



Research Article

Validity and Effectiveness of Online Platform Connecting Farms to Customers: A Case Study of Punjab, Pakistan

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Abstract | The research investigated the impact of online farm-to-consumer platform on various aspects of agricultural efficiency and consumer behavior in Pakistan. Data were collected using a pretested questionnaire to ensure reliability and validity, and structured interviews conducted in Urdu captured detailed information on experiences and perceptions regarding the online platforms. Furthermore, data analysis was performed using the Statistical Package for Social Sciences (SPSS), employing descriptive statistics to summarize sample characteristics and inferential statistics. Key findings revealed that most of the respondents lived in rural areas, with about 44.8% in urban settings, and the majority were married and in joint or extended families of up to eight members. Around 66% of farmers sold fruits online, with farm sizes averaging 23 acres. Almost 81% earned less than Rs 60,000 per month from various sources, and about half owned and rented land. Respondents perceived the platform as valid and effective, with high mean scores of 3.55 and 3.54 respectively, and disagreed with the statement that the platform had usage problems. Furthermore, fruit farming was more prevalent than vegetable farming, with 66% selling fruits and 34% vegetables. User satisfaction was high, with 51% rating product quality as very good. It was suggested that awareness campaigns be conducted to educate both farmers and consumers on the benefits and effective use of online platforms. The government was urged to establish regulations to prevent fraud in online transactions and to support the development of infrastructure necessary for maintaining the quality of fresh produce during transportation. Educational programs focusing on digital literacy and online marketing strategies were recommended to help farmers adapt to new technologies. Furthermore, it was advised that continuous monitoring and regular updates of the platform be conducted to address technical issues and enhance user experience.

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Keywords | E-Agriculture, Farm-to-consumer, Supply-chain, Household Food Security, Rural Livelihoods



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Introduction

Agriculture is one of the leading pillars of Pakistan's economy, playing a vital role in contributing to the GDP and employment of the country (Economic Survey of Pakistan, 2024). Even today, most outdated farming practices continue to dominate the industry, ranging from water reuse in fields and lack of market access, leading to low profit margins for the farmers. Due to these outdated supply chains, Pakistan's farmers are stuck with old ways of selling their crops (Khan and Bae, 2017).

The use of e-commerce technology in agriculture was initiated in Pakistan as it had strong potential to boost this sector. A number of innovative startups are beginning to establish footholds by developing online marketplaces where farmers can sell directly to consumers and businesses. Such technologies enhance the supply chain by reducing waste, and ensuring that farmers get a reasonable price for their produce. However, the hurdles for its wide adoption are enormous and await its resolute resolution. A study by Abbas and Liu (2022) explored the challenges faced by startups in resource-scarce economies such as Pakistan. These challenges include poor internet penetration in rural areas, the digital literacy of farmers, and a lack of trust between buyers and sellers. Despite these challenges, initial results from these platforms suggest a promising future for marketing and selling agricultural products in Pakistan on a global scale.

Despite the existence of online platforms linking farmers to consumers, the practical implication is highly limited due to a series of barriers to adoption, user trust, and logistical expansion issues that need to be addressed for these applications to work consistently, fairly, and profitably (Su *et al.*, 2021). Local markets operate through a chain of intermediaries, with farmers handing over their produce to village-level agents, who in turn consign these to wholesale markets, followed by distribution to retail outlets and finally the end user. The farmers have little or no access to the market. They are often ignorant of the market-clearing price and are often exploited (Deichmann *et al.*, 2016). There is an urgent need to create channels for direct market access for farmers, leading to higher prices, lower post-harvest losses, and wider job opportunities. Consumers in the general retail market are faced with limited availability of fresh produce, high prices, and doubts about the

authenticity of organic labeling (Nugroho, 2021). An online platform has to connect an end consumer to a farmer has sufficient potential to meet this demand by providing a reliable source of fresh produce while building consumer trust through transparency and traceability (Jiang *et al.*, 2021). Another important gap in existing solutions is a lack of attention to digital literacy and technology adoption among farming communities. Urban consumers with access to platforms could easily shop online, yet many farm communities in remote areas often lack the skills and digital tools to fully engage in these platforms (Lin, 2022).

