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ROLE OF FACILITIES IN AGRIBUSINESS SUPPLY CHAIN MANAGEMENT: A CASE STUDY OF DRY CHILLI FARMERS

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ABSTRACT

Dry chilli farmers need facilities to produce, store and manage chilli they produce to enhance the overall supply chain profit. Facility utilization for the dry chilli farmers is an important aspect of supply chain drivers. When one looks at facility, its various forms need to be analyzed. Hence this research brings out the dimensions of facility preferred by dry chilli farmers. A descriptive research methodology was used & Statistical technique Factor analysis was carried out. The different dimensions of facilities chosen by farmers to make an optimized decisions are: utilization of own facility, facility available with the commission agent, cold storage, e-tendering and APMC market.

KEYWORDS: Agri business supply chain, dry chilli, farmers, facilities, factor analysis.

INTRODUCTION

The history and culture of Indian spices is probably as old as human civilization itself. The Vedas, the Bible and the Quran are all replete with references - direct or indirect - to Indian spices. The earliest literary record in India on spices is the Rig Veda (around 6000 BC), and the other three Vedas - Yajur, Sama and Atharva (Rohatash. K. Bhardwaj, B. K. Sikka, Ashutosh Singh, M. L. Sharma, N. K. Singh, 2011). Chilli is an important spice crop as well as vegetable crop grown all over India. India the 'Land of spices' is the largest producer, consumer and exporter of spices with mammoth share in the world trade(Y Prabhavathi, N T Krishna Kishore, Dr. Seema,2013). Chilli is one of the most important commercial crops of India. It is an indispensable item in the kitchen as it is being consumed daily as a condiment in one form or the other. Among the spices consumed per head, dried chilli fruits constitute a major share (B. C. Rajur, B. L. Patil and H. Basavaraj, *2008*).

LITERATURE REVIEW

Dry Chilli

Chilli is one of the important vegetable spices grown all over the world except in colder parts. It is also known as red pepper or hot pepper and it constitutes an important well-known commercial crop used as a condiment, culinary supplement or as a vegetable. Chilli is mainly used as culinary supplement to add flavour, colour, vitamin and pungency. Chilli is virtually an indispensable item in the kitchen. Different varieties are grown for vegetables, spices, condiments, sauces and pickles (K Gurava Reddy, A Subbarami Reddy, J.Satish babu, and M Chandra Sekhara Reddy, 2011).

Chillies are pungent fruits of *capsicum annum L* and *capsicum frutescence* (Y Prabhavathi, N T Krishna Kishore, Dr. Seema,2013). It is also known as red pepper or dry chillies. Majorly used as condiment or culinary. It is specially used for its pungency, spicy taste, besides the appealing colour it adds to the food. It is used in pickles, sauces, ketchup, essences, oleoresins and it is an inevitable ingredient in Indian dishes. An alkaloid capsaicin is extracted from chili. which has medicinal value, besides its richness in vitamin C. Average per capita consumption in India ranges from 50gms-60gms per day.

Countries majorly producing dry chilli in the world are India, China, Pakistan, Morocco, Mexico, Turkey and Bangladesh. Chillies are grown in all over India. Dry chillies are majorly Produced in Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, Orissa and Rajasthan contributing 2/3 rd of India's production. And Andhra Pradesh alone contributes 46% for production making it the largest producer in India, followed by Karnataka. Oleoresin oil is extracted from dry chilli contributing major export share of India's FOREX.

Supply chain management

Supply-chain management is referred to the management of the entire set of production, distribution, and marketing process with the help of which a consumer is supplied with a desired product. A set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements (Simchi-Levi et al., 2008).

Supply chains are complex entities that serve many functions. They are institutional arrangements that link producers, processors, marketers and distributors. S upply chains are forms of industrial organization which allow buyers and sellers who are separated by time and space to progressively add and accumulate value as products pass form one member of the chain to the next (Hughes, 1994, Fearne, 1996, Handfield and Nichols, 1999). Supply chains are the conduits through which (Cooper et al., 1997). Thus, supply chains enforce internal mechanisms and develop chain wide incentives for assuring the timely performance of production and delivery commitments (Iyer & Bergen, 1997, Lambert and Cooper, 1998).

