4

Results and Discussion

The results and discussion on the study entitled **"Agricultural Marketing Behaviour and Practices of Rural Farmers in Dibrugarh District, Assam"** have been summarized under the following sub-headings:

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4.1.2 Information on Family Background of the Farmers

4.2 FARMING RESOURCES UTILIZED BY THE FARMERS

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4.7 SUGGESTIONS OFFERED BY FARMERS TO OVERCOME BARRIERS IN VEGETABLE MARKETING

4.8 IMPACT OF EDUCATIONAL AWARENESS ON AGRICULTURAL MARKETING

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4.8.2 Impact of Educational Awareness on Farmers' Opinion on Agricultural Marketing

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4.8.4 Impact of Educational Awareness on Farmers' Knowledge, Opinion and Marketing Behaviour level Before and After the Awareness Programme

4.1 GENERAL PROFILE OF THE FARMERS

4.1.1 Socio-Economic characteristics of the Farmers

The socio-economic characteristics of farmers encompass a wide array of factors aimed at identifying individuals who influence their livelihoods through internal characteristics such as age, gender, caste, religion, educational qualifications and marital status and experience of farming as presented in Table X.

TABLE X

SOCIO-ECONOMIC CHARACTERISTICS OF THE FARMERS

S. no.	Characteristics	Categories	N=600	
			F	%
1	Age (Years)	Less than 35 (Young)	116	19
		35-55 (Middle)	243	41
		Above 55 (Old)	241	40
2	Gender	Male	399	66
		Female	201	34
3	Caste	General	186	31
		OBC	224	37
		MOBC	34	6
		SC	68	11
		ST	88	15
4	Religion	Hindu	494	82
		Muslim	105	18
5	Educational Qualification	Illiterate	5	1
		Primary school education (grade I to V)	27	4
		Middle school education (VI to VIII)	37	6
		High school education (IX to X)	244	40
		Higher secondary education (XI to XII)	265	44
		Under Graduation	22	4
6	Marital Status	Married	558	93
		Unmarried	38	6
		Divorced	1	.2
		Widowed	3	.5
7	Experience of Farming	0-5 years	48	8
		5-10 years	86	14
		10-15 years	306	51
		Above 15 years	160	27

Age is a crucial factor in understanding individuals' perspectives on specific issues, as greater age often signifies a higher level of maturity (Singh et al., 2021). The data presented in the table X shows that forty-one percent of the farmers belong to the age group between (35-55) years and nineteen percent belong to the age group less than 35 years. Similar findings were also reported by (Mishra & Ghadei, 2015) as they informed that middle-aged farmers were experienced and had good management practices. Promoting agricultural entrepreneurship, modern techniques and financial incentives can attract the younger generation and ensure sustainability in agriculture.

Gender pertains to the roles and behaviours that society assigns to men and women, reflecting the social interpretation of biological differences in sex (Joshi & Kalauni, 2018). The data indicates that sixty-six percent of the farmers are male and only thirty-four percent are female. Similar findings were noted by (Ghosh et al., 2020). This highlights a gender inclusivity issue in agriculture, influenced by socio-cultural factors and specific barriers. Traditional roles assign outdoor farming tasks to men, while women typically handle household duties. Promoting greater female involvement in farming could enhance diversity in the agricultural sector.

Caste is a fixed social stratification that divides society into higher and lower categories (Bharti et al., 2022). Thirty-seven percent of the farmers belong to the Other Backward Class (OBC) category and the presence of More Other Backward Classes (MOBC) consists of only six percent, which signifies the existence of additional subgroups within the OBC community.

Religions are an individual's beliefs, practices and values that often involve worshiping a higher power or deity. The majority (82%) of the farmers identified as Hindu, while eighteen percent belonged to the Muslim religion.

Education facilitates learning and acquiring knowledge, skills, values, beliefs and habits. It thus refers to the level of formal education obtained by the farmers. Forty-four percent of the farmers have completed higher secondary education and one percent of the farmers were illiterate. Promoting higher education opportunities could lead to a more skilled and knowledgeable farming community and sustainable agricultural practices. The results were in accordance with Sindhura et al. (2022).

Marital status denotes an individual's legal relationship. It significantly influences farmers' willingness to pursue knowledge related to farming. The data shows that 93 % of the farmers were married, while six percent were unmarried.

Years of experience in farming refers to the total number of years an individual has actively engaged in agricultural work and other farming practices. It highlights that fifty-one percent of the farmers have experienced 10-15 years and at least eight percent have experienced less than five years. A possible explanation for this trend could be that vegetable cultivation provides a steady income throughout the season (Nayak & Banerjee, 2022).

4.1.2 Information on Family Background of the Farmers

The family background information of the farmers refers to the socio-economic, cultural and historical context that surrounds the family engaged in farming activities, which are displayed in Table XI.

TABLE XI

INFORMATION ON FAMILY BACKGROUND

S. No.	Family Background	Categories	N=600	
			F	%
1	Type of Family	Nuclear	402	67
		Joint family	198	33
2	Family Size	2-3 (small)	28	5
		4-5 (Medium)	374	62
		6 & above (Large)	198	33
3	Head of the Family	Father	362	60
		Mother	34	6
		Husband	196	33
		Grandfather	6	1
		Grandmother	2	.3
4	Nature of Occupation	Agriculture	483	81
		Agriculture + Business	36	6
		Agriculture + Agricultural labourer	78	13
		Agriculture + Services	2	.3
5	No. of Family Members engaged in Cultivation	1	32	5
		2	345	58
		3	132	22
		4 & above	91	15
6	Annual Income of the family (Rs)	Less than 50,000 (Low income)	143	24
		50,000 – 1 lakh (Middle income)	353	59
		Above 1 lakh (High income)	104	17

The data reveals that sixty seven percent of farmers belong to nuclear families, indicating an individualistic approach to farming decisions. Type of family refers to the structure of a household, typically classified by the relationships between its members, while thirty-three percent are part of joint families, potentially implying shared decision-making processes. The finding is in conformity with the results of Nayak and Banerjee (2022).

Family size is the total number of individuals living in a farmer's household, typically including the farmer, their spouse, children and any other dependents or relatives residing with them. The data on family size of the farmers highlights that sixty two percent of the farmers family consist of 4-5 family members which is classified as medium size and five percent of the farmers family size consist of 2- 3 family members which is categorized as small.

The head of the family is the primary authority and decision-maker within a household who is often responsible for managing family affairs, making key decisions and providing financial and emotional support. The data showcased that sixty percent of the farmer's father is the head of the family due to the traditional pattern of generational succession, where the father typically serves as the head of the family and passes down leadership roles and responsibilities to the next generation and least one percent of the farmers head of the family is grandfather as older farmers may still be actively involved in farming operations.

An occupation is a person's work situation in a specific field, where they apply distinct skills aligned with their interests to contribute to that area (Bharti et al., 2022). Majority (81%) of farmers considered their nature of occupation as agriculture, reaffirming its central role in their livelihoods and less than one percent occupation is combination of agriculture with services like government teachers.

The number of family members is the total number of individuals in a household, typically including parents, children and other relatives. More than half, i.e., fifty-eight percent, of the farmer's family involve two members in farming, which reflects the collaborative nature of farming within family units and five percent of the farmer's family were the sole members in farming.

Annual income is the total sum of money that farmers generate from their agricultural activities over a year. Fifty-nine percent of the farmers earned Rs 50,000- 1

lakh annually, considered middle income and twenty-four percent earned less than Rs 50,000, considered low income. Farmers who have better access to organized markets may fetch higher prices for their produce and farmers lacking access to such channels may be forced to sell their produce at lower prices, resulting in a low-income status.

4.2 FARMING RESOURCES UTILIZED BY THE FARMERS

4.2.1 Land details of the Farmers

The hectare of land owned by an individual can influence their adoption of innovations and play a key role in shaping their decision-making and risk-taking abilities. The land-related details of the farmers, such as land ownership, size of land, type of land and soil, are explained in Table XII.

TABLE XII

LAND DETAILS OF THE FARMERS

Sl. No.	Particulars	Land Details	N=600	
			F	%
1	Ownership of land	Owned	576	96
		Leased	23	4
2	Size of Land (Ministry of Agriculture & Farmers Welfare, 2019)	Marginal Farmers (0.4-1 Ha)	62	10
		Small Farmers (1-2 Ha)	256	43
		Medium Farmers (2-3 Ha)	155	26
		Large Farmers (3-4 Ha)	85	14
		Very Large Farmers (Above 4 Ha)	42	7
3	Type of land	Arable	600	100
4	Type of soil	Alluvial	600	100

The data revealed that 96% of the farmers owned land while four percent leased in land. Land ownership is the legal right that farmers hold over cultivating land. Land ownership is an institutional factor significantly impacting farmers' willingness to invest in farmland (Akber et al., 2024). Land ownership gives farmers socio-economic stability and security. Farmers who lease land often encounter instability because their agricultural practices are temporary and they have limited access to capital.

Size of land is the total area of land that a farmer owns and operates for agricultural purposes. The size of the farmers' land depicts that forty-three percent had land of about (1-2 Ha), classifying them as small farmers and seven percent possessed land above (>4 Ha), identifying them as very large farmers. The data shows a diverse distribution of land sizes among the farmers. This diversity in landholdings can lead to varied agricultural practices depending on the land's size and capabilities, which influence the type of crops grown, farming methods employed and overall agricultural productivity. Khan et al., (2020) have also reported similar findings. The other reason may be the fragmentation of the holdings due to the nuclear family system (Mahajan, 2016) agreed with (Mishra & Ghadei, 2015).

Land is classified based on its usage, such as agricultural (e.g., salitoli, lahitoli, etc.) homestead (basti, residential site-I/II) etc (Govt. of Assam, 2024). Cent percent of the farmers reported having arable land as a subtype of agricultural land and cent percent of the farmers reported that the soil type as alluvial soil. Arable land is suitable for growing crops that are regularly cultivated and alluvial soil is rich in nutrients, making it highly favourable for a wide range of crops, including good drainage and moisture retention. These land and soil characteristics can influence the types of crops grown and the agricultural practices employed in the region.

4.2.2 Daily Work Schedule of the Farmers

The Farmers' Daily Work Schedule is the typical routine and activities that farmers engage in on a daily basis at specific times. The Participatory Rural Appraisal (PRA) technique gathers data on the daily work schedules of rural men and women farmers as they share their routines from early morning to late evening. These schedules often include planting, harvesting, household chores, livestock care and other activities carried out in a day. The daily work schedule of the farmers is displayed in Table XIII.

The data highlights cent percent of both men and women farmers wake up between 4:00 and 4:30 am. From 4:30 to 5:30 am, a majority (75%) of male farmers focus on harvesting crops, while cent percent of women clean their homes. From 5:30 to 6:30 am, the majority of the men (75%) assembling the crops, while 88 % of women tend to do household tasks.

TABLE XIII

DAILY WORK SCHEDULE OF THE FARMERS

Time	N= 399			N=201		
	Men Farmers			Women Farmers		
	Activities	F	%	Activities	F	%
4:00-4:30 am	Wake up	399	100	Wake up	201	100
4:30-5:30 am	Harvesting vegetables	301	75	Cleaning the House	201	100
5:30-6:30 am	Assembling the crops	299	75	Household activities	176	88
6:30 -7:00 am	Take bath	310	78	Take bath	201	100
7:00- 8:00 am	Drinking tea and eating breakfast	399	100	Kitchen work, Drinking tea and eating breakfast	201	100
8:00-12:00 pm	Daily labour (field work)	377	94	Daily labour (field work)	198	98
12:00- 12:30 pm	Feeding animals	299	75	Kitchen work	122	61
12:30-1:00 pm	Lunch	399	100	Lunch	201	100
1:00 – 4:00 pm	Selling agricultural produce at the market	246	62	Daily labour & Milching from cow	111	55
4:00- 4:30 pm	Irrigating crops	85	21	Rest	113	56
4:30-5:00 pm	Informal talks with the village people	266	67	House hold activities	179	89
5:30 – 6:00 pm	Family time and Leisure activities	306	77	Family time and Leisure activities	201	100
6:00- 7:30 pm	Feeding animals	299	75	Kitchen work	196	98
7:30- 8:00 pm	Dinner	399	100	Dinner	201	100
8:00 –9:00 pm	Sleep	399	100	Sleep	201	100

***Multiresponse*

From 6:30 to 7:00 am, 78% of men and cent percent of women farmers take a bath. Between 7:00 and 8:00 am, both men and women share breakfast. From 8:00 am to 12:00 pm, 94% of men and 98% of women farmers engage in daily labour, including tasks like preparing the soil for cultivation, sowing and applying manure. After fieldwork, 75% of men farmers feed animals (cattle and goats), while sixty-one percent of women focus on kitchen duties from 12:00 to 12:30 pm. Both men and women farmers typically have lunch together from 12:30 to 1:00 pm.

After lunch, sixty-two percent of men farmers go to the market to sell vegetables, while 55% of women continue with daily labour and mulching cows. Between 4:00 and 4:30 pm, 21% of men irrigating the crops, while 56% of women rest. During the 4:30 to 5:00 pm slot, 67% of men farmers informally talk with the villagers, whereas 89% of women farmers are busy with household activities. From 5:30 to 6:00 pm, men farmers (77%) and all women participate in informal discussions with their families.

Between (6:00 -7:30) pm, 75% of men feed animals, while 98% of women do kitchen work. Both men and women have their meals together from 7:30 to 8:00 pm and sleep from around 8:00 to 9:00 pm.

The distinct daily routines of rural men and women indicate that men are more involved in outdoor agricultural tasks such as feeding animals, labour and selling produce. Women handle a mix of household chores, kitchen responsibilities and outdoor activities like milking cows and fieldwork (weeding, harvesting, etc.), reflecting rural women's diverse roles in balancing household and agricultural work. Both men and women maintain demanding schedules, starting their days early in response to the challenges of rural farm life.

4.2.3 Material Possession of Farmers

The material possession of farmers is the tangible assets farmers own, which can significantly affect their farming operations and livelihood that includes agricultural implements and household materials (appliances, transportation owned and communication media) available.

4.2.3.1 Agricultural Implements

The Agricultural Implements possessed by the farmers are used to perform various farming tasks and activities to improve their agricultural practices are presented in Table XIV.

TABLE XIV

AGRICULTURAL IMPLEMENTS USED BY THE FARMERS

Sl. No.	Name of the Agricultural Implements	N=600			
		Yes		No	
		F	%	F	%
1	Yoke	600	100	-	-
2	Spade	600	100	-	-
3	Axe	538	90	62	10
4	Electric motor	506	84	94	16
5	Shovel	503	84	97	16
6	Hoe	494	82	106	18
7	Winnower	400	67	200	33
8	Leveler	259	43	341	57
9	Wheel Hoe	245	41	355	59
10	Diesel engine	222	37	378	63
11	Seed drill	200	33	400	67
12	Power Tillers	42	7	558	93
13	Cultivator	26	4	574	96
14	Tractor	20	3	580	97
15	Plough	20	3	580	97

**Multiresponse*

The data reveals that cent percent of the farmers have yokes and spades and 90% of the farmers owning axes. Basic tools like yokes, spades, axes, shovels and hoes are commonly available to farmers, which are fundamental for their daily farming tasks and essential for land preparation, planting, cultivating and harvesting crops.

On the other hand, 97% of the farmers lacks ploughs and tractors. The lack of advanced equipment like ploughs, tractors, cultivators and power tillers are attribute to economic constraints, lack of access to technology or a shift towards alternative farming practices.

4.2.3.2 Household items available

The household materials owned by the farmers, provides an overview of the items and assets present in their households such as appliances, transportation and communication media which contribute to their overall living conditions as showcased in the table XV.

TABLE XV

HOUSEHOLD ITEMS AVAILABLE AT THE FARMERS HOME

S.No.	Appliances Available	N=600			
		Yes		No	
		F	%	F	%
1	Clock	551	92	49	8
2	Gas stove	543	91	57	9
3	Pressure cooker	441	74	159	27
4	Fan/cooler	399	67	201	34
5	Double bed	224	37	376	63
6	Electric Iron	59	9	541	90
7	Fridge	38	6	562	94
8	Heater	15	3	585	98
9	Sewing machine	12	2	588	98
S. No.	**Vehicles owned**				
10	Cycle	589	98	11	2
11	Bike/Scooter	341	57	259	43
12	Battery Rickshaw	43	7	556	93
13	Car	16	3	584	97
14	Auto Rickshaw	13	2	587	98
15	Trolley	-	-	600	100
16	Bus	-	-	600	100
17	Truck	-	-	600	100
18	Bullock cart	-	-	600	100
Sl. No	**Communication media**	**F**	**%**	**F**	**%**
19	Mobile	586	98	14	2
20	T.V.	448	75	279	47
21	Radio	142	24	323	76
22	News paper	20	3	573	96
23	Agricultural magazines	3	1	594	99
24	Agricultural Books	2	.3	598	99
25	General Magazines	1	.2	599	99

***Multiresponse*

The data indicates that 92% of the farmers owned clocks and 91% possess gas stoves. Therefore, gas stoves and clocks are prevalent and essential household items among farmers. The table also highlights the absence of specific household items among farmers as the majority (98%) of farmers do not have heaters or sewing machines, which implies that these appliances may not be commonly found or considered necessities in the households among the farmers.

Most of the farmers (98%) owned bicycles and fifty-seven percent owned motorcycles. Therefore, bicycles and motorcycles are the most common modes of personal transportation, likely used for short-distance travel, agricultural activities and marketing. The farmers do not own bullock carts, trucks, buses and trolleys because these vehicles are expensive to purchase and maintain.

Mobile phones have emerged as the most widely used communication tool among farmers, with 98% of the farmers relying on them for information exchange. Mobile phones are ideal mass media tools for disseminating information, emphasizing mobile technology's widespread availability and convenience in rural areas. At the same time, 99% of the farmers do not read general and agricultural magazines or agricultural books, which implies a gap in accessing information and educational resources due to the unavailability of relevant reading materials, lack of interest and limited time due to farming responsibilities.

4.2.4 Availability of Village Infrastructure Facilities

The overview of the village infrastructure facilities available within the villages includes the types of roads and conditions, sanitation, school facilities, health services, electricity, drinking water facilities, bank, post office, Anganwadi centre and internet café available in the area, highlighted in table XVI.

The data in the above table highlights that thirty-three percent of the farmers mentioned the presence of mud roads, black topper roads and paver block roads as the type of road available. While thirty-nine percent of the farmers perceive the road conditions as good, which implies that the farmers are pleased with the road conditions, but they still expect more improvement in road conditions.

TABLE XVI

AVAILABILITY OF VILLAGE INFRASTRUCTURE FACILITIES

Sl. No	Facilities		N= 600			
			Yes		No	
			F	%	F	%
1.	Type of road	Mud road	200	33	-	-
		Black toper road	200	33	-	-
		Concrete road	-	-	-	-
		Paver Block	200	33	-	-
2.	Condition of the road	Good	235	39	-	-
		Satisfactory	157	26	-	-
		Poor	208	35	-	-
3	Toilet available in the household		600	100	-	-
4	School	Primary schools	600	100	-	-
		Junior Secondary schools	600	100	-	-
		Senior Secondary schools	-	-	600	100
5	Health	Public Health Centre	-	-	600	100
		Community Health Centre	-	-	600	100
		Private Nursing Home	-	-	600	100
		Traditional Practitioner	204	34	396	66
6	Electricity Connection		567	95	32	5
7	Drinking water		382	64	218	36
8	Bank		-	-	600	100
9	Post office		-	-	600	100
10	Anganwadi Centre		600	100	-	-
11	Internet cafe		-	-	600	100

***Multiresponse*

With regard to toilet availability, cent percent of the farmers reported the availability of toilet facilities in the household, highlighting universal access to basic sanitation in the villages. Cent percent of the farmers reported the presence of primary and junior secondary schools, but no senior secondary schools were available. Thus, it indicates that while basic education is accessible, students must travel elsewhere for higher education. Cent percent of the farmers revealed that there is no availability of public health centres, community health centres, or private nursing homes within the village.

