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Exploration of Risk Attitude of Vegetable Farmers in Kerala, India

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ABSTRACT

The study was conducted in Alappuzha, Thrissur, Palakkad and Idukki districts of Kerala, India during 2020–2021 to analyse the risk attitude of vegetable farmers. The study examined the personal and social characteristics of respondents and the association of these characteristics with risk attitude. Simple random sampling technique was used to select 270 vegetable farmers from 6 panchayats representing the Special Agricultural Zones for vegetables in Kerala. Collected data were analyzed using statistical methods like mean, Kruskal-Wallis test, correlation coefficient and multiple regressions. The study revealed that majority (74.07%) of the farmers belonged to a medium category of risk attitude. Majority (55.18%) of the farmers were in the age group of 35–55 years, 46.29% had gone up to middle school, 72.59% of the farmers had an area below 2.31 acres and 67.4% respondents were engaged in vegetable farming and allied works and 54.07% had economic water scarcity. It was noticed that majority of the respondents were in the low category in the case of vegetable farming experience (61.48%), annual income (55.56%), innovative proneness (56.67%), economic motivation (56.3%), extension participation (70%), social participation (94.44%) and high category with regard to credit orientation (53.7%). Correlation analysis revealed that variables area under vegetable cultivation, education, annual income, irrigation potential, extension participation, innovative proneness, economic motivation and social participation were positively and significantly corelated with risk attitude of respondents at 1% level and at 5% level. Regression analysis revealed that 60% of the variation in farmer risk attitude was explained by the independent variables.

KEYWORDS: Correlation, multiple regression, Kruskal-Wallis, risk attitude, standard deviation

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1. INTRODUCTION

Risks are predominant in the agricultural sector, posing potentially serious consequences for farmers and consumers. Agricultural risks are also the root cause of transient food insecurity, creating a poverty trap for millions of households across the developing world (Akhtar et al., 2018). Climate change is aggravating this cycle by shifting the frequency and intensity of weather-related risks and increasing uncertainty. The agricultural productivity is low due to risks associated with weather conditions, diseases and pests, price fluctuations (Ullah et al., 2015). Diversification of agricultural activities is considered important for enhancing agricultural production and productivity. In this context vegetable play a pivotal role and have emerged as popular crops among the farmers in recent years. (Ghosh, 2011). Vegetable production provides an opportunity for nutritional and economic security and more importantly, produces higher returns per unit area (Acharya and Kafle, 2018; Kundu and Mandal, 2020). Commercial vegetable farming refers to producing vegetables not only for own consumption but also to sell in the market for improving the livelihoods of smallholder farmers. It remains the major intervention adopted by national and international governmental and non-governmental organizations (Murithi and Matz, 2015; Sibhatu and Qaim, 2017; Shrestha and Karki, 2017). In the process of intensification through vegetable production the risks associated is more (Ali and Kapoor, 2008; Shinogi et al., 2017). Risk and uncertainty contribute to discrepancies in the rates of adoption of new technologies by vegetable farmers (Dinham, 2003). Effective agricultural risk management (ARM) is crucial to increasing economic growth, improving food security, and reducing poverty (Choudary et al., 2016). In Kerala, the total area under the cultivation of vegetables during 2016–17 was 46,732 ha which represented 4.94% area of total food crops and it is the vegetables that has witnessed an increase in area by 0.02% in the year 2016–17 unlike other food and cash crops which showed a decline in area than the previous year 2015–16 due to government's effort. If tapioca and other tuber crops are considered in vegetables, then the total area under the cultivation of vegetables would be 14.15% of total food crops (Anonymous, 2017). Moreover, Kerala is dominant with coconut-based farming system and homegarden farming system where the prospects of including vegetables as intercrop is very high.

Risks and uncertainity significantly lowers production level and causes major losses (Moschini and Hennessy, 2001; Drolette, 2009; Arce, 2010). Farm household's economic decisions are overshadowed by risk (Dadzie and Acquah, 2012). Farmers decisions under risky situations are best analysed by taking into account their risk attitude and responses to risk (Witjaksono et al., 2021). Therefore, their attitude towards risk tends to display an explanation for the many observed economic decisions. Each farmer has different attitude towards risk, and perceives the same risk source differently. For a same uncertain situation, different preferred attitudes will be elicited depending on how individuals or groups perceive the uncertainty (Ayinde, 2008; Ahsan and Roth, 2010). Risk attitude is a unique reflection of a person's personality. It is influenced by socio-economic factors and life experiences (Joshi and Priya, 2021). As a consequence, understanding individual attitudes towards risk is intimately linked to the goal of understanding and predicting economic behaviour (Dohmen et al., 2011).