Need for the study

Many economies have relied on agricultural sectors for a long time. However, farmers often struggle to access markets, especially at a price that is profitable for them. A well-functioning online marketplace can spur economic empowerment for farmers by providing direct access to markets. In addition to access to markets, online platforms can provide fair pricing to farmers because they bypass intermediaries that often inflate their costs by reducing profit margins for others (Levi *et al.*, 2020). Another important benefit of direct farm-to-consumer transactions is improving food quality and safety. Perishable goods such as food can degrade and contaminate as they enter and move through the standard supply chain (Pal and Kant, 2020). Online platforms reduce the supply chain to one-and-a-half steps, bypassing supermarkets and distributors. Furthermore, farmers need technology to meet market access and other efficiency demands faster, but usually, the rate and nature of adoption vary widely. Understanding these factors can provide valuable insights into what hinders and what helps people adopt new technologies. Agri-tech solutions must have an impact and be scaled to different contexts improving farmers' livelihoods and empowering consumers when making decisions about food. These types of online platforms must be designed not just to deal with short-term challenges, but also to adapt and evolve as these challenges transform. There is a need to study the factors and strategies that contribute to an Agri-tech platform's long-term viability and sustainability (Bethi and Deshmukh, 2023).

However, effective online platforms have the potential to become powerful transformative factors in the agricultural sector. By raising farmer incomes, improving food safety and quality, promoting technol-

ogy adoption, and improving sustainability, online platforms are already starting to change the face of agriculture and rural lifestyles. With this back ground current study was designed to evaluate the validity and effectiveness of online platform connecting farms to customers in the Punjab province of Pakistan.

Materials and Methods

Present research study was conducted in the Punjab province of Pakistan during year 2024. Conceptual framework of the study was divided into independent and dependent variables. Online platform usage, marketing strategies and product quality were the independent variables and satisfaction level of users was the dependent variable.

Research population and sample selection

The research population includes all online sellers, buyers, and operators of the selected platforms in the Sargodha district dealing with the sale and purchase of agricultural produce. For this study a purposive sampling approach was employed (Campbell *et al.*, 2020). The sample included 50 vegetable consumers (non-farmers) and 50 vegetable producers (farmers) from each of the two selected tehsils in the Sargodha district. Additionally, 5 owners/operators of the available platforms were interviewed. This sampling technique was chosen to closely reflect the population of interest and gather relevant insights from those most directly involved with the online platforms.

Data collection and analysis

Data collection was carried out using a pretested questionnaire to ensure the reliability and validity of the responses. The questionnaire was pretested on a small sample of respondents similar to the study population. This pretesting phase helped in identifying and rectifying issues with the questionnaire design, ensuring that the questions were clear to the respondents. The face validity of the questionnaire was established through a review by experts in the field of agricultural e-commerce. Their feedback ensured that the questions were relevant, clear, and adequately covered the key aspects of the study objectives. Structured interviews were conducted with the selected farmers and consumers to gather detailed information. The collected data was analyzed using the Statistical Package for Social Sciences (SPSS) (Arafat *et al.*, 2020). Descriptive statistics were used to summarize the characteristics of the sample population and the responses

obtained from the interviews. Inferential statistics, including correlation analyses and chi-square tests, were employed to explore the relationships between various factors, such as the age and education level of farmers and their willingness to use the online platforms.

Research Hypothesis

Following were the research hypotheses for this piece of research

H₁: There is an association between platform usage and user satisfaction.

H₂: There is an association between marketing strategies and user satisfaction.

H₃: There is an association between product quality and user satisfaction.

Results and Discussion

Respondent Type

The individuals (producers, consumers, and app-owners) of the selected sample were asked to identify the type of category they belonged to such as consumers, producers or app owners. The data regarding respondent types have been presented in the Table 1 given below.