Individual suppliers, producers and marketers who are associated through a supply chain coordinate their value creating activities with one another and in the process create greater value than they can when they operate independently (Giupero & Brand, 1996, Gattorna, 1998).

Agribusiness supply chain management

Agribusiness is defined as practice of activities relating to production, processing, marketing, distribution and trade of food, feed and fibre' (Acharya, 2006), it has long been argued for redefining agriculture as 'the science and A shift from 'agriculture' to 'agribusiness' is being viewed as an essential pathway to revitalize Indian agriculture. In this context, agribusiness can be defined as science and practice of activities, with backward and forward linkages, related to production, processing, marketing, trade, and distribution of raw and processed food, feed and fibre, including supply of inputs and services for these activities(S.S. Acharya, 2007). Folkerts and Koehorst (1998, p.385) define a supply chain as: a set of interdependent companies that work closely together to manage the flow of goods and services along the value-added chain of agricultural and food products, in order to realize superior customer value at the lowest possible costs. However, in agribusiness, the main purpose is to manage demand and supply gaps across time and regions. Furthermore, temperature control is also another important factor in warehouse decisions.

Facilities as a driver

Facilities in a supply chain refer to the physical location of the nodal organization or its partners in the supply chain; the locations where a product or service is being fabricated, assembled, produced, processed or stored. Theorists developed propositions based on weight-losing material and volume-based raw material tending to be located near raw material sources. (Chandrasekhar & Raghuram, 2014).

Role of Facilities in agriculture supply chain management

Decisions regarding planning of facility locations and products logistics should be made cautiously in order to establish a sustainable supply chain. Many researchers have investigated different aspects of facility location and supply chain planning problem and the results of their efforts shed light on different aspects of the problem. Decisions regarding planning of facility locations and products logistics should be made cautiously in order to establish a sustainable supply chain. Many researchers have investigated different aspects of facility location and supply chain planning problem and the results of their efforts shed light on different aspects of the problem. Dynamic facility location planning, as a well-known problem, has been a point of attraction for researchers (R.H. Ballou, 1968) Ballou proposed a model for the dynamic facility location problem considering time-varying parameters. On the other hand, considering demand uncertainty in supply chain models also attracts researchers (S.H. Daskin, M.S. Owen). In a research by Baker (S. Talluri, R.C. Baker), first the location problem and then the corresponding transportation problem is solved applying a multi-stage optimization method. However,

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concurrent consideration of demand uncertainty in supply chains and facility location for multiple planning periods, as a newer topic, has drawn less attention.

RESEARCH METHODOLOGY

Exploratory and descriptive research design was used in this research for the clarity of research problem. The sample size was calculated with the help of the formula $n = \frac{z^2\sigma^2}{H^2}$ with 95% confidence level and 0.05 level of significance. The sample size finally determined was 596 farmers trading dry chilli in three APMCs of Karnataka (state), they are Hubballi, Byadagi, and Gadag. The sampling technique used was judgmental and convenience sampling method under non-probability sampling techniques while identifying the dry chilli farmers as respondents for the study.

Required secondary data for the literature was collected from APMC website, Horticulture department, and Meteorological department, Chilli Board of Karnataka, Journals and Magazines. The primary data was gathered with the help of a structured questionnaire in Kannada regional language from the farmers visiting three APMC's for selling dry chilli during January to May 2016. During the pilot study Personal interview, Group discussion and Delphi technique were used. With the help of Pilot study dimensions of farmer needs towards facilities for decision making at various stages were identified. Fine-tuned structured questionnaire was developed to collect the data. Primary data was collected with the help of questionnaire by using personal interview, schedule and survey method. After four rounds of pilot testing, items yielding above 0.70 in *Factor analysis* were finally selected to measure their extent of agreement towards variables on a 5 point Likert scale with 1 representing low score (Strongly dis agree) and 5 representing a high score (strongly agree). *Cronbach's Alpha test* was performed for the reliability of the research tool and obtained the alpha value of 0.910. This shows the tool is reliable and the factors obtained based on these items are reliable, and can be used for further analysis.

Objective: The objective of this paper is to identify the dimensions of facilities in agribusiness supply chain management of dry Chilli growing farmers.

NEED OF THE STUDY

Decision to choose a market depends on the farmers own facility, facility available with the commission agent, cold storage and APMC market. Hence facilities available with the farmers and in the market plays a vital role in any decision making for dry chilli growing farmers. Therefore it is necessary to identify the dimensions of facilities in agribusiness supply chain management of dry Chilli growing farmers.