Our identification and understanding of why risk response occurs and how it motivates observed behaviour is very limited. The nature and distribution of risk attitude of vegetable farmers has only been given limited attention in terms of research. Keeping in view the above facts, the present study was under taken to study the risk attitude of vegetable farmers in Kerala, to compare risk attitude according to panchayats, to profile the personal and social characteristics of the respondents and to understand the relationship and the extent of contribution of personal characteristics on risk attitude.

2. MATERIALS AND METHODS

The study was conducted during 2020–2021 in the six panchayats of Kerala (Kollengode, Vadakarapathy, Chelakkara, Kanjikuzhy, Vattavada and Devikulam) India. These panchayats were purposively selected because it belonged to the blocks of Special Agricultural Zones (SAZs) for vegetables in Kerala as mentioned in GOK, 2017 report. A maximum of 45 vegetable farmers from each panchayat were randomly selected in consultation with the concerned Agricultural Officers of the respective Krishibhavans thus making a total of 270 vegetable farmers as respondents for the study. The data was collected during 2020–2021 through personal interview method from selected farmers.

Hillson and Webster (2004) explained risk, as an uncertainty that could have a positive or negative effect on one or more objectives, and attitude as a chosen state of mind or mental view with regard to a fact. Attitude is an abstract quantity and difficult to measure. Various ways had been described by eminent psychologists to measure it directly or indirectly. The present study used an attitude scale which was developed for the study using the Summated Rating scale method as developed by Likert (1932), and used by Bard and Barry (2000), Semie et al. (2009) and Roslan et al. (2012). The scale was developed in a stepwise manner i.e., starting from collection of statements, editing following the Edwards (1957) criteria, item analysis and final selection of

statements. The scale had proved its validity and reliability.

The scale consisted of 28 statements describing proposed risk management strategies and farmer's preference or aversion to risk. Some of the statements were negatively worded and were reversed during analysis. Vegetable farmers were asked to declare their degree of agreement with 28 risk attitude statements on a 5-point scale. The scoring pattern adopted was 5 to 1, in which, 5 weighs to strongly agree response, 4 to agree, 3 to undecided, 2 to disagree and 1 to strongly disagree response for positive statement and for negative statement, the scoring pattern was reversed. The statements were constructed in such a way that a score of higher than three would represent risk seeking attitudes, while less than three would be risk averse. The maximum total score was 140 if the respondent scores 5 for each item and minimum total score was 28 if respondent scores 1 for each statement. The farmer's rating of the 28 items was summed up to yield an average score for each farmer, which was a method of measuring farmer's attitude (Fakoya et al., 2007). Based on the total scores, the vegetable farmers were classified into three categories ranging from low to high by considering the mean and standard deviation values (Table 1).

Table 1: Categorisation of respondents

Category	Classification
Low risk attitude	Less than mean-standard deviation
Medium risk attitude	Between (M-SD) to (M+SD)
High risk attitude	Greater than mean+standard deviation

Twelve personal characteristics of farmers age, area under vegetable cultivation, education, annual income, vegetable farming experience, vocational diversification, irrigation potential, extension participation, social participation, innovative proneness, economic motivation, management orientation and credit orientation were identified as independent variables through review of literature. Attitude of farmers towards risks in agriculture was considered as dependent variable. The following tools were employed in the analysis of the data collected; descriptive statistical analysis, Kruskal–Wallis One Way Analysis of Variance (ANOVA), correlation and multiple regression analysis.

3. RESULTS AND DISCUSSION

3.1. Risk attitude of vegetable farmers towards risks

Data for risk attitude of the respondents is given in Table 2. A close look at the data revealed that majority of the vegetable farmers fall in medium category (74.07%) of risk attitude followed by the high-risk attitude category (16.67%). Whereas 9.25% farmers belonged to low-risk category. Vegetable farming being a risky business, farmers adopt various risk management strategies to overcome it. The results obtained are in agreement with those of Ravikishore et al. (2016) and Tura et al. (2017).

On doing panchayat wise comparisons, it was understood that a greater number of farmers in high-risk attitude category was found in Kollengode panchayat (40%) followed by Kanjkuzhy (33.33%). This could be because of the innovative proneness of Kollengode farmers who rely on innovative techniques of farming and also experiment with latest varieties of vegetables. Even though majority of the farmers were in medium risk-taking category, 40% of the Kollengode farmers believed that one should take risks in farming to achieve greater success. Farmers in Kanjikuzhy panchayat face certain challenges in farming such as poor fertility of the soil, heavy pest infestations and market competition. Irrespective of these challenges, 33% of the farmers were high risk takers.

