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Risk perceptions and management practices adopted by vegetable farmers in South Gujarat

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Abstract

Vegetable growers face different types of risks like pests and diseases, weeds, poor quality of inputs, natural calamities, price fluctuations, inadequate demand forecasting, lack of infrastructural facilities, lack of capital, change in government policies, etc. These risks directly affect the yield and net income of farmers. To tackle these agriculture risks, individual farmers and governments adopt various management strategies to eliminate or partly reduce the effects of factors creating risk in agriculture. The study examined the sources of risk and management strategies among vegetable farmers in South Gujarat. Study indicated that pests and diseases, weather, damage by animals, erratic rainfall, yield variations, and labour unavailability and cost are considered major risk sources by vegetable farmers. Vegetable farmers mainly adopt risk mitigation and coping strategies such as pest and disease management, use of family labour, improved inputs, crop and enterprise diversification, and use of market information. However, farmers' adoption of formal risk management approaches such as crop insurance, personal insurance, use of formal credit, and government schemes and subsidies were found to be low. Applying low-risk technologies, diversification, agricultural insurance, hedging, contracting, information support, effective use of natural resources and professional training can play an increasingly important role in the risk management of the farmers.

Keywords: Risk, management, sources of risk, agriculture, strategies, perception

Introduction

The Indian agricultural sector is exposed to a variety of risks which are highly risky and uncertain, right from the field to the market. These risks are controllable, uncontrollable, biological and man-made. Some of the sources of risks and uncertainties are pests and diseases, weeds, poor quality of inputs, natural calamities, price fluctuations, inadequate demand forecasting, lack of infrastructural facilities, lack of capital, change in government policies etc. These events forces farmers to take decisions under predictable and unpredictable situations. Agricultural risks are categorized into production, market and financial risk (Boehlje and Eidman, 1984) [4]. These risks directly affect the yield and net income of farmers, thereby affecting the equity, efficiency and sustainability in agriculture (Yang, 2010) [15]. This fluctuating yield and price also aid in increasing the input costs and enlarge the yield gap which further increases the income risk among farmers (Akcaoz and Ozkan B., 2005) [1].

To tackle these risks of agriculture, individual farmers and governments adopt various management strategies. Different management strategies have different types of effects on production and the income of the farmers. Risk management strategies are the methods applied by the farmers to eliminate or partly reduce the effects of factors creating risk in agriculture. To cope and survive in the agricultural production process, it is necessary to use risk coping strategies. The selection of risk management strategies depends on the geographical, financial and economic conditions and risk behaviour of farmers (Akcaoz and Ozkan B., 2005) [1]. Risk coping strategies are classified into formal and informal to deal with production, market and financial risks. Formal risk management strategy includes formal documented policies by the government for risk management like crop insurance. Informal risk coping mechanisms used by farmers in the production process are risk smoothening and risk pooling mechanisms. Informal risks are further divided into ex-ante and ex-post risk coping strategies, where the ex-ante coping mechanism refers to the risk avoidance strategies that the farmers take during the production process before the occurrence of risk, which mainly includes crop diversification, inter-cropping or mixed cropping. Ex-post informal strategies are the risk coping measurements applied by an individual after the occurrence of risks, which mainly include consumption smoothing and asset smoothing mechanisms (Lipton,1989) [7]. The risk management strategy is also classified into production, marketing and financial risk management

strategies (Hardaker,2004 and Moss,2010) [5, 9]. Production and market strategy deal with production and market related risk, while financial strategy deals with finance related risk. Production strategies reduce risk by reducing variability in yield, whereas market response reduces the market fluctuation by narrowing the price fluctuations in the market. Financial risk can be reduced by transferring risk to others or providing financial assistance during financial requirements (Patrick,1998) [12]. The risk perceptions of farmers influence their risk-taking behavior. Hence a comprehension of farmers' risk perceptions is important in helping farmers make better and informed decisions relating to the risky agriculture businesses (Asravor,2018) [2].

Fruits and vegetables account for nearly 90 percent of the total horticulture production in the country. The vegetable sector is a driving force in stimulating the Indian economy and the most profitable venture of all farming activities as it provides ample employment opportunities and scope to raise the income of the farming community. It also has tremendous potential to push the overall agriculture growth. Vegetable growers face different types of risks like pests and diseases, weeds, poor quality of inputs, natural calamities, price fluctuations, inadequate demand forecasting, lack of infrastructural facilities, lack of capital, change in government policies, etc. So, the present study focuses on the identification and analysis of risk sources and the risk management strategies adopted by the vegetable farmers of South Gujarat.