DATA ANALYSIS AND INTERPRETATION

Reliability

The general reliability measurement is most frequently used for examining the internal consistency of the questionnaire. The consistency and stability of measurement results are Cronbach's α coefficient. The higher the Cronbach's α coefficient is, the higher will be consistency of variables to be measured, existing between each question item, this indicate the high reliability of question items in questionnaire.

Table 1 : Case Processing Summary

		N	%
Cases	Valid	596	100.0
	Excluded	0	0.0
	Total	596	100.0

a. List wise deletion based on all

Table 2 : Reliability Statistics

Cronbach's Alpha	N of Items
.910	38

Churchill G. A. (1979) suggests eliminating question item with correlation coefficient of total single item under 0.50 for improving Cronbach's α coefficient and ensuring the reliability quality of question item. Nevertheless, Cronbach's α coefficient higher than 0.70 is adopted by this study as standard for reliability analysis of

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questionnaire scale. The Cronbach's α according to Guilford (1965) is supposed to be higher than 0.70, the coefficient between 0.35 to 0.70 is acceptable, but the value under 0.35 should be dropped.

The overall reliability of items asked to dry chilli farmers through questionnaire achieved was 0.91. The 38 items provided in the questionnaire has consistency and reliability within acceptable range. This assures the consistency & reliability of the results executed based on application of any further statistical tools. To identify the dimensions of facilities in terms of dry chilli farmers view Factor analysis technique used and factors obtained are reliable for further analysis.

Factor Analysis

Factor analysis is a data reduction statistical technique that allows simplifying the correlational relationships between a numbers of continuous variables. Exploratory factor analysis is used in order to identify constructs and investigate relationships among key interval scaled questions regarding preferences given by farmers to make right decisions.

The factor analysis carried out by this study was focusing on identifying the hidden dimensions of driver *facilities* from the farmer's point of view, for making efficient decisions. Several views of facilities of farmer were taken to identify the hidden dimensions. The factors obtained through major component analysis, for extracting factor with eigenvalue over 1 as standard, then selected appropriate numbers in accordance with the requirement of the study, followed by orthogonal rotation with the maximum variation, in order to make structure of each factor to be more explicit.

Empirical Analysis and Interpretation

The factor analysis was carried out for the items: KMO and Bartlett's test, Communalities, Total variance explained and Factors developed matrix table based on Rotated component matrix, are obtained as a result of factor analysis. The details of the analysis are presented below**.**

KMO and Bartlett's Test

KMO & Bartlett's Test of Sphericity is a measure of sampling adequacy that is recommended to check the case to variable ratio for the analysis being conducted. In most academic and business studies, KMO & Bartlett's test play an important role for accepting the sample adequacy. The suitability of data can be checked from this test.

This table shows two tests that indicate the suitability of the data. The ***Kaiser-Meyer-Olkin Measure of Sampling Adequacy*** is a statistic that indicates the proportion of variance in your variables that might be caused by underlying factors. Kaiser (1974) recommends accepting values greater than 0.5 as acceptable. High values (close to 1.0) generally indicate that a factor analysis may be useful with collected data. ***Bartlett's test of sphericity*** measure tests the null hypothesis that the original correlation matrix is an identity matrix. For factor analysis to work we need some relationships between variables and if the R-matrix were an identity matrix then all correlation coefficients would be zero. Therefore, we want this test to be *significant* (i.e. having a significant value less than 0.05). A significant test tells us that the R-matrix is not an identity matrix; therefore, there are some relationships between the variables we hope to include in the analysis.

Factor Analysis for Facility

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.854
Bartlett's Test of Sphericity	Approx. Chi-Square	7947.275
	df	406
	Sig.	0.0000

Factor analysis was used in an objective to find the factorability of items using the Kaiser criterion with Eigen value as 1. Kaise- Meyer-Olkin measure of sampling adequacy was .854 which is above the recommended value of 0.5, and Bartlett's test of Sphericity was significant (χ^2 = 7947.275, p<.05). The results from both the test showed the presence of sample adequacy and relation among the selected variables respectively.

