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Comparative risk perception of young vegetable farmers engaged in commercial and urban cultivation in Southern Kerala

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Abstract

Despite Kerala's vegetable production potential, local output falls far short of annual demand, presenting significant challenges and risk for farmers. This study examined and compared risk perception among young commercial and urban vegetable farmers in Thiruvananthapuram and Alappuzha districts to understand how different farmer categories experience agricultural risks. The study employed a purposive sampling design, selecting 140 respondents comprising 70 commercial vegetable farmers (25-45 years, minimum 1.5 acres) and 70 urban vegetable farmers (25-45 years, minimum 30 growbags/containers) equally distributed across both districts. Risk perception was measured using a structured five-point rating scale across 42 specific risk sources grouped into five major categories: Production Risk, Market Risk, Financial Risk, Institutional Risk, and Personal Risk. Risk perception indices were calculated and compared using independent samples t-tests. Results revealed that Commercial vegetable farmers in both districts perceived substantially higher market risk (Alappuzha: 55.66; Thiruvananthapuram: 55.35) compared to urban vegetable farmers (38.82 and 37.98 respectively), reflecting their direct market dependence. Similarly, commercial vegetable farmers reported significantly higher financial risk due to greater financial investments. However, production risk showed no significant differences between groups, indicating universal vulnerability to climate variability, pests, and input quality issues regardless of farming scale. Institutional risk exhibited district-specific patterns, with Alappuzha's urban vegetable farmers reporting higher institutional risk due to inadequate extension support. The findings highlight the need for differentiated risk management strategies tailored to farmer type and regional context. These insights are important for developing targeted policy interventions that address specific challenges faced by diverse farming communities.

Keywords: Risk perception, commercial vegetable farmers, urban vegetable farmers, vegetable cultivation, Kerala, agricultural extension

Introduction

Vegetables are recognized for their protective nutritional qualities and offer significant potential in India's agricultural sector because they grow quickly, yield substantial harvests, provide essential nutrients, and generate good income. In Kerala, a southern Indian state, local vegetable production reaches approximately 500,000 tonnes annually, while the state's total yearly demand stands at roughly 25 Lakhs tonnes, creating a substantial shortfall that cannot meet the population's needs (Kalidas *et al.*, 2017) ^[1].

Despite this potential and pressing demand, vegetable cultivation in Kerala faces numerous barriers. Several challenges discourage farmers from growing vegetables. Although using better varieties and new technologies could improve production and yields, farmers still face many obstacles in their farming activities (Noopur *et al.*, 2023) ^[2]. A significant factor contributing to these challenges is the inherent risk associated with agricultural production. Agricultural operations face considerable risk due to the unpredictable nature of their business environment. Agriculture depends on outdoor growing conditions, farmers deal with production risks like poor weather, insects, and plant diseases; they face price risks from market changes;

and they encounter policy risks from government decisions or contract problems. They also face personal risks such as health problems and accidents, plus financial risks from loans and changing interest rates, which all add to the uncertainty (Hardaker *et al.*, 2015) ^[3].

Understanding and managing these risks is crucial for agricultural success. Farmers can achieve optimal returns from agriculture only when they have a clear understanding of the risk involved and adopt effective management strategies (Aubry & Manouchehri, 2019) ^[4]. The decisions farmers make are influenced by the types of uncertainties they encounter and their personal willingness to take chances (Hardaker *et al.*, 2015) ^[3].

Given the importance of risk management in vegetable production and the diversity of farming systems, the present study aims to identify the major risk categories affecting commercial vegetable farmers and urban vegetable growers, and to compare the intensity and nature of risks faced by both groups. Specifically, the study seeks to understand which risk categories are most significant for each farming type, assess the differences in risk perception between the two groups, and examine the underlying reasons for these differences. The findings will provide insights for

developing targeted risk management strategies and policy interventions that address the specific challenges faced by each category of farmers.

Methodology

Study Area

The study was conducted in Alappuzha and Thiruvananthapuram districts of Kerala, India. These districts were purposively selected since Thiruvananthapuram and Alappuzha have the highest area under vegetable cultivation in Southern Kerala (Directorate of Agriculture Development & Farmers' Welfare, 2023, p. 345)^[5].

