	M3	2.00	0.33	1.00	1.00	1.00	0.50	0.121	
	M4	2.00	0.50	0.50	1.00	3.00	0.203	M4	2.00	0.33	1.00	1.00	1.00	0.50	0.121	
	M5	2.00	0.50	0.50	0.33	1.00	0.126	M5	2.00	0.33	1.00	1.00	1.00	0.50	0.121	
	M6	2.00	0.50	0.50	0.33	0.50	0.101	M6	2.00	0.33	2.00	2.00	2.00	1.00	0.195	
	$\ddot{e}_{\max} = 6.39$		CI = 0.08		$\ddot{e}_{\max} = 6.23$		CI = 0.04									
A16	M1	M2	M3	M4	M5	M6	PV	A17	M1	M2	M3	M4	M5	M6	PV	
	M1	1.00	0.50	0.50	0.50	0.50	0.086	M1	1.00	0.20	0.30	0.20	0.20	0.20	0.039	
	M2	2.00	1.00	2.00	2.00	2.00	0.290	M2	5.00	1.00	0.50	0.30	0.20	0.50	0.095	
	M3	2.00	0.50	1.00	2.00	2.00	0.215	M3	3.33	2.00	1.00	1.00	1.00	1.00	0.186	
	M4	2.00	0.50	0.50	1.00	3.00	0.186	M4	5.00	3.33	1.00	1.00	1.00	0.50	0.200	
	M5	2.00	0.50	0.50	0.33	1.00	0.113	M5	5.00	5.00	1.00	1.00	1.00	2.00	0.273	
	M6	2.00	0.33	0.50	0.50	1.00	0.110	M6	5.00	2.00	1.00	2.00	0.50	1.00	0.206	
	$\ddot{e}_{\max} = 6.28$		CI = 0.06		$\ddot{e}_{\max} = 6.37$		CI = 0.07									

Table 11: Final Attribute Weight and Normalised Attributes Matrix for Alternative Marketing Channels for Group 'A' Famers

M1	M2	M3	M4	M5	M6	Weight	Attribute
0.67	0	1	0.67	1	0.33	0.011	A1
1	0.57	0.29	0	0	0.14	0.058	A2
0	1	0.67	0.33	0.33	0.33	0.028	A3
0	0	1	1	1	1	0.024	A4
0	1	1	0	0	0	0.039	A5
0.03	0.27	0.19	0.12	0.18	0.21	0.085	A6
0.03	0.12	0.24	0.19	0.21	0.21	0.063	A7
-0.33	0.27	0.27	0.27	0.27	0.27	0.087	A8
0.28	0.22	0.09	0.11	0.14	0.17	0.056	A9
0.05	0.29	0.11	0.14	0.23	0.18	0.098	A10
0.05	0.12	0.21	0.21	0.21	0.21	0.091	A11
0.05	0.29	0.23	0.18	0.14	0.11	0.047	A12
0.09	0.18	0.25	0.2	0.14	0.14	0.058	A13
0.085	0.27	0.216	0.203	0.126	0.101	0.074	A14
0.087	0.354	0.121	0.121	0.121	0.195	0.053	A15
0.086	0.29	0.215	0.186	0.113	0.11	0.075	A16
0.039	0.095	0.186	0.2	0.273	0.206	0.052	A17
0.094	0.296	0.273	0.191	0.199	0.196	← $R_j = \sum P_{ij} w_i$	
6	1	2	5	3	4	← rank	
		[P _{ij}]			[W _i]		

Table 12: Ranking Results After AHP Analysis of All Groups

Farmers	M1	M2	M3	M4	M5	M6
Group A	6	1	2	5	3	4
Group B	5	3	2	4	1	6
Group C	6	1	3	5	4	2
Group D	1	5	3	6	4	2

Main Findings

The study was implemented to find a set of different qualitative and quantitative attributes affecting the farmers' choice of selecting appropriate marketing channel. It was observed that farmers who are completely depending on farm income are cautious about selecting an alternate appropriate market. Alternate marketing channels are eliminating the presence of middleman and maximum share of consumer price is going into the farmer's pocket. The prices of the products in urban areas are relatively higher and opportunity to directly sell to customers in urban area could increase so that the income of farmers and become self-sustainable on farm income. Although this opportunity is present, majority of the farmers find it difficult to get access due to many variables as studied above. The retail outlet, online store in cities have to maintain their own supply chain system which includes warehouse, delivery system, staff for quality control, purchasing, packaging, monitoring orders, handling customer inquiry, handling farmers, etc. Such stores order products based upon forecasting of probable orders and if there is no demand on particular day there is wastage. The cost of product for customer on such store is more as compared to the other market. So, these stores always offer less price to farmers for their product, however based on the demand, they can raise the cost product to farmer. Some of the stores have their own pick up system for getting the product directly from farm, so it becomes easy for the farmer to sell the product to them. In case of FPC, since it is well organised, maintaining good relationship with the farmers is also a

convenient market for farmers. While in case of *Mandi*, farmers market and APMC market, farmers' have to make their own supply chain to deliver the product. If it is small scale, making the storage and delivery is quite easy for the farmer once he gets hand-on-experience. However, making this supply chain more efficient needs good understanding of networking, contact with information sources, understating of market (demand, price fluctuation), etc. Farmers will prefer to choose the market which gives them a good price for product with assured demand for products. Groups are made based upon the land holding and distance from the market place to understand how the landholding and distance impacts the market choice. The results obtained after AHP analyses are presented in Table 12. It was observed that small farmers as well as medium farmers from nearby areas from the market place prefer first choice of selling their products into farmers' market. Such farmers use other markets and give last preference to APMC market. It is observed that they could sell major products in these alternate markets and are sustainable on the income front. It was observed that medium farmers living in remote place from city are the only group who are selecting APMC as a major marketing channel, followed by weekly bazaar market. Also, the small farmers from remote area prefer direct selling of products into the farmers' market followed by selling it in weekly bazaar through SHG or Farmer Producer Company. In all the observations, farmers want to prefer direct selling of their product to get maximum returns as compared to traditional method of selling products. However, remotely

living medium famers are lagging on information of such markets in the city and can be benefited if provided in a convenient way. It is concluded that farmers can be economically sustainable if farmers could get the major share of consumer price. Such alternate markets in urban areas is in their early stage and need to grow to accommodate large number of farmers. The

planning committees in agriculture marketing boards in local areas need to work out the supply chain system for small and medium farmers in nearby and remote areas to motivate farmers to participate in such markets. It is observed that farmers could create the relationship with customer and both have faith on each other about the safety and price of products.

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