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Evaluation of Problems Faced by Farmers in the Food Processing Sector of Kerala

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Abstract: The food processing sector encourages the demand for agricultural crops and raw materials used for value addition, raising the income of the farmers and, in turn, promote economic growth and the development of the nation. Kerala is one of the major states in the food processing sector of India. In this processing process, the farmers are providing necessary raw materials to producers for timely production. This research attempts to identify the problems faced by farmers regarding their inability to provide necessary raw materials for the food processing sector of Kerala by studying 240 farmers. Factor analysis is used to identify the factors affecting farmers'inability to provide raw materials for production, and structured equation modelling is used to measure the effectiveness of the model used for this research. The empirical findings suggest the government should provide more credit at lower interest rates, as well as credit subsidies and quality seeds, standard fertilizers and pesticides at reasonable prices to farmers.

1. Introduction

The country has already taken steps to develop the food processing industry, with such as 100 percent FDI through the automatic route, Mega Food Parks, and the Make in India scheme. Still, India has got several unexplored chances and opportunities that it is only able to tackle after recognising and eliminating the barriers that hinder the growth and development of the food processing industry. The Indian Food Processing Industry is one of the major employment-oriented industries ranked fifth position in respect to economic activities which involve production, distribution, and consumption wherein Kerala is the major producer of coconut, bananas, mango, jackfruit, papaya, tapioca, cardamom, ginger, pepper, spices, etc. The demand for processed food items increases day-by-day due to the changing attitudes, tastes, and preferences of consumers and an increase in their standard of living. Hence, the food processing sector is a fast-growing sector that has several new opportunities to conquer.

The raw materials, which are inputs, are first produced by the farmers. The crops thus produced are collected through various means and stored in respective warehouses to ensure the availability of the materials when they are required for processing. The stored inputs are then processed, with the first being primary processing, in which agricultural produce, milk, fish, and meat are converted into commodities or products fit for human consumption, followed by secondary processing of raw materials and passing through other value-added processes that provide them with increased shelf life and ready for consumption (Shukla *et al.,* 2020). Therefore, the farmers are playing a major role in the collection of raw materials in the production process, and after that, the processed food products are ready to be sold at the shops and markets. The present study focused on the problems faced by the farmers regarding their inability to provide necessary raw materials for the food processing sector of Kerala and also suggests the relevant measures to mitigate the obstacles faced by farmers related to the food processing sector of the state.

2. Review of Literature

Singh *et al.* (2021) have investigated the barriers to growth in the Indian food processing sector and pointed out fifteen growth barriers at the farmer's level. The exploratory factor analysis and confirmatory factor analysis were used to carry on the research work, and finally four dimensions, i.e., heavy rain, cost, infrastructure, and credit facility, were identified by the researchers.

2.1. Heavy Rain

Zike (2019) examined the effect of rainfall, which reduces the yield of crops or substantially reduces the growth of food crops. Heavy rain or rain-dependent farming has a significant impact on crop yield and harvest. Similarly, Krishna *et al.* (2004) suggest that agriculture is highly dependent on the temporal dispensation of rainfall during the monsoon. Prasanna (2014) focused upon the monsoon rainfall impact on India's gross food grain yield. He has also suggested that an increase or decrease in rainfall is connected with an increase or decrease in the yield of food grain. Moreover, Torres *et al.* (2019) discussed the impact of rainfall fluctuations on agriculture production and generation. Mauldin (2013) investigated the negative effects of excessive or heavy rainfall on farm cultivation. It creates several problems for the growth and harvesting of the crops because of partially losing the roots of the crops, which results in a low yield for the farmers.