Communalities

Communalities tells us how much of the variance in each of the original variables is explained by the extracted factors. Principal component analysis works on the initial assumption that all variance is common; therefore,

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before extracted communalities are all 1. Communalities are in terms of the proportion of variance explained by the underlying factors. After extraction some of the factors are discarded and some information is lost. So, the amount of variance in each variable that can be explained by the retained factors is represented by the communalities after extraction.

Table 4: Communalities

Communalities		
	Initial	Extraction
I have sufficient place to store the dry chilli at home.	1.000	.421
I have all the required facility for cultivation of dry chilli.	1.000	.585
Preference to a particular APMC is based on number of cold storages available.	1.000	.713
If dry chilli is not sold after bringing to the market, I prefer cold storage.	1.000	.673
Cold storages offers insurance for the safety of my dry chilli	1.000	.702
I prefer Cold storage rather than my own storage facility, to maintain the quality of chilli.	1.000	.628
If it is not necessary to sell immediately, I store at cold storage.	1.000	.712
I prefer such commission agents who takes the responsibility of my dry chilli stored in the cold	1.000	.558
Regular quality check carried in the cold storage excludes the danger of fungus and damage of	1.000	.621
Cold storage employees provides me, information about the proper condition of dry chilli	1.000	.674
Any number of bags are accepted in cold storage.	1.000	.654
I prefer such markets which have e-tendering system.	1.000	.590
E-tender trading system improved the transparency in trading compared to manual bid system.	1.000	.687
E-tender trading has solved the problems of delay in payment to us.	1.000	.735
I am happy with modifications in the trading practices of government i.e. introduction of E-tender trading.	1.000	.763
I prefer a particular market which provides opportunity to sell any variety of dry chilli produced.	1.000	.579
I prefer such markets where good canteen facilities are present.	1.000	.617
I prefer such markets where good lodging facilities are present.	1.000	.671
I prefer such markets where good lighting facilities are present.	1.000	.756
I prefer such markets where good road facilities are present.	1.000	.758
I prefer such markets where good water facilities are present.	1.000	.756
I prefer such markets in which good number of labors are present	1.000	.640
I prefer a particular market where good weighing and measurement facilities.	1.000	.646
Due to the influence of my other farmer friends I prefer a particular market.	1.000	.661
With the influence of family members I prefer a particular market	1.000	.629
I prefer such market which offer high price compared to other dry chilli markets.	1.000	.481
I prefer such markets in which there is huge number of commission agents present.	1.000	.625
I prefer such markets in which commission agent have good network with purchasers.	1.000	.628
I prefer such markets in which labor expenses are less.	1.000	.501
Extraction Method: Principal Component Analysis.		

Factor Extraction (Total Variance Explained)

Output lists the eigenvalues associated with each linear component (factor) before extraction, after extraction, and after rotation were executed using Principal Extraction method. The Eigen values associated with each factor represent the variance explained by that particular linear component and also displays in terms of % of variance explained. It should be clear that the first few factors explain relatively large amounts of variance (especially factor 1) whereas subsequent factors explain only small amounts of variance. SPSS then extracts all factors with eigenvalues greater than 1.

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The Eigen values associated with these factors are again displayed in the columns labelled *Extraction Sums of Squared Loadings.* The values in this part are same as the values before extraction, except that the values for the discarded factors are ignored (hence, the table is blank after the third factor). In the final part of the table *Rotation Sums of Squared Loadings*, the eigenvalues of the factors after rotation are displayed. Rotation has the effect of optimizing the factor structure and one consequence for these data is that the relative importance of the seven factors is equalized.

The seven factors showing initial eigen values more than 1 & below 1 are ignored. The initial Eigen values with % of variance explained from first to seventh are 7.33 (25.276%) 3.309(11.41%), 2.271(7.830%), 1.992(6.869%), 1.567(5.404%), 1.166 (4.02%) and 1.028(3.54%) respectively. After rotation an modified equalized Eigen values with % of variance explained from first to seventh are 4.162(14.35%), 3.524(12.153%),3.509(12.099%),2.251(7.763%), 2.193(7.561%), 1.591(5.485%), and 1.434(4.944%) respectively. Hence all seven factors cumulatively 64.354% of variance explained with respect to dimensions of Facility.