Most of the farmers (95%) have access to electricity connections, a positive indicator of infrastructure development. However, only sixty-four percent of the farmers have access to drinking water facilities, indicating a potential area for improvement. Cent percent of the farmers stated that the Anganwadi center is available to provide early childhood services. On the other hand, all the farmers reported no access to banking, post office services, or internet cafes in the village due to a lack of financial and digital infrastructure.

4.2.5 Irrigation Patterns followed by the Farmers

The irrigation details illustrate how farmers manage water resources for crop cultivation. These details include the sources of irrigation, types of irrigation used, availability of subsidies for water-saving technologies, seasonal irrigation patterns and irrigation frequency, as shown in Table XVII.

TABLE XVII

IRRIGATION PATTERN FOLLOWED BY THE FARMERS

Sl. No.	Particulars		N=600	
			F	%
1	Source of irrigation for Crops cultivation	Tube well	345	58
		Pump set	162	27
		Pond water	93	15
2	Types of Irrigation	Manual Irrigation	557	93
		Sprinkler Irrigation	167	28
		Localized Irrigation	126	21
3	Subsidy for water saving technologies	Yes	26	4
		No	574	96
4	Irrigation pattern changes season wise	Yes	521	87
		No	79	13
5	Frequency of irrigation	Demand based	600	100

The data denotes that fifty-eight percent of the farmers rely on tube wells and fifteen percent on pond water for irrigation. This alludes to the fact that tube wells are the primary water source for most farmers, likely due to their ability to provide a consistent and controlled water supply. The use of pond water implies that ponds may be available but are less favoured, possibly due to seasonal availability and distance from fields.

Manual irrigation remains the most common practice, with 93% of the farmers opting for it, indicating a strong inclination towards cost-effective practices among the farming community. Also, the farmers may not widely adopt mechanized irrigation systems, which may not be affordable in the area. In contrast, twenty-one percent of the farmers use localized irrigation, such as drip and sprinkler systems. These methods are beneficial in optimizing water use and enhancing crop productivity. Therefore, further efforts are needed to promote and facilitate localized irrigation technologies for broader and more effective implementation.

Most of the farmers (96%) indicated they had not received any form of subsidies for water-saving technologies. Although subsidies are financial contributions from the government designed to benefit the public, there appears to be an awareness gap. Farmers lack information about available subsidies due to insufficient outreach or limited communication from government agencies.

Seasonal variations play a key role in irrigation decisions, as 87% of the farmers reported experiencing seasonal irrigation pattern changes based on factors such as rainfall, temperature and crop requirements.

However, cent percent of the farmers irrigate the crops based on demand. Water requirements vary based on climate, crop type and the soil's moisture levels. Water usage fluctuates throughout the growing season and can be challenging to accurately predict due to the uneven rainfall distribution throughout the year, particularly during critical growth stages (Penn State Extension, 2022).

4.2.6 Cropping Practices and Decision-making patterns among Farmers

Cropping pattern is the proportion of land allocated to different crops at a specific time within a defined area. It encompasses the annual sequence and spatial arrangement of crops and fallow periods on that land (IAS Hub, 2023). The cropping pattern followed by the farmers depicts the type of cropping system adopted, crop pattern year-wise, source of labour, cultivation of seasonal crops and advice from others to get quality produce and high productivity, as shown in Table XVIII.

TABLE XVIII

CROPPING PRACTICES AND DECISION-MAKING PATTERNS AMONG FARMERS

Sl. No	Particulars		N=600	
			F	%
1	Type of cropping system adopted	Crop rotation	274	46
		Intercropping	326	54
2	Change of crop pattern from year to year	Yes	569	95
		No	31	5
3	Selection of crop pattern	Men	358	60
		Women	112	19
		Both men and Women	130	22
4	By whom is the cultivation done	Self-cultivation	32	5
		Labour	568	95
5	Source of labour used for cultivation	Family labour	323	54
		Hired labour	276	46
6	Cultivate seasonal crops	Yes	579	98
		No	15	3
7	Advices *	Experienced farmers	587	98
		Advise of progressive farmers	410	68
		Advise of Agriculture Officers	118	20
		Help of Krishi Seva Kendra	99	17
		TV Programmes related to agricultural	56	9
		Internet	51	9
		Attended Agricultural Workshop/Seminars	52	9

**Multiresponse*

The data shows that fifty-four percent of the farmers adopted an intercropping type of cropping system. Intercropping is an agricultural practice that involves growing multiple crops together in the same field, gaining recognition for its potential to enhance productivity. This method combines profitable crops with cover or non-profitable crops to achieve mutual benefits while distributing advantages across various agricultural systems (Toker et al., 2024).

Majority of the farmers (95%) reported changing the crop patterns from year to year. A change in cropping patterns signifies a shift in the proportion of land allocated to different crops, which is significantly affected by the resources available in specific agro-climatic zones (Rupe et al., 2024).

Decision-making in crop selection is primarily led by men, as reported by sixty percent of the farmers, highlighting their role in determining crop patterns. This reflects a patriarchal structure where men are the primary decision-makers in agricultural practices.

Reliance on hired labour is a common practice, with 95% of the farmers employing additional workers beyond their family members, indicating the importance of the labour market in supporting agricultural operations.

More than half, i.e., fifty-four percent, of the farmers depend on family labour for cultivation due to the traditional nature of small-scale farming. This illustrates that family members play a vital role in farming activities and their involvement is common.

Most of the farmers (98%) cultivated seasonal crops, which indicates a strong preference for short-term, market-oriented farming practices. Seasonal crops often align with local market demand and climatic conditions, offering farmers the opportunity for regular income within a growing cycle and 98% of the farmers get advice for quality produce from Experienced farmers that reflects trust and value placed on traditional knowledge and peer networks within agricultural practices.

4.2.7 Varieties of vegetables cultivated by the Farmers

The varieties of vegetables are cultivated by the farmers, reflecting regional agricultural practices and consumer demand. The varieties of vegetables cultivated include leafy vegetables, Cruciferous, marrow, roots & tubers, bulbs and pods & seeds, as shown in Table XIX.

TABLE XIX

VARIETIES OF VEGETABLES CULTIVATED

S. No.	Varieties of Vegetables		N=600	
			F	%
1	Leafy Vegetables	Coriander	600	100
		Vegetable Mustard	576	96
		Water Spinach	433	72
		Spinach	432	72
		Chinese mellow	355	59
		White Goosefoot	345	58
		Amaranth	332	55
		Fiddle Head fern	251	42
		Purslane	231	39
2	Cruciferous	Cauliflower	489	82
		Cabbage	450	75
		Long Bottle Gourd	354	59
		Broccoli	321	54
		Kohlrabi (ulkobi)	231	39
3	Fruit Vegetables	Cucumber	501	84
		Tomato	496	83
		Squash	321	54
		Capsicum	321	54
		Sponge Gourd	256	43
		Ridge Gourd	231	39
		Round Bottle Gourd	214	36
		Cantola	296	49
		Green Biter Gourd	111	19
		Pumpkin	321	54
		Eggplant	211	35
4	Roots & Tubers	Potato	370	62
		Carrot	243	41
		Radish	236	39
		Yam	211	35
		Beets	109	18
		Turnip	109	18
5	Bulb	Onion	98	16
6	Pod& seed	Green beans	483	81
		Peas	321	54

**Multiresponse*

The data showcased that cent percent of the farmers cultivated coriander, likely due to its widespread culinary use and ease of cultivation and thirty-nine percent of the farmers cultivated purslane as a leafy vegetable.

Cauliflower was cultivated by 82 % of the farmers, driven by consistent market demand, ensuring better income and thirty nine percent cultivated Kohlrabi (ulkobi) as cruciferous varieties.

Cucumber was one of the most cultivated crops, with 84 % of the farmers, likely due to high demand and nineteen percent of the farmers cultivated eggplant as fruit vegetables varieties.

Potato was another significant crop, grown by sixty-two percent of the farmers due to its versatility and strong market demand, while root and tuber varieties such as beet and turnip were cultivated by eighteen percent.

Onion cultivation was relatively low, with only sixteen percent of farmers growing it, possibly due to market saturation making it a less attractive investment.

Green beans were cultivated by 81 % of the farmers, as they are widely consumed and favored for their nutritional value and versatility in cooking, resulting in substantial market demand and fifty-four percent of the farmers cultivated peas, which fall under pod & seeds varieties.

The varieties of vegetables cultivated by the farmers, like coriander, cauliflower, cucumber, potato and green beans, have the highest cultivation practices. These vegetables are likely to have a strong demand in local markets and are well-suited to the region's agricultural conditions. It also reflects the diversity in farmers' choices, which can be valuable for local agricultural planning, market analysis and efforts to promote a balanced and sustainable agricultural landscape.

4.2.8 Inputs used by the Farmers for vegetables cultivation

Farmers require a variety of inputs to cultivate crops effectively. Seeds serve as the foundation of crop production. Fertilizers provide essential nutrients to plants, promoting healthy growth and increasing crop yields. Pesticides protect crops from pests, diseases and weeds. Thus, detailed information on the inputs is highlighted in Table XX.

TABLE XX

INPUTS USED BY THE FARMERS ON VEGETABLES CULTIVATION

Inputs				**N=600**
A.	**Details on Seeds**		**F**	**%**
1	Type of seeds used for cultivating crops	Hybrid	392	65
		Traditional preservative seeds	188	31
		High Yielding Variety seeds	120	20
2	Source of seeds purchased	Agriculture Development office	189	32
		Local seed stores	510	85
		Private seed companies	56	9
3	Varieties of seeds selected	Better keeping and good quality	405	68
		Disease tolerance	249	42
		Low cost	124	21
		Lesser handling susceptibility	222	37
B.	**Details on Fertilizers**			
1	Fertilizers used	Organic	77	13
		Inorganic (chemical)	523	87
2	Reason for organic fertilizers	Cheap and best	77	13
3	Reason for inorganic fertilizers	Easily available	494	82
		Good yield	9	2
		Eco friendly	9	1
		Traditionally used	4	1
		Cheap and best	7	1
4	Source of fertilizer	Agriculture Development office	252	42
		Agricultural supply stores	397	66
		Livestock manure (from local area)	77	13
C.	**Details on Pesticides**			
1	Pesticides used	Inorganic	600	100
	Types of Pesticides *	Insecticides	600	100
		Herbicides	600	100
		Bactericides	494	82
2	Reason for inorganic pesticides	Cheap and best	107	18
		Easily available	493	82
3	Source of Pesticides	Agricultural supply stores	600	100

The data revealed that sixty-five percent of the farmers use hybrid types of seed for crop cultivation. Farmers adopting hybrid varieties could be due to their higher yield potential, disease resistance and other benefits associated with hybrid seeds. The majority (85%) of the farmers purchased seeds from Local seed stores, which shows the importance of local suppliers in providing accessible seed varieties for farmers. Also, farmers prefer the convenience and availability of seeds from nearby stores rather than distant suppliers. Sixty-eight percent of the farmers selected the seed varieties due to better keeping and processing quality as they can stay fresh longer and are easier to handle during farming activities. Thus, the aim is to reduce waste and improve farming efficiency by selecting varieties that offer long-term advantages and easier handling.

Majority of the farmers (87%) use inorganic (chemical) fertilizers due to widespread reliance on chemical inputs for crop cultivation. 82% of farmers cite easy availability as the primary reason for using inorganic fertilizers as accessibility and convenience are major factors influencing their choice, as farmers may prioritize products that are readily obtainable. Sixty-six percent of the farmer's source of fertilizer is Agricultural supply stores. These stores are key sources of essential farming inputs and play a crucial role in providing farmers with the necessary resources, making them a vital link in the agricultural supply chain.

Pest control practices reflected a complete dependence on inorganic pesticides as cent percent of the farmers reported having used inorganic pesticides, specifically insecticides and herbicides. 82 % of the farmers reported that easy availability was the reason for using inorganic pesticides, as they prefer products that are readily accessible when needed. Cent percent of the farmers sourced their pesticides from agricultural supply stores, likely because these stores offer trusted, reliable brands and the assurance of product availability when needed. They also provide guidance and help farmers choose appropriate pesticides for specific pests and crops.

4.2.9 Membership and Training attended by the Farmers

4.2.9.1 Membership Details of the Farmers

The membership details of the farmers are affiliated with any specific groups as well as their engagement in various communal and social events as shown in table XXI.

TABLE XXI

DETAILS ON MEMBERSHIP OF THE FARMERS

Sl No.	Particulars		N=600	
			F	%
1	Member of any Organization	Yes	265	44
		No	335	56
2	If, Yes name of the organization	Self-help group (SHG)	201	33
		Farmers discussion group	58	2
		Panchayat union	6	1
3	Involvement in Social Participation	Yes	600	100
4	If yes, specify the involvement*	Local Festival Day Celebration	600	100
		Bihu Celebration	422	70
		Caste Group Union	178	30
		Village Panchayat meeting	167	28
		Farmers Mela	98	16
		Taluka Panchayat meeting	63	11
		Farmers Day Function	54	9
		School Committee	36	6
		Village Haats	132	22
5	Own Kisan Credit Card	Yes	393	66
		No	207	34
6	Purpose for using Kisan Credit Card	To meet the short-term credit requirements for cultivation of crops	299	50
		Post-harvest expenses	143	24
		Maintenance of farm assets	136	23
		Offering protection against loss of crops due to pestattacks, natural calamities, etc.	110	18
		Marketing crops	55	9

***** *Multiresponse*

The data indicates that fifty-six percent of the farmers are not involved in formal organizations and forty-four percent are members of organizations, namely the Self-help Group (SHG), farmers' discussion group and panchayat union. Notably, 33 percent of farmers are members of Self-Help Groups (SHGs). The extent of social participation among the farmers reported that cent percent of the farmers were involved in social participation such as Local Festival Celebration Day. Social participation is the extent of an individual's involvement in a social organization, either as a member or in a leadership role (Bharti et al., 2022). Farmers are primarily involved in community and cultural events. This high level of participation shows that local festivals are important for bringing people together, celebrating traditions and strengthening community bonds; meagerly, six percent of the farmers are involved in the school committee.

More than half, i.e., Sixty-six percent of the farmers owned Kisan Credit Cards, while thirty-four percent of the farmers do not own. The Kisan Credit Card (KCC) Scheme provides farmers with timely and adequate short-term credit for crop cultivation, mainly to purchase necessary inputs (Selvam & Karpagam, 2011).

However, Fifty percent of the farmers stated that the purpose of the Kisan Credit Card was to meet short-term credit requirements for crop cultivation and relied on these cards to finance the immediate costs associated with planting and growing crops, such as purchasing seeds, fertilizers and other essential inputs. On the other hand, least nine per cent of the farmers utilized kisan credit cards to selling and distributing their produce specially for marketing crops.

4.2.9.2 Training attended by the Farmers

Training is the process of acquiring new skills, attitudes and knowledge to prepare individuals for entry into a profession or enhance their productivity in a particular vocation (Sajeev et al., 2021). Training is essential to equip farmers with the knowledge and practical skills required to effectively manage their farms, increase agricultural productivity and adopt sustainable practices as discussed in table XXII.

The data revealed that fifty-seven percent of the farmers attended the training programme as they got opportunities for improving their farming practices and knowledge and forty-three percent of the farmers did not attend any training programme, indicating a lack of interest, lack of available training resources and opportunities.

TABLE XXII

TRAINING ATTENTED BY THE FARMERS

Sl. No	Aspects		N=600	
			F	%
1	Training Exposure	Yes	344	57
		No	256	43
2	If yes, number of attended days	1 day training	131	22
		2-3 days training	200	33
		4-5 days training	13	2
3	Area of training *	Crop Production	245	41
		Irrigation and Plant protection	198	33
		Soil Health and fertility management	132	22
		Organic Farming	88	15
4	Training Organization	Krishi Vigyan Kendra	344	57
		District Agricultural Office	344	57

**Multiresponse*

The number of training sessions attended by the farmers depicts that thirty-three percent of the farmers attended 2-3 days of training, which implies that shorter training sessions are more accessible or preferable for farmers, possibly due to time constraints and the intensity of their farming schedules. The specific areas of training the farmers received show that forty-one percent of the farmers received training on crop production as it yields immediate benefits, aiming to equip farmers with modern techniques, including improved seed varieties, best practices and effective pest management.

Fifty-seven percent of the farmers received training from District Agricultural Offices and Krishi Vigyan Kendra. These organizations play a vital role in providing agricultural extension services and knowledge dissemination to farmers by organizing training programmes to enhance farmers' skills and knowledge. Krishi Vigyan Kendras (KVKs) offer a range of training programmes for farmers and rural youth in every district across the country, beginning with the crucial step of identifying training needs, which is essential for organizing any effective training programme (Sajeev et al., 2021)**.**

4.2.10 Savings and Credit Patterns of Farmers

Savings and Credit Patterns of Farmers pertains to farmers' financial strategies and behaviours concerning saving money, the reasons they save, the sources of their income and their management of financial resources. These patterns are pivotal in shaping farmers' financial stability and prosperity in their agricultural pursuits, as discussed in Table XXIII.

TABLE XXIII

SAVINGS AND CREDIT PATTERNS OF FARMERS

Sl No	Particulars		N=600	
			F	%
1.	Own a Bank account	Yes	535	89
		No	65	11
2	If yes, Name of the Bank	State Bank of India	236	39
		Assam Gramin Vikash Bank	189	32
		Allahabad Bank	61	10
		Union bank	42	7
		Lakhimi Gaonlia Bank	7	1
3	Source of income	Farming	600	100
		Allied activity	210	35
		Livestock Management	145	24
		Labour	111	19
		Other family member	56	9
4	Satisfied with the income that earn from agriculture	Yes	266	44
		No	333	56
5	Any Debts	No	600	100
6	Type of savings *	Cash in hand	493	82
		Postal deposit	245	41
		Commercial bank	535	89
		Insurance policy	16	3
7	Mention the purpose of savings *	Regular needs	600	100
		Child education	389	65
		Health purpose	180	30
		Daughter‘s marriage	148	25
		Unforeseen events	19	3
		Invest in any kind of asset	12	2

***** *Multiresponse*

The data showcased majority (89%) of the farmers have a bank account which indicates farmers recognized the importance of banking services for managing their finances. The specific banks where the farmers have their accounts highlights thirty-nine per cent of the farmers have bank account in State Bank of India, a commonly used bank among the farmers.

All the farmers relied entirely on farming as their primary source of income, while at least nine percent also received support from other family members, i.e., generated non-agricultural activities such as wage labour, small businesses and employment in different sectors. About fifty-six percent of the farmers are unsatisfied with their agricultural income, which is inadequate to meet their needs and aspirations. Meanwhile, forty-four percent of the farmers are satisfied with their income due to efficient management practices, diversification of income sources and access to support services and markets.

Surprisingly, cent percent of the farmers do not have any debts as they manage their finances responsibly and do not rely on borrowed funds to sustain their agricultural activities and meet other financial obligations. Majority of the farmers (89 %) saved money in commercial banks and 82% preferred to keep their savings as cash in hand, ensuring immediate access to funds essential for meeting day-to-day expenses, purchasing inputs and other unforeseen emergencies. The purposes for which the farmers saved their money depicted that cent percent of the farmers aimed to meet regular needs to maintain financial stability and cover essential expenses.

4.2.11 Mass media Exposure of the Farmers

4.2.11.1 Extent of Mass Media Exposure

Mass media plays a crucial role in disseminating agricultural technologies. Magazines, newspapers, radio, television and mobile phones are information-sharing channels (Paramasivam & Philip, 2017). Table XXIV highlights the details of mass media exposure.