Sampling Design and Sample Size

Seven blocks were chosen from each district in coordination with Agricultural Department officials, while seven wards were selected from Thiruvananthapuram Corporation and Alappuzha Municipality in consultation with local self-government bodies and ward councillors. Five commercial vegetable farmers were sampled from each block, and five urban vegetable farmers from each ward,

yielding 35 respondents per category from each district. The total sample comprised 140 respondents: 70 commercial farmers and 70 urban farmers.

Commercial vegetable farmers in the 25-45 age group, owning at least 1.5 acres, were purposively selected. Urban rooftop farmers in the same age group, maintaining a minimum of 30 growbags or containers, were similarly selected through purposive sampling.

Data Collection Procedure

Primary data were collected during 2025 through personal interviews of farmer' using a well-structured, pre-tested interview schedule. The schedule was developed based on extensive literature review and pre-tested with farmers from non-sample areas.

Risk Categories and Sources

Based on literature review and consultations with agricultural experts, 42 risk sources relevant to vegetable farming in Kerala were identified and grouped into five major risk categories (Table 1):

Table 1: List of risk sources under each category

Sl. No.	Risk Category	No. of Risk Sources	Risk Sources
1	Production Risk	12	(1) Climatic variations (flood, drought, rainfall); (2) Pest and disease incidence; (3) Lack of timely and quality inputs; (4) Lack of awareness about production technologies; (5) Poor productivity; (6) Lack of well-developed infrastructure; (7) Fragmentation of land/lack of area; (8) Seasonality of crops; (9) Water scarcity; (10) Difficulty in water drainage; (11) Lack of skilled labour/high labour wages; (12) Wild animal or bird attacks
2	Market Risk	15	(1) High post-harvest losses; (2) Processing and quality control issues; (3) Fluctuation in output market prices; (4) Varying consumer preferences; (5) Inadequate facilities/lack of cold storage; (6) Changes in marketing regulations; (7) Perishability of horticultural produce; (8) Low price for products; (9) High marketing costs; (10) Lack of marketing centers; (11) Exploitation by middlemen; (12) High processing cost; (13) Poor product handling; (14) Lack of timely market information; (15) Overproduction
3	Financial Risk	7	(1) Inadequate credit availability; (2) Inflexible mode of repayment; (3) Limited access to bank loans; (4) Higher interest rates; (5) High demand for collateral; (6) Complicated banking procedures; (7) Costly fuels/diesel
4	Institutional Risk	6	(1) Government regulations on pesticides, regulation on import, export; (2) Changes in credit policy; (3) Government policies on land resources; (4) Poor extension to farmer linkage; (5) Poor support from Krishibhavan and government institutions; (6) Limited awareness about government policies and schemes
5	Personal Risk	2	(1) Conflicts and violence among producers; (2) Illness of family members

Risk Perception Measurement

Risk perception was measured using a structured five-point rating scale. For each of the 42 risk sources, farmers rated their perception of risk severity on the following scale:

- 1 = very low risk
- 2 = Low risk
- 3 = Moderate risk
- 4 = High risk
- 5 = Very high risk

Risk Perception Index Calculation

Risk perception was quantified through a two-stage calculation process:

Stage 1: Individual Risk Source Index

For each specific risk source, the Risk Perception Index was calculated as:

Risk Source Index = $(\Sigma \text{ Scores from all respondents in the group} / (n \times 5)) \times 100$

where:

- $\Sigma \text{ Scores}$ = Sum of risk perception scores from all respondents in that farmer group
- n = Number of respondents in the group (35)
- 5 = Maximum possible score on the rating scale

This yielded an index ranging from 20 to 100 for each risk source, where higher values indicate higher perceived severity.

Stage 2: Category-Level Mean Risk Perception Index

For each of the five risk categories, the Mean Risk Perception Index was calculated as the arithmetic mean of all individual risk source indices within that category:

Mean Category Index = (Σ All risk source indices in category) / (Number of sources in category)

Risk Category Ranking

Within each farmer group, the five risk categories were ranked from 1 (highest mean risk perception index) to 5 (lowest mean risk perception index). This ranking enabled identification of priority risk concerns for each farmer type and district.

Statistical Analysis

Descriptive statistics including mean, frequency, and percentage were computed to summarize risk perception indices. Independent samples t-tests were conducted to compare mean risk perception indices between commercial and urban farmers separately for each district.

Results and Discussion

The analysis of risk perception revealed significant variations in how different farmer categories across the two districts prioritized various risk types.