Table 5: Total Variance Explained

Total Variance Explained									
	Initial Eigenvalues			Extraction Sums of Squared			Rotation Sums of Squared		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.330	25.276	25.276	7.330	25.276	25.276	4.162	14.350	14.350
2	3.309	11.411	36.687	3.309	11.411	36.687	3.524	12.153	26.503
3	2.271	7.830	44.517	2.271	7.830	44.517	3.509	12.099	38.602
4	1.992	6.869	51.386	1.992	6.869	51.386	2.251	7.763	46.365
5	1.567	5.404	56.790	1.567	5.404	56.790	2.193	7.561	53.926
6	1.166	4.020	60.810	1.166	4.020	60.810	1.591	5.485	59.410
7	1.028	3.544	64.354	1.028	3.544	64.354	1.434	4.944	64.354
8	.943	3.252	67.607						
9	.929	3.203	70.810						
10	.775	2.671	73.480						
11	.726	2.503	75.984						
12	.642	2.214	78.198						
13	.600	2.067	80.265						
14	.543	1.874	82.139						
15	.537	1.851	83.990						
16	.521	1.797	85.787						
17	.461	1.589	87.376						
18	.428	1.476	88.852						
19	.403	1.388	90.241						
20	.373	1.286	91.527						
21	.358	1.234	92.761						
22	.332	1.143	93.904						
23	.305	1.053	94.957						
24	.304	1.050	96.007						
25	.275	.950	96.957						
26	.245	.846	97.803						
27	.233	.803	98.605						
28	.213	.736	99.341						
29	.191	.659	100.000						
Extraction Method: Principal Component Analysis.									

Rotated component Matrix

The rotated component matrix (also called as rotated factor matrix in factor analysis) which is a matrix of the factor loading for each variables onto each factor. This matrix contains the same information as the component matrix except that it is calculated after rotation. Before rotation, most variables loaded highly onto the first factor

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and the remaining factors didn't really get a look in. however rotation of the factor structure has clarified things considerably.

Table 6 : Rotated Component Matrix

Rotated Component Matrix[a]							
	Component						
	1	2	3	4	5	6	7
Cold storages offer insurance for the safety of	***0.797***	0.014	0.062	0.152	0.148	0.12	-0.052
If it is not necessary to sell immediately, I store	***0.758***	0.277	0.125	0.065	0.072	0.138	-0.13
Any number of bags are accepted in cold	***0.737***	-0.01	0.141	0.047	0.112	-0.109	0.253
I prefer Cold storage rather than my own	***0.723***	0.099	0.147	0.17	0.021	0.187	-0.101
Regular quality check carried in the cold storage	***0.646***	0.239	0.037	-0.077	0.296	-0.014	0.226
Cold storage employees provide me,	***0.64***	0.411	0.097	-0.012	0.162	-0.102	0.222
I prefer such commission agents who takes the	***0.601***	0.401	0.06	-0.05	0.081	0.025	0.15
Preference to a particular APMC is based on	0.357	***0.736***	0.014	0.127	-0.052	-0.025	-0.155
I have all the required facility for cultivation of	0.104	***0.727***	-0.009	0.01	0.067	0.145	0.139
I prefer such markets which have e-tendering	0.11	***0.668***	-0.098	-0.009	0.286	0.016	0.201
If dry chili is not sold after bringing to the	0.438	***0.635***	0.117	0.175	-0.084	-0.097	-0.132
I prefer such markets where good canteen	-0.08	***0.63***	0.454	0.019	-0.046	-0.071	-0.031
I have sufficient place to store the dry chili at	0.171	***0.587***	0.046	0.113	0.059	0.172	0.01
I prefer such markets where good road facilities	0.058	0.135	***0.853***	0.068	0.053	0.031	0.006
I prefer such markets where good water	0.08	0.136	***0.836***	0.072	0.027	0.16	-0.007
I prefer such markets where good lighting	0.177	-0.1	***0.827***	0.146	0.099	-0.011	0.01
I prefer such markets where good lodging	0.176	-0.063	***0.773***	0.162	0.043	-0.05	0.09
I prefer such markets in which good number of	0.079	0.141	***0.601***	0.206	-0.151	0.393	0.182
I prefer such markets in which commission	0.026	0.119	0.136	***0.769***	0.012	0.024	0.045
I prefer such markets in which there is huge	-	0.125	0.149	***0.737***	0.113	0.044	0.171
I prefer such markets in which labor expenses	0.261	0.063	0.146	***0.625***	-0.057	0.103	-0.048
I prefer such market which offer high price	0.006	-0.064	0.062	***0.585***	0.201	0.233	0.188
I am happy with modifications in the trading	0.159	0.026	0.066	0.118	***0.841***	0.07	-0.084
E-tender trading has solved the problems of	0.185	0.037	0.06	0.108	***0.812***	0.157	0.034
E-tender trading system improved the	0.279	0.354	-0.031	-0.03	***0.596***	0.111	0.338
Due to the influence of my other farmer friends	0.088	0.006	0.053	0.205	0.152	***0.75***	0.151
With the influence of family members, I prefer	0.031	0.357	0.118	0.07	0.288	***0.623***	-0.103
I prefer a particular market which provides	0.062	0.122	0.042	0.188	0.061	0.01	***0.721***
I prefer a particular market where good	0.155	-0.117	0.2	0.216	-0.074	0.434	***0.573***
Extraction Method: Principal Component Analysis.							
Rotation Method: Varimax with Kaiser Normalization.							