Objectives of the study

1. To study the socio-economic and personal characteristics of the vegetable farmers
2. To identify the major sources of risk in vegetable production as perceived by vegetable farmers
3. To analyze the risk management practices adopted by vegetable farmers

Methodology

Multi stage sampling method was used. Three districts of South Gujarat i.e. Surat, Navsari and Tapi were selected purposively as having highest area under vegetable cultivation. Talukas, villages and 100 farmers from each district were selected randomly thus making a total sample size of 300 vegetable farmers.

Information and data on the socio-economic characteristics of the farmers were analyzed using simple descriptive statistics. Respondents' Perceptions of various sources of risk and adoption of risk management strategies were collected through personal interviews on a pre-structured schedule. For assessing the respondents' perception regarding various sources of risk the respondents were asked to elucidate their perception about each source of risk and rate the risk management tools as per their importance on a 5-point Likert type scale (irrelevant-1, somewhat irrelevant-2, neutral-3, somewhat relevant-4 and relevant-5) and accordingly based on selected statements a scale was prepared. Simple descriptive statistics and tabular analysis were used for analysis.

Results and Discussion

The demographic characteristics of the respondents *viz.*, gender, age, education, occupation, family size, farm size, size of landholding under vegetable farming, and annual income affect the risk management practices followed by vegetable farmers of South Gujarat to a considerable extent.

It can be observed from Table 1 that 70.67 percent of the respondents were male members who were handling all the farm operations and 29.33 percent of the respondents were females who owned and handled the farm. It was observed that 41.67 percent of the respondents belonged to age group (between 41-50 years) followed by 30 percent between the ages of 31-40 years, 13.33 percent belonged to the age group of 51-60 years, 7.67 percent belonged to the age group of greater than 60 years, only 7.33 percent belonged to the age group of 20-30 years. It is important to note that the educational status of respondents plays an important role in the adoption of various risk management practices. The highest percentage of the respondents were educated up to matric level (49.33%) followed by primary level (17%), post-graduate level (13.67%), illiterate (13.33%), graduate level (6%), and very few were having professional education (0.67%). It can be seen from the results that the majority of the respondents had farming as a main occupation (75%) and the remaining (25%) had farming as well as livestock as secondary occupation. The average family size of the respondents was 4.23 members.

Most of the respondents had land between 1-2.5 acres (39%), followed by 32 percent had between 2.5-5 acres, 17 percent between 5-10 acres, 9 percent had land below 1 acre and only 3 percent had above 10 acres of land under farming operations. The highest (45.67) respondents had below 1 acre of land under vegetable farming followed by 32.67 percent had between 1-2.5 acres of land, 8.33 percent between 2.5-5 acres of land, 7 percent between 5-10 acres, and 6.33 per cent above 10 acres land under vegetable farming. The average farming experience of these farmers was 12.15 years and the experience of vegetable farming was 8.68 years. Besides this majority 61.67 percent of the respondents were earning annual income from vegetable farming below 1.5 lakhs, followed by 37.67 percent of farmers who earned 1.5-3 lakhs annually, and only 0.66 percent earned 3-5 lakhs from vegetable farming annually.

Table 1: Socio-economic characteristics of vegetable farmers

	Frequency	Percent
Gender		
Male	212	70.67
Female	88	29.33
Total	300	100
Age		
20-30 years	22	7.33
31-40 years	90	30
41 -50 years	125	41.67

51-60 years	40	13.33
Greater than 60 years	23	7.67
Total	300	100
Education		
Illiterate	40	13.33
Primary	51	17
Matric	148	49.33
Graduate	18	6
Post graduate	41	13.67
Professional	2	0.67
Total	300	100
Occupation		
Main	225	75
Secondary	75	25
Total	300	100
Average Family Size (nos.)		
4.23		
Farm size (in Acres)		
Below 1 acres	27	9
Between 1-2.5 acres	117	39
Between 2.5-5 acres	96	32
Between 5-10 acres	51	17
Above 10 acres	9	3
Total	300	100
Land under vegetable farming (in Acres)		
Below 1 acres	137	45.67
Between 1-2.5 acres	98	32.67
Between 2.5-5 acres	25	8.33
Between 5-10 acres	21	7
Above 10 acres	19	6.33
Total	300	100
Farming experience (in years) (Average)		
12.15		
Experience in vegetable farming (in years) (Average)		
8.68		
Annual income from vegetable farming		
Below 1.5 lakh	185	61.67
1.5 - 3 lakh	113	37.67
3 – 5 lakh	2	0.66
Above 5 lakh	0	0
Total	300	100