Table 1: Frequency and percentage of respondents concerning their category.

Category	F	%
Consumer	100	47.6
Producer	100	47.6
Producer and app owners	6	2.9
App owners/ Operators	4	1.9
Total	210	100

The data presented in Table 1 provide an overview of the categories of respondents. The table shows that majority of the respondents were evenly split between consumers and producers, each constituting 47.6% of the total. A small fraction of respondents was both producers and app owners (2.9%) or solely app owners/operators (1.9%). This indicates that most respondents were either directly involved in consumption or production, with very few having roles in app ownership or management.

Commodity Sold by Farmers

Farmers were asked to specify the type of commodity they sold. The data in this regard have been presented in Table 2.

Table 2: Frequency and percentage of commodities sold by farmers (total 100).

Commodity	F	%
Fruit	66	66
Vegetable	34	34
Total	100	100

The data presented in Table 2 show that the majority of farmers sold fruits (66%), while the remaining 34% sold vegetables. This indicates that fruit farming was more prevalent among the respondents compared to vegetable farming in the selected region.

Total income of Producers

Producers' total income was categorized into three levels. The details have been summarized in Table 3 given below.

Table 3: Frequency and percentage of producers (farmers) according to different levels of total monthly income.

Total Income (Rs)	f	%
Low (Below 30,000)	44	44
Average (30,000 to 60,000)	37	37
High (Above 60,000)	19	19
Total	100	100

The data in Table 3 reveal that a significant proportion of producers (44%) fall into the low-income category, while 37% had an average monthly income and only 19% had a high level of monthly income i.e. above rupees sixty thousand per month. The income strengthens the adaptive capacities of the farmers and persuades them by improving their affordability to adopt the particular technology. Syiem and Raj (2015) found that income of the farmers had a significant impact on the adoption of modern techniques. The results are more or less similar to those of Latif (2009) who reported that 64% of farmer had their monthly income under 8333 PKR whereas 33.2% of farmers had monthly income of more than 8333 PKR. Mehmood (2011) found that 31.5% of respondents had monthly earning of less than 16666 PKR and 14% of farmers were earning more than 33333 PKR. Likewise, findings of Talib (2017) are more or less in accordance to the present study according to whom 31.9% of farmers had earning between 7083 and 8666 PKR.

Perceptions/ Responses on The Likert Scale

The respondents were required to respond on a Lik-

ert scale concerning their level of agreement with the statements related to online agricultural platforms. Their responses have been presented in Table 4.

Table 4: Means and standard deviations of the respondents' perceptions.

Statement	1	2	3	4	5	$\bar{x}$	Σ
Consumers purchase products at reasonable prices (cheaper than the market.)	5.7	6.2	31	24.3	32.9	3.72	1.153
The platform is easy to navigate and use	3.3	9.5	29	32.4	25.7	3.68	1.063
The information presented on the App/Website/platform is accurate and trustworthy.	5.2	9.5	28.1	28.6	28.6	3.66	1.144
The platform ensures timely delivery of orders and accurate order fulfillment	4.3	8.1	33.8	28.1	25.7	3.63	1.083
The platform has the potential to empower farmers in terms of timely selling of produce.	6.2	10.5	27.6	30	25.7	3.59	1.159
Producers receive fair prices for their produce	6.2	9	32.9	25.7	26.2	3.57	1.152
I feel confident about the security measures taken for transactions on this platform.	6.2	11.9	24.8	34.3	22.9	3.56	1.149
The proposed/ actual App/Website/platform seems very valid.	7.1	10	29	28.6	25.2	3.55	1.178
The proposed/ actual App/Website/platform seems very effective.	6.2	11.4	28.1	30.5	23.8	3.54	1.154
The products researchers have purchased from this platform meet or exceed my expectations in terms of quality.	6.2	12.4	27.1	31.9	22.4	3.52	1.150
This platform has positively impacted local farms by providing them with increased visibility	7.1	12.9	24.3	33.3	22.4	3.51	1.179
It is easy to find the products or produce I am looking for on this platform	7.1	13.3	22.4	37.1	20	3.50	1.163
The proposed/ actual App/Website/platform enhances consumer access to fresh produce	8.6	14.8	21	32.4	23.3	3.47	1.238