2.2. Cost

Bishaw *et al.* (2007) focused on the importance of quality seeds in agriculture, as well as the issues of high seed and fertiliser costs, as well as a lack of a variety of seeds for crop cultivation. The high cost of these necessities makes them unaffordable to farmers. This would in turn affect the existence of the farmers as well as the growth of the food processing industry. On the other hand, Arthur and Cord (2017) emphasise the importance of modern seeds, fertilizers, and water in increasing agricultural crop yield. Narayanamoorthy (2013) discussed the profitability of crop cultivation in India, where there is tremendous growth in the production of crops. Similarly, Raghavan (2008) studied the changing path in the use of inputs as well as the cost of agricultural cultivation. Show (2018) examined the cultivation costs and profit from agriculture, which suggested that vegetables are more profitable than other crops and cereals. Pathak *et al.* (2022) explained the importance of grading of the crops and grains whereby a higher price can be charged, which could increase the income generation of agriculture. Boss and Pradhan (2020) determined the management of crops after harvest so as to reduce the losses after the harvest of the crops. It was also pointed out that the task is a complex one too.

2.3. Infrastructure

Llanta *et al.* (2012) studied the impact of facilities like infrastructure on the productivity of agriculture and concluded that there is a positive impact on infrastructure facilities where they face the inadequacy of the same for the farmers. Fleming (2019) proposed the importance of proper cold chain facilities so as to eliminate the losses of the food crops and also to better use the crops whenever required. Radhakrishnan (2019) suggested that farming has got several challenges where there are different solutions required to solve them. Goyal *et al.* (2016) pointed out that agriculture and farmers are facing mainly two problems, which include a deficit of knowledge and a deficit of infrastructure, which lead to low productivity in farming.

2.4. Credit Facilities

Haque and Goyal (2021) explained the importance of credit provided by institutions to farmers. While Amanullah and Channa (2020) investigated the constraints of credit as well as its impact on the agriculture economy, they suggested three means to get relief from the constraints raised due to the lack of credit support for farmers. In addition, Ullah*et al.* (2020) discovered the key factors that would affect the accessibility of farmers to getting credit to carry on agriculture as well as the adoption of more sophisticated technologies and techniques for cultivation and other related activities. Ekwero and Edem (2014)assessed the role of credit facilities in agricultural production where the deficiency of funds is a vital issue faced by farmers. Their study also revealed that there is a positive effect on production when farmers have more access to credit facilities. Where there is more access to advances and loans, the farmers could carry on their agricultural activities without any sort of delay during the process of agri-farming. Hence, they suggested increasing the availability of loans to farmers. Ogundeji *et al.* (2018) discussed farmers' access to credit as well as its impact on farmers' income. The study pointed out that due to the increased demand for food, there is a need for a proper supply chain for food so as to meet those demands. They have also suggested the need for more capital investment by means of adequate credit access for farmers. Souza (2020) scrutinised improving the availability of credit for farmers and also reducing the threat of loan access for carrying on agricultural activities.Das *et al.* (2009) explain the agriculture credit impact or effect on the productivity of agriculture. The study also examined the role of both direct and indirect credit for agriculture by considering the disparities in various regions. Joshi and Dinesh (2020) studied the awareness of farmers as well as the acts of maintaining the cold chain after the harvest of the crops. The researcher mainly pointed out that there is a deficiency of funds among the farmers that drives them to disregard the use of cold chai facilities.

Sakina (2019) has found out that even though there is a strong raw material base, there is high wastage of perishables due to the low processing level of agricultural commodities. She has highlighted the importance of food processing for the nation because it connects or links between the two pillars of the economy, which are the industrial sector as well as the agricultural sector. Deeja (2017) suggested that processing and value addition would reduce the wastage of raw materials. The various primitive methods that have been used for food processing, as well as the earlier process of the development of food science, were quoted in the study. Kumar and Joshi (2018) suggested a policy to enhance agricultural production and also use public-private participation in the plantation methods. The government has announced several opportunities for farmers and various schemes for the development of farmers as well as the food processing industry. Aggarwal (2021) discussed the importance of technology in agriculture to solve various problems that may arise and affect the growth and income of farming.Singh and Singh (2021) examined the availability of mobile power sources as well as increasing the participation of women in enhancing food products. Female farmers' participation is very low; this problem should be addressed by encouraging women to work in all stages of agricultural production. While Chand (1986) has suggested that there is an increase in the usage of inputs that would make the agriculture sector grow.