Data in Table 3 shows that 46.66% of Chelakkara farmers belonged to low category of risk attitude i.e., they are risk averse. Risk aversive farmers are more likely to utilise and adopt risk management tools in vegetable production (Dohmen et al., 2011; Dadzie and Acquah, 2012). On

Table 2: Distribution of farmers based on attitude towards risks in vegetable cultivation

	High (>87.83)	Medium (61.04 to 87.83)	Low (<61.04)	Total	Highest total score	Lowest total score
Kollengode	18 (40)	27 (60)	0	45	103	63
Vadakarapathy	2 (4.44)	43 (95.55)	0	45	99	66
Chelakkara	2 (4.44)	22 (48.88)	21(46.66)	45	94	55
Kanjikuzhi	15 (33.33)	28(62.22)	2(4.44)	45	111	57
Vattavada	8 (31.11)	37 (82.22)	0	45	96	69
Devikulam	0	43 (95.55)	2 (4.44)	45	87	54
Total	45 (16.66)	200 (74.07)	25 (9.25)	270		
Mean=74.44; SD=13.39						

Figures in parentheses indicate percentage

Table 3: Summary of statements for risk attitude scale

Sl. No.	Statement	Mean	SD
1.	I concentrate mainly in one or two vegetable crops at a time	2.37	1.10
2.	I usually engage in more than one enterprise (-)	1.63	0.72
3.	I have thorough and well-documented control on my crop production activities	3.32	0.97
4.	I collaborate with other farmers to share risk (-)	3.31	1.22
5.	My farmed acreage is mostly consisting of less risky crops (-)	2.42	0.94
6.	I continue growing same remunerative crops year after year (-)	2.34	1.02
7.	I do not complement my farm income with non-farm income	2.69	1.31
8.	I engage in less risky enterprises based on my past experiences (-)	1.85	0.79
9.	I plant only high yielding and resistant crop varieties in my farm for higher returns (-)	2.53	0.83
10.	I do not consider myself to be a low-cost producer of vegetables	2.87	1.21
11.	I practice mixed farming as it ensures continuous income from farming (-)	2.27	1.15
12.	I am more likely to resort to crop diversification and multiple cropping as it reduces risk of sole cropping (-)	1.85	0.89
13.	I often experiment with new agricultural practices and technologies	2.46	1.11
14.	I am always one among the first in my area to adopt a new technology	2.49	1.00
15.	I use crop insurance policy as it can be a shock absorbing mechanism (-)	2.49	1.00
16.	I discuss issues related to my farm operation with professional advisor (-).	2.71	1.16
17.	I attend all workshops and trainings to learn more about vegetable cultivation	3.25	1.11
18.	I prefer "playing it safe" when growing vegetable crops and selling produce (-)	2.42	1.12
19.	I tend to avoid risk choices when making on farm decisions even though this may result in lower returns (-)	2.40	0.97
20.	I do not think about the consequences when doing farming out of passion	3.14	0.86
21.	I am hesitant to adopt agricultural innovations, until I see their advantages and disadvantages from farmers around me (-)	2.14	0.73
22.	I am concerned about existing profit more than several predicted and non-guaranteed profit (-)	2.50	0.83
23.	To implement my farm plan goals, I take risks more than others	2.66	0.98
24.	I adopt technologies which are famous among fellow farmers	2.83	0.99
25.	I do not produce to the highest possible quality if it means higher costs (-)	2.80	1.07
26.	I do not stop trying even if failures come my way	3.74	0.93
27.	I continue vegetable farming thinking that even if I suffer huge loss one-time, next time I will be able to overcome it.	3.72	0.85
28.	I am able to minimize the consequence of risk in vegetable cultivation by proper planning	3.07	1.04

looking at the total attitude score, it was identified that the farmers of Kanjikuzhy panchayat had the highest total attitude score followed by Kollengode and then Vadakarapathy.

The findings show that the lower of average scores for individual statements on risk attitude indicate farmers were risk averse (Roslan et al., 2012). Farmers were risk averse on statements 2,8,12 with average score ranging from 1.62 to 1.85. A score of 1.62 for statement 2: "I usually engage in more than one enterprise", suggest the risk aversive nature of vegetable farmers. Attitudes towards mechanisms used for managing risk reflect the farmer's underlying construct of a risk attitude (Alderman, 2008)

Statements 26, 27 have average scores of 3.74 and 3.71 for positively worded statements. These statements with highest level of agreement indicates that farmers were inclined towards risk taking attitude. Statement 26: "I do not stop trying even if failures come my way", has the highest average score of 3.74. This suggests that as every decision taken in farming has an element of uncertainty

associated, all farm decision makers are risk takers (Hanson and Lagerkvist, 2012)

The average score of 3.06 for statement 28: "I am able to minimize the consequence of risk in vegetable cultivation by proper planning" imply that farmers neither agreed nor disagreed with the risk statement. These statement with average score of 3 indicates that farmers were risk neutral.