Sometimes the proposed/ actual App/ Website/platform does not respond.	39	37.1	19.5	2.4	1.9	1.91	.921
It needs some improvement.	41	38.6	13.3	3.8	3.3	1.90	.995
The platform provides adequate customer support to address any issues or concerns	41	39	12.9	3.3	3.8	1.90	1.005
There are glitches in the user interface.	42.4	35.7	16.2	2.9	2.9	1.88	.973
The proposed/ actual App/Website/platform is difficult to use	43.3	37.1	13.3	2.9	3.3	1.86	.982
The proposed/ actual App/Website/platform seems to have some problems in its usage by the users.	42.9	38.1	12.9	3.3	2.9	1.85	.964
The proposed/ actual App/Website/platform disconnects frequently.	45.7	35.2	13.8	2.4	2.9	1.81	.958

1: Strongly disagree; 2: Disagree; 3: Undecided; 4: Agree; 5: Strongly agree.

Data given in Table 4 indicate that the perceptions that received a mean (3.50 or above) were: Consumers purchase products at reasonable prices (cheaper than the market); The platform is easy to navigate and use; The information presented on the App/Website/platform is accurate and trustworthy; The platform ensures timely delivery of orders and accurate order fulfillment; The platform has the potential to empower farmers in terms of timely selling of produce; Producers receive fair prices for their produce; I feel confident about the security measures taken for transactions on this platform; The proposed/ actual App/ Website/platform seems very valid; The proposed/ actual App/Website/platform seems very effective; The products researchers have purchased from this platform meet or exceed my expectations in terms of quality; This platform has positively impacted local farms by providing them with increased visibility; and It is easy to find the products or produce I am looking for on this platform. Number of research studies such as Hassan *et al.* (2002); Nlerum (2008); Siddiqui *et al.* (2006); Nzomoi *et al.* (2007); Yasin (2015) and Ashraf *et al.* (2015) have reported the significant association between the adoption of technologies and socio-economic characteristics of the respondents. These studies incur that economically weak farmer had less chances to adopt the particular technologies.

Few more studies such as Ashraf (2001); Siddiqui *et al.* (2006); Salehin *et al.* (2009) had reported that awareness among the farmers about the technologies was related to the socio-economic attributes of the farmers such as age, education, income and size of land holding. Inadequate awareness refers to the inadequate knowledge among farmers pertinent to poor socio-economic attributes the farmers had poor level of knowledge. This poor knowledge among farmers restricts adoption of technologies. Ayoade and Akintonde (2012) have reported that the constraints faced by the farmers significantly limit the adoption of technologies.

Platform Influence Analysis

Pricing of products (Consumer)

The pricing of products by consumers was evaluated and the data are presented in Table 5.

Table 5: Frequency and percentage distribution of pricing of products (Consumer).

Pricing	f	%
Lower than the local market	53	53
Equal to the local market	34	34
Higher than the local market	13	13
Total	100	100

According to Table 5, slightly more than half (53%) of consumers found the pricing of products to be lower than the local market, while 34% found it equal to the local market. Only 13% found the prices higher than the local market.

Farmers- Consumers' Connection

The respondents were asked about the connection between farmers and consumers. The results are summarized in Table 6.

Table 6: Frequency and percentage distribution of farmers-consumers' Connection.

Connection	Producers (Farmers)		Consumers		App Operators	
	F	%	f	%	F	%
No Difference	37	37	21	21	0	0
Better	63	63	79	79	10	100
Total	100	100	100	100	10	100

Table 6 indicates that 63% of farmers and 79% of consumers felt that the connection had improved. All

app operators (100%) also agreed that the connection was better. The report from [Deichmann et al. \(2016\)](#) confirmed that demonstration was a very important tool used by the extension agencies for the awareness and facilitation of the farmers. In another study, [Kock et al. \(2017\)](#) reported that numerous communication methods were used by the working staff. They agreed that radio was the important medium where the programs were broadcasted to showcase on-farm demonstration plots, information dissemination regarding alternate cropping schemes, seed types and sources and organization of farmers' training.

