

Original Research Article

CUSTOMER VALUE PROPOSITION FOR PRECISION FARMING

ABSTRACT

Global population is expected to grow by 70% by 2050, putting ever-increasing pressure on agriculture to feed the world. At the same time land and water shortages, changing consumer patterns and a global trend toward preserving natural environmental resources such as soil quality add to the burden on farmers to balance the various demands. So far, farmers have to monitor manually the condition of their livestock, environment or agricultural produce, even on large farms. The farmers machinery and equipment also require safety controls and security protection against natural disasters, theft, and accidents. The study focuses on formulate a customer value proposition and identification of the problems faced by banana growers. The research follows a descriptive research design, utilizing a non-probability sampling method, specifically purposive sampling. The sample unit comprises farmers who have more than 2 ha agriculture land. Total of 50 farmers were studied in the sample from Anand and Umreth Talukas. The survey was conducted using a semi-structured research instrument. Formulating a customer value proposition specifically for banana growers enable the development of tailored offerings that address their unique needs and challenges. Additionally, identifying the problems faced by banana growers will help in understanding the current issues and areas of improvement within the agricultural sector. The findings of this research were contributing to the knowledge and understanding of precision farming in Anand and Umreth Talukas. The customer value proposition developed for banana growers were assist in enhancing their productivity and profitability. Quality of products was considered the most important factor by customers. The top issues for farmers are disease, weather, nutrition, insect-pest, and irrigation. Climate change-related challenges, availability of input markets, and remote farm access were also recognized as significant factors affecting agricultural practices.

Keywords: Customer Value Proposition, Precision Farming, Productivity, Profitability

1. INTRODUCTION

Agriculture, an essential activity for human civilization, entails the cultivation of crops, the raising of livestock, and the production of vital resources such as food, fiber, and other

agricultural products. The previous two years have seen brisk expansion in the agriculture industry. The industry, which employs the most people, contributed a significant 18.8 percent of the country's (GVA) in 2021–22, growing by 3.6 percent in 2020–21 and 3.9 percent in 2021–22.

A customer value proposition represents the distinctive advantages and value that a business provides to its customers. It encompasses the compelling reasons why customers should select a specific product or service from a company amidst other available options. An effective customer value proposition effectively communicates the unique benefits, relevance, and differentiation of the product or service, establishing its value proposition to potential customers.

The terms precision agriculture (PA) and site-specific crop management (SSCM) refer to a technology-enabled farming management strategy that monitors, gauges, and assesses the requirements of specific fields and crops. The third revolution will be driven by cutting-edge analytical skills and continually evolving IoT capabilities, such as drones for precision agriculture. Precision farming aims to boost effectiveness and production, lower input costs, and enhance environmental sustainability.

The worldwide precision farming market was worth USD 9,476.3 million in 2022 and is predicted to increase at a compound annual growth rate (CAGR) of 12.6% between 2023 and 2030. By 2030, the market for precision agriculture is anticipated to reach \$15.6 billion. Precision agriculture is growing due to the expanding ubiquity of the Internet of Things (IoT) and farmers' usage of advanced analytics. Precision farm planning, field maps, crop scouting, yield maps, and the determination of the precise quantity of inputs to be applied to fields are all created using computer-based software. The capacity to create a sustainable agriculture plan, which aids in reducing expenses and increasing yields, is one advantage of this approach.

In India, Banana (*Musa sp.*) is the second most significant fruit crop after mango. It is the most popular fruit across all social classes because to its year-round availability, low cost, wide variety, flavor, nutritional value, and therapeutic properties.^[8] It has strong export potential as well. High-tech crop production is a financially feasible venture that increases productivity, improves produce quality, and enables early harvest maturity with premium pricing. Worldwide 113.2 lac tonnes of banana is produced per year. India is the largest banana producer in the world with 29.12 lac tonnes production volume per year.