The land of Kerala is rich with fertility and has got a variety of crops, some of which are in plenty and some are limited. Those raw materials which are available in plenty, especially perishables, are to be focused on to get value addition so as to eliminate the wastage of raw materials. In this context, farmers are playing a leading role in collecting raw materials for the food processing sector. Unfortunately, they are facing certain problems in the collection of raw materials in different seasons even as prices have gone up. Therefore, it is essential to identify the problems caused by farmers' inability to provide necessary raw materials for the food processing sector of Kerala.

3. Objectives of the Study

The main objectives of this study are:

- To determine the factors affecting the farmers' inability to provide necessary raw materials for the food processing sectors in Kerala.
- To validate the major factors that makes raw materials unavailable for the production process.

4. Research Methodology

The area of research is confined to Kerala. Therefore, the total food processing units of each district in Kerala were used to frame the population for the study. Table 1 depicts the district-wise distribution of food processing units in Kerala.

The samples are collected by using the Multi-Stage Sampling technique (Benny 2021). In the first stage, the processing units in 14 districts vary according to their size. Therefore, three sample districts like Thrissur, Ernakulam, and Kozhikode are selected through the Lahri method under probability proportionate size sampling techniques (Skinner 2016).

In the second stage, the researcher found out the top ten food processing companies in Kerala along with the number of products offered by them through recognised sources. Table 2 depicts the top ten food processing companies in Kerala along with their products.

Table 1: District wise Distribution of Food Processing Units in Kerala

No.	*Districts*	*Number of Food Processing Units*
1.	Kasargode	3
2.	Kannur	8
3.	Wayanad	4
4.	Kozhikode	27
5.	Malappuram	15
6.	Palakkad	25
7.	Thrissur	19
8.	Ernakulam	88
9.	Idukki	6
10.	Kottayam	5
11.	Alappuzha	28
12.	Pathanamthitta	15
13.	Kollam	7
14.	Thiruvananthapuram	18

Sources: *https://www.mofpi.gov.in/*
https://foodcompaniesdirectory.com/

Table 2: Top Ten Food Processing Companies in Kerala

No.	*Name of the Food Processing Company*	*Number of Products*
1	Double Horse	120
2	Kaula	151
3	Vincos	30
4	Saras	42
5	Pavizham	60
6	Nirapara	140
7	Elite	105
8	Sparco	24
9	Melam	57
10	Eastern	253

Sources: *https://www.mofpi.gov.in/*
https://foodcompaniesdirectory.com/

Here, each company is offering a different number of products. Thus, the researcher again used the Lahiri method and three sample firms, like Double Horse, Nirapara, and Eastern, were selected through probability proportionate size sampling techniques.

In the third stage, the researcher used an equal allocation stratified sampling technique for the selection of farmers from each district. The total sample size for this study is 240; therefore, 80 farmers from three districts have been selected for the evaluation.

In the fourth stage, the researcher used a proportional allocation stratified sampling technique for firm-wise selection of farmers. The proportion has been decided with the help of the number of products offered by the firms (as per table 2, Double Horse – 120 Products, Nirapara – 140 Products, and Eastern – 253 Products). Therefore, the final proportion is 120: 140: 253.

In the final stage, 240 farmers (19 farmers from Double Horse, 22 farmers from Nirapara, and 39 farmers from Eastern from three districts) have been selected through proportional allocation of stratified sampling(Benny 2022). The researchers collected the data for this study from February 2022 to June 2022.

The minimum sample size needed for conducting EFA and CFA should be N = 150, with the Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) methods of analysis (Mundfrom et al., 2005). The responses were graded on a 5-point scale (5–Strongly Agree, 1–Strongly Disagree). Techniques of EFA and CFA were run to unravel and confirm the dimensions regarding the barriers of farmers' inability to provide raw materials for the food processing sector. EFA (performed through SPSS Software) was run for the purpose of data reduction and component summarization, and CFA (performed through SPSS Amos Software) was done to test and confirm construct validity for dimensions.