The data indicates that 96% of the farmers do not at all read newspapers and five percent of the farmers read newspapers. The source is from tea stalls and shops and the purpose of using newspapers is for only news as their interest is in staying informed about current events rather than other potential uses of newspapers such as entertainment, advertisements and other content.

TABLE XXIV

EXTENT OF MASS MEDIA EXPOSURE

Sl. No	Mass Media	Particulars		N=600	
				F	%
1	Newspaper	Frequency of reading	Not at all	573	96
			Once a week	25	5
			Twice a week	2	.3
		Source of acquiring newspaper	Tea stall or shop	27	5
		Purpose of Use	News	27	5
2	Agricultural Magazine	Frequency of reading	Do not read	594	99
			Once or twice a week	6	1
		Source of acquiring magazine	Tea stall	6	1
		Purpose of Use	Entertainment	6	1
3	Radio	Frequency of listening	Once or twice a week	7	1
		Source	Own	7	1
		Period of Exposure	No exposure	593	98
			One to five years	7	1
		Purpose of Use	News	1	.2
			Entertainment	6	1
		Frequency of Mass media Exposure	Occasionally	7	1
4	Television	Frequency of viewing	Do not view	270	45
			Once a fortnight	80	13
			Once a week	217	36
			Twice a week	7	1
			Thrice or more per week	4	1
			Daily	22	4
		Source	Own	448	75
			Do not own	152	25
5	Mobile	Brand owned currently	Samsung	237	40
			Oppo	173	29
			Vivo	82	14
			jio	94	16
		Price range (Rs)	1000-5000	380	63

Sl. No	Mass Media	Particulars		N=600	
				F	%
			5000- 10000	178	30
			10000-15000	28	5
		Factors influencing choosing the model *	Price	586	97
			Function	521	87
			Size & weight	141	24
			Appearance	65	11
			Trend	61	10
		Frequency of usage	Daily	565	94
			Once a fortnight	11	2
			Once a week	8	1
			Twice a week	2	0.3
		Mobile Operator	Jio	276	46
			Airtel	223	37
			Vodafone	54	9
			BSNL	33	6
		Average time spent on phone	Less than 30 minutes	382	64
			30 minutes- 1 hour	122	20
			1 hour- 2 hour	82	14
		Features utilize on phone *	Internet Browsing	50	8
			Phone call	586	97
			Text messaging	227	38
			Camera	74	12
			News	67	11
		Purpose of Use *	Agriculture	586	97
			Entertainment	600	100

**Multiresponse*

99% of the farmers do not read magazines and one percent read them once or twice a week. The source of acquiring magazines is from tea stalls, which are read-only for entertainment and could serve as a leisure activity.

The frequency of radio listening denotes that only one percent of the farmers listen and own a radio once a week, which indicates that regular radio listening is relatively uncommon among farmers. Only one percent of the farmers occasionally use radio for entertainment and are more inclined to use it during leisure rather than for informational purposes.

Forty-five percent of the farmers do not watch television, implying there is limited or no engagement with this form of media. Seventy-five percent of the farmers own a television. However, they don't use them much due to the demanding nature of farming, which leaves little time for watching TV.

Mobile phone usage illustrates that forty percent of farmers use Samsung phones, the most popular mobile phone brand among them. Its popularity is attributed to its wide range of models and reliability. Sixty-three percent of the farmers purchased phones within the price range between Rs (1000-5000), which implied a strong preference for budget-friendly options. 97% of the farmers choose for the price, which is reflected due to budget constraints and the necessity to prioritize spending on essential farming and household needs.

The frequency of phone usage showed that 94 % of the farmers relied on their mobile phone as a daily tool, integrating them into their regular routine for various purposes such as communication, information and entertainment.

Jio emerged as the preferred mobile operator, with Forty-six percent of the farmers chose Jio due to its extensive network coverage. The average time spent on phones by the farmers was less than 30 minutes daily as reported by sixty-four percent of the farmers. Most of the farmers (97 %) relied on phone calls to facilitate communication, coordinate agricultural activities, stay in touch with the market and communicate with family and peers. The purposes for using phones showcased that cent percent of the farmers used them for entertainment and 97 % had utilized them for agriculture. They primarily depended on personal entertainment, such as listening to music, watching videos and using social media during leisure time. Mobile phones are an essential tool for both entertainment and agricultural activities, making them a highly effective medium for disseminating agricultural information and support services to farmers.

4.2.11.2 Extent of Urban & Extension Agency Contact

The extent of urban and extension agency contact with the farmers is the interaction between urban areas and extension agencies, which can be assessed by considering factors such as the frequency of contact and purpose of visits, etc. The data are displayed in the Table XXV.

TABLE XXV

EXTENT OF URBAN & EXTENSION AGENCY CONTACT

Extent of Contact		N=600			
		Urban		Extension Agency	
		F	%	F	%
Frequency of contact	Occasionally	513	86	360	60
	Never	87	15	238	40
Purpose of visit	Agriculture	321	54	360	60
	Non – agriculture	432	72	-	-
	Both	513	86	-	-

***Multiresponse*

The data depicted that the majority, 86% of the farmers, have occasionally had urban contact, which shows farmers do engage with urban entities from time to time, but their interactions are not frequent or regular. On the other hand, fifteen percent of farmers have no contact with urban agencies, which could be due to a lack of perceived need for urban interactions. The purpose of visits unveiled that the majority (86%) of the farmer's purpose is for agriculture and non-agriculture. Farmers travel to urban areas for a dual agenda, addressing needs related to farming activities such as buying seeds, equipment and fertilizers, selling produce, attending agricultural meetings, or consulting with agricultural experts. Non-agricultural purposes could involve accessing healthcare services, buying groceries, household items, handling administrative tasks and spending time with family and friends.

The frequency of contact with the extension agency highlights that sixty percent of the farmers occasionally contact and seek guidance periodically. Extension contact is essential for acquiring knowledge and skills related to the latest technological developments in agriculture. Frequent interactions with extension services provide farmers with current information, helping them implement improvements in their farming practices (Nayak and Banerjee, 2022). On the other hand, forty percent of farmers never contact extension agencies, which indicates a lack of engagement with them. The purpose of visits depicts that sixty percent of the farmer' purpose is only for agriculture, as their primary motivation is to seek assistance, information and resources related to farming practices, marketing and other agricultural concerns.

4.2.12 Informal gathering venue of Farmers

Chat corners refer to informal meeting places or gathering spots where local community members come together to engage in conversations, socialize and exchange information or news. The various spots where the farmers typically gather are shown in Table XXVI.

TABLE XXVI

INFORMAL GATHERING VENUE OF FARMERS

Sl. No	Name of the Chat Corners	N=600	
		F	%
1	Under the Tree	600	100
2	Mobile SMS interaction	213	36
3	Local Market	214	36
4	Temple	217	36
5	In front of Panchayat office	207	35
6	Near School	170	28
7	Agricultural shops	67	11
8	Tea Shop	29	5
9	Bank	16	3

***Multiresponse*

The data depicts cent percent of the farmers chats under the tree' as their preferred chat corner, indicating that this is the most popular spot for social interaction, reflecting its central role in local social life. Thirty six percent of the farmers chat through mobile interaction, in the temple and the local market which implies that modern technology is embraced for social interactions alongside traditional locations like the temple and the local market. Whereas five percent of the farmers gather in the tea shop as a chat corner and only three percent use the bank as a chat corner.

4.3 DETAILS ON MARKETING OF VEGETABLES

Marketing details on vegetables are aimed at promoting, selling and distributing vegetables efficiently. This involves information on Marketing and its sources, post-harvest marketing practices, marketing behaviour and its influential factors.

4.3.1 Information on Marketing of Vegetables

Agricultural information plays a vital role in rural development. Farmers depend on diverse sources and communication channels to access timely and relevant information, which can greatly improve farm productivity and support the sustainable growth of agricultural activities. (Joshi, 2022). Table XXVII depicts information on Marketing Vegetables.

TABLE XXVII

INFORMATION ON MARKETING OF VEGETABLES

Sl. No	Aspects			N=600	
				F	%
1	Markets channel for selling	Formal markets	Commission agents	129	22
			Wholesalers	42	7
			Retailer	5	1
		Informal markets	Village Haats	346	41
			Roadside	129	22
			Direct selling	225	38
2	Benefits of the market channels	Receive high price		587	98
		Nearer		199	33
3	Market availability	Yes		404	67
		No		196	33
	If No, reason	Sell at low price		152	25
		Store and sell later		39	7
		Utilize for family consumption		5	1
4	Price Fixation	Market-determined price by the government		400	67
		Negotiation during sales		371	62
		Self (Farmers)		229	38
5	Prior Information to sales	Yes		358	60
		No		242	40
6	If yes, frequency	Daily		271	45
		Weekly		87	15
7	Farmers collaboration	Yes		158	26
		No		442	74
8	Market infrastructure	Good		284	48
		Bad		311	52
9	Information on Price	Always		125	21
		Occasionally		347	58
		Rarely		128	21

The data revealed twenty-two percent of the farmers sell their produce to commission agents who act as intermediaries between the farmers and the buyers for negotiating prices, finding buyers and managing the transaction process. Forty-one percent of the farmers sell their produce in Informal markets, i.e., village haats and local market stalls where the farmers feel it convenient and beneficial to sell their produce locally. These markets are typically organized at regular intervals, usually once or twice a week, at a designated location (Kalita, 2023).

Most of the farmers (98%) benefitted from receiving high prices through the market channel, which indicates that farmers prioritize market channels that offer better financial returns for their produce. Sixty-seven percent of the farmers always found a market for all the goods they produce, indicating a good level of market demand. Farmers are able to sell their entire output regularly and consistent demand can lead to stable income for farmers. Thirty-three percent of the farmers did not always find a market and twenty-five percent of the farmers sold their produce at low prices to minimize losses and prevent spoilage.

Sixty-seven percent of the farmers mentioned that market-determined pricing was set by the government, as price fixation is influenced by external factors rather than being set by the farmers themselves. Sixty percent of the farmers had received prior market information to sales, enabling them to make informed decisions regarding when, where and at what price to sell their produce and forty-five percent of the farmers had access to market information on daily basis.

With regard to farmers collaboration, seventy percent of the farmers preferred to sell individually rather than collectively. Collaborative marketing helps small to mid-sized farmers access larger markets and reduce costs but doesn't guarantee overall profitability (Cornell Cooperative Extension, 2012). Fifty-two percent of the farmers rated the available market infrastructure as 'bad' due to the deficiencies in the physical infrastructure, such as inadequate market buildings, poor sanitation, insufficient storage facilities and lack of basic amenities like clean water and restrooms. Fifty-eight percent of the farmers occasionally received price information, possibly due to limited access to reliable information sources and a lack of awareness about the benefits of using this information.

The absence of timely and accurate information on prices can cause inefficiencies in agricultural production, harvesting and marketing, which leads to a reduction in farmers' income and affects their well-being (Camacho & Conover, 2019).

4.3.2 Source of Receiving information on Agricultural marketing

Input sources of information consist of various channels through which the farmers obtain information to make informed decisions about marketing their products. Transferring sources disseminate information from farmers to others, including family, friends and other stakeholders. Sources of Receiving information on Agricultural marketing are presented in Table XXVIII.

TABLE XXVIII

SOURCE OF RECEIVING INFORMATION ON AGRICULTURAL MARKETING

Sl. No.	Source	N=600					
A.	Input Sources	Regular		Occasionally		Never	
		F	%	F	%	F	%
1.	Relatives	533	89	65	11	2	.3
2.	Neighbors	449	75	149	25	2	.3
3.	Commission agents	194	32	150	25	256	43
4.	Input dealers	89	15	317	53	193	32
5.	Local traders	4	1	148	25	448	75
6.	NGO worker	-	-	-	-	600	100
7	Village level extension officer	4	1	158	26	437	73
8	Block level extension officer	7	1	211	35	381	64
B.	Mass contact sources						
9	News papers	-	-	61	10	539	90
10	Radio	35	6	37	6	528	88
11	Television	215	36	197	33	187	31
12	Farmer fairs / Exhibition	-	-	105	18	495	83
13	Agricultural Meetings / Training	1	.2	125	21	474	79
SL. No	Transferring Source (Information)	N=600					
14	Own family	594	99	6	1	-	-
15	Relatives	474	79	126	21	-	-
16	Neighbors	339	57	252	42	9	2
17	Friends	184	31	391	65	25	4
18	Known people	18	3	431	72	151	25
19	Farmers of same area	35	6	346	58	219	37
20	Agricultural Labourers	332	55	179	30	89	15
21	Farmers of neighboring village	12	2	105	18	483	81

The input source data illustrated that most (89%) of the farmers received information from relatives regularly as they often interact more frequently and intimately than other sources. Also, they have high trust and communication within family networks. Fifty-three percent of the farmers receive information from input dealers occasionally. This may be because input dealers do not consistently provide market information and farmers often rely on alternative sources for market information. Cent percent of the farmers never receive any information related to agriculture marketing from NGO workers, indicating a lack of engagement.

Thirty-six and thirty-three percent of the farmers reported that they regularly and occasionally receive information from television. Television stands out as the most important source of information (Mukherjee, 2024) and it is a more effective channel because of the combination of visual and auditory elements that help to reach farmers. Whereas 90 % of the farmers never receive information due to a lack of newspaper availability in rural areas.

Transferring information sources highlights that 99 % of the farmers give information to their own families regularly, as farmers are highly communicative within their families. Seventy-two percent of the farmers occasionally provide information to all the known people. 81% of the farmers never share information with the farmers of neighbouring villages, which implies no interaction and less networking.

4.3.3 Marketing Practices adopted by the farmers in Vegetables Marketing

Marketing Practices adopted by the Farmers in Vegetables Marketing delves into the actions and procedures farmers undertake after harvesting their vegetable crops, focusing on how these practices impact the marketing and sale of their produce, as shown in Table XXIX.

TABLE XXIX

MARKETING PRACTICES ADOPTED BY THE FARMERS IN VEGETABLES MARKETING

Sl. No	Practices adopted		N=600	
			F	%
1	Harvesting Time	Early morning (4 am to 9 am)	554	92
		Early evening (5 pm and 7 pm)	15	3
		Late evening (7 pm to 9 pm)	4	1
		Night (10 pm to 3am)	27	4
2	Sorting and grading of vegetables	No	36	6
		Yes	564	94
	If Yes, Reason	Insect attack and Diseased produce	397	66
		Damaged by mechanical injuries	46	8
		Misshapen of the produced	32	5
		Due to over mature	8	1
		Due to immature	3	1
		Rotten vegetables	78	13
3	Washing of vegetables	No	346	58
		Yes	254	42
	If Yes, Reason	Removal of cohering dirt	224	37
		Removal of dust	21	3
		Removal of insects	9	2
4	Trimming of vegetables	No	56	9
		Remove unwanted particles	544	91
5	Precooling of vegetables	No	459	77
	If Yes, Reason	Yes (To remove field heat after harvest)	141	23
6	Post-harvest disease control of vegetables	Yes	236	39
		No	364	61
	If Yes, Reason	Prone to infection by microorganisms	118	20
		Mechanical injuries,	69	11
		Contamination with diseases vegetables	21	3
		Heat and other environmental agencies	28	5
7	Weighing of produce	Using electronic weighing machine	339	57
		Mechanical scale or balance	261	43
8	Methods used for storage vegetable produce	No	354	59
		Yes	246	41
	If Yes, Reason	Controlled and Modified atmosphere:	246	41
9	Place of storage	Home	600	100
10	Periods to store	Everyday	600	100
11	Distance of market	Within 10 kilometres	206	34
		Between 11 and 20 kilometers	317	53
		Between 21 and 30 kilometers	77	13
12	Place of sale of the Vegetables produce	In the village itself	182	30
		Nearby Market	135	22
		Nearby Weekly Market	206	34

Sl. No	Practices adopted		N=600	
			F	%
		Far away Market	77	13
13	Selling details	Directly to the consumers	72	12
		Village level middleman	203	34
		Commission agents (Middleman)	249	41
		Local shops	76	13
15	Package of Vegetables	Only Bamboo Baskets	42	7
		Only Jute bags	67	11
		Jute bags (Gunnybags) + Bamboo Baskets	450	75
		Polythene bags + Corrugated Craft paper cartons + Thermocol	41	7
16	Transport used to carry the vegetables	Bicycle	254	42
		Moped	219	37
		Mini truck	103	17
		Tempo	24	4
17	Pattern of Payment received	Advance payment done by middleman	63	11
		Getting payment at the time of selling	500	83
		Delayed payment (maintaining account book by the customer to pay later)	37	6
18	Disposal of produce to market	Quantity by volume	358	60
		Quality by sorting	242	40

Harvesting Time

The majority of the farmers (92%) preferred to harvest their vegetables during the early morning hours, specifically between 4 to 9 am. This timing choice aligns with freshness and cool weather, optimizing the quality of their produce. It also minimizes the risk of dehydration, which can occur during the hotter parts of the day. Kader (2013) highlighted that early morning harvesting reduces respiration rates, preserving freshness, texture and nutritional value for better shelf life and market appeal.

Sorting and Grading

The vast majority of the farmers (94 %) engaged in sorting and grading their vegetables. Sixty-six percent of the farmer's graded their produce due to insect attacks and the presence of diseased vegetables. Variations in agricultural produce quality across time and regions highlighted the need for pricing that reflected grade and quality differences,

ensuring fairness and transparency (Pathak et al., 2022). This practice indicated a focus on quality control and ensured that only high-quality vegetables reached the market.

Washing of Vegetables

Forty-two percent of the farmers washed their vegetables primarily to remove dirt and dust. Farmers prioritize cleanliness in their produce handling practices, as revealed by thirty-seven percent of the farmers.

Trimming of Vegetables

Most of the farmers (91 %) trimmed their vegetables primarily to remove unwanted particles, which denotes that the farmers are trying to maintain their quality and appearance. While, nine percent of the farmers do not trim the vegetables. Kaur and Kaur, (2024) stated that trimming improves visual appeal, minimizes produce deterioration and simplifies handling, packaging and transportation.

Precooling of Vegetables

The majority of the farmers (77%) did not practice precooling, due to being unaware of the benefits of precooling, which involves prolonging shelf life and maintaining its quality. Also, it can be time-consuming, required additional labour and management efforts. Whereas twenty-three percent of the farmers precooled primarily to remove field heat after harvest, which helps preserve the produce's freshness. Room cooling is suitable for most fruits and vegetables, but it is slower compared to other cooling methods (Duan et al., 2020).

Post-Harvest Disease Control

Post-harvest disease control measures were not implemented by sixty-one percent of the farmers, likely because these practices often demand additional resources, including specialized equipment, proper storage facilities and chemical treatments. These requirements can increase costs and resource demands, which may be challenging for farmers with limited access to such infrastructure. Tripathi et al., (2022) stated that post-harvest losses reduced the quantity of vegetables available for consumption and affect their quality, leading to economic losses for farmers and traders.

Weighing of Produce

More than half, i.e., Fifty-seven percent of the farmers used electronic weighing machines, which were often preferred for their accuracy and precision in measuring

weights. These machines reduced human errors in measurement. Meanwhile, forty-three percent of the farmers used mechanical scales for weighing, which are generally less expensive than electronic weighing machines. Also, it is more durable and less prone to damage.

Storage

Controlled/modified atmosphere storage methods were utilized by forty-one percent of the farmers. This shows an understanding of the importance of proper storage to extend the shelf life of the vegetables. Cent percent of farmers stored their produce in their homes, which indicates a lack of specialized storage facilities. They typically keep the storage for only a few days, as vegetables are perishable and they have a relatively short shelf life.

Market Distance

Fifty-three percent of the farmers have to travelled from 11 to 30 kilometers to sell their vegetables as suitable markets are not within immediate proximity, which implies that these farmers often need to cover relatively long distances to access suitable markets for their produce. Also, some farmers sell their produce to middlemen within the village, especially when their villages are far from the markets. (Vineetha et al., 2019).