For the Construct Facility, seven factors were extracted. Seven items namely Cold storages offer insurance for the safety of my dry chili, If it is not necessary to sell immediately, I store at cold storage, Any number of bags are accepted in cold storage, I prefer Cold storage rather than my own storage facility, to maintain the quality of chili, Regular quality check carried in the cold storage excludes the danger of fungus and damage of dry chili, Cold storage employees provide me, information about the proper condition of dry chili regularly and I prefer such commission agents who takes the responsibility of my dry chili stored in the cold storage with factor loadings as 0.797, 0.758, 0.737, 0.723 0.646, 0.640 and 0.601 were represented as *"Advantages of Cold storage"***.**

Second factor had items like Preference to a particular APMC is based on number of cold storages available, I have all the required facility for cultivation of dry chili, I prefer such markets which have e-tendering system, If dry chili is not sold after bringing to the market, I prefer cold storage, I prefer such markets where good canteen facilities are present and I have sufficient place to store the dry chili at home with loading on the factor as 0.736, 0.727, 0.668, 0.635, 0.630 and 0.587. This factor was represented as *"Cold storage and Farmers own facility".* Factor3 were compressed of five items namely I prefer such markets where good road facilities are present, I prefer such markets where good water facilities are present, I prefer such markets where good lighting facilities are present, I prefer such markets where good lodging facilities are present and I prefer such markets in which

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good number of labors are present with loadings on the factor as 0.853, 0.836, 0.827, 0.773 and 0.601. The factor is represented as *"Infrastructure facility & selection of market".*

Factor 4 compressed of four items namely I prefer such markets in which commission agent have good network with purchasers, I prefer such markets in which there is huge number of commission agents present, I prefer such markets in which labor expenses are less and I prefer such market which offer high price compared to other dry chili markets had loadings as 0.769, 0.737, 0.625 and 0.585 and the factor is termed as *"Reasons for preferring particular APMC market".*

Factor5 termed as *"Preference for E-tender trading"* was found to have items like I am happy with modifications in the trading practices of government i.e. introduction of E-tender trading, E-tender trading has solved the problems of delay in payment to us and E-tender trading system improved the transparency in trading compared to manual bid system with item loadings on the factor as 0.841, 0.812 and 0.596.

Factor6 had loadings as 0.750 and 0.623 had loadings from two items Due to the influence of my other farmer friends I prefer a particular market and With the influence of family members, I prefer a particular market was represented as *"Reference group influence for the selection of market".*

The final seventh factor in facilities had two items I prefer a particular market which provides opportunity to sell any variety of dry chili produced and I prefer a particular market where good weighing and measurement facilities with factor loadings as 0.721 and 0.573. This factor is represented as *"Weighing and Opportunity".*

Consolidated Factor Analysis

The summarized factor analysis is shown in below table. The factor loading was drawn by checking the potentiality (high loadings) from rotated component matrix, which help to identify key items showing common behavior of farmers towards development of factors, they are as shown in below table.