Risk attitude and perceptions play an important role in shaping farmers' decisions regarding farm operations and management of exposed risks [6]. The results of sources of risk as perceived by vegetable farmers of South Gujarat are shown in Table 2. Sources of risks were categorized in three major categories production risks, marketing risks, and financial/institutional risks. In production risks, the most important sources of risk found were diseases with a mean score of 4.98 followed by pests and rodents with a mean score of 4.78, bad weather conditions or situations with a mean score of 4.54, damage by animals (4.50), excess rainfall (4.34), yield variability (3.69), poor availability and high cost of labour (2.79) and some least important sources of risks related to production were found to be theft (1.42) followed by an unexpected rise in input prices (1.47), post-harvest losses at farm level (1.92), etc.

While sources of risks as perceived by vegetable farming related to marketing of the produce, results revealed that the most important source of risk was price fluctuation (3.36) followed by market failure (2.62), lack of alternative market (2.53), changes in consumer preferences (2.51) and fluctuating input prices (2.38) and the least important sources of risks as perceived by vegetable growers related to marketing were distant location of markets (1.86) followed by scattered sales (1.98), transportation problems (2.02) etc. These findings are in line with Moges *et al*.(2022) [8]

Besides production and marketing risks farmers were also facing risks related to finance as the majority of the farmers were small and marginal having low financial capacity to mitigate the farming risks. Regards to financial/institutional sources of risks, the most important source of risk was changes in government agricultural policies (2.03) followed by lack of savings (1.98), unavailability of institutional credit (1.90), changes in subsidies and government support (1.65) and borrowed cash or kind (1.35) faced by vegetable growers of South Gujarat.

While overall ranking of various sources of risks as perceived by vegetable farmers, the most important source of risk was diseases ranked first followed by pests and rodents ranked second, bad weather conditions or situation ranked third, damage by animals ranked fourth, too much rainfall/flood ranked fifth etc.

Table 2: Sources of risk as perceived by Vegetable farmers

Sources of Risk	R	SR	N	SI	I	CS	Mean	Rank in category	Overall Rank
Production									
Pest &Rodents	233(1165)	67(268)	0(0)	0(0)	0(0)	1433	4.78	2	2
Diseases	294(1470)	6(24)	0(0)	0(0)	0(0)	1494	4.98	1	1
Drought	3(15)	150(600)	1(3)	2(4)	144(144)	766	2.55	8	10
Too Much rainfall/flood	144(720)	140(560)	2(6)	2(4)	12(12)	1302	4.34	5	5
Fire incidence	3(15)	11(44)	139(417)	8(16)	139(139)	631	2.10	13	17
Bad weather condition	211(1055)	72(288)	0(0)	2(4)	15(15)	1362	4.54	3	3
Theft	3(15)	15(60)	10(30)	50(100)	222(222)	427	1.42	16	27
Damage by animals	209(1045)	64(256)	11(33)	1(2)	15(15)	1351	4.50	4	4
Poor availability and high cost of labour	63(315)	32(128)	60(180)	69(138)	76(76)	837	2.79	7	8
Inadequate family labour	11(55)	110(440)	5(15)	70(140)	104(104)	754	2.51	10	13
Change in labour cost	13(65)	50(200)	61(183)	78(156)	98(98)	702	2.34	11	15
Yield variability	3(15)	222(888)	61(183)	7(14)	7(7)	1107	3.69	6	6
Unavailability of inputs	70(350)	51(204)	1(3)	20(40)	158(158)	755	2.52	9	12
Unexpected rise in input prices	9(45)	11(44)	11(33)	50(100)	219(219)	441	1.47	15	26
Post Harvest Losses at farm level	1(5)	59(236)	13(39)	68(136)	159(159)	575	1.92	14	22
Sophisticated technology	50(250)	23(92)	3(9)	68(136)	156(156)	643	2.14	12	15
Marketing									
Changes in consumer preferences	59(295)	1(4)	73(219)	69(138)	98(98)	754	2.51	4	13
Market Failure	15(75)	57(228)	89(267)	77(154)	62(62)	786	2.62	2	9
Lack of alternative markets	23(115)	129(516)	8(24)	14(28)	76(76)	759	2.53	3	11
Price fluctuations	73(365)	129(516)	8(24)	14(28)	76(76)	1009	3.36	1	7
Fluctuating input prices	13(65)	87(348)	50(150)	2(4)	148(148)	715	2.38	5	14
Middlemen's dominance	17(85)	56(224)	3(9)	76(152)	148(148)	618	2.06	7	18
Transportation problems	64(320)	9(36)	9(27)	4(8)	214(214)	605	2.02	8	19
Distant location of markets	23(115)	2(8)	50(150)	60(120)	165(165)	558	1.86	10	24
Lack of storage	63(315)	8(32)	2(6)	70(140)	157(157)	650	2.17	6	16
Scattered sales	23(115)	0(0)	2(6)	199(398)	76(76)	595	1.98	9	21
Financial/Institutional									
Changes in Government agricultural policies	0(0)	11(44)	59(177)	157(314)	73(73)	608	2.03	1	20
Changes in subsidies and govt. support	1(5)	0(0)	31(93)	130(260)	138(138)	496	1.65	4	25
Lack of savings	0(0)	9(36)	122(366)	23(46)	146(146)	594	1.98	2	21
Borrowed cash or kind	0(0)	0(0)	13(39)	80(160)	207(207)	406	1.35	5	28
Unavailability of institutional credit	0(0)	11(44)	111(333)	16(32)	162(162)	571	1.90	3	23