Table 2: Risk perception of young vegetable farmers

Sl No	Risk Category	Commercial Farmers				Urban Farmers			
		Alappuzha		Thiruvananthapuram		Alappuzha		Thiruvananthapuram	
		Mean Risk Perception Index	Rank	Mean Risk Perception Index	Rank	Mean Risk Perception Index	Rank	Mean Risk Perception Index	Rank
1	Production Risk	52.67	2	58.71	1	44.76	2	49.90	1
2	Market Risk	55.66	1	55.35	3	38.82	5	37.98	4
3	Personal Risk	29.43	5	35.14	5	39.71	4	30.57	5
4	Institutional Risk	40.48	4	50.95	4	45.71	1	40.29	2
5	Financial Risk	52.24	3	58.53	2	43.27	3	38.61	3

For commercial vegetable farmers in Alappuzha district, Market Risk was identified as the most pressing concern, recording the highest mean risk perception index of 55.66. This was followed closely by Production Risk at 52.67 and Financial Risk at 52.24, indicating these three risk categories dominated their concerns. Institutional Risk scored moderately at 40.48, while Personal Risk registered the lowest at 29.43.

Commercial vegetable farmers in Thiruvananthapuram district, however, showed a different risk hierarchy. Production Risk topped their concerns with an index of 58.71, closely followed by Financial Risk at 58.53, indicating these two risks were nearly equally severe. Market Risk came third at 55.35, while Institutional Risk scored 50.94. Personal Risk again ranked lowest at 35.14,

though slightly higher than commercial farmers in Alappuzha.

Urban vegetable farmers presented contrasting risk perceptions compared to commercial farmers. In Alappuzha district, urban vegetable farmers identified Institutional Risk as their primary concern with an index of 45.71. Production Risk followed at 44.76, with Financial Risk at 43.27, Personal Risk (39.71) and the lowest perceived risk category as Market Risk (38.82).

Urban vegetable farmers in Thiruvananthapuram district showed yet another pattern, with Production Risk emerging as their foremost concern at 49.90. Institutional Risk ranked second at 40.29, followed by Financial Risk at 38.61 and Market Risk at 37.98. Personal Risk was perceived as least severe at 30.57.

Table 3: Comparison of risk perception between young commercial farmers and urban farmers of alappuzha and thiruvananthapuram districts

Sl No	Risk Category	Alappuzha				Thiruvananthapuram			
		Urban Farmers (Mean)	Commercial Farmers (Mean)	t-value	df	Urban Farmers (Mean)	Commercial Farmers (Mean)	t-value	df
1	Production Risk	44.76	52.67	1.56	22	49.90	58.71	1.63	22
2	Market Risk	38.82	55.66	6.32**	28	37.98	55.35	8.16**	28
3	Personal Risk	39.71	29.43	-1.26	2.00	30.57	35.14	0.55	2
4	Institutional Risk	45.71	40.48	-1.75	10	40.29	50.95	2.87**	10
5	Financial Risk	43.27	52.24	2.91**	7.33	38.61	58.53	8.04**	7.33

Significance levels: ** $p < 0.05$, * $p < 0.1$

The analysis revealed substantial differences in market risk perception between commercial and urban farmers across both districts. Commercial vegetable farmers in Alappuzha (mean=55.66) and Thiruvananthapuram (mean=55.35) perceived considerably higher market risk compared to urban farmers (38.82 and 37.98 respectively), with t-values of 6.32 and 8.16 indicating highly significant differences. This difference can be attributed to fundamental differences in how these farmer groups engage with markets. Urban vegetable farmers have minimal market involvement, they prioritize household consumption more over income generation and when they produce surplus, they typically

distribute it among acquaintances rather than pursuing commercial sales this can be substantiated by the observation of Jacob *et al.* (2025) ^[6] that farming within urban areas frequently takes place in high-density zones, primarily serving self-sufficiency or community sharing via informal small scale farming. Their market-related concerns are largely limited to perishability, marketing costs, and low prices. In contrast, risks that concerns commercial vegetable farmers are price fluctuations, overproduction issues, and marketing expenses, as mentioned by Mehroratra (2025) ^[7] price fluctuations in cash markets represent one of the major risks encountered by farmers, which explains their

significantly higher market risk perception.