Table 7: Consolidated factor analysis of driver Facilities

Factor	Factor	Loading	Variables included in the factors
Advantages of Cold storage	Factor explains 14.35% of variance	***0.797***	Cold storages offer insurance for the safety of my dry chili
		0.758	If it is not necessary to sell immediately, I store at cold storage.
		0.737	Any number of bags are accepted in cold storage.
		0.723	I prefer Cold storage rather than my own storage facility, to maintain
		0.646	Regular quality check carried in the cold storage excludes the danger
		0.64	Cold storage employees provide me, information about the proper
		0.601	I prefer such commission agents who takes the responsibility of my
Cold storage and Farmers own facility	Factor explains 12.153% of variance	***0.736***	Preference to a particular APMC is based on number of cold storages
		0.727	I have all the required facility for cultivation of dry chili.
		0.668	I prefer such markets which have e-tendering system.
		0.635	If dry chili is not sold after bringing to the market, I prefer cold
		0.63	I prefer such markets where good canteen facilities are present.
		0.587	I have sufficient place to store the dry chili at home.
Infrastructure facility & selection of market	This factor explains 12.01% of variance	***0.853***	I prefer such markets where good road facilities are present.
		0.836	I prefer such markets where good water facilities are present.
		0.827	I prefer such markets where good lighting facilities are present.
		0.773	I prefer such markets where good lodging facilities are present.
		0.601	I prefer such markets in which good number of labors are present
Reasons for preferring particular APMC market	This factor explains 7.763% of variance	***0.769***	I prefer such markets in which commission agent have good network
		0.737	I prefer such markets in which there is huge number of commission
		0.625	I prefer such markets in which labor expenses are less.
		0.585	I prefer such market which offer high price compared to other dry
Preference for E-tender trading	This factor explains 7.561% of	***0.841***	I am happy with modifications in the trading practices of government
		0.812	E-tender trading has solved the problems of delay in payment to us.
		0.596	E-tender trading system improved the transparency in trading
		0.75	Due to the influence of my other farmer friends I prefer a particular

Reference	This factor	***0.623***	With the influence of family members, I prefer a particular market
Weighing and Opportunity	This factor explains	***0.721***	I prefer a particular market which provides opportunity to sell any
		0.573	I prefer a particular market where good weighing and measurement

The most liked marketing elements by retailers are located with the help of factor analysis; The questions loaded highly (>0.7) on each factor shows common interest for which we need to give new name. Hence, seven factors are obtained from factor analysis, which explains the behavior of farmers towards the need of information for decision making.

FINDINGS

Different dimensions of facilities in agribusiness supply chain management found are: Farmer store dry chilli at cold storage, if it is not necessary to sell immediately. They prefer such commission agents who takes the responsibility of dry chilli stored in the cold storage.

The reasons for preferring cold storage are: Cold storages offer insurance for the safety of farmers dry chili, Any number of bags are accepted in cold storage, It maintains the quality of chili, Regular quality check carried in the cold storage excludes the danger of fungus and damage of dry chili, cold storage employees provide information about the proper condition of dry chili regularly. Farmers prefer such commission agents who takes the responsibility of their dry chili stored in the cold storage.

Farmers have all the required facility for cultivation of dry chili and they have sufficient place to store the dry chili at home but if the dry chili is not sold after bringing to the market, they prefer cold storage. Farmers prefer such markets which have e-tendering system, good weighing and measurement facilities are available and provides opportunity to sell any variety of dry chili produced, good number of cold storages are available, good canteen, road, water, lighting, labors and lodging facilities are present.

Farmers select such market in which labor expenses are less and huge number of commission agents are offering high price compared to other dry chili markets and are having good network with purchasers. With the influence of family members and other farmer friends, farmers prefer a particular market.

Farmers are happy with the modifications in the trading practice of the government i.e., introduction of E-tender trading because, E-tender trading system improved the transparency in trading compared to manual bid system, it has solved the problems of delay in payment to farmers.

CONCLUSIONS

Farmers search advantages of cold storage over their own facility. They evaluate the Infrastructure facility & other facilities available for the selection of APMC market. Farmers figure out a particular Reason for preferring particular APMC market: Like Weighing Opportunity available, E-tender trading practice available in the APMC market and Reference group influence for the selection of market, etc.

SCOPE FOR FURTHER RESEARCH

There is a scope for further study of different dimensions i.e., drivers like: transportation, inventory, pricing, information, and sourcing. And further the factors influencing drivers like weather condition, government policies, quality issues, perishability nature, information technology and infrastructure capability can be studied.

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