3.2. Difference between risk attitudes of vegetable farmers according to panchayats

Kruskal–Wallis One Way Analysis of Variance (ANOVA) was estimated to investigate difference between risk attitude of vegetable farmers based on each panchayat. From the analysis, p value was found to be less than 0.05, which signified that there was significant difference between risk attitudes of farmers in more than one pair of panchayats. To find, which panchayats were significantly different, a Dunn test was done for pair wise comparisons and the results of the test are shown in Table 4. Groups with same letters are not significantly different at 5% level

Table 4: Kruskal-Wallis rank sum test

Panchayat	Total mean and Standard deviation
Kollengode	83.822(14.044)[a]
Kanjikuzhy	81.37(18.15)[ab]
Vattavada	78.88(7.702)[a]
Vadakarapathy	72.44(6.686)[b]
Devikulam	67.42(5.979)[d]
Chelakkara	62.66(8.579)[c]

Kruskal: Wallis chi squared - 108.207; df- 5; p: 0.00

The results in Table 4 signifies that risk attitude of vegetable farmers of Kollengode panchayats were significantly different from farmers of Vadakarapathy, Devikulam and Chelakkara panchayats whereas not significantly different from Kanjikuzhy and Vattavada panchayats. Risk attitude of vegetable farmers of Vadakarapathy were significantly different from farmers of Kollengode, Chelakkara, Vattavada and Devikulam panchayats and not significantly different from Kanjikuzhy farmers. Whereas risk attitude of vegetable farmers of Chelakkara and Devikulam were significantly different from all panchayats. Risk attitude of vegetable farmers of Vattavada were significantly different from Vadakarapathy, Chelakkara and Devikulam panchayats. Difference in attitude of farmers are exhibited due to differences in socio-economic conditions, climatic and geographic factors (Khaledi et al., 2010).

3.3. Distribution of respondents according to personal and social characteristics of farmers

The results of personal and social characteristics of farmers are mentioned in Table 5.

Table 5: Personal social characteristics of respondents

Sl. No.	Independent variable	Frequency	Percentage
1. Age			
	Young (<35)	18	6.66
	Middle (35–55)	149	55.18
	Old (>55)	102	37.77
2. Education			
	Illiterate	0	0
	Primary school	16	5.92
	Middle school	125	46.29
	SSLC (10^{th})	90	33.33
	Intermediate	22	8.14
	College level	17	6.29
3. Vegetable farming experience			
	Low (<18.62)	166	61.48
	High (>18.62)	104	38.52
	Mean=18.62		
4. Annual income			
	Low (<423015.2)	150	55.56
	High (>423015.2)	120	44.44
	Mean=423015.2		
5. Area under vegetable cultivation			
	Low (<2.31)	196	72.59
	High (>2.31)	74	27.41
	Mean=2.31		
6. Vocational diversification			
	Only vegetable farming	88	32.59
	Vegetable farming+allied	182	67.40
7. Irrigation potential			
	Physical water scarcity	68	25.18
	Economic water scarcity	146	54.07
	Little or No water scarcity	56	20.74
8. Extension participation			
	Low (<11.02)	189	70
	High (>11.02)	81	30
	Mean=11.02		
9. Innovative proneness			
	Low (<21.68)	153	56.67
	High (>21.68)	117	43.33
	Mean=21.68		

Table 5: Continue...

Sl. No.	Independent variable	Frequency	Percentage
10.	Social participation		
	Low (<2.02)	255	94.44
	High (>2.02)	15	5.55
	Mean=2.02		
11.	Economic motivation		
	Low (<19.37)	152	56.30
	High (>19.37)	118	43.70
	Mean=19.37		
12.	Credit orientation		
	Low (<10.51)	125	46.30
	High (>10.51)	145	53.70
	Mean=10.51		

The personal and social characteristics of individual farmer would have an influence in the risk behaviour of an individual (Bard and Barry, 2000). From the data given in Table 5 it is revealed that majority (55.18%) of the farmers belonged to the age group of 35–55 years followed by old age group (37.77%). Predominance of 35–55 age category was because this group belongs to the active working class who are able to manage their farm efficiently. With respect to education, it was found that majority of the respondents (46.29%) had education up to middle school followed by those educated up to 10th class (33.33%). The findings are in line with Sharma et al. (2018).