Place of Sale

In terms of the sales location, nearly thirty-four percent of the farmers chose the nearby weekly markets as their primary selling point. Weekly markets are popular among farmers as the primary location for selling their produce, which includes a ready customer base, higher demand, competitive prices, or other incentives that make these markets a preferred choice for selling agricultural goods. Thirteen percent of the farmers sell in faraway markets as it offer better prices for their produce.

Selling Details to Consumers

Selling to commission agents was common among forty-one percent of the farmers, indicating that intermediaries had established connections and could sell the produce in bulk. Sandika (2012) indicated that a marketing channel is a network of intermediaries selling various vegetables at different stages. Intermediaries help reach a broader market, including distant or urban areas, which would be difficult for farmers to

access independently. Meagrely, twelve percent of the farmers directly sold their produce to the consumers as they can set their prices, build relationships and receive immediate feedback on their produced.

Packaging

The majority of the farmers (75 %) relied on Jute bags (gunny bags) and bamboo Baskets to pack vegetables during transportation because polythene bags will not be adequate for packaging their produce (Janani et al., 2016). This reflects a mix of traditional and eco-friendly packaging options as these bags are often biodegradable and considered more environmentally friendly than certain modern packaging materials, like plastics. Meagrely, seven percent used only bamboo baskets and Polythene bags + Corrugated Craft paper cartons + Thermocol to package vegetables, as usage of thermocol could be attributed to concerns about its harmful effects on the environment.

Transportation

Bicycles remained the most commonly used mode of transportation for farmers as stated by forty-two percent of the farmers and a small fraction i.e., four percent of the farmers used used tempo. Bicycles are likely a more cost-effective and practical option for most farmers. Jeyaramya (2022) expressed that despite the crucial role of agricultural markets in every village, transportation options remain inadequate.

Pattern of Payment

The majority of the farmers (83%) received payment immediately at the time of selling, ensuring immediate access to cash for meeting daily expenses, reinvesting in their farming operations and managing household finances. It also reduces the financial strain on farmers, helping them to maintain stability. Whereas six percent of the farmer's pattern of payment is maintaining an account bank to pay later.

Disposal of Produce to market

Disposing of produce by volume was practiced by Sixty percent of the farmers, as measuring by volume provided a quick process during limited time and labour. In contrast, forty percent of the farmers disposed of produce based on quality by sorting, as consumers preferred aesthetically pleasing produce and discarded those that did not look appealing.

4.3.3.1 Association between Marketing Practices and Socio-economic Characteristics of the farmers

Table XXX presents the association between farmers' marketing practices (Table XXIX) and their socio-economic characteristics to test Hypothesis (H1).

TABLE XXX

ASSOCIATION BETWEEN MARKETING PRACTICES Vs SOCIO-ECONOMIC CHARACTERISTICS OF THE FARMERS

Socio Economic Characteristics	Mean	SD	Chi square	df	P value
Age	2.21	.745	55.452[a]	46	.160
Gender	1.33	.472	23.198[a]	23	.449
Educational Qualification	4.34	.890	157.587a	115	**.005 ****
Marital Status	1.08	.329	85.860a	69	.083
Annual Income	1.94	.639	65.482[a]	46	**.031***
Experience in Farming	2.96	.854	91.509[a]	69	**.036***
Size of Land	2.65	1.068	129.024[a]	92	**.007****

*significant at 5 % level and ** significant at 1 % level

Based on the Chi-square test results in Table XXX, it can be observed that out of the seven socioeconomic characteristics, educational qualification and size of land showed a highly significant association at the 1% level, as their p-values were less than 0.01. The role of education in enhancing market access and decision-making skills among farmers is that they are more likely to adopt improved marketing strategies and utilize modern marketing channels for better market performance. Similarly, the larger landholdings provide farmers with better opportunities to engage in bulk marketing, negotiate better prices and access larger markets, enhancing their marketing skills and profit.

In contrast, annual income and farming experience exhibited a significant association with marketing practices at the 5% level, with p-values less than 0.05. Higher income provides farmers with the financial capability to invest in advanced marketing infrastructure, ultimately improving their market participation. Farming experience also contributes to better market knowledge, strategic decision-making and adaptability to changing market conditions, which are critical in enhancing marketing practices.

The characteristics such as age, gender and marital status, were found no significant association with marketing practices, which reinforces the understanding that socioeconomic characteristics directly related to resources, knowledge and capacity to have a more profound impact on agricultural marketing practices. Therefore, the hypothesis (H1: There is a significant association between Socioeconomic characteristics and Marketing practices on vegetables) is accepted.

4.3.4 Marketing Behaviour of the Farmers towards Vegetables Marketing

Marketing behaviour, in general, is defined as various activities performed from the time of harvest to the sale of the produce that deals only with the implementation aspect (Anusha & Padma, 2022). This can include decisions related to harvesting, sorting and grading, storage, packaging, time of sale, the reason for selecting a particular period, market selection and criteria for fixing a price that is presented in Table XXXI.

TABLE XXXI

MARKETING BEHAVIOUR OF THE FARMERS ON VEGETABLES MARKETING

Sl No.	Aspects		N=600											
			Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Mean	SD
			F	%	F	%	F	%	F	%	F	%		
1	Harvesting of vegetables	Sensory evaluation for flavour and taste of vegetables	1	.2	27	4	74	12	385	64	113	18	2.03	.712
		Assessment through experience on texture and appearance in maturity of vegetables	-	-	-	-	414	69	136	23	50	8	2.61	.637
		Determining the timing of Harvest to maintain Post-harvest longevity	26	4	459	76	56	9	34	6	25	4	3.71	.810
		Optimum period of maturity	14	2	75	12	55	9	354	59	102	17	2.24	.956
		Harvesting at favourable temperature helps to preserve the quality of the produce.	19	3	26	4	47	8	452	75	56	9	2.17	.777
2	Sorting and grading for quality	Immaturity of vegetables due to unfavourable weather conditions	5	.8	309	51	69	11	124	21	93	15	3.02	1.173
		Damaged by physical injuries transporting to the market.	17	3	45	7	48	8	403	67	87	15	2.17	.867
		Insect attacked	5	.8	12	2	62	10	109	18	412	69	1.48	.823
		Affected by Diseased	-	-	36	6	84	14	133	22	347	58	1.68	.927
		Aesthetic appeal of the produced	7	1	370	62	62	10	70	12	91	15	3.22	1.158
		Ripened produced which leads to spoilage	53	9	237	39	181	30	80-	13	49	8	3.27	1.065
		Damaged by physical injuries harvesting in the field	98	16	174	29	201	34	100	17	27	4	3.36	1.078

Sl No.	Aspects		N=600											
			Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Mean	SD
			F	%	F	%	F	%	F	%	F	%		
3	Purpose of storage	To get better price later	28	5	54	9	77	13	378	63	63	10	2.34	.947
		Shortage of transport facilities	100	17	405	67	65	11	22	4	8	1	3.95	.735
		High cost of transport	87	14	235	39	59	9	206	34	13	2	3.29	1.148
		Maintains freshness	37	6	67	11	36	6	393	65	67	11	2.36	1.024
		Optimize market timing to align with the consumer demand	30	5	35	5	181	30	283	47	71	12	2.45	.950
		Minimize losses due to spoilage, damage, or wastage	81	13	408	68	80	13	13	2	18	3	3.87	.780
		Improving shelf life avoiding market glut	18	3	136	23	294	49	129	22	23	4	3.00	.846
		Reduce and control transpiration, respiration and disease infection	45	7	225	37	146	24	136	23	48	8	3.14	1.098
4	Packaging of vegetables	Assemble the produce into convenient units	179	30	228	38	124	21	41	7	28	5	3.82	1.080
		Transportation efficiency to carry the produce	209	35	220	27	166	28	5	.8	-	-	4.06	.810
		Provide cushioning to fresh produce	209	35	239	40	146	24	6	1	-	-	4.08	.791
		Protects from any physical and pathological deterioration.	261	43	225	37	113	19	1	.2	-	-	4.24	.756
		Maintains the overall quality of the produce	185	31	415	69	-	-	-	-	-	-	4.31	.462
		Provides greater attraction to the produce	6	1	172	29	162	27	212	35	48	8	2.79	.979
5	Time of sale of the produce	Immediately after the harvest whatever the prices	105	17	192	32	138	23	127	21	38	6	3.33	1.174
		After initial storage, when it is convenient	88	15	111	18	166	28	185	31	50	8	3.00	1.190
		Immediately after the harvest, if prices are favourable	71	12	105	17	175	29	167	28	82	14	2.86	1.207

Sl No.	Aspects		N=600											
			Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Mean	SD
			F	%	F	%	F	%	F	%	F	%		
6	Reasons for selecting a specific period	Immediate financial need	282	47	135	22	78	13	84	14	21	3	3.95	1.215
		Highly perishable	290	48	127	21	78	13	84	14	21	4	3.97	1.221
		Based on market demand	68	11	84	14	245	41	153	25	50	8	2.95	1.087
		Indebtedness to trader	48	8	53	9	69	12	67	11	363	61	1.93	1.338
		Quality was not good	51	8	57	9	78	13	116	19	298	50	2.08	1.330
		No cold storage facilities available	107	18	346	58	67	11	63	10	17	3	3.77	.956
7	Reason for selection of market	Market demand	68	11	96	16	239	40	141	23	56	9	2.96	1.106
		Market is very near to place	-	-	-	-	-	-	119	20	48`	80	1.20	.399
		More population in the area	100	17	107	18	135	22	162	27	96	16	2.92	1.324
		Higher price of return	86	14	111	18	242	40	120	20	41	7	3.13	1.102
		Better transport facilities available to the village	-	-	-	-	-	-	139	23	461	77	1.23	.422
		Less competition in the area	51	8	106	18	251	42	155	26	37	6	2.97	1.011
8	Criteria for fixing price	Fluctuate based on seasonal variations	77	13	408	68	92	15	16	3	7	1	3.89	.694
		Based on market demand and supply	24	4	66	11	340	57	215	21	45	7	2.83	.867
		Based on government policies (MSP)	23	4	382	64	67	11	79	13	49	8	3.42	1.037
		Quality and grading of produce	87	14	99	16	138	23	160	27	116	19	2.80	1.322
		Competition in the market	13	2	333	55	89	15	99	16	66	11	3.21	1.097
		Based on production cost	382	64	152	25	22	4	44	7	-	-	4.45	.873

Harvesting of Vegetables

The aspect 'Determining the timing of harvest to maintain post-harvest longevity' recorded the highest mean score of 3.71, with nearly 76% of the farmers agreed that harvesting during the optimum period is essential. This highlights their strong focus on ensuring the freshness and Quality of vegetables for extended periods. By harvesting at the correct maturity stage, farmers can significantly reduce losses during transportation and storage, which is vital for maintaining market value. On the other hand, 'Sensory evaluation for flavour and taste of vegetables' received the lowest mean score of 2.03, possibly reflecting a lack of awareness among farmers about the role of sensory evaluation in enhancing consumer satisfaction and improving long-term market prospects.

Sorting and Grading for Quality

'Damaged by physical injuries during harvesting in the field' had the highest mean score of 3.36, indicating that mechanical operations during harvesting often caused damage like bruising, crushing, or rupturing of vegetables, making them more vulnerable to pathogens (Ufitinema et al., 2024). As a result, farmers actively sorted and graded their produce. Whereas the lowest mean score of 1.48 for crops being insect-attacked showed that insect damage was less of an issue during the harvesting phase, possibly due to effective pest control measures taken before the harvest that significantly reduced insect damage prior to the harvest period.

Storage of vegetables

The highest mean score of 3.95 for 'Shortage of transport facilities' indicated its significant role in storage. When transportation options are limited, farmers often struggle to promptly move their harvested goods to the market. Storage allows farmers to keep produce until transportation becomes available.

On the other hand, the lowest mean of 2.34 for getting a better price later indicated that farmers are less likely to hold onto their produce in hopes of getting a higher price later. This was because they needed immediate cash flow, could not afford to wait for potential future price increases and lacked proper infrastructure (such as storage facilities) to store the produce safely for extended periods.

Packaging of Vegetables

The aspect 'Maintaining the overall quality of the produce' scored the highest mean of 4.31 for the packaging of vegetables, which indicates that farmers strongly emphasized

ensuring that their crops retained freshness, appearance and nutritional value from harvest until they reach the market. Phukan et al., (2018) stated that the distribution of agricultural produce was the primary method for transporting goods from farms to markets. Higher quality produce was more likely to attract better prices and customer satisfaction, making quality control an essential focus. Whereas the lowest mean of 2.79 indicated a lesser ability to enhance the attractiveness of the produce. Farmers prioritize functionality over visual appeal and buyers primarily focused on cost over appearance in local markets.

Time of Sale of Produce:

With the highest mean of 3.33, 'selling immediately after the harvest regardless of the prices' highlighted that farmers prioritize immediate sales, even when market prices are unfavourable. Financial pressure and limited storage facilities (Kowsalya et al., 2021) often compelled them to sell their produce quickly to maintain cash flow. On the other hand, the lowest mean score of 2.86 for 'selling immediately after the harvest, if prices are favourable' indicated that most farmers did not wait for better prices, possibly due to the lack of storage facilities, limited market information, or the urgency of selling to meet immediate expenses.

Reasons for Selecting a Particular Period

The highest mean of 3.97 for 'Highly Perishable' highlighted that the short shelf life of produce was a key factor in farmers' decision towards selecting a particular period. Crops must be sold quickly without sufficient storage or refrigeration to prevent spoilage. In contrast, indebtedness to traders received the lowest mean score of 1.93, indicated that financial dependence on traders plays a minimal role in influencing farmers' selling decisions. Farmers can access alternative credit sources, reducing their reliance on traders for financial support.

Reasons for Selecting a specific Market

The highest mean score of 3.13 for 'Higher price of return' showed that farmers prioritized the potential for better financial returns when making decisions about selling their produce. Farmers were motivated to obtain a higher price for their goods, which often led them to choose specific markets where prices are more favourable. Maratha and Badodiya (2017) also stated that farmers preferred specific markets for selling their produce because they offered better prices. The lowest mean of 1.20 for 'market is very near' indicated that proximity alone did not determine market preference. Even if a market

is nearby, it may not provide the best prices, making them prefer to transport their goods to a further market to achieve higher profits.

Criteria for Fixing Price

'Based on production cost' had the highest mean score of 4.45 for the pricing criterion, implying that farmers prioritized covering their costs when determining prices. Farmers need to ensure that the price they set covers essential expenses and without this, they risk financial losses and reduced sustainability. On the other hand, the lowest mean score of 2.80 for 'quality and grading of produce' showed that while quality was recognized, it was not prioritized as highly, likely because it does not significantly influence the prices farmers received or they face limitations in implementing grading practices. Also, farmers might not have seen immediate benefits from higher quality goods.

4.3.4.2 Level of Marketing Behaviour

The marketing behaviour responses were obtained from the farmers on eight marketing behaviour aspects (Table XXXI) such as Harvesting of vegetables, Sorting and grading for quality, Purpose of storage, Packaging of vegetables, Time of sale of the produce, Reasons for selecting at a particular period, Reason for selection of Market and Criteria for fixing price. The total score for all eight aspects gave the overall marketing behaviour score of the farmers. Based on the total score obtained by the farmers, the following categories of marketing behaviour were presented in Table XXXII with the help of mean and standard deviation values.

TABLE XXXII

LEVEL OF MARKETING BEHAVIOUR OF THE FARMERS

Sl	Level of Marketing Behaviour	Frequency (f)	Percentage (%)	Mean	SD
1	Low < 133.83	155	26	141.52	7.687
2	Moderate (133.83 – 149.21)	**279**	**47**		
3	High > 149.21	166	27		
TOTAL		600	100.0		

The data revealed that forty-seven percent of the farmers had a moderate level of marketing behaviour, which indicates that these farmers engage in activities related to

marketing their vegetables, but perhaps not at an extensive or highly strategic level. Twenty-six percent of the farmers had a low level of marketing behaviour, which depicts that farmers may not be fully engaging in marketing their vegetables and this could be due to various reasons such as lack of knowledge about marketing techniques, limited resources, or a primary focus on production rather than marketing. While twenty-seven percent of the farmers had a high level of marketing behaviour, here, farmers carefully analyze market trends, consumer preferences and competitor strategies to identify opportunities for their vegetables. The study is consistent with findings by Anusha and Padma (2022), who reported that two-thirds (66.00%) of vegetable growers in the study area exhibited a moderate level of marketing behaviour.

The mean score of marketing behaviour was 141.52 and S.D. was 7.687. The mean score being higher than the midpoint (50%) indicates that, on average, farmers are somewhat engaged in marketing activities. However, the relatively high standard deviation indicates that there is considerable variation among farmers in terms of their marketing behaviour.

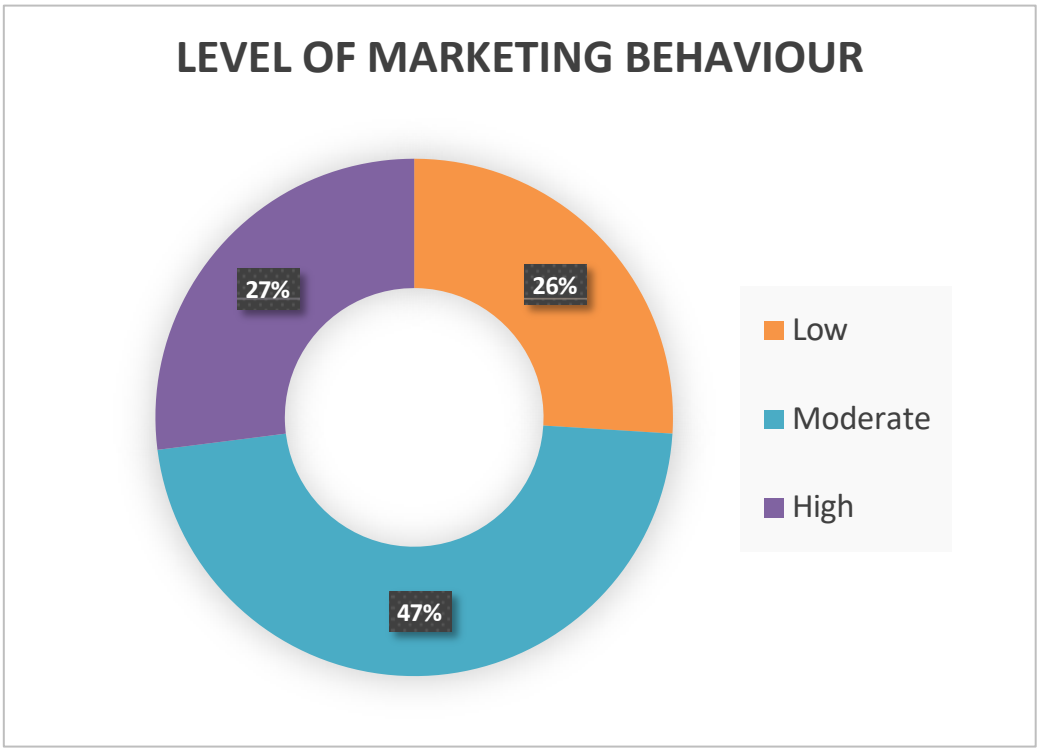

FIGURE VII : LEVEL OF MARKETING BEHAVIOUR

4.3 Association between Socio Economic Characteristics and level of Marketing Behaviour

Socioeconomic Characteristics and Level of Marketing Behaviour (Table XXXII) seek to identify the association and how the characteristics shape Marketing behaviour. To explore this hypothesis, H2 is examined and presented in Table XXXIII.