Improvement of rural livelihood

The impact on rural livelihood was assessed on different livelihood parameters and the data in this regard is shown in the following [Table 7](#).

Table 7: Frequency and percentage distribution of improvement in rural livelihood.

Improvement in Livelihood	Improvement Level	Producers (Farmers)		Consumers		App Operators	
		F	%	f	%	F	%
	No Difference	40	40	28	28	0	0
	Better	60	60	72	72	10	100
Market Information	No Difference	22	22	12	12	4	40
	Improved	78	78	88	88	6	60
Improves production methods	No Difference	7	7	8	8	1	10
	Improved	78	78	73	73	7	70
	Somewhat						
Food security level	Improved a lot	15	15	19	19	2	20
	No Difference	9	9	7	7	2	10
	Improved Somewhat	64	64	76	76	4	70
Economic growth	Improved a lot	17	17	17	17	4	20
	No Difference	15	15	24	24	2	20
	Improved	85	85	76	76	8	80
Role of intermediaries	Decreased	73	73	96	96	10	100
	No Difference	14	14	4	4	0	0
	Increased	13	13	0	0	0	0
Quality of produce	Deteriorated	8	8	11	11	1	10
	No Difference	63	63	73	73	6	60
	Increased	29	29	16	16	3	30
	Total	100	100	100	100	10	100

The results in [Table 7](#) indicate that 78% of farmers, 88% of consumers, and 60% of app operators felt that access to market information had improved. It also

shows that 78% of farmers and 73% of consumers reported some improvement in production methods, with 15% of farmers and 19% of consumers noting a significant improvement. 70% of app operators saw some improvement, and 20% saw significant improvement. [Baral et al. \(2021\)](#) found that farmers were getting more production, and income and the environment was protected as a result of using Good Agricultural Practices promoted and guided by the extension sector. The table indicates that 64% of farmers and 76% of consumers noted some improvement in food security at the household level. 17% of both farmers and consumers reported significant improvement. 40% of app operators saw some improvement, and 20% saw significant improvement. According to above table, 85% of farmers and 76% of consumers reported economic growth, with 80% of app operators agreeing. The role of intermediaries as given in the above table shows that, 73% of farmers and 96% of consumers reported a decrease in the role of intermediaries. All app operators (100%) agreed. Additionally regarding quality of produce shows that 63% of farmers and 73% of consumers noted no difference in the quality of produce. However, 29% of farmers and 16% of consumers reported an increase in quality. 60% of app operators saw no difference, and 30% noted an improvement.

Healthier eating habits (Consumer)

The consumers' perception of healthier eating habits was recorded and is detailed in [Table 8](#).

Table 8: Frequency and percentage distribution of healthier eating habits of consumers.

Pricing	f	%
No Difference	18	18
Became Better	82	82
Total	100	100

According to [Table 8](#) 82% of consumers reported that their eating habits had improved, while 18% saw no difference.

Variables For Hypothesis Testing

Platform Usage: The analysis of platform usage was conducted to understand user engagement and interaction patterns. Detailed findings are presented in [Table 9](#).

Table 9: Frequency and percentage of platform using on-line platform.

Platform Usage	Producers (Farmers)		Consumers		App Operators	
	f	%	f	%	F	%
Never	67	67	19	19	0	0
Casual	24	24	70	70	0	0
Regular	9	9	11	11	10	100
Total	100	100	100	100	10	100

Table 9 presents the distribution of platform usage among respondents. Among producers, 67% never used the platform, 24% used it casually, and 9% were regular users. Among consumers, 70% were casual users, 19% never used it, and 11% were regular users. All app operators (100%) were regular users.