5. Data Analysis and Interpretation

5.1. Demographic Profile

Table 3: Demographic Analysis

Gender	*Frequency*	*Percent*
Male	135	56.25
Female	105	43.75
Total	240	100
Age	*Frequency*	*Percent*
Below 30	45	18.75
30-45	55	22.92
45-60	83	34.58
Above 60	57	23.75
Total	240	100
Education	*Frequency*	*Percent*
High School	47	19.58
SSLC	95	39.58
Plus Two	60	25.00
UG	38	15.84
Total	240	100

Source: Author's Own Compilation

Table 3 shows the demographic profile of farmers. Out of 240, 135 were males (56.25%) and 105 were females (43.75%). As per the age level, 45 respondents (18.75%) were aged below 30 years, followed by 30 – 45 years (22.92%), 45 – 60 years (34.58%), and there were 57 respondents above 60 (23.75%). In terms of education level, 47 respondents were high school level (19.58%), 95 respondents were SSLC level (39.58%), 60 respondents were plus two level (25.00%), and 38 respondents were graduation level (15.84%).

5.2. Exploratory Factor Analysis

Factor analysis has been used to identify the factors affecting farmers' inability to provide necessary raw materials for the food processing sector of Kerala. The key factors were framed based on the existing literature reviews related to this study.

Table 4: Descriptive Statistics of Factors affecting the Inability of Raw materials

Factors	*Mean*	*Std. Deviation*	*Analysis N*
Rain destroy crop	4.6545	.47696	240
Slow plant growth	4.3788	.57687	240
Low yield	4.4424	.49819	240
Quality declines	4.3576	.50548	240
Proper Cold chain storage	3.3030	.97170	240
Easy Grading and Sorting	3.2364	.90318	240
Sufficient water supply	4.1394	.94931	240
Proper logistics	3.2909	.39332	240
Cheaper quality seed	3.5636	.72583	240
Fertilizers at reasonable price	4.3636	.56408	240
Modernization affordable	3.0727	.90772	240
Great government support	3.5030	.64546	240
Credit facilities	3.0424	.10625	240
Reduced rate loans	3.7939	.24203	240
Credit subsidy	4.5333	.19212	240

Source: Author's Own Compilation

Table 4 shows the mean and standard deviation of the factors affecting farmers regarding the inability of raw materials for the food processing sector. The descriptive statistics specify that average weights are given by most of the respondents to these factors.

Table 5: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.778	
Bartlett's Test of Sphericity	Approx. Chi-Square	3107.584
	df	105
	Sig.	.000

Source: Author's Own Compilation

The outcome of Table 5 was seized from 240 farmers, and the result has been comprehensively analysed in this part. The KMO value is 0.778, which is greater than 0.7 and Bartlett's Test is significant at a 5% level of significance. It suggests that the 15 variables associated with the factors are appropriate for factor analysis.

Table 6: Communalities

Variables	*Extraction*
Rain destroy crop	.555
Slow plant growth	.718
Low yield	.722
Quality declines	.858
Proper Cold chain storage	.776
Easy Grading and Sorting	.890
Sufficient water supply	.745
Proper logistics	.787
Cheaper quality seed	.719
Fertilizers at reasonable price	.921
Modernization affordable	.709
Great government support	.660
Credit facilities	.833
Reduced rate loans	.851
Credit subsidy	.747

Note: *Extraction Method: Principal Component Analysis*
Source: Author's Own Compilation

The extraction communalities portray the correlation between the variable and other variables before rotation, which is shown in Table 6. Here, all the extraction communalities are above 0.50. This reveals that there is a good or ideal relationship between each variable.