Mean = Cumulative Score (CS) / Total No. of Respondent (300)
Score = Maximum Scale × No. of Respondent (irrelevant-1, somewhat irrelevant-2, neutral-3, somewhat relevant-4 and relevant-5)

Table 3: Distribution of vegetable farmers based on their Risk perception

Category	Frequency	Percentage
Low (less than 2.17)	66	22.00
Moderate (2.18 to 3.05)	161	53.66
High (3.06 to 5.0)	73	24.33
Total	300	100

Based on the overall mean score (2.61) and standard deviation (0.44) of risk perception, vegetable farmers were classified into three classes having Low, Medium, and High-risk perception as mentioned in Table 3. 53.66 percent of farmers had moderate risk perception while 24.33 farmers perceived high risk and 22 percent farmers perceived low risk, respectively. It indicated that farmers in the study area are affected by the production risk, financial risk, market or price risk.

Management of risk requires knowledge of the most crucial risk being faced, identifying the impacts and likelihood of undesirable results; and taking possible steps to mitigate impacts. Risk management practices followed by vegetable farmers of South Gujarat are presented in Table 4. From the results in can be concluded that the most important risk management practices were pest and disease management with the highest mean score of 4.63 and use of family labour with a mean score of 4.63 ranked first followed by used improved inputs (4.25) ranked second, use of market information (4.10) ranked third, crop diversification and intercropping/mixed farming (4.05) ranked fourth, enterprise diversification (Apiculture/Poultry/Dairy, etc.) (4.04) ranked fifth.(Ortmann *et al*,1992) [11]. There is a strong tendency on the part of the farmers to mitigate the production risks at the farm level by adopting appropriate measures (Bardhan *et al*,2006, Shukla *et al*., 2019) [3, 14]

While crop insurance (2.65), selection of crop varieties with less price variability (2.54) and yield variability (2.50), personal insurance (2.50), taking benefit of government schemes (2.34), use of credit (2.10), spreading sales over time (2.07) and advice from extension agents (1.86) were least considered risk management practices by vegetable farmers of South Gujarat. This implies that farmers use prevention, diversification, mitigation, and coping risk management strategies in the study area to avert risk.