TABLE XXXIII

ASSOCIATION BETWEEN LEVEL OF MARKETING BEHAVIOUR VS SOCIO ECONOMIC CHARACTERISTICS

Socio Economic Characteristics						N=600
	Level of Marketing Behaviour				Chi-Square Value	p-value
		L	M	H		
Age (year)	Less than 35	31	42	43	10.288	.036*
	35– 55	69	112	60		
	Above 55	55	125	63		
Educational Qualification	Illiterate	2	0	3	17.779	.050 *
	Primary School	7	12	8		
	Middle School	16	14	7		
	High School	69	115	60		
	Higher Secondary	58	124	83		
	Graduation and above	3	14	5		
Annual Income (Rs)	Less than 50,000	31	59	53	10.129	.038*
	50,000 – 1Lakh	99	164	90		
	Above 1 Lakh	25	56	23		
Experience of farming (Year)	0-5	9	23	16	6.903	.330 NS
	5-10	28	39	19		
	10-15	84	142	80		
	Above 15	34	75	51		
Size of Land (Hectare)	0.4-1 Hectare	17	27	18	10.892	.208 NS
	1 – 2 Hectare	81	113	62		
	2 – 3 Hectare	31	75	49		
	3– 4 Hectare	16	42	27		
	Above 4 Hectare	10	22	10		

** significant at 5 % level, ((L- Low, M- Moderate, H- High)*

The data glancing on the farmers' socioeconomic characteristics and marketing behaviour indicate significant associations between age, educational qualifications and annual income with the marketing behaviour at a 5 % level.

Older farmers often possess extensive experience in agricultural practices and marketing, enabling them to make well-informed decisions. Education improves farmers' access to market information and their ability to negotiate better deals, thus influencing their marketing behaviour. Education broadens an individual's knowledge horizon, fostering logical thinking compared to those without formal education (Devde, 2017). An individual's annual income serves as an indicator of their economic status. Those with higher economic status typically have greater access to various information sources. Farmers with higher annual incomes have greater access to resources like transportation, storage facilities and market connections, all of which can strengthen their marketing capabilities. Hence, hypothesis H2 (There is an association between farmers' socioeconomic characteristics and level of marketing behaviour) is accepted.

4.3.5 Factors Influencing Marketing Behaviour of Farmers

The factors influencing the marketing behaviour of the farmers are shaped by a variety of interrelated factors that influence their decisions on what, how and where to market their produce, as presented in Table XXXIV.

TABLE XXXIV

FACTORS INFLUENCING MARKETING BEHAVIOUR OF FARMERS

Sl. No.	Influencing Factors	N=600							
		Agree		Neutral		Disagree		Mean	
		F	%	F	%	F	%		
1	Generating income	600	100	-	-	-	-	3.00	
2	Sustainable livelihood	600	100	-	-	-	-	3.00	
3	Rapid sale of perishable vegetable	567	95	33	5	-	-	2.95	
4	Fluctuation in price	511	85	50	8	39	7	2.79	.546
5	Input cost is too high	291	49	149	25	160	27	2.22	.840
6	Competition against other farmers and vendors	279	47	133	22	188	31	2.15	.870
7	Market demand	224	37	134	22	242	40	1.97	.882
8	Availability of bank credit	156	26	162	27	282	47	1.79	.829
9	Inadequate storage facilities	185	31	65	11	350	58	1.73	.904
10	Lack of access to Market information	191	32	31	5	378	63	1.69	.923
11	Lack of collaboration with other farmers and traders	134	22	46	8	420	70	1.52	.835
12	Improved market structure	57	10	192	32	351	58	1.51	
13	Manipulation of middleman/commission agents	-	-	457	76	143	24	1.24	.426
14	Involvement of more media	-	-	124	21	476	79	1.21	.405
15	Accessible Transport Facilities for Market Access	1	.2	110	18	489	82	1.19	

The data highlights the factors influencing farmers' marketing behaviour, with generating income and sustainable livelihoods having the highest mean score. Vegetable farming is a key contributor to income and employment, especially for the growing population (Mukaila et al., 2021). Farmers see the potential of vegetable production to meet essential needs, driving them to cultivate not only for personal consumption but also for sale, to improve their livelihoods and overall well-being (Asadu et al., 2018). This indicates that economic considerations, such as profitability and financial stability, are central to their decision-making processes in marketing.

The rapid sale of perishable vegetables follows with a mean score of 2.95, reflecting the urgency for farmers to sell quickly to avoid losses. Vegetables experience the most significant postharvest losses because of their highly perishable nature and the inadequate post-production infrastructure needed for proper handling. This means that

without proper storage, transportation and processing facilities, a large portion of vegetables spoil before they can reach markets or consumers (Affoghon et al., 2015).

Fluctuations in Price due to seasonal gluts, with a mean score of 2.79, indicate a significant challenge for farmers. Seasonal gluts occur when an oversupply of produce leads to a sharp decline in prices, reducing profitability for farmers during peak harvesting periods. Meanwhile, accessible transport facilities for market access received the lowest mean score of 1.19, likely due to the limited availability of transportation options. With fewer vehicle services, farmers' market participation is restricted, reducing the influence of this factor on their marketing decisions.

5.1 Relationship between Socio Economic Characteristics and Factors Influencing Marketing Behaviour

To investigate the relationship between factors influencing marketing behaviour (Table XXXIV) and socio-economic characteristics, hypothesis H3 is formulated, with the results presented in Table XXXV.

TABLE XXXV

RELATIONSHIP BETWEEN SOCIO ECONOMIC VS FACTORS INFLUENCING MARKETING BEHAVIOUR

Socio Economic Characteristics	N=600	
	Pearson Correlation	Sig
Age (years)	-.168 **	.000**
Gender	-.002	.953
Educational Qualification	.207 **	.000**
Marital Status	-.055	.179
Annual Income	.072	.077
Experience in Farming:	-.005	.900
Size of Land	-.091*	.026*

**significant at 5 % level, ** significant at 1 % level*

The data sought to analyze the relationship between various Socioeconomic characteristics of farmers and the factors influencing their marketing behaviour, as reflected by the zero-order correlation coefficients. The analysis showed that age and

educational qualification are significant at 1 % level and size of land is significant at 5 % level. However, gender, marital status, annual income, experience in farming and size of land are not significantly correlated.

Age is an essential factor affecting farmers' marketing behaviour. Older farmers, with more years of farming experience, often possess greater knowledge and tend to prioritize preserving family traditions and maintaining stability. However, younger farmers are more likely to adopt innovative marketing strategies for economic independence. Education has been identified as a key factor influencing many decisions farmers make, including their choice to participate in markets and sell their produce (Zhang et al., 2020). Farmers with more extensive landholdings tend to have a higher production capacity and have better access to resources, such as storage facilities, transportation and labour, enabling them to manage and market their produce more effectively. A similar finding was also reported by Maratha & Badodiya (2017). Hence, the hypothesis (H3: There is a relationship between socioeconomic characteristics and factors influencing marketing behaviour) was rejected.

4.4 KNOWLEDGE OF THE FARMERS ON AGRICULTURAL MARKETING

Knowledge of the farmers regarding the marketing of agricultural produce refers to the understanding and awareness that farmers possess the various aspects of agriculture and selling their agricultural products in the market. This knowledge encompasses multiple factors, including awareness regarding government schemes and programmes, knowledge of farmers' views on vegetable marketing and digital marketing.

"Wang (1988) defined Farmer's knowledge as the sum total of knowledge and practices based on people's accumulated experience in dealing with situations and problems in various aspects of life and such knowledge and practices‖ .

4.4.1 Knowledge among the Farmers on Vegetables Marketing

Knowledge about vegetable marketing is essential for farmers to make informed decisions throughout the agricultural value chain, from production to consumer sales. Assessing farmer's understanding of key concepts in vegetable marketing is presented in Table XXXVI.

TABLE XXXVI

KNOWLEDGE AMONG THE FARMERS ON VEGETABLES MARKETING

Sl No	Statements	N=600					
		Agree		Neutral		Disagree	
		F	%	-	-	F	%
1	Vegetables are produced seasonally, but the market requires them throughout the year	585	98	-	-	15	3
2	Local markets sell produce directly to consumers or traders	528	88	-	-	71	12
3	Street Hawkers prefer to move around specific localities to sell Vegetables.	371	62	-	-	229	38
4	Wholesalers buy vegetables directly from the farmers	335	56	169	28	96	16
5	Storage facilities makes it unnecessary to market vegetables immediately after harvest	326	54	162	27	112	19
6	Retail Market prices are Higher than wholesale market prices	230	38	63	10	307	62
7	Post-harvest losses of vegetables occur at all stages of the value chain from production to consumption	211	35	335	56	54	9
8	Retailers buy vegetables from wholesalers to sell to consumers	186	31	211	35	203	34
9	Grading and sorting are processes where farmers differentiate commodities based on quality specifications	388	65	149	25	63	10
10	Online markets are commercial platforms where multiple third parties provide information on vegetables	114	19	272	45	214	36

The data shows that 98% of farmers agree that 'Vegetables are produced seasonally, but the market requires them throughout the year.' Farmers are aware of the mismatch between the natural growing seasons of vegetables and the market's consistent demand for fresh produce year-round.

Seasonality plays a crucial role in market arrivals and their impact on pricing. Seasonal fluctuations in arrivals and prices are regular, recurring changes each year, driven by shifts in weather and growing conditions (Kundu et al., 2019). Farmers

understand the challenge posed by the perishability of crops and the need for solutions to extend availability beyond harvest seasons.

Fifty-six percent of the farmers remained neutral regarding the statement, 'Post-harvest losses of vegetables occur at all stages of the value chain from production to consumption.' This indicates that farmers may be aware of post-harvest losses but may not fully grasp their impact or the specific stages of these losses. Post-harvest losses in the value chain can happen during harvesting, storage, transportation, processing and even retail. Furthermore, farmers typically sell the produce to nearby markets, ensuring the produce remains fresh (Gupta & Rathore, 1998).

Sixty-two percent of the farmers disagree with the statement, 'Retail Market prices are Higher than wholesale market prices.', which implies that a significant portion of the farmers believe retail markets do not consistently offer higher prices than wholesale markets. Farmers may have experienced selling their produce directly at retail markets or through middlemen. Farmers may find the price difference between wholesale and retail negligible or may not have access to retail markets offering higher prices. This also indicates that farmers view wholesale markets as providing more consistent and reliable pricing compared to the costs associated with retail sales. They may also face challenges in directly entering retail markets, such as the need for larger volumes and higher quality standards in selling to retail outlets.

4.4.2 Knowledge among the Farmers on Digital Marketing.

Knowledge among the Farmers towards Digital Marketing is the extent to which farmers possess information and awareness about the concept and practices of digital marketing in agriculture, as shown in Table XXXVII.

TABLE XXXVII

KNOWLEDGE AMONG THE FARMERS ON DIGITAL AGRICULTURAL MARKETING

Sl No	Statements	N=600					
		Agree		Neutral		Disagree	
		F	%	F	%	F	%
1	Digital Marketing is the process of marketing a product or service using the Internet.	562	94	38	6	-	-
2	National Agriculture Market or eNAM is an online trading platform available for farmers	362	60	238	40	-	-
3	Social media is very useful in agricultural marketing	102	17	472	79	26	4
4	It helps create awareness about the availability of agricultural products	71	12	464	77	65	11
5	ICT is a tool or application that helps in the digital marketing of agricultural produce	51	9	483	81	66	11
6	The KISAN RATH Mobile App is available for the transportation of agricultural produce	19	3.2	322	54	259	43
7	Farmers can buy agricultural inputs via e-platforms	16	3	352	59	232	38
8	e-Choupal connects rural farmers to the market via the internet for procuring agricultural products	-	-	600	100	-	-
9	AGMARKNET caters to the need of farmers by providing agriculture related information	-	-	600	100	-	-
10	NAFED supports farmers by ensuring profits and eliminating middlemen	-	-	600	100	-	-
11	IKISAN is a one stop information resource for farmers	-	-	600	100	-	-

The data highlights that 94% of the farmers agreed with the statement, 'Digital Marketing is the process of marketing a product or service using the Internet.' Farmers recognize what digital marketing entails, but they do not fully grasp its practical applications or benefits in the context of agriculture. This highlights a potential need for training and support to help farmers understand and effectively utilize digital marketing tools to enhance their market access and income.

Cent percent of the farmers remained neutral on the statements, 'e-Choupal connects rural farmers to the market via the internet for procuring agricultural products,' 'AGMARKNET caters to the need of farmers by providing agriculture related information,' 'NAFED supports farmers by ensuring profits and eliminating middlemen' and 'IKISAN is a one stop information resource for the farmer'. This entails that farmers may not have sufficient knowledge and experience with these platforms. Despite their importance in enhancing market access, providing valuable information and reducing middlemen's role. It reflects a potential gap in awareness of these platforms and services. Therefore, there is a need for greater outreach, training and support to ensure farmers understand and can take advantage of these platforms to improve their agricultural practices and market outcomes.

Forty-three percent of the farmers disagreed with the statement, 'The KISAN RATH Mobile App is available for the transportation of agricultural produce.' This shows that a significant portion of the farming community may not be aware of the KISAN RATH Mobile App or its functionalities. This app was designed to facilitate the transportation of agricultural produce by connecting farmers with transporters, thus helping them move their products efficiently from farms to markets. It, therefore, highlighted that while some farmers know these tools, many remain unaware of how to use them effectively. This situation points to the necessity for addressing this knowledge gap, which could lead to better utilization of technology in agriculture, ultimately benefiting farmers in terms of efficiency and profitability.

4.4.3 Awareness on the Government Schemes and Programmes in Agriculture and Agricultural Marketing

Awareness regarding the Government Schemes and Programmes on Agriculture refers to whether farmers know various government schemes and programmes related to agriculture and Agricultural Marketing. The data are displayed in the table XXXVIII.

TABLE XXXVIII

AWARENESS ON THE GOVERNMENT SCHEMES AND PROGRAMMES

Sl. No	Name of the Schemes	N=600					
		Aware		Somewhat Aware		Not Aware	
		F	%	F	%	F	%
1	Farmer Producer Organization Scheme	-	-	592	99	8	1
2	Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)	-	-	555	93	45	8
3	Pradhan Mantri Fasal Bima Yojna (PMFBY)	-	-	554	92	46	8
4	Paramparagat Krishi Vikas Yojana (PKVY)	-	-	546	91	54	9
5	Pradhan Mantri Kisan SAMPADA Yojana (PMKSY)	-	-	389	65	211	35
6	PM-Kisan (Pradhan Mantri Kisan Samman Nidhi	-	-	299	50	301	50
7	Rastriya Krishi Vikas Yojana (RKVY)	-	-	286	48	314	52
8	National Mission for Sustainable Agriculture (NMSA)	-	-	210	35	390	65
9	Mission Organic Value Chain Development in Assam (MOVCD)	-	-	26	4	574	96
10	Mukhya Mantri Krishi Sa Sajuli Yozana (MMKSY)	-	-	25	4	575	96
11	Credit Guarantee Fund Scheme (CGFS)	-	-	24	4	576	96
12	Marketing Research & Information Network (MRIN)	-	-	15	3	585	98
13	Horticulture Mission for North East & Himalayan States (HMNEH)	-	-	11	2	589	98
14	Equity Grant Scheme (EGS)	-	-	8	1	591	99
15	Integrated Scheme for Agricultural Marketing Infrastructure (ISAM)	-	-	8	1	592	99

A remarkable 99% of farmers are somewhat about the Farmer Producer Organizations scheme. Farmer Producer Organizations (FPOs) offer an effective platform for marketing agricultural products, which can significantly boost farm productivity and raise the income of their members (Bharali & Gogoi, 2022).

Similarly, the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) schemes were somewhat aware, with 93% of farmers familiar with it but not entirely. This scheme focuses on improving water-use efficiency in agriculture and farmers recognize the critical role of water management in enhancing productivity and sustainability.

However, 99% of the farmers are unaware of the Equity Grant Scheme (EGS) and the Integrated Scheme for Agricultural Marketing Infrastructure (ISAM). The lack of awareness might limit farmers' access to valuable resources and support. To address this, more focused efforts are needed to promote these lesser-known schemes through farmer education programmes, better dissemination of information and active engagement by local agricultural institutions.

4.4.4 Awareness on the Applications & Portals on Agriculture and Agricultural Marketing

Farmers' awareness of agricultural applications and portals refers to their understanding and utilization of mobile apps to enhance various aspects of agricultural activities, as presented in Table XXXIX.

TABLE XXXIX

AWARENESS ON APPLICATIONS & PORTALS ON AGRICULTURE

S. No	Name of the Applications	N=600					
		Aware		Somewhat Aware		Not Aware	
		F	%	F	%	F	%
1	AgSpeak	-	-	211	35	389	65
2	Agri app	-	-	207	35	393	66
3	Kisan Rath app	-	-	187	31	413	69
4	APEDA Farmer Connect Mobile App	-	-	186	31	414	69
5	Crop Insurance app	-	-	26	4	574	96
6	AgMart- Agrimarket App	-	-	21	3.5	579	97
7	IFFCO- Kisan Agriculture app	-	-	14	2	586	98
8	Crop Insurance app	-	-	10	2	590	98
9	Pusa Krishi app	-	-	3	1	597	99
10	Krishi Network: Smart Kisan	-	-	2	.3	598	99
11	PMKISAN GOI	-	-	-	-	600	100
12	Fasal salah Agriculture app	-	-	-	-	600	100
	Name of the Portals						
13	National Agriculture Market or eNAM	-	-	562	94	38	6
14	Kisan Mandi.com	-	-	209	35	390	65
15	Agricultural Marketing Information Network (AGMARKNET)	-	-	64	11	536	89

The data reveals that 35% of the farmers are aware of the AgSpeak and Agri applications app, primarily due to limited outreach efforts. Farmers mainly lack the necessary knowledge and access to smartphones and the internet, which are crucial for effectively utilizing these apps. Cent percent of the farmers were unaware of the PMKISAN GOI and Fasal Salah Agriculture apps, indicating that these apps are not widely recognized. PMKISAN GOI App is designed to check the beneficiary status and correct name and to offer a complete technology solution to directly transfer funds into farmers' accounts, while the Fasal Salah App provides timely and relevant agricultural advisory services to bridge the information gap. Low awareness indicates the importance of better promotion and education to ensure farmers can take full advantage of these digital tools.

The awareness regarding the portals indicates that most (94%) of farmers are aware of the National Agriculture Market (eNAM), but extensive outreach efforts have not been done in the particular villages. Promotional campaigns by government agencies should have played a key role in educating farmers about the benefits and functionalities of eNAM, significantly increasing its visibility across various regions of the country. On the other hand, 89% of farmers are unaware of AGMARKNET, likely due to its reliance on technology, which many rural farmers lack access to. As a result, mobile platforms like AGMARKNET remain unknown primarily to farmers and need increased promotion and education to improve access to agricultural information and markets.

4.5 OPINION OF THE FARMERS ON AGRICULTURAL MARKETING

The farmers' opinion towards marketing agricultural produce focuses on understanding how farmers feel and think about selling their agricultural products, such as crops, livestock, or other goods they produce. Through this opinion, specific challenges and opportunities for farmers can be found to improve marketing in various ways.

4.5.1 Opinion of the Farmers on Vegetables Marketing.

The farmers' opinion on vegetable marketing is composed of their perceptions, views and experiences towards marketing vegetable produce. The data are highlighted in the table XL.