Table 7: Total Variance Explained

Factors	*Initial Eigenvalues*			*Extraction Sums of Squared Loadings*			*Rotation Sums of Squared Loadings*		
	Total	*% of Variance*	*Cumulative %*	*Total*	*% of Variance*	*Cumulative %*	*Total*	*% of Variance*	*Cumulative %*
1	5.411	36.076	36.076	5.411	36.076	36.076	3.955	26.364	26.364
2	3.252	21.682	57.758	3.252	21.682	57.758	3.556	23.704	50.067
3	1.727	11.514	69.272	1.727	11.514	69.272	2.847	18.982	69.049

contd. table 7

Factors	*Initial Eigenvalues*			*Extraction Sums of Squared Loadings*			*Rotation Sums of Squared Loadings*		
	Total	*% of Variance*	*Cumulative %*	*Total*	*% of Variance*	*Cumulative %*	*Total*	*% of Variance*	*Cumulative %*
4	1.100	7.334	76.606	1.100	7.334	76.606	1.133	7.556	76.606
5	.834	5.559	82.164						
6	.740	4.936	87.100						
7	.523	3.487	90.588						
8	.381	2.542	93.130						
9	.312	2.080	95.210						
10	.205	1.364	96.574						
11	.190	1.264	97.838						
12	.127	.847	98.686						
13	.081	.537	99.223						
14	.072	.483	99.706						
15	.044	.294	100.000						

Note: *Extraction Method: Principal Component Analysis*

Source: Author's Own Compilation

Table 7 reveals that four factors have eigenvalues greater than 1, which is the usual criterion for factor identification. Here, the first factor explains 36.076 percent, the second factor explains 21.682 percent, the third factor explains 11.514 percent, and the fourth factor explains 7.334 percent. Therefore, these four factors need to be considered by the researcher for rotation.

The first four eigenvalues (5.411, 3.252, 1.727, and 1.100) of the rotation matrix of 15 variables are considered. A factor solution with four factors is given in Table 8. The principal component factor analysis method was used to estimate the factor loadings. In the first factor, the 5th, 6th, 7th, and 8th variables have high loading with an eigenvalue of 5.411, which has 36.076 percent of variation. This factor is termed infrastructure. The second factor, in which the 12th, 13th, 14th, and 15th variables have heavy loading with an eigenvalue of 3.252, which has 21.682 per cent of variation, is called credit facility. The third factor, in which the 1st, 2nd, 3rd, and 4th variables have massive loading, has an eigenvalue of 1.727 with 11.514 percent of variation. This factor is known as heavy rain. In the case of the fourth factor, where the 9th, 10th and 11th variables have heavy loading with an eigenvalue of 1.100, which has 7.334 percent of variation. This factor is labelled as cost. These four variables account for 76.606 percent of the total variance.

6. Results and Discussion

6.1. Confirmatory Factor Analysis

CFA is advocated and administered to affirm "construct validity" for dimensions related to factors affecting the farmers' inability to provide necessary raw materials for the food processing sector of

Table 8: Rotated Component Matrix

Variables	*Statements*	*Component*			
		1	*2*	*3*	*4*
Variable 1	Rain destroy crop (Heavy Rain 1)	.203	-.302	**.602**	.244
Variable 2	Slow plant growth (Heavy Rain 2)	.176	.081	**.819**	-.094
Variable 3	Low yield (Heavy Rain 3)	.156	.002	**.824**	-.133
Variable 4	Quality declines (Heavy Rain 4)	.205	.092	**.899**	.017
Variable 5	Proper Cold chain storage (Infrastructure 1)	**.850**	.195	.090	.081
Variable 6	Easy Grading and Sorting (Infrastructure 2)	**.875**	.296	.137	-.136
Variable 7	Sufficient water supply (Infrastructure 3)	**.818**	-.134	.212	-.118
Variable 8	Proper logistics (Infrastructure 4)	**.816**	.187	.283	.082
Variable 9	Cheaper quality seed (Cost 1)	-.078	.032	.303	**.787**
Variable 10	Fertilizers at reasonable price (Cost 2)	-.065	-.042	-.047	**.956**
Variable 11	Modernization affordable (Cost 3)	.170	.583	-.174	**.556**
Variable 12	Great government support (Credit Facility 1)	.149	**.797**	-.046	.028
Variable 13	Credit facilities (Credit Facility 2)	-.004	**.901**	-.118	.084
Variable 14	Reduced rate loans (Credit Facility 3)	.091	**.906**	.125	-.084
Variable 15	Credit subsidy (Credit Facility 4)	.175	**.812**	.134	-.196
Eigenvalues		**5.411**	**3.252**	**1.727**	**1.100**
Percentage of variation		**36.076**	**21.682**	**11.514**	**7.334**

Notes: Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Source: Author's Own Compilation

Kerala, which will lay the ground for examining the relationship between construct dimensions and their items (Figure 1). The values establish the model fitness for the data specified in Table 9.