Table 4: Risk management practices followed by vegetable farmers

Risk Management Strategies	R	SR	N	SI	I	CS	Mean	Rank
Spread sales over time	49(245)	10(40)	0(0)	96(192)	145(145)	622	2.07	19
Choose crop varieties with lower price variability	9(45)	97(388)	37(111)	62(124)	95(95)	763	2.54	15
Choose crop varieties with lower yield variability	0(0)	101(404)	46(138)	101(202)	52(52)	749	2.50	16
Pest and disease management	200(1000)	90(360)	9(27)	0(0)	1(1)	1388	4.63	1
Store feed or seed or crop reserves	2(10)	145(580)	104(312)	49(98)	0(0)	1000	3.33	7
Crop diversification and inter cropping/mixed farming	132(660)	63(252)	95(285)	9(18)	1(1)	1216	4.05	4
Used improved inputs	94(470)	196(784)	1(3)	9(18)	0(0)	1275	4.25	2
Crop/farm insurance	0(0)	64(256)	103(309)	98(196)	35(35)	796	2.65	14
Use of organic/natural inputs	135(675)	43(172)	18(54)	103(206)	1(1)	1108	3.69	6
Use of family labour	227(1135)	54(216)	0(0)	19(38)	0(0)	1389	4.63	1
Keep farm records	58(290)	0(0)	176(528)	63(126)	3(3)	947	3.16	9
Use improved PHM practices	0(0)	103(412)	87(261)	109(218)	1(1)	892	2.97	11
Adoption of new technologies	87(435)	52(208)	17(51)	143(286)	1(1)	981	3.27	8
Use weather advisories	36(180)	87(348)	58(174)	11(22)	108(108)	832	2.77	13
Take benefit of various Govt. schemes	8(40)	9(36)	145(435)	52(104)	86(86)	701	2.34	17
Personal insurance	83(415)	22(88)	1(3)	49(98)	145(145)	749	2.50	16
Save income in banks	41(205)	92(368)	8(24)	93(186)	66(66)	849	2.83	12
Use of credit	13(65)	3(12)	90(270)	90(180)	104(104)	631	2.10	18
Work off-farm for supplement income	14(70)	143(572)	52(156)	91(182)	0(0)	980	3.27	8
Enterprise diversification	46(230)	233(932)	9(27)	10(20)	2(2)	1211	4.04	5
Use market information	138(690)	58(232)	102(306)	0(0)	2(2)	1230	4.10	3
Access various market channels	125(625)	11(44)	112(336)	51(102)	1(1)	1108	3.69	6
Association with cooperatives/FPOs/SHGs etc.	131(655)	1(4)	2(6)	73(146)	93(93)	904	3.01	10
Make value added products/processing	51(255)	0(0)	1(3)	245(490)	3(3)	751	2.50	16
Advice from extension agents/KVKs/SAUs	0(0)	1(4)	52(156)	150(300)	97(97)	557	1.86	20

Mean = Cumulative Score (CS) / Total No. of Respondent (300)
Score = Maximum Scale × No. of Respondent (irrelevant-1, somewhat irrelevant-2, neutral-3, somewhat relevant-4 and relevant-5)

Table 5: Distribution of vegetable farmers based on their adoption of Risk management practices

Category	Frequency	Percentage
Low (<2.80)	61	20.33
Moderate(2.80 to 3.50)	199	66.33
High (3.50 to 5.00)	40	13.33
Total	300	100

Based on the overall mean score (3.15) and standard deviation (0.35) the vegetable farmers were classified into three classes based on their adoption of risk management practices High, Medium, and Low as mentioned in Table 5. Table 5 suggests that only 13.33 percent of vegetable farmers had a high level of adoption and understanding of risk management practices, while 66.33 percent of farmers had a moderate and 20.33 percent of farmers had a low level of adoption of risk management practices. These findings were in line with Bardhan *et al*, 2006 [3] and Senapati,2020 [13].

Conclusion

The study examined the sources of risk and management strategies among vegetable farmers in South Gujarat. The study showed that farmers in the study area are affected by production risk, financial risk, market or price risk, and technological risk sources. Study indicates that pests and diseases, weather, damage by animals, erratic rainfall, yield variations, and labour unavailability and cost are considered major risk sources by vegetable farmers. Vegetable farmers mainly adopt risk mitigation and coping strategies such as pest and disease management, use of family labour, improved inputs, crop and enterprise diversification, and use of market information. However, farmers' adoption of formal risk management approaches such as crop insurance, personal insurance, use of formal credit, and government schemes and subsidies was found to be low. Consequently, their effective use depends not only on farmers but on the institutional interventions for awareness and effective implementation. It is important to increase the penetration of crop insurance in agriculture. There is a necessity to create an awareness among the farmers to enable them to develop a progressive attitude responsive to improved agricultural techniques. Applying low-risk technologies, diversification, agricultural insurances, hedging, contracting, information support, effective use of natural resources and professional training can play an increasingly important role in the risk management of the farmers. There is a need for a holistic approach to bring farm stability and profitability through the effective use of natural resources, effective use of government programs, and skillful management.

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