TABLE XL

OPINION OF THE FARMERS ON VEGETABLES MARKETING

S. No	Opinion	N=600											
		SA		A		N		D		SD		Mean	SD
		F	%	F	%	F	%	F	%	F	%		
1	Income is the primary factor in vegetable marketing	188	31	222	37	114	19	39	7	37	6	3.81	1.133
2	One should produce items that are high in market demand	170	28	188	31	112	19	80	13	50	8	3.58	1.257
3	A farmer can secure a good price by producing high quality products	174	29	219	36	108	18	52	9	47	8	3.70	1.198
4	Advertising and promoting vegetables produce can increase sales	203	34	162	27	121	20	75	12	39	7	3.69	1.238
5	Government support for vegetable marketing is insufficient	157	26.2	245	41	134	22	39	6	24	4	3.78	1.037
6	Institutional credit is easily available for growing vegetable produce	135	23	249	42	153	26	38	6	25	4	3.72	1.015
7	Storage facilities for vegetable produce are sufficient	252	42	183	31	79	13	53	9	33	6	3.95	1.183
8	One should sell products to the nearest market regardless of price	230	38	165	28	81	14	61	10	63	10	3.73	1.342
9	Expanding the area of vegetable cultivation helps to achieve higher income	253	42	143	24	78	13	63	11	63	10	3.77	1.366
10	Marketing of vegetable crops is very simple	259	43	98	16	74	12	103	17	66	11	3.64	1.450

S. No	Opinion	SA		A		N		D		SD		Mean	SD
		F	%	F	%	F	%	F	%	F	%		
11	Using digital technology in marketing helps consumers access and understand farm produce, ensuring they get what they need at the right price.	255	43	102	17	73	12	101	17	68	11	3.64	1.490
12	Farmers can sell the vegetable products online	-	-	66	11	91	15	227	38	216	36	2.01	.976
13	Pre and post-harvest losses are high in vegetable production	-	-	88	15	57	10	235	39	220	37	2.02	1.025
14	Standardization and grading increase the burden on farmers	12	2	42	7	77	13	205	34	264	44	1.89	1.009
15	There is a need for more co-operative agencies to improve market linkages	-	-	65	11	91	15	231	38	213	35	2.01	.970
16	The roads are good enough to transport produce to the main road	-	-	64	11	91	15	231	39	214	35	2.01	.970
17	Better marketing facilities help farmers get better price for their produce	-	-	66	11	91	15	234	39	209	35	2.01	.968
18	Farm women have a lesser role in vegetable marketing than men	-	-	88	15	57	9	214	36	241	40	2.02	.970
19	Setting up regulated purchase centre for vegetable produce in nearby localities boost vegetable cultivation	19	3	42	7	84	14	184	31	271	45	1.99	1.042
20	Knowledge of vegetable preservation is essential during periods of high demand	18	3	42	7	83	14	187	31	270	45	1.92	1.074

(SA- Strongly Agree, A- Agree, N-Neutral, D-Disagree, SD-Strongly Disagree)

The data reveals the highest mean value of 3.95 for the statement, 'Storage facilities for vegetable produce are sufficient.' Farmers believe they have basic storage facilities to hold their produce temporarily, but they lack the necessary preservation techniques. This limitation increases the risk of post-harvest losses, especially during periods of high demand. Without proper preservation methods, storage benefits are limited, as the produce remains vulnerable to spoilage over time, preventing farmers from fully capitalizing on favourable market conditions.

The mean value of 3.81 for the statement, 'Income is the primary factor in vegetable marketing,' highlights the significant role that economic considerations play for farmers when marketing their produce. Maximizing income is a primary concern for farmers, shaping their decisions and strategies in vegetable marketing. The financial aspect becomes a driving force behind their overall approach to marketing vegetables.

The lowest mean value of 1.89 for the statement, Standardization and grading increases the burden on farmers, implies that farmers do not perceive these processes as significant burdens but rather see them as manageable and beneficial. Farmers may view these practices as a regular part of vegetable marketing rather than an overwhelming task that hinders their operations.

A mean value of 1.92 for the statement, 'Knowledge of vegetable preservation is essential during periods of high demand,' implies that farmers may not thoroughly prioritize the importance of preservation techniques during periods of high demand. Farmers may miss opportunities to reduce post-harvest losses, stabilize supply and capitalize on higher prices during peak demand without sufficient preservation knowledge.

4.8.5 Identification of the Factors Related to opinion of the Farmers towards vegetable marketing

The opinion of the farmers towards vegetable marketing on agricultural produced and the most dominating factor was analyzed through factor analysis. The result is highlighted in the Table (XLI, XLII and XLIII).

TABLE XLI

CRONBACH'S RELIABILITY TEST

Reliability Statistics	
Cronbach's Alpha	N of Items
.874	20

Source: Estimation based on Field survey

In order to evaluate the reliability of factor analysis, Cronbach's alpha test was applied and the results are presented in Table XLI. The table shows a Cronbach's alpha value of 0.874, exceeding the 0.7 threshold, indicating high internal consistency among the constructs. Thus, the instrument utilized in this study demonstrated strong reliability. Factor analysis was performed to identify the latent dimensions of the constructs.

TABLE XLII

KMO AND BARTLETT'S TEST MEASURES

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.838
Bartlett's Test of Sphericity	Approx. Chi-Square	20885.595
	Df	190
	Sig.	.000

Source: Estimation based on Field survey

In the study, factor analysis was employed to assess the farmers' opinions of vegetable marketing. Two preliminary tests were conducted to assess the significance of the association among variables: the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy and Bartlett's Test of Sphericity. The Kaiser-Mayer-Olkin measure of sample adequacy was calculated to be 0.838 and the $\chi 2$ value for Bartlett's test for sphericity was 20885.595. These results indicate that the selected variables for factor analysis were adequate..

TABLE XLIII

FACTOR LOADINGS ON OPINION OF THE FARMERS ON VEGETABLE MARKETING

S. No.	Opinion	Components		
		1		3
1	Income is the primary factor in vegetable marketing			
2	Marketing of vegetable crops is very simple			
3	Institutional credit is easily available for growing vegetable produce			
4	Government support for vegetable marketing is insufficient		.761	
5	Pre and post-harvest losses are high in vegetable production		.847	
6	Setting up regulated purchase centre for vegetable produce in nearby localities boost vegetable cultivation		.841	
7	Standardization and grading increase the burden on farmers			.868
8	Farmers can sell the vegetable products online			.822
9	There is a need for more co-operative agencies to improve market linkages			.788
10	Expanding the area of vegetable cultivation helps to achieve higher income			.847
11	Storage facilities for vegetable produce are sufficient			.838
12	Knowledge of vegetable preservation is essential during periods of high demand	.933		
13	Farm women have a lesser role in vegetable marketing than men	.888		
14	The roads are good enough to transport produce to the main road	.840		
15	Advertising and promoting vegetables produce can increase sales	.929		
16	Using digital technology in marketing helps consumers access and understand farm produce, ensuring they get what they need at the right price.	.928		
17	A farmer can secure a good price by producing high quality products	.930		
18	Better marketing facilities help farmers get better price for their produce	.903		
19	One should sell products to the nearest market regardless of price	.896		
20	One should produce items that are high in market demand	.894		
Eigen values		8.083		1.736
Percentage of variance		40.416		8.682
Cumulative percentage		40.416		78.700

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization,
Rotation converged in 5 iterations.
Source: Estimation based on Field Survey

Factor 1 was found to have a significant loading on nine variables: knowledge on preservation, a lesser role for women than men, good transportation, advertisement and promotion can increase the sales, help consumers to understand, getting a good price, better marketing facilities, selling products at the nearest market and producing product on demand. This factor explains approximately 40 percent of the variance in the selected factor.

Factor 2 exhibited substantial loading on six variables: income is the primary factor, marketing of vegetables is very simple, institutional credit is easily available, government support is insufficient, loss in pre and post-harvest and setting up regulated purchase centers in nearby localities will boost production. This factor accounted for approximately 30 percent of the variation in the studied variables.

Factor 3 was found to be significant loading on five statements, namely standardization and grading increases the burden, selling online, need for more corporative agencies and increasing area and storage facilities. This factor accounted for approximately 9 percent of the variation in the studied variables. Therefore, the study revealed that the primary factor influencing farmers' opinions on vegetable marketing was factor 1, which had the highest percentage of variance.

4.5.2 Opinion of the Farmers on Digital Agricultural Marketing

The opinions of farmers on digital agricultural marketing indicate how they perceive and respond to the use of digital platforms and technologies in the marketing of agricultural products. This could include farmers' views on the effectiveness, accessibility and potential benefits of digital tools such as mobile apps, online marketplaces, e-commerce platforms and digital payment systems in connecting them directly to buyers, improving market access and enhancing profitability. The data are displayed in the table XLIV.

TABLE XLIV

OPINION OF THE FARMERS ON DIGITAL AGRICULTURAL MARKETING

Opinion	N=600											
	SA		A		N		D		SD		Mean	SD
	F	%	F	%	F	%	F	%	F	%		
Helps in marketing agricultural products through mobile phones	64	11	193	32	149	25	114	19	80	13	4.36	3.87
Agricultural marketing apps can be highly accepted because of its reliable information	27	5	188	31	195	33	173	29	17	3	3.33	1.04
Easily provides agricultural information whenever needed	146	24	362	60	74	12	10	2	8	1	3.29	0.81
Enhances communication among farmers	87	15	162	27	190	32	114	19	47	8	3.28	1.05
Mobile applications that provide price information can help reduce market distortions	74	12	196	33	186	31	116	19	28	5	3.22	1.09
Offers area-wise reliable price information and aids in marketing.	298	50	169	28	81	14	37	6	15	3	3.21	1.14
Facilitates access to market information and promotes agricultural products.	78	13	200	33	193	32	101	17	28	5	3.17	1.10
Provides good online trading platforms for agricultural commodities in India.	58	10	216	36	142	24	143	24	41	7	3.07	1.21
Helps farmers sell their agricultural products at better prices.	44	7	172	29	309	52	66	11	9	2	3.05	0.94
Assists in evaluating, organizing and facilitating easy marketing of agricultural products	65	11	210	35	161	27	125	21	39	7	2.72	0.92

(SA- Strongly Agree, A- Agree, N-Neutral, D-Disagree, SD-Strongly Disagree)

The statement 'Helps in marketing agricultural products through mobile phones' has the highest mean value of 4.36, indicating that mobile phones are widely recognized as valuable tools for marketing. However, challenges such as limited digital literacy and restricted access to technology may hinder full adoption and prevent widespread support.

'Agricultural marketing apps can be highly accepted because of their reliable information', has a mean value of 3.33, highlighting the importance of trustworthy and accurate information. Farmers likely perceive digital marketing as valuable because these platforms provide dependable market data and other relevant information in a single, accessible location.

The statement, 'Helps farmers sell their agricultural products at better prices', has a mean value of 3.05, which implies various factors such as market demand, quality of produce and access to market information that contribute to the prices farmers receive for their products. Thus, more effective strategies are needed to ensure farmers receive fair produce prices.

The statement, 'Assists in evaluating, organizing and facilitating easy marketing of agricultural products,' has the lowest mean value of 2.72 among all the statements. It states that Farmers likely feel that existing systems are inadequate due to poor infrastructure, limited digital adoption, low market awareness, middleman dominance and low financial and technical literacy. These challenges highlight the need for better infrastructure, digital integration and policy support to enhance agricultural marketing.

4.6 Barriers Experienced by the Farmers in Marketing Vegetables.

Barriers experienced by farmers in marketing vegetables consist of the obstacles that farmers encounter when selling their vegetable produce in the marketplace. These barriers can encompass a range of issues that hinder the successful marketing of vegetables. The barriers are divided into production, economic, communication, storage & transporting and marketing. The garret ranking method was used to identify the barriers perceived by the farmers.

4.6.1 Production Barriers experienced by the Farmers in Marketing Vegetables

Production barriers experienced by the farmers are highlighted in Table XLV..

TABLE XLV

PRODUCTION BARRIERS EXPERIENCED BY THE FARMERS

Production Barriers	N=600		
	Total Garrett score	**Average score**	**Rank**
High cost of seed, pesticides and fertilizers	45546	77.69	I
Lack of knowledge about improved harvesting methods	39877	68.04	II
Lack of post-harvest technology	35847	60.95	III
Lack of scientific knowledge about vegetable cultivation	33270	56.74	IV
Non-availability of seeds and planting materials at the required time	23456	52	V
Transition from subsistence farming to commercial Farming	17964	50.138	VI
Inadequate irrigation facilities	28302	48.33	VII
Lack of knowledge about pests and diseases control measures	24907	42.29	VIII
Minimization of land holdings	23151	39.70	IX
Non availability of tractors for ploughing at the required time	12918	22.28	X

The data outlines that the High cost of seed, pesticides and fertilizers has the highest average Garrett score of 77.69 and is ranked I, which implies that the cost of these essential inputs is disproportionately high compared to other barriers. It's likely difficult for farmers to sustain their production levels.

Lack of knowledge about improved harvesting methods is ranked second with an average Garrett score of 68.04, affecting farmers' production activities that indicate that farmers may not be aware of the latest techniques and technologies in harvesting, which result in inefficiencies, lower yields, increased labour requirements, post-harvest losses and overall reduced profitability.

Non availability of Tractor for ploughing at required time with an average Garrett score of 22.28 and is ranked X indicates that farmers may face difficulties accessing mechanized equipment when they need it for land preparation activities such as ploughing.

This could be due to various reasons, such as the limited availability of tractors in the area, high demand during peak seasons, technical constraints and affordability issues for small-scale farmers.

4.6.2 Economic Barriers experienced by the Farmers

Economic barriers experienced by the farmers are shown in the table XLVI

TABLE XLVI

ECONOMIC BARRIERS EXPERIENCED BY THE FARMERS

Economic Barriers	N=600		
	Total Garrett score	Average score	Rank
Not enough profit	38789	64.65	I
Inadequate credit to purchase inputs	37961	63.26	II
lack of remunerative price	33025	55.04	III
Frequent price fluctuation	32759	54.59	IV
Lack of input subsidies	31071	51.78	V
High labour cost	30253	50.42	VI
Unevenly rising prices	30897	51.49	VII
High input cost	30083	50.13	VIII
Trade manipulations	29315	48.85	IX
Prolonged transaction	28468	47.44	X
Limited access to affordable credit	21964	36.60	XI
High cost of packaging material	20805	34.67	XII

The data depicts that 'not enough profit' has the highest average Garrett score of 64.65 and is ranked I. When farmers are not making enough profit, they may struggle to cover their expenses, invest in necessary inputs or equipment, repay loans, or sustain their businesses over the long term, leading to financial stress.

Inadequate credit to purchase inputs, average Garrett score of 63.26 and is ranked II; when farmers lack access to sufficient credit to purchase essential inputs such as seeds, fertilizers, pesticides, machinery, or other equipment, engaging in sustainable agricultural practices is difficult. It can hinder farmers' capacity to invest in essential inputs for improving crop quality.

High cost of packaging material has the lowest Garrett score of 34.67 and ranked XII. Packaging is essential for preserving the quality and presentation of produce and the high cost of packaging might not be a widespread concern if affordable alternatives are available.

4.6.3 Communication Barriers experienced by the Farmers

Communication barriers experienced by the farmers are displayed in Table XLVII.

TABLE XLVII

COMMUNICATION BARRIERS EXPERIENCED BY THE FARMERS

Communication Barriers	N=600		
	Total Garrett score	Average score	Rank
Inaccessibility to market related information from distributors/retailers/ suppliers/input dealers	46131	76.89	I
Less contact with extension agencies	40022	66.70	II
Price fixation by middlemen	34532	49.50	III
Lack of Proper physical communication	28364	47.23	IV
Poor linkage among producers and traders	26453	44.08	V
Interference of middlemen	26155	43.59	VI
Higher commission rate of middlemen	23735	39.55	VII
Delays in cash payment by the middlemen	20697	34.49	VIII

The data portrayed that inaccessibility to market-related information from distributors/retailers/ suppliers/input dealers is ranked I with an average Garrett score of 76.89. The inability to access such information can lead to inefficiencies in farmers facing difficulties in timing their production cycles, negotiating fair prices for their products and selecting appropriate inputs tailored to market demands.

_Less contact with extension agencies‘ is ranked second, with an average Garrett score of 66.70. Extension agencies play a crucial role in providing farmers agricultural advisory services, technical assistance and training. When farmers have less contact with these agencies, they miss out on valuable opportunities to access information, knowledge

and resources that can help improve their farming practices to increase productivity.

Delays in cash payments by the middlemen had the lowest average Garrett score of 34.49, which indicates a relatively lower concern for farmers. Middlemen often ensure timely payments to maintain long-term relationships with farmers. Since they rely on farmers for continued business, they are more likely to make timely payments to build trust and sustain future transactions.

4.6.4 Storage and Transporting Barriers experienced by the Farmers

Storage and transportation barriers experienced by the farmers are highlighted in table XLVIII.

TABLE: XLVIII

STORAGE AND TRANSPORTING BARRIERS EXPERIENCED BY THE FARMERS

Storage and Transporting Barriers	N=600		
	Total Garrett score	Average score	Rank
Timely unavailability of transportation	45322	71	I
High transportation costs	42254	66	II
Inadequate access to road	34554	61	III
Damage of vegetable during transport	32113	56	IV
Improper storage facilities	23114	49	V
Lack of storage facilities in growing area	21112	46.80	VI
Lack of processing industries in the nearby areas	20495	37	VII
Lack of trained personnel and equipments for processing	13456	35	VIII
Inadequate storage facilities	15550	26.90	IX

The data shows that Timely unavailability of transportation is ranked first with an average Garrett score of 71. This poses a challenge for farmers as they cannot access transportation at the right time to move their products to market. For perishable goods, such as vegetables, timely transportation is crucial as delays can lead to spoilage.

High transportation costs, with an average Garrett score of 66, are ranked second as high transportation costs extend beyond increased expenses for farmers. Most farmers

lacked personal vehicles for market transport and shared vehicles operated on fixed schedules, making it difficult for them to send their produce at convenient times (Shah, 2020).

Inadequate storage facilities, with the lowest average Garrett score of 26.9, are ranked ninth, which indicates insufficient infrastructure, limited availability of warehouses and cold storage facilities are needed to preserve the quality and quantity of harvested crops, which were not a significant challenge compared to other barriers.

4.6.5 Marketing Barriers experienced by the Farmers

Marketing barriers experienced by the farmers are presented in the table XLIX.

TABLE XLIX

MARKETING BARRIERS EXPERIENCED BY THE FARMERS

Marketing Barriers	N=600		
	Total Garrett score	Average Score	Rank
High Perishability of produce	56432	84.4	I
Lack of Market Information	40987	72.7	II
Lack of marketing skills	40754	67.92	III
Distress sale due to social pressure	36789	64	IV
Non availability of nearby market	35895	59.83	V
Low level of literacy	32113	58.2	VI
Insufficient market information available	30223	50.20	VII
Lack of wholesale market	29955	49.93	VIII
Malpractices in trade at unorganized market	26789	48	IX
Natural calamities and uneven rainfall	25678	43	X
Low production due to lack of proper marketing facility	23082	38.47	XI
Poorly developed Village Market	21618	36.03	XII
Lack of proper local market yard facilities	18916	31.53	XIII
Less media coverage	15676	24.9	XIV
Lack of regulated market	12334	19	XV

**Multiresponse*

The data depicts that high Perishability of produce is ranked first with an average Garrett score of 84.4. This reflects the tendency of agricultural products to spoil rapidly after harvest, making them unsuitable for sale or consumption. Such Perishability presents a major challenge for farmers. The high moisture levels in fruits and vegetables make

them susceptible to rapid decay and microbial growth (Basediya et al., 2013). The impact of high Perishability extends beyond immediate financial losses for farmers, leading to food waste and reduced market access at the community level.

Lack of Market Information, with an average Garrett score of 72.7, is ranked second as farmers did not have timely, accurate and relevant information about market conditions, including current market prices, demand trends and potential market opportunities. Without this information, farmers faced difficulty in making informed decisions about which crops to plant, when to harvest and where and how to market their produce.

The lack of a regulated market consists of the lowest average Garrett score of 19, ranked fifteenth. Farmers view the lack of a regulated vegetable market as less significant, likely because they have adjusted to relying on informal markets for selling their produce. Over time, they have developed relationships with local traders, middlemen and unorganized markets, which provide them with quicker transactions and easier access.