Table 9: Model Fit Measures

Model Fit Indices	*Citation*	*Threshold Limit*	*Estimated Value*	*Interpretation*
Normed Chi-Square	Jackson, J A. (1998)	< 3	225.776/ 87 CMIN/DF – 2.595	Excellent
CFI (Comparative Fit Index)	Shi, D., Lee, T. &Maydeu-Olivares, A. (2018), Ximénez, C., Maydeu-Olivares, A., Shi, D., & Revuelta, J. (2022), and Xia, Y., & Yang, Y. (2018)	> 0.90	0.965	Acceptable

contd. table 9

Model Fit Indices	*Citation*	*Threshold Limit*	*Estimated Value*	*Interpretation*
GFI (Goodness of Fit Index)	Shi, D., Lee, T. & Maydeu-Olivares, A. (2018), Ximénez, C., Maydeu-Olivares, A., Shi, D., & Revuelta, J. (2022), and Xia, Y., & Yang, Y. (2018)	>.90	0.930	Good
IFI (Incremental Fit Index)	Shi, D., Lee, T. & Maydeu-Olivares, A. (2018), Ximénez, C., Maydeu-Olivares, A., Shi, D., & Revuelta, J. (2022), and Xia, Y., & Yang, Y. (2018)	>.90	0.921	Good
NFI (Normed Fit Index)	Shi, D., Lee, T. & Maydeu-Olivares, A. (2018), Ximénez, C., Maydeu-Olivares, A., Shi, D., & Revuelta, J. (2022), and Xia, Y., & Yang, Y. (2018)	>.90	0.911	Good
RMSEA (Root Mean Squared Residual)	Hooper, D., Coughlan, J. & Mullen, R M. (2008), Kyriazos, T A. (2018).	< 0.08	0.071	Acceptable
SRMR (Standardized Root Mean Squared Residual)	Pavlov, G., Maydeu-Olivares, A. & Shi, D. (2020).	< 0.06	0.041	Excellent

Source: Author's Own Compilation

Table 9 reveals the indices of the relevant model. As per the model fit criteria, the ratio of goodness of fit to degrees of freedom should not exceed 3 and RMSEA < 0.08, along with GFI, IFI, NFI, and CFI values being > 0.9. The smaller SRMR indicates a better model fit. The value of RMSEA is < 0.08 and CMIN/DF is < 3 which indicates a good model.

Table 10: Standardized and Unstandardized Regression Weights of the Model

		Unstandardized Regression Weights					
Indicator Variable	<—-	*Latent Variables*	*Estimate*	*S.E.*	*Critical Ratio*	*P-value*	*Standardized Regression Weights*
Infrastructure4	<—-	Infrastructure	1				0.791
Infrastructure3	<—-	Infrastructure	2.140	0.186	11.505	***	0.832
Infrastructure2	<—-	Infrastructure	1.489	0.195	7.626	***	0.774
Infrastructure1	<—-	Infrastructure	1.743	0.216	8.075	***	0.842

contd. table 10

Credit.Facility4	<—-	Credit Facility	1.000				0.834
Credit.Facility3	<—-	Credit Facility	1.241	0.077	16.201	***	0.991
Credit.Facility2	<—-	Credit Facility	0.909	0.071	12.774	***	0.809
Credit.Facility1	<—-	Credit Facility	0.705	0.073	9.648	***	0.841
Heavy.Rain4	<—-	Heavy Rain	1.000				0.969
Heavy.Rain3	<—-	Heavy Rain	0.732	0.064	11.375	***	0.724
Heavy.Rain2	<—-	Heavy Rain	0.969	0.069	14.125	***	0.829
Heavy.Rain1	<—-	Heavy Rain	0.940	0.071	13.239	***	0.751
Cost3	<—-	Cost	1.000				0.738
Cost2	<—-	Cost	1.220	0.098	12.411	***	0.948
Cost1	<—-	Cost	1.149	0.106	10.851	***	0.827