Financial Risk demonstrated significant differences between the two groups in both districts. Commercial vegetable farmers in Alappuzha (mean=52.24) perceived higher financial risk than urban vegetable farmers (43.27, $t=2.91$), with this gap widening further in Thiruvananthapuram between commercial farmers (58.53) and urban farmers (38.61, $t=8.04$). This pattern reflects the reality that commercial farming demands substantial capital investments in inputs, infrastructure, and operational costs, whereas urban farmers can operate with considerably smaller financial outlays compared to urban vegetable farmers, but financial risk still is a significant risk category with a ranking of 3 for urban farmers of both the district. Cabannes (2012) [8] likewise pointed out that scarce financial resources continue to pose a significant barrier for small-scale urban cultivators. Urban vegetable farmers in Alappuzha reported higher financial risk perception than urban farmers in Thiruvananthapuram district, which can be associated with the fact that majority of urban vegetable farmers in Thiruvananthapuram are in high income category when compared to urban farmers from Alappuzha. Also, commercial vegetable farmers in Thiruvananthapuram reported highest financial risk perception due to delayed availability of subsidies and crop insurance, combined with other financial challenges including high collateral requirements and complex banking procedures.

Production Risk showed no statistically significant differences between farmer categories in either district (Alappuzha: $t=1.56$; Thiruvananthapuram: $t=1.63$), although commercial vegetable farmers in Alappuzha and Thiruvananthapuram recorded moderately higher mean values, 52.67 and 58.71 respectively when compared to urban vegetable farmers in Alappuzha and Thiruvananthapuram with mean values of 44.76 and 49.90 respectively. This finding suggests that production-related challenges, including climate variability, pest infestations, and access to quality inputs, affect both farming groups with comparable intensity, regardless of their scale of operation, as mentioned by Patrick (1998) [9] that production risk represents the inherent unpredictability and variation that exists in agricultural production activities.

Institutional Risk exhibited distinct district-specific patterns. In Alappuzha, no significant difference emerged between commercial vegetable (40.48) and urban vegetable farmers (45.71, $t=-1.75$), with urban vegetable farmers actually reporting higher institutional risk. This high perception among urban vegetable farmers results from their experience of receiving minimal support from government agricultural extension services, particularly Krishibhavan, and having weak extension-to-farmer linkages. In Thiruvananthapuram, commercial vegetable farmers reported significantly higher institutional risk (50.95) compared to urban vegetable farmers (40.29, $t=2.87$), primarily due to inadequate Krishibhavan support, limited awareness of available policies and schemes, and delays in subsidy disbursement. These patterns indicate that institutional inadequacies manifest differently depending on farmer type and local administrative capacity. This finding is substantiated by the findings of Thomas and Eljo (2018) [10], who identified several key challenges hampering Krishibhavan's effectiveness, including limited time

available for extension services, delays in fund allocation, frequent staff transfers, poor quality of seeds and planting materials distributed to farmers, and insufficient data availability for planning and program development.

Personal Risk perception showed no significant differences between farmer types in either district (Alappuzha: $t=-1.26$; Thiruvananthapuram: $t=0.55$). Given that personal risk primarily encompassed respondent health and conflicts among fellow farmers, and considering that the study focused on young farmers within similar age groups, personal risk remained consistently low across both farming categories.

Conclusion

This study shows that risk perception in vegetable farming varies greatly depending on the type of farmer and their location. Due to their large investments and direct reliance on the market, commercial vegetable farmers in both districts expressed more concern about market and financial risks, whereas urban vegetable farmers gave institutional risks resulting from poor extension support and limited access to government services top priority. However, production risk turned out to be a universal issue that affected both farmer categories equally, emphasizing the inherent risks in agricultural production regardless of farming scale.

The study's differential risk profiles highlight the necessity of avoiding generic strategies for agricultural development. Instead of assuming uniform risk experiences across the agricultural sector, effective interventions must be customized to both farmer type and regional context. Commercial vegetable farmers would benefit most from market stabilization mechanisms, improved credit access, and strengthened institutional support for subsidy delivery and policy awareness. Urban vegetable farmers, conversely, require production technology transfer, capacity building, and inclusive extension coverage that recognizes their distinct needs and farming practices.

Furthermore, the district-level variations observed in institutional risk perception highlight the importance of localized implementation of agricultural support programs. Extension services and institutional mechanisms must be adapted to serve diverse farmer categories while accounting for regional administrative capacities and local contexts.

In order to create more resilient and sustainable agricultural systems, policymakers and agricultural development organizations must identify these differential vulnerabilities and create focused strategies that address the distinctive challenges that each farming community faces.

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