Product Quality (Consumer): Consumer perceptions of product quality were assessed through various metrics to gauge satisfaction and reliability. The comprehensive results are displayed in Table 10.

Table 10: Frequency and percentage distribution of consumers by product quality.

Product Quality	f	%
Normal	39	39
Good	10	10
Very Good	51	51
Total	100	100

Table 10 shows the perceived quality of the product. A majority of the respondents (51%) rated the product quality as "Very Good," followed by 39% who consider it "Normal," and 10% of respondents rated product quality as "Good" indicating a generally positive perception of the product quality, with the highest percentage indicating strong satisfaction.

User satisfaction: User satisfaction levels were measured to evaluate overall experience and service quality. The findings are summarized in Table 11.

Table 11 depicts user satisfaction data across three groups: producers (farmers), consumers, and app operators. Among producers, 61% were fully satisfied, 21% were partially satisfied, and 18% were not satisfied. Among consumers, 54% were fully satisfied, 33% were partially satisfied, and 13% were not satisfied. For app operators, 6 out of 10 (60%) were fully satisfied, 4 out of 10 (40%) were partially satisfied, and

none were dissatisfied. The data shows that generally, most of the respondents were satisfied with their experience regarding the platform.

Table 11: Frequency and percentage distribution of user satisfaction.

User Satisfaction	Producers (Farmers)		Consumers		App Operators	
	f	%	f	%	F	%
Not Satisfied	18	18	13	13	0	0
Partially Satisfied	21	21	33	33	4	4
Fully Satisfied	61	61	54	54	6	6
Total	100	100	100	100	10	10

Testing of Hypothesis: Three hypotheses of this research were tested below. The results regarding testing of four (04) hypothesis are hereby presented in Tables 12, 13, 14 (a & b).

Hypothesis 1

H₁: There is an association between platform usage and user satisfaction.

Table 12 (a): Association of platform usage of the respondents with user satisfaction.

Platform usage	User satisfaction level			Total
	Not satisfied	Partially satisfied	Fully satisfied	
Never	11	19	12	42
Casual	8	17	11	36
Regular	12	22	98	132
Total	31	58	121	210

The chi-square value was calculated using the following formula which was already provided in the methodology section.

$\chi^2 = \sum (O_i - E_i)^2 / E_i$, where O_i = observed value (actual value) and E_i = expected value.

Table 12 (b): Expected Values for Table 12 (a).

Platform usage	User satisfaction			Σ	$O_i - E_i$			$(O_i - E_i)^2 / E_i$		
	N.S	S	F.S		N.S	S	F.S	N.S	S	F.S
Never	11	19	12	42	4.80	7.40	-12.20	3.72	4.72	6.15
Casual	8	17	11	36	2.69	7.06	-9.74	1.36	5.01	4.58
Regular	12	22	98	132	-7.49	-14.46	21.94	2.88	5.73	6.33
Total	31	58	121	210	0.00	0.00	0.00	7.95	15.46	17.06

N.S = Not Satisfied, P.S = Partially Satisfied, F.S = Fully Satisfied, Σ = Total.

Conclusion Chi-Square cal. $\chi^2_{cal} = 40.47$; Chi Square Critical $\chi^2_{crit} = 9.488$

Degree of freedom = 4, Alpha = 0.05, P value = 0.000

Result = Reject H_0 and accept H_1 therefore it is concluded that our proposed hypothesis stands true. This indicates that significant association exists between frequency of use of online platform and satisfaction level of users of online platform.

Hypothesis 2

H²: There is an association between marketing strategies and user satisfaction.

Table 13 (a): Association of marketing strategies of respondents with user satisfaction.

Marketing Strategies	User satisfaction			Total
	Not Satisfied	Partially Satisfied	Fully Satisfied	
Advertisement	10	10	13	33
Personal communications	8	11	48	67
Total	18	21	61	100

Table 13 (b): Expected Values for Table 13 (a).