Source: Author's Framework and Calculation

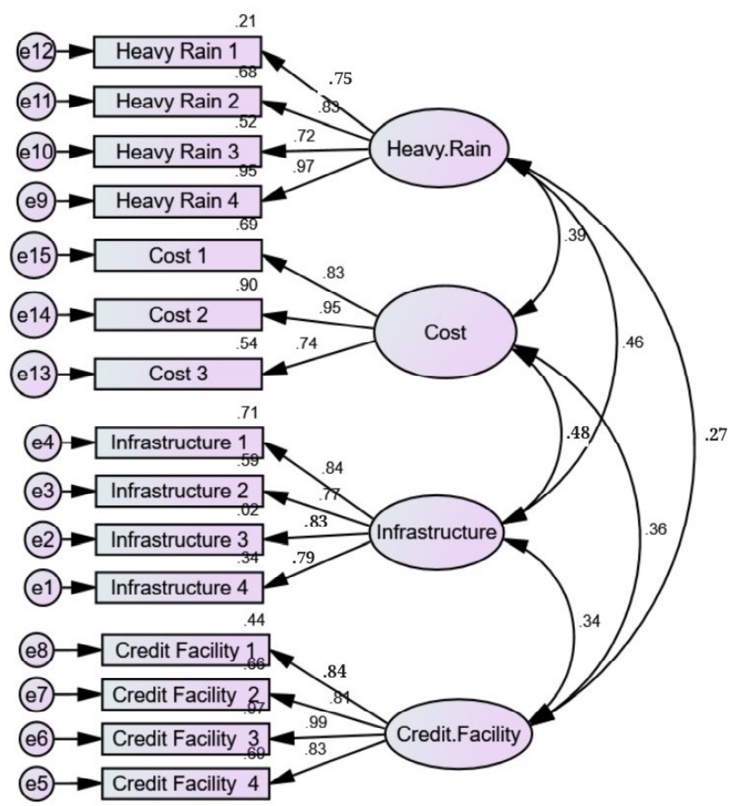

Figure 1: Confirmatory Model of Farmers

Source: Author's Framework and Calculation

Table 10 shows the standardised and unstandardized regression weights of the model based on latent and indicator variables. The standardised regression weights of all the latent variables based on indicator variables are greater than 0.5 and p-values are less than 0.01. It indicates that all the indicator variables used to predict the latent variable are statistically significant.

Table 11: Composite Reliability of the Model

Latent Variables	*CR*	*AVE*	*MSV*	*MaxR(H)*
Heavy Rain	0.893	0.679	0.214	0.952
Infrastructure	0.857	0.656	0.234	0.861
Credit Facility	0.926	0.760	0.127	0.984
Cost	0.879	0.709	0.234	0.924

Source: Author's Framework and Calculation

The composite reliability of the model is expressed in Table 11. The composite reliability (CR) of Heavy Rain is 0.893, Infrastructure is 0.857, Credit Facility is 0.926, and Cost is 0.879. If CR > 0.70, AVE < CR, and AVE > MSV, which indicates that the model achieved composite reliability.