4.7 SUGGESTION OFFERED BY VEGETABLE FARMERS TO OVERCOME MARKETING PROBLEMS.

A suggestion is an idea to solve a problem or improve something. Suggestions are often based on identified challenges or opportunities within the agricultural marketing sector. These recommendations are meant to overcome the marketing problems of vegetable farmers, as shown in Table L.

TABLE L

SUGGESTIONS TO OVERCOME MARKETING PROBLEMS

S. No.	Suggestions	N= 600	
		F	%
1	Setting up local marketplaces (Mandis) in nearby areas	586	98
2	Organizing training sessions and workshops on marketing aspects	526	88
3	Encouraging the direct e-marketing of vegetables to consumers	506	84
4	Formation of Farmer Producer Organizations (FPOs)	500	83
5	Establishment of marketing Information center	497	83
6	Cold Storage facilities for vegetables to prevent losses	487	81
7	Ensuring the availability of quality inputs for producing high-quality goods	423	71
8	Development of infrastructure for marketing vegetables	411	69
9	Diversify crops by growing a range of vegetables to appeal to various market segments and mitigate risks.	409	18
10	Offering weekly government transportation services for marketing the produced goods (Mobile Van Service)	401	67
11	Engaging in contract farming arrangements or direct marketing initiatives.	366	61
12	Build a network with other farmers, marketers and industrial experts to share knowledge and resources.	331	55
13	Accessing financial support from banks and other sectors for vegetable cultivation	210	35
14	Provision of export facilities for vegetable produce	126	21
15	Distribute Electronic Weighing for more accurate weight	64	11

**Multiresponse*

The results presented in Table L reveal that the majority, 98 % of the farmers, suggested 'setting up of local marketplaces (Mandis) in nearby areas.' This recommendation reflects the farmer's desire for easily accessible, local venues to sell their produce directly. Setting up local Mandis would help farmers reduce transportation costs and time, eliminate the need for intermediaries and allow them to have greater control over pricing, which would likely increase their profits and ensure that consumers receive fresher produce.

88% of the farmers recommended organizing training sessions and workshops on marketing aspects, which help farmers understand market demand, pricing strategies and consumer preferences. However, workshops can provide opportunities for farmers to

connect with buyers, suppliers and other farmers, enhancing their market reach. Thus, it can lead to better decisions about what crops to grow and when to sell them.

The least recommendation by twenty-one percent of the farmers on providing export facilities for vegetable produce indicates that farmers are more familiar with local market dynamics, making it easier and less risky. Also, the infrastructure required for exporting, such as advanced packaging, transportation and handling facilities, can be expensive and may not be readily accessible. However, only eleven percent of the farmers recommended distributing electronic weighing machines. This shows that traditional weighing methods are sufficient for their needs.

4.8 IMPACT OF EDUCATIONAL AWARENESS ON AGRICULTURAL MARKETING

The impact of educational awareness on agricultural marketing was assessed before and after by evaluating the Knowledge, Opinion and Marketing Behaviour of the farmers.

4.8.1 Impact of Educational Awareness on Farmers' Knowledge of Agricultural Marketing

A paired sample t-test was used to evaluate changes in farmers' knowledge of agricultural marketing by comparing their understanding before and after the educational awareness programme.

4.8.1.1 Impact of Educational Awareness on Farmers' Knowledge of Vegetable Marketing

Knowledge of vegetable marketing is essential for farmers to make informed decisions throughout the agricultural value chain, from production to consumer sales, as shown in Table LI.

TABLE LI

IMPACT OF EDUCATIONAL AWARENESS ON FARMERS' KNOWLEDGE OF VEGETABLE MARKETING

Knowledge		N=50				
		Mean	SD	SE	t-value	P value
Vegetables are produced seasonally, but the market requires them throughout the year	Before	2.18	1.101	.156	-14.965	.000**
	After	3.34	1.042	.147		
Local markets sell produce directly to consumers or traders	Before	1.78	.737	.104	-19.290	.000**
	After	2.86	.833	.118		
Street Hawkers prefer to move around specific localities to sell Vegetables.	Before	1.88	.746	.106	-21.356	.000**
	After	2.98	.845	.119		
Wholesalers buy vegetables directly from the farmers	Before	2.32	1.269	.179	21.356	.000**
	After	3.42	1.214	.172		
Retailers buy vegetables from wholesalers to sell to consumers	Before	3.08	.986	.140	-15.236	.000**
	After	4.10	.886	.125		
Retail Market prices are Higher than wholesale market prices	Before	3.48	1.165	.165	-9.333	.000**
	After	4.28	.834	.118		
Online markets are commercial platforms where multiple third parties provide information on vegetables	Before	2.26	1.192	.169	-20.207	.000**
	After	3.26	1.139	.161		
Grading and sorting are processes where farmers differentiate commodities based on quality specifications	Before	2.40	1.069	.151	-5.213	.000**
	After	3.52	1.111	.157		
Storage facilities makes it unnecessary to market vegetables immediately after harvest	Before	2.22	1.075	.152	-24.126	.000**
	After	3.34	1.136	.161		
Post-harvest losses of vegetables occur at all stages of the value chain from production to consumption	Before	2.84	1.235	.175	-12.969	.000**
	After	3.78	1.148	.162		

** significant at 1% level, * significant at 5% level, NS- Not Significant

From the table, it can be identified that the awareness programme significantly impacted farmers' knowledge of vegetable marketing. The comparison of scores before and after the programme highlights the normally distributed mean differences in scores before and after the awareness programme, which were consistent among all participants. Since all ten statements have a p-value of less than .000, it is statistically significant at the 1 % level. The results depict that after attending the awareness programme, farmers gained a better understanding of vegetable marketing, making them more informed.

4.8.1.2 Impact of Educational Awareness on Farmers' Knowledge of Digital Agricultural Marketing

Knowledge among the farmers on digital agricultural marketing is the extent to which farmers possess awareness of the concept and practices of digital marketing in agriculture. The results are displayed in Table LII.

TABLE LII

IMPACT OF EDUCATIONAL AWARENESS ON FARMERS' KNOWLEDGE OF DIGITAL AGRICULTURAL MARKETING

Knowledge						N=50
		Mean	SD	SE	t-value	P value
National Agriculture Market (eNAM) is an online trading platform available for farmers	Before	1.96	.903	.128	-31.244	.000**
	After	3.02	.915	.129		
Digital Marketing is the process of marketing a product or service using the Internet.	Before	2.46	.973	.138	-22.998	.000**
	After	3.60	1.030	.146		
Social media is very useful in agricultural marketing.	Before	2.18	.919	.130	-21.356	.000**
	After	3.28	.904	.128		
It helps create awareness about the availability of agricultural products	Before	2.12	.558	.079	-21.356	.000**
	After	3.22	.648	.092		
ICT is a tool or application that helps in the digital marketing of agricultural produce	Before	2.48	1.015	.144	-21.157	.000**
	After	3.52	1.035	.146		
KISAN RATH Mobile App is available for the transportation of agricultural produce	Before	2.10	.544	.077	-19.290	.000**
	After	3.18	.691	.098		
Farmers can buy agricultural inputs via e platform	Before	2.76	1.061	.150	-26.000	.000**
	After	3.80	1.069	.151		
e-Choupal connects rural farmers to the market via the internet for procuring agricultural products	Before	2.42	.731	.103	-22.430	.000**
	After	3.50	.789	.112		
AGMARKNET caters to the need of farmers by providing agriculture related information	Before	2.36	1.225	.173	-17.182	.000**
	After	3.44	1.163	.165		
NAFED supports farmers by ensuring profits and eliminating middlemen	Before	2.36	1.174	.166	-18.198	.000**
	After	3.48	1.165	.165		
IKISAN is a one stop information resource for farmers	Before	2.30	.735	.104	-20.546	.000**
	After	3.42	.758	.107		

** significant at 1% level

The data depicts mean score differences before and after the educational awareness, with a p-value of less than 0.001, indicating significance at 1% level. All aspects of farmers' knowledge on digital agricultural marketing have significantly improved. The findings demonstrate a substantial positive impact of the awareness on enhancing digital marketing knowledge across all measured areas.

4.8.1.3 Impact of Educational Awareness on Farmers' Knowledge on Government Schemes and Programmes on Agriculture

The government has implemented various schemes to boost farmers' productivity, financial well-being and agricultural infrastructure. Central and State governments frequently initiate programmes to advance the agricultural sector and support farmers' welfare (Mahesh et al., 2021). The results are presented in Table LIII.

TABLE LIII

IMPACT OF EDUCATIONAL AWARENESS ON FARMERS' KNOWLEDGE OF GOVERNMENT SCHEMES AND PROGRAMMES ON AGRICULTURE

Name of the Schemes and Programmes		N=50				
		Mean	SD	SE	t-value	P value
Farmer Producer Organization Scheme	Before	1.84	.681	.096	-19.444	.000**
	After	3.00	.881	.125		
Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)	Before	2.20	.926	.131	-14.965	.000**
	After	3.36	.942	.133		
Pradhan Mantri Fasal Bima Yojna (PMFBY)	Before	1.82	.720	.102	-17.146	.000**
	After	3.02	.869	.123		
Paramparagat krishi Vikas Yojana PKVY	Before	1.78	.418	.059	-14.000	.000**
	After	2.98	.654	.093		
Pradhan Mantri Kisan SAMPADA Yojana (PMKSY)	Before	2.02	.622	.088	-16.803	.000**
	After	3.12	.773	.109		
PM-Kisan (Pradhan Mantri Kisan Samman Nidhi	Before	1.70	.544	.077	-22.998	.000**
	After	2.84	.650	.092		
Rastriya Krishi Vikas Yojana (RKVY)	Before	2.28	1.089	.154	-14.009	.000**
	After	3.50	1.055	.149		
Mission Organic Value Chain Development in Assam (MOVCD)	Before	2.94	1.316	.186	-11.225	.000**
	After	3.90	1.074	.152		

Name of the Schemes and Programmes		N=50				
		Mean	**SD**	**SE**	**t-value**	**P value**
Mukhya Mantri Krishi Sa Sajuli Yozana (MMKSY)	Before	2.18	.720	.102	-37.151	.000**
	After	3.22	.737	.104		
Credit Guarantee Fund Scheme (CGFS)	Before	2.58	1.071	.151	-13.404	.000**
	After	3.68	.868	.123		
Marketing Research & Information Network (MRIN)	Before	2.26	.853	.121	-23.898	.000**
	After	3.32	.819	.116		
Horticulture Mission for North East & Himalayan States (HMNEH)	Before	3.58	1.052	.149	-10.635	.000**
	After	4.44	.837	.118		
Equity Grant Scheme (EGS)	Before	2.82	.919	.130	-15.070	.000**
	After	3.96	.880	.124		
Integrated Scheme for Agricultural Marketing Infrastructure (ISAM)	Before	1.68	.471	.067	-14.398	.000**
	After	3.02	.795	.112		
Sub-mission on Agricultural Mechanization (SMAM)	Before	2.60	.948	.134	-2.415	.020*
	After	4.58	5.750	.813		
Chief Minister Samagra Gramya Unnayan Yojana (CMSGUY)	Before	2.02	.654	.093	-37.151	.000**
	After	3.06	.682	.097		
Assam Agribusiness & Rural Transformation Project (APART)	Before	2.02	.622	.088	-37.151	.000**
	After	3.06	.652	.092		
Integrated Scheme for Agricultural Marketing Infrastructure (ISAM) National Mission for Sustainable Agriculture (NMSA)	Before	1.98	.553	.078	-31.244	.000**
	After	3.04	.605	.086		

** significant at 1% level, *significant at 5 % level

The data indicates a significant increase in awareness of agricultural schemes and programmes. Among the eighteen schemes, seventeen are significant at 1% level, with p-values less than 0.001. However, the 'Sub-mission on Agricultural Mechanization (SMAM) Scheme' has a p-value of 0.020, which is significant at the 5% level. Therefore, there is a significant difference in awareness of government schemes and programmes for agriculture before and after the educational awareness programme.

4.8.1.4 Impact of Educational Awareness on Farmers' Knowledge of Applications and Portals for Agriculture

The government has launched various web and mobile-based applications to offer free information on agricultural activities, benefiting farmers and other stakeholders (Press Information Bureau, 2016). Farmers' knowledge of agricultural applications and portals indicates their understanding and awareness of utilizing and benefiting from these mobile apps, software tools and portals, as presented in Table LIV.

TABLE LIV

IMPACT OF EDUCATIONAL AWARENESS ON FARMERS' KNOWLEDGE OF APPLICATIONS & PORTALS FOR AGRICULTURE

Applications						N=50
		Mean	SD	SE	t-value	P value
APEDA Farmer Connect Mobile App	Before	2.08	.488	.069	-8.664	.000 **
	After	3.30	.953	.135		
IFFCO Kisan Agriculture	Before	1.86	.572	.081	-12.598	.000 **
	After	3.50	.909	.129		
Agri app	Before	1.94	.586	.083	-8.077	.000**
	After	3.20	.969	.137		
Pusa Krishi app	Before	1.70	.505	.071	-14.567	.000**
	After	3.48	.995	.141		
Crop Insurance app	Before	1.98	.553	.078	-13.181	.000**
	After	3.54	.813	.115		
Kisan suvidha app	Before	1.66	.479	.068	14.732	.000**
	After	3.24	.822	.116		
Krishi Network: Smart Kisan	Before	1.72	.573	.081	-14.941	.000**
	After	3.36	.875	.124		
AgSpeak	Before	1.62	.490	.069	-13.619	.000**
	After	3.46	.952	.135		
Agri- market app	Before	1.74	.565	.080	-11.658	.000**
	After	3.42	.971	.137		
PMKISAN GOI	Before	1.92	.601	.085	-13.024	.000**
	After	3.42	.883	.125		
Fasal salah app	Before	2.04	.533	.075	12.913	.000**
	After	3.68	.999	.141		

Applications						N=50
		Mean	**SD**	**SE**	**t-value**	**P value**
Kisan Rath app	Before	1.72	.573	.081	11.677	.000**
	After	3.32	1.077	.152		
Portals		**Mean**	**SD**	**SE**	**t-value**	**P value**
Kisan Mandi.com	Before	1.68	.551	.078	-12.813	.000**
	After	3.24	.916	.130		
Government of Assam, Department of Agriculture & Horticulture	Before	1.72	.454	.064	-12.312	.000**
	After	3.56	1.013	.143		
National Agriculture Market or eNAM	Before	2.40	.990	.140	-14.849	.000**
	After	3.60	1.069	.151		
Agricultural Marketing Information Network (AGMARKNET)	Before	1.78	.582	.082	-11.841	.000**
	After	3.48	1.015	.144		

** significant at 1% level

The data highlights that the calculated p-value is below 0.000, which is significant at 1 % level regarding the Farmer's knowledge of all the mobile applications and portals for Agricultural Marketing. This implies that the educational intervention had a measurable impact and farmers have developed a clearer understanding of these tools and their role in supporting marketing activities by bridging the gap in digital awareness. The initiative has encouraged farmers to explore technology-driven methods to improve marketing efficiency and profitability.

4.8.1.5 Significant Difference between Knowledge level and Socio-Economic Characteristics of the Farmers Before and After Awareness Programme

"Knowledge is defined as those behaviours and test situations which emphasized the remembering either by recognition or recall of ideas, materials or phenomena" (Bloom et al., 1956) and Socio-economic status refers to an individual's or family's position relative to the average community standards, based on factors such as cultural assets, income levels, material possessions and participation in community activities. (Gautam & Shahare, 2020). Hypothesis H5 was formulated to examine the significant differences before and after the educational awareness based on the socio-economic characteristics and the level of knowledge (computed from Table LI, LII, LIII, LIV) among the farmers, as shown in Table LV.

TABLE LV

DIFFERENCE BETWEEN KNOWLEDGE LEVEL (BEFORE AND AFTER AWARENESS) BASED ON SOCIO ECONOMIC CHARACTERISTICS

Variables		N=50								
		Before					After			
		F	Mean	SD	F value	P value	Mean	SD	F value	P value
Age (Years)	Less than 35	9	1.56	.527	24.653	**.000****	1.33	.500	26.286	**.000****
	35-55	21	1.67	.577			1.67	.577		
	Above 55	20	2.70	.470			2.65	.489		
Gender	Male	27	2.15	.818	.830	.367NS	2.07	.730	.559	.458NS
	Female	23	1.96	.638			1.91	.793		
Educational Qualification	Primary school education	3	1.67	.577	.697	.598	1.33	.577	2.746	**.040 ***
	Middle school education	10	1.90	.738			1.60	.699		
	High school education	29	2.10	.724			2.10	.724		
	Higher secondary education	4	2.50	1.000			2.75	.500		
	Graduation & above	4	2.00	.000			2.00	.816		
Annual Income (Rs)	Less than 50,000	8	2.38	.744	2.386	.103NS	2.13	.835	1.176	.318NS
	50,000 – 1 lakh	20	1.80	.616			1.80	.768		
	Above 1 lakh	22	2.18	.795			2.14	.710		
Land size (Hectare)	0.4-1 Hectare	6	2.50	.548	1.669	.199NS	2.17	.753	1.252	.295NS
	1 – 2 Hectare	32	1.94	.716			1.88	.751		
	2 – 3 Hectare	12	2.17	.835			2.25	.754		
Experience in Farming (Years)	0-5	3	1.33	.577	5.559	**.002 ****	1.33	.577	6.657	**.001****
	5-10	24	1.80	.707			1.68	.748		
	10-15	11	2.30	.675			2.50	.527		
	Above 15	12	2.58	.515			2.42	.515		

*ANOVA test * significant 1 % level.

The relationship between socioeconomic characteristics and knowledge level shows that for **age**, the knowledge levels of farmers showed significant differences before and after educational awareness. Since, the p value is less than 0.001, it is significant at 1 % level, with older farmers (above 55 years) had higher mean scores than younger groups. The **educational qualification** significantly impacts knowledge after the educational awareness at a 5 % level. Farmers with higher education (graduation and above) had higher mean scores than those with lower educational backgrounds.

The **years of experience** in farming demonstrated a significant difference before and after for both at 1 % significant level, with farmers having more than 15 years of experience scoring higher mean scores before and after. However, gender, annual income and land size showed no significant differences in knowledge levels before or after. Hence, the hypothesis (H5: There will be a significant difference before and after educational awareness based on socioeconomic characteristics with knowledge, opinion and marketing behaviour among the Farmers) was accepted.

4.8.2 Impact of Educational Awareness on Farmers' Opinion on Agricultural Marketing

A paired sample t-test was used to evaluate changes in farmers' opinion on agricultural marketing by comparing their perceptions before and after the educational awareness programme.

4.8.2.1 Impact of Educational Awareness on Farmers' Opinion on Vegetable Marketing

The farmers' opinions consist of their beliefs, perceptions and judgments on vegetable marketing, displayed in Table LVI.