Strategy	User satisfaction			Total	O _i - E _i			(O _i - E _i) ² /E _i		
	N.S	S	F.S		N.S	S	F.S	N.S	S	F.S
Advertisement	10	10	13	33	4.06	3.07	-7.13	2.78	1.36	2.53
Personal communications	8	11	48	67	-4.06	-3.07	7.13	1.37	0.67	1.24
Total	18	21	61	100	0.00	0.00	0.00	4.14	2.03	3.77

N.S = Not Satisfied, P.S = Partially Satisfied, F.S = Fully Satisfied.

Conclusion Chi-Square cal. $\chi^2_{cal.} = 9.94$; Chi Square Critical $\chi^2_{crit.} = 5.991$

Degree of freedom = 2; Alpha = 0.05; P value = 0.007

Result = Reject H_0 And accept H_1 Therefore it is concluded that our proposed hypothesis stands true. This indicates that significant association exists between marketing strategies of respondents regarding online platform and satisfaction level of users of online platform.

Hypothesis 3

H³: There is an association between product quality and user satisfaction.

Conclusions and Recommendations

The study investigated the impact of online farm-to-consumer platform on various aspects of agricultural efficiency and consumer behavior in Pakistan. Key findings revealed that most of the respondents

lived in rural areas. Most farmers sold fruits online. Farmers perceived the platform as valid and effective. Furthermore, fruit farming was more prevalent than vegetable farming. User satisfaction was high. Platform usage, geographic location, marketing strategies, and product quality were the independent variables, while user satisfaction was the dependent variable. Three hypotheses were set in this research. It is suggested that awareness campaigns be conducted to educate both farmers and consumers on the benefits and effective use of online platforms. The government is urged to establish regulations to prevent fraud in online transactions and to support the development of infrastructure necessary for maintaining the quality of fresh produce during transportation. Educational programs focusing on digital literacy and online marketing strategies are recommended to help farmers adapt to new technologies. Furthermore, it is advised that continuous monitoring and regular updates of the platform be conducted to address technical issues and enhance user experience.

Table 14 (a): Association of product quality of respondents with user satisfaction.

Product Quality	User satisfaction			Total
	Not Satisfied	Partially Satisfied	Fully Satisfied	
Normal	13	14	12	39
Good	0	10	0	10
Very Good	0	9	42	51
Total	13	33	54	100

Table 14 (b): Expected Values for Table 14 (a).

Product Quality	User satisfaction			Total	O _i - E _i			(O _i - E _i) ² /E _i		
	N.S	S	F.S		N.S	S	F.S	N.S	S	F.S
Normal	13	14	12	39	7.93	1.13	-9.06	12.40	0.10	3.90
Good	0	10	0	10	-1.30	6.70	-5.40	1.30	13.60	5.40
Very Good	0	9	42	51	-6.63	-7.83	14.46	6.63	3.64	7.59
Total	13	33	54	100	0.00	0.00	0.00	20.33	17.35	16.89

N.S = Not Satisfied, P.S = Partially Satisfied, F.S = Fully Satisfied.

Conclusion Chi-Square cal. $\chi^2_{cal.} = 54.57$; Chi Square Critical $\chi^2_{crit.} = 9.488$

Degree of freedom = 4; Alpha = 0.05; P value = 0.000

Result = Reject H_0 And accept H_1 Therefore it is concluded that our proposed hypothesis stands true. This shows that there is association between product quality and user satisfaction.

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Novelty Statement

Current research study provides a pioneer analysis into the impact of online farm-to-consumer platforms on agricultural efficiency and consumer behavior in Pakistan. Unlike previous studies, this research highlights the dominance of fruit online marketing over vegetable online marketing. These findings provide guidance for e-agriculture in Pakistan.

Author's Contribution

Muhammad Luqman: Conceptualization.

Muhammad Yaseen: Writing - review and editing.

Talha Mohsin Tanvir: Investigation, methodology, resources.

Tahir Munir Butt Butt: Data curation, software.

Muhammad Usman: Writing - original draft, Project Administration.

Abdus Salam: Validation, Project Administration.

Conflict of Interest

The authors have declared no conflict of interest.

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