Table 12: Convergent Validity of the Model

Indicator Variable	*<—-*	*Latent Variable*	*Standardized Loading*	*Square of Standardized Loading*	*Sum of Square of Standardized Loading*	*Number of Indicators*	*AVE*
Infrastructure 4	<—-	Infrastructure	0.791	0.626	2.626	4	0.656
Infrastructure 3	<—-	Infrastructure	0.832	0.692			
Infrastructure 2	<—-	Infrastructure	0.774	0.599			
Infrastructure 1	<—-	Infrastructure	0.842	0.709			
Credit.Facility 4	<—-	Credit Facility	0.834	0.696	3.039	4	0.760
Credit.Facility 3	<—-	Credit Facility	0.991	0.982			
Credit.Facility 2	<—-	Credit Facility	0.809	0.654			
Credit.Facility 1	<—-	Credit Facility	0.841	0.707			
Heavy.Rain 4	<—-	Heavy Rain	0.969	0.939	2.714	4	0.679
Heavy.Rain 3	<—-	Heavy Rain	0.724	0.524			
Heavy.Rain 2	<—-	Heavy Rain	0.829	0.687			
Heavy.Rain 1	<—-	Heavy Rain	0.751	0.564			
Cost 3	<—-	Cost	0.738	0.545	2.127	3	0.709
Cost 2	<—-	Cost	0.948	0.899			
Cost 1	<—-	Cost	0.827	0.684			

Source: Author's Framework and Calculation

Table 12 reveals the convergent validity of the model. In order to achieve convergent validity, the AVE (Average Variance Extracted) must be 0.5 or more than 0.5, and standard factor loadings are greater than 0.50. As per this model, the AVE of infrastructure is 0.656, credit facility is 0.760, heavy rain is 0.679 and cost is 0.709. The factor loadings of all the latent variables based on indicator variables are greater than 0.5. It indicates that the model achieved convergent validity.

Table 13: Discriminant Validity of the Model

Latent Variables	*Heavy Rain*	*Infrastructure*	*Credit Facility*	*Cost*
Heavy Rain	**0.824**			
Infrastructure	0.463	**0.810**		
Credit Facility	0.267	0.341	**0.872**	
Cost	0.389	0.484	0.357	**0.842**

Source: Author's Framework and Calculation

The Discriminant Validity of the model expressed in Table 13. In order to achieve discriminant validity, the square root of AVE must be greater than latent variable correlations, i.e., inter-construct correlations. As per this model, the square root AVE of Heavy Rain is 0.824, Infrastructure is 0.810, Credit Facility is 0.872, and Cost is 0.842, which are greater than inter-constructed correlations. Therefore, this model satisfies the requirements for discriminant validity.

7. Conclusion

Kerala is blessed with fertile soil, which helps in the cultivation of several crops. But there are lots of difficulties in grabbing the yield. This would directly affect the food processing industry in Kerala. Farmers are intimately involved in the collection of raw materials and provide high-quality materials to producers. Unfortunately, they have faced certain problems in the availability of raw materials for production.This research has tried to investigate the major factors that cause inability to provide necessary raw materials for the food processing sector of Kerala, which were satisfied by analysing the responses from the farmers. As per this investigation, the researcher has found that four factors, such as heavy rain, cost, infrastructure, and credit facility, are the causes of the farmers' inability to provide the raw materials for food processing sectors in Kerala.

Heavy rain is one of the important factors in the destruction of agricultural crops. It reduces the yield and quality of the crops produced. Along with that, farmers face the problem of high costs for quality seeds, standard fertilisers, and pesticides. Many times, it becomes unaffordable for them. Another critical factor that affects farmers is the lack of infrastructural facilities. They do not have proper cold chain facilities near the farm or proper logistics and handling facilities. While there is a lack of credit facilities for the farmers, so they are able to afford the quality crops, tools, equipment, and facilities, therefore, government support is also crucial for the farmer's development and progress.

This research also suggests making more value-added for all the food crops and exploring the untapped opportunities where wastage can be reduced. There should be enough facilities and means for the farmers to cultivate those crops which are more imported from other states, so as to reduce the import cost. Meanwhile, protect the crops by providing raised beds for more drainage of water during heavy rain as well as preparing the soil for cultivation with natural cloth to assist with drainage. A rain garden can be made so as to drain out the rain water. All these revolve around the matter of the financial status of the farmers, where the government should provide greater credit facilities at reduced interest rates, as well as credit subsidies and quality seeds, standard fertilisers and pesticides at reasonable prices for the farmers.

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