TABLE LVI

IMPACT OF EDUCATIONAL AWARENESS ON FARMERS' OPINION ON VEGETABLE MARKETING

Opinion on vegetable Marketing						N=50
		Mean	SD	SE	t-value	P value
Income is the primary factor in vegetable marketing	Before	3.52	1.199	.170	-9.333	.000 **
	After	4.64	.631	.089		
Marketing of vegetable crops is very simple	Before	2.50	1.344	.190	-14.705	.000 **
	After	4.16	.681	.096		
Institutional credit is easily available for growing vegetable produce	Before	2.92	1.192	.169	-14.510	.000**
	After	4.48	.614	.087		
Government support for vegetable marketing is insufficient	Before	2.80	1.107	.156	-18.585	.000**
	After	4.50	.647	.091		
Pre- and post-harvest losses are high in vegetable production	Before	3.30	1.074	.152	-12.794	.000**
	After	4.72	.536	.076		
Setting up regulated purchase centre for vegetable produce in nearby localities boost vegetable cultivation	Before	3.90	1.111	.157	-8.654	.000**
	After	4.80	.495	.070		
Standardization and grading increase the burden on farmers	Before	2.86	1.030	.146	-16.671	.000**
	After	4.58	.575	.081		
Farmers can sell the vegetable products online	Before	2.70	1.093	.155	-16.728	.000**
	After	4.46	.613	.087		
There is a need for more co-operative agencies to improve market linkages	Before	3.52	.953	.135	-12.713	.000**
	After	4.86	.405	.057		
Expanding the area of vegetable cultivation helps to achieve higher income	Before	2.72	1.230	.174	-17.051	.000**
	After	4.38	.753	.106		
Storage facilities for vegetable produce are sufficient	Before	2.30	1.093	.155	-22.602	.000**
	After	4.22	.764	.108		
Knowledge of vegetable preservation is essential during periods of high demand	Before	3.32	1.077	.152	-13.096	.000**
	After	4.72	.573	.081		
Farm women have a lesser role in vegetable marketing than men	Before	3.28	1.070	.151	5.160	.000**
	After	2.28	.858	.121		
The roads are good enough to transport produce to the main road	Before	4.40	.639	.090	-5.409	.000**
	After	4.94	.240	.034		
Advertising and promoting vegetables produce can increase sales	Before	2.86	.833	.118	-21.609	.000**
	After	4.68	.587	.083		
Using digital technology in marketing helps consumers access and understand farm produce, ensuring they get what they need at the right price.	Before	2.84	1.017	.144	-17.381	.000**
	After	4.60	.606	.086		
A farmer can secure a good price by producing high quality products	Before	2.30	.995	.141	-26.819	.000**
	After	4.24	.716	.101		
Better marketing facilities help farmers get better price for their produce	Before	2.32	.957	.135	-30.547	.000**
	After	4.20	.756	.107		
One should sell products to the nearest market regardless of price	Before	2.34	1.493	.211	-.157	.876 NS
	After	2.38	1.086	.154		
One should produce items that are high in market demand	Before	2.80	.782	.111	-27.817	.000**
	After	4.64	.525	.074		

** significant at 1% level, NS- Not significant

The analysis of the twenty statements on farmers' opinions shows that nineteen statements are statistically significant at 1% level, with p-values less than 0.001, indicating that these factors are likely to influence farmers' decision-making processes. However, the statement 'One should sell products to the nearest market regardless of price' was found to be non-significant, implying that proximity to the market, regardless of price, does not play a meaningful role in farmers' marketing decisions. Farmers should consider multiple factors when choosing where to sell their produce. Market price fluctuations, transportation expenses, demand-supply conditions and the availability of better marketing channels likely influence their decision-making. This finding implies that farmers may prioritize other factors, such as price, over convenience when deciding where to sell their products.

4.8.2.2 Impact of Educational Awareness on Farmers' Opinion on Digital Agricultural Marketing

The farmers' opinions on digital agricultural marketing in agriculture encompass their beliefs, perceptions and views regarding the processes and practices involved in selling their produce digitally, presented in the Table LVII.

TABLE LVII

IMPACT OF EDUCATIONAL AWARENESS ON FARMERS' OPINION ON DIGITAL AGRICULTURAL MARKETING

Opinion		N=50				
		Mean	SD	SE	t-value	P value
Easily provides agricultural information whenever needed	Before	2.56	1.013	.143	-16.099	.000 **
	After	3.72	.927	.131		
Helps farmers sell their agricultural products at better prices.	Before	2.72	1.031	.146	-13.797	.001**
	After	3.76	.847	.120		
Offers area-wise reliable price information and aids in marketing.	Before	2.72	.730	.103	-3.710	.001**
	After	3.22	1.016	.144		
Helps in marketing agricultural products through mobile phones	Before	3.40	.969	.137	-19.107	.000**
	After	4.32	.844	.119		
Enhances communication among farmers	Before	3.08	.695	.098	-35.000	.000**
	After	4.08	.634	.090		
Facilitates access to market information and promotes agricultural products	Before	3.10	.763	.108	-13.229	.000**
	After	4.10	.735	.104		
Mobile applications that provide price information can help reduce market distortions	Before	2.66	1.118	.158	-14.849	.000**
	After	3.86	.926	.131		
Digital Marketing is a good online trading platforms for agricultural commodities in India	Before	3.16	.866	.122	-15.400	.000**
	After	4.26	.751	.106		
Digital Marketing does not assists in evaluating, organizing and facilitating easy marketing of agricultural products	Before	2.58	.859	.122	-16.099	.000**
	After	3.74	.828	.117		
Agricultural marketing apps can be highly accepted because of its reliable information	Before	2.12	.718	.102	-3.128	.003**
	After	2.54	.788	.111		

** significant at 1% level

The data identified that all ten statements had normally distributed differences in mean scores before and after the awareness, which indicates a positive impact on helping farmers get the idea of digital agricultural marketing. Since the P value is less than 0.00, at 1% significant level, a significant difference exists between the farmers' opinions before and after the educational awareness programme. The increase in opinion after the awareness, it signifies that the programme had a remarkable positive impact and farmers have gained a better understanding of digital marketing and farmers' perception of digital agricultural marketing.

4.8.2.2 Significant Difference between Opinion level and Socio-Economic Characteristics of the Farmers Before and After Awareness Programme

The data on significant differences in opinion levels (computed Table LVI and LVII) based on the selected socio-economic characteristics of the farmers, presented in Table LVIII. Hypothesis H5 was formulated to test the significant differences before and after educational awareness.

TABLE LVIII

DIFFERENCE BETWEEN OPINION LEVEL (BEFORE AND AFTER AWARENESS) BASED ON SOCIO ECONOMIC CHARACTERISTICS

Variables			N=50							
			Before				After			
		F	Mean	SD	F	P value	Mean	SD	F	P value
Age (Years)	Less than 35 (Young)	9	2.33	.707	1.626	.208	1.78	.972	4.380	**.018***
	35-55 (Middle)	21	1.81	.814			1.76	.625		
	Above 55 (Old)	20	2.05	.686			2.35	.587		
Gender	Male	27	2.00	.734	.000	1.000 NS	2.07	.781	.602	.442 NS
	Female	23	2.00	.798			1.91	.668		
Educational Qualification	Primary school education	3	1.67	.577	.656	.625 NS	1.00	.000	5.944	**.001****
	Middle school education	10	1.80	.789			1.60	.843		
	High school education	29	2.10	.817			2.07	.593		
	Higher secondary education	4	1.75	.500			2.25	.500		
	Graduation & above	4	2.25	.500			3.00	.000		
Annual Income (Rs)	Less than 50,000	8	2.13	.641	.155	.857 NS	1.88	.641	2.832	.069 NS
	50,000 – 1 lakh	20	2.25	.786			2.00	.649		
	Above 1 lakh	22	1.73	.703			2.05	.844		
Land size (Hectare)	0.4-1 Hectare	6	2.50	.548	1.527	.228 NS	2.17	.753	1.354	.268 NS
	1 – 2 Hectare	32	1.94	.840			1.88	.707		
	2 – 3 Hectare	12	1.92	.515			2.25	.754		
Experience in Farming (Years)	0-5	3	2.00	1.000	.292	.831 NS	2.33	1.155	4.593	**.007****
	5-10	25	1.96	.790			1.68	.627		
	10-15	10	2.20	.789			2.10	.568		
	Above 15	12	1.92	.669			2.50	.674		

**denotes significant at 1% level, *denotes significant at 5% level, NS- Not Significant

A perusal of the above data reveals the significant difference between various socio-economic characteristics and the opinion level. Regarding age, the opinion levels of farmers showed significant differences after the awareness at 5 % level, older farmers (above 55 years) had higher mean scores than younger groups. The farmer's educational qualification depicts a significant difference at 1 % level after the educational awareness. Education often transforms a person's perspective, contributing to a shift in opinion (Gautam & Shahare, 2020). The years of experience in farming demonstrated significant differences after the programme which was significant at 1 % level. Therefore, age, educational qualification and years of experience significantly influenced farmers' opinion levels. While gender, annual income and land size, showed no significant differences in opinion levels either before or after.

Thus, the hypothesis (H5: There will be a significant difference before and after educational awareness based on socioeconomic characteristics with knowledge, opinion and marketing behaviour among the Farmers) was accepted.

4.8.3 Impact of Educational Awareness on Farmers' Marketing Behaviour in Vegetable

A paired sample t-test was used to evaluate the farmers' Marketing Behaviour in vegetables by comparing before and after the educational awareness programme.

Marketing behaviour influences the efficiency and profitability of vegetable marketing by shaping how farmers navigate market dynamics. It encompasses decisions related to harvesting, sorting and grading, storage purpose, vegetable packaging, timing of sales, reasons for choosing specific periods, market selection and pricing criteria. These behaviours play a critical role in determining the attainment of the vegetable marketing process highlighted in Table LIX.

TABLE LIX
IMPACT OF EDUCATIONAL AWARENESS ON FARMERS' MARKETING BEHAVIOUR IN VEGETABLE

Marketing Behaviour		Mean	SD	SE	t-value	P value
						N=50
Harvesting of vegetables						
Sensory evaluation for flavour and taste of vegetables	Before	2.04	.903	.128	-10.011	.000 **
	After	3.56	1.013	.143		
Assessing through experience on texture and appearance of maturity of vegetables	Before	2.44	.705	.100	-12.289	.000 **
	After	3.94	.867	.123		
Longer Post-harvest longevity to maintains the quality and freshness.	Before	2.90	.678	.096	-14.849	.000**
	After	4.10	.678	.096		
Optimum period of maturity	Before	2.82	1.024	.145	-12.390	.000**
	After	4.18	.800	.113		
Harvesting at favourable temperature helps to preserve the quality of the produce.	Before	2.26	.777	.110	-13.556	.000**
	After	3.72	.834	.118		
Sorting and grading for quality						
Damaged by physical injuries harvesting in the field	Before	2.82	1.155	.163	-12.079	.000**
	After	4.00	.904	.128		
Damaged by physical injuries transporting in the market.	Before	2.40	.990	.140	-12.663	.000**
	After	3.60	.782	.111		
Insect attacked	Before	2.12	.982	.139	-17.026	.000**
	After	3.34	1.002	.142		
Affected by Diseased	Before	2.28	1.310	.185	-11.241	.000**
	After	3.68	1.133	.160		
Aesthetic appeal of the produced	Before	1.98	1.169	.165	-11.240	.000**
	After	3.46	1.110	.157		
Ripened produced which leads to spoilage	Before	3.30	.909	.129	-11.909	.000**
	After	4.26	.664	.094		
Immaturity of vegetables due to unfavorable weather conditions	Before	2.10	1.015	.144	-12.960	.000**
	After	3.48	1.054	.149		
Purpose of storage						
To get better price later	Before	3.24	1.153	.163	-10.197	000**
	After	4.18	.850	.120		
Maintains freshness	Before	2.88	1.118	.158	-14.299	000**
	After	3.98	.915	.129		
Optimize market timing to align with the consumer demand	Before	2.70	.505	.071	-21.500	000**
	After	3.88	.521	.074		
Minimize losses due to spoilage, damage, or wastage	Before	3.56	1.033	.146	-11.500	000**
	After	4.48	.814	.115		
Improving shelf life avoiding market glut	Before	3.32	.868	.123	-15.400	000**
	After	4.42	.642	.091		
To reduce and control transpiration, respiration and disease infection	Before	3.46	1.216	.172	-10.349	000**
	After	4.28	.904	.128		
Packaging of vegetables						
Assemble the produce into convenient units	Before	4.10	.931	.132	-8.615	000**
	After	4.74	.600	.085		
Transportation efficiency to carry the produce	Before	4.18	.983	.139	-6.228	000**
	After	4.72	.536	.076		
Provide cushioning to fresh produce	Before	3.92	.900	.127	-8.887	000**
	After	4.64	.598	.085		

Marketing Behaviour		Mean	SD	SE	t-value	P value
						N=50
Protects from any physical and pathological deterioration.	Before	4.12	.918	.130	-7.425	000**
	After	4.72	.573	.081		
Maintains the overall quality of the produce	Before	3.96	.925	.131	-8.957	000**
	After	4.74	.600	.085		
Provides greater attraction to the produce	Before	3.12	1.023	.145	-12.160	000**
	After	4.16	.817	.116		
Time of sale of the produce						
Immediately after the harvest whatever the prices may	Before	3.08	1.027	.145	-10.985	000**
	After	4.16	.738	.104		
After initial storage, when it is convenient	Before	3.68	1.168	.165	-6.600	000**
	After	4.48	.762	.108		
Immediately after the harvest, if prices are favorable	Before	3.74	1.103	.156	-8.186	000**
	After	4.50	.707	.100		
Reasons for selecting at a particular period						
Immediate financial need	Before	4.32	.741	.105	-5.996	000**
	After	4.78	.418	.059		
Highly perishable	Before	4.22	.975	.138	-5.088	000**
	After	4.66	.593	.084		
Based on Market demand	Before	2.90	1.129	.160	-16.187	000**
	After	3.88	1.003	.142		
Indebtedness to trader	Before	1.98	1.152	.163	-11.713	000**
	After	3.20	1.050	.148		
Quality was not good	Before	1.66	1.099	.155	-11.459	000**
	After	2.92	1.066	.151		
No cold storage facilities available	Before	3.64	1.102	.156	-7.824	000**
	After	4.40	.833	.118		
Reason for selection of Market						
Market demand	Before	3.26	1.192	.169	-9.134	000**
	After	4.10	.839	.119		
Market is very near to place	Before	2.06	1.252	.177	-11.704	000**
	After	3.60	1.195	.169		
More Population in the area	Before	3.44	1.146	.162	-8.723	000**
	After	4.28	.834	.118		
Higher Price	Before	3.56	1.091	.154	-6.514	000**
	After	4.30	.886	.125		
Better transport facilities available to the village	Before	2.22	1.217	.172	-11.956	000**
	After	3.50	1.111	.157		
Less Competition in the area	Before	3.44	1.072	.152	-9.358	000**
	After	4.36	.851	.120		
Criteria for fixing price						
Fluctuate based on seasonal variations	Before	3.50	.735	.104	-21.157	000**
	After	4.54	.646	.091		
Based on market demand and supply	Before	3.30	.995	.141	-12.312	000**
	After	4.22	.815	.115		
Quality and grading of produce	Before	3.22	1.166	.165	-9.773	000**
	After	4.28	.904	.128		
Based on government policies	Before	3.34	1.222	.173	-8.345	000**
	After	4.24	.771	.109		
Competition in the market	Before	2.86	.926	.131	-15.400	000**
	After	3.96	.925	.131		
Based on production cost	Before	4.20	.808	.114	-6.340	000**
	After	4.72	.497	.070		

**significant at 1% level

The data glancing on all the aspects of marketing behaviour such as harvesting, sorting and grading, storage purpose, vegetable packaging, timing of sales, reasons for selecting specific periods, market choice and pricing criteria showed significant differences at 1% level, with p-values below 0.01. This implies that the educational awareness programme effectively enhanced farmers' knowledge and behaviour related to vegetable marketing. The generous increases in mean values across these aspects implies that the awareness led to better decision-making and practices, which are imperative for optimizing efficiency and profitability in vegetable marketing. Also, it can lead to meaningful changes in practices that ultimately benefit farmers and the broader agricultural market.

4.8.3.2 Significant Difference between Marketing Behaviour level and Socio-Economic Characteristics of the Farmers

The significant difference between the level of marketing behaviour (based on Table LIX) and the socio-economic characteristics of farmers, presented in Table LX. The hypothesis, H5, was formulated to determine the significant difference between before and after educational awareness.

TABLE LX

DIFFERENCE BETWEEN MARKETING BEHAVIOUR LEVEL (BEFORE AND AFTER AWARENESS) BASED ON SOCIO ECONOMIC CHARACTERISTICS

N=50

Variables		F	Before				After			
			Mean	SD	F	P value	Mean	SD	F	P value
Age (Years)	Less than 35 (Young)	9	1.89	.782	.976	.384 NS	1.78	.667	2.827	.069 NS
	35-55 (Middle)	21	1.95	.805			1.81	.750		
	Above 55 (Old)	20	2.25	.786			2.30	.733		
Gender	Male	27	2.11	.847	.240	.626	2.15	.770	2.315	.135
	Female	23	2.00	.739			1.83	.717		
Educational Qualification	Primary school education	3	1.67	.577	1.892	.128 NS	1.67	.577	5.865	**.001 ** **
	Middle school education	10	2.00	.816			1.80	.632		
	High school education	29	1.97	.778			1.83	.711		
	Higher secondary education	4	2.25	.957			3.00	.000		
	Graduation & above	4	3.00	.000			3.00	.000		
Annual Income (Rs)	Less than 50,000	8	2.13	.835	.341	.713	1.63	.518	4.092	**.023 * **
	50,000 – 1 lakh	20	2.15	.745			1.80	.696		
	Above 1 lakh	22	1.95	.844			2.32	.780		
Land size (Hectare)	0.4-1 Hectare	6	1.83	.983	.600	.553	1.50	.548	3.587	**.035* **
	1 – 2 Hectare	32	2.03	.782			1.94	.716		
	2 – 3 Hectare	12	2.25	.754			2.42	.793		
Experience inFarming (Years)	0-5	3	2.00	1.000	1.619	.198	2.00	1.000	5.501	**.003 ** **
	5-10	25	1.84	.800			1.72	.737		
	10-15	10	2.20	.632			1.90	.568		
	Above 15	12	2.42	.793			2.67	.492		

**significant at 5% level, *significant at 1% level, NS-Not Significant

The data shows that the socio-economic characteristics, namely educational qualification and years of experience in farming, exhibited significant differences with marketing behaviour at 1 % level of significance after the educational awareness programme. On the other hand, annual income and land size indicated significant differences in marketing behaviour at 5 % level of significance. This indicates that higher education, more income, larger landholdings and extensive experience positively influence farmers' marketing practices. The remaining variables, age and gender, exhibited a non-significant contribution to the marketing behaviour level of the farmers before or after the educational intervention programme. Hence, the hypothesis (H5: There will be a significant difference before and after educational awareness based on socioeconomic characteristics with knowledge, opinion and marketing behaviour among the Farmers) was accepted.

4.8.4 Impact of Educational Awareness on Farmers' Knowledge, Opinion and Marketing Behaviour Score Before and After the Awareness Programme

Impact of Knowledge, Opinion and Marketing Behaviour score before and after the Educational Awareness programme was analyzed to know how a person's knowledge, opinions and marketing behaviours change due to educational awareness, as shown in Table LXI. The hypothesis, H4, was framed to know the significant difference before and after the educational awareness programme.

TABLE LXI

COMPARISON OF KNOWLEDGE, OPINION AND MARKETING BEHAVIOUR SCORE (BEFORE AND AFTER) THE EDUCATIONAL AWARENESS

CONTENT	MEAN	SD	t test value	P value
Knowledge				
Knowledge Score- Before	124.58	7.489	-71.769	.000**
Knowledge Score- After	188.18	9.501		
Opinion				
Opinion Score- Before	87.60	6.575	-50.940	.000**
Opinion Score- After	124.08	4.189		
Marketing Behaviour				
Marketing Behaviour Score- Before	139.64	13.584	-29.418	.000**
Marketing Behaviour Score- After	185.34	12.054		

*** significant at 1 % level*

The overall score of the knowledge, opinion and marketing behaviour shows that there was a significant increase after the educational awareness, as indicated by the substantial rise in the mean score and highly significant at 1 % level since the p-value was less than .001. The significant improvement in the knowledge, opinion and marketing behaviour score indicates that the awareness programme was effective in enhancing the farmers' knowledge, had a strong influence on altering farmers' opinions in a positive direction and had a positive impact on farmers' marketing strategies. Thus, the hypothesis (H4: There will be an impact of knowledge, opinion and marketing behaviour among the farmers on agricultural marketing before and after the educational awareness programme) was accepted.