The data furnished in Table 5 indicated that more than half of the respondents were in the low category i.e., (below mean) in the case of vegetable farming experience (61.48%), annual income (55.56%), innovative proneness (56.67%) and economic motivation (56.3%). Most of the vegetable farmers (67.4%) had opted for vocational diversification along with vegetable farming whereas 32.59% farmers were engaged in vegetable farming alone.

A perusal of the Table 5 indicated that more than half of the respondents (54.07%) had economic water scarcity followed by 25.18% with physical water scarcity. In case of area under vegetable cultivation, 72.59% of the farmers had an area under vegetable cultivation below 2.31 acres whereas 27.41% had an area above 2.31 acres. Majority of the respondents were in the low category of extension participation (70%) and social participation (94.44%). Whereas in the case of credit orientation, majority (53.7%) respondents belonged to the high category.

3.4. Relationship of personal, social characteristics of farmers on their risk attitude

Correlation analysis was done to determine whether any relationship exists between dependent and independent variable and the result are depicted in Table 6.

Table 6: Relationship between the characteristics of vegetable farmers and risk attitude

Sl. No.	Independent variable	Correlation coefficient
1.	Age	-0.127*
2.	Area under vegetable cultivation	0.509**
3.	Education	0.207**
4.	Annual Income	0.453**
5.	Vegetable farming experience	0.041^{NS}
6.	Vocational diversification	-0.218**
7.	Irrigation potential	0.482**
8.	Extension participation	0.485**
9.	Social participation	0.195*
10.	Innovative proneness	0.713**
11.	Economic motivation	0.390**
12.	Credit orientation	0.028^{NS}

*: (p=0.05) Significant level; **: (p=0.01) significant level; NS: Non-Significant

Table 6 revealed that age is found to be negatively significant to risk attitude. Younger farmers are more adventurous than older ones (Sherrick, 2006). Area under vegetable cultivation was positively significant at 1% level. This implies that larger the cultivation area more is the opportunity for a farmer to try new farming techniques. It was also found that education and annual income had positive and significant association with the risk attitude of the respondents at 1% level of probability. This suggest that farmers who are educated and have high income are more risk takers. The results obtained were in agreement with findings of Shams and Fard (2017); Pongener and Jha (2020). Irrigation potential had positive and significant correlation with risk attitude. This means that farmers with better access to irrigation sources have a positive risk attitude

It was also found that extension participation was significantly associated with risk attitude at 1% level. This suggests that farmer who participate in extension activities gain better exposure to new ideas and venture which subsequently improves their risk-taking attitude (Lapple, 2013) . A positive and significant correlation was found between innovative proneness and risk attitude. This is justified by the fact that innovativeness is a major characteristic of a risk loving/risk preferring farmer. Economic motivation was also significantly correlated at 1% level. Economic conditions of the farmers might get improved by adopting and trying new ideas in vegetable cultivation. A farmer with the desire

of improving his economic conditions will look for areas to expand which signifies a positive risk attitude.

Table 6 revealed that the social participation was positively and significantly associated with risk attitude. It means social participation of farmers exerts highly significant influence on the risk attitude of farmers. The findings may be due to the fact that through social participation, farmers get an opportunity to widen their knowledge base and discuss their farm related concerns.

This signifies that these variables were important in influencing the risk attitude of the vegetable farmers. The variable vegetable farming experience and credit orientation were non significantly correlated with risk attitude of vegetable farmers.

3.5. Effect of personal social variables on farmer's risk attitude

A standard multiple regression analysis was conducted to evaluate how well independent variables scores predicted risk attitude. It is observed from Table 7, the multiple correlation coefficient was 0.771, coefficient of determination was R^2=0.595 indicating that approximately 60% of the variance in risk attitude can be accounted by the linear combination of independent variables.

Table 7: Regression model summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.771[a]	0.595	0.574	8.73786

a: Predictors: (Constant), credit orientation, vegetable farming experience, area under vegetable cultivation, vocational diversification, social participation, education, irrigation potential, extension orientation, age, economic motivation, management orientation, annual income, innovative proneness; b: Dependent variable: Risk attitude

4. CONCLUSION

Majority of vegetable farmers belonged to a medium category of risk attitude and found that nine independent variables were positively and significantly related with risk attitude of vegetable farmers at 1% and at 5% level of significance. Multiple regression analysis revealed that independent variables contributed to 60% of variations in the dependent variable. The study calls for policy intervention to be formulated and implemented for the future development of vegetable farmers in Kerala taking into consideration their risk behaviour.

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