Rosario & Raimundo (2021) concluded that the value proposition is a declaration of the firm's promises and dedication to influencing the attitudes, perceptions, and behaviors of its target market in favour of rivals.

Vishali and Sudha (2021) found that IoT is utilised to enhance many agricultural fields. Efficiency in terms of time, water saving, crop monitoring, soil management, pesticide and insect spray safety, etc... Agriculture might use the Internet of Things (IoT) to boost yields and better manage all agriculture related operations.

Sheth, J. N. (2019) concluded that value creation is a fundamental aspect of capitalism, and there are various ways in which it can be achieved. The paper discusses three main approaches to

value creation: insourcing, outsourcing, and value co-creation. value co-creation is seen as a strategic approach for the future survival and growth of both customer and supplier companies.

AIM OF THE STUDY

Formulate a customer value proposition specifically for banana farmers in Anand and Umreth Talukas. Identify the problems faced by banana farmers in agriculture. Assist in enhancing the productivity and profitability of banana farmers. Provide valuable insights for stakeholders, policymakers, and service providers in the agriculture sector to make informed decisions and develop effective strategies to support farmers in adopting precision farming practices. The study was conducted with the objectives (i) To formulate customer value proposition for Banana farmers (ii) To identify problems faced by Banana farmers in agriculture

2. RESEARCH METHODOLOGY

The research follows a descriptive research design, utilizing a non-probability sampling method, specifically purposive sampling. The sample unit comprises farmers who have more than 2 ha agriculture land. The study was conducted in Anand and Umreth Taluka of Gujarat. A total of 50 banana growers were studied in the study area. The survey was conducted using a semi-structured research instrument.

3. RESULTS AND DISCUSSION

The study was conducted with the 50 sample size of banana growers in Anand and Umreth taluka. The detail analysis of the responses received from the farmers are as follows:

3.1 Age of the Farmers

Table 1. Age of the Farmers

Age	Frequency	Percentage
25-40	18	36.00
41-55	29	58.00
More than 55	3	6.00
Total	50	100.00

According to the report, a key demographic that affects purchasing behaviour and decision-making in Anand areas was the average age of farmers. The majority of the sample population falls in the age group of 41 to 55 years old, with 58.00% of the total individuals. We may claim that middle-aged folks dominated the area. Older farmers, or more than 55 years, made up 6.00% of the sample, while younger farmers, or those between 25 to 40 years old, made up 36.00%.

3.2 Education of the Farmers

Table 2. Education of the Farmers

Education Qualification	Frequency	Percentage
Illiterate	2	4.00
SSC	39	78.00
HSC	7	14.00
Graduation	2	4.00
Total	50	100

Table 2 shows that, 78.00% of the farmers in the sample population have an SSC level education, making them the majority of the population. This shows that the completion of secondary school was the greatest education level attained by the majority of the sample's participants. 14.00% respondents from the sample's population had earned an HSC level education. Only 4.00% respondents had graduation level education. Farmers' literacy means they do their duties with complete knowledge, which were benefited for farming related activities. They can broaden their knowledge and read market circumstances.

3.3 Formulate Customer Value Proposition

A customer value proposition represents the distinctive advantages and value that a business provides to its customers. It encompasses the compelling reasons why customers should select a specific product or service from a company amidst other available options. An effective customer value proposition effectively communicates the unique benefits, relevance, and differentiation of the product or service, establishing its value proposition to potential customers.

Table 3. Factors for Customer Value Proposition

Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Quality of the products	0 (0.00%)	2 (4.00%)	9 (18.00%)	14 (28.00%)	25 (50.00%)
Satisfied with the value for money	1 (2.00%)	8 (16.00%)	13 (26.00%)	14 (28.00%)	14 (28.00%)
Reliability of the products	8 (16.00%)	15 (30.00%)	14 (28.00%)	10 (20.00%)	3 (6.00%)
Money back guarantee	4 (8.00%)	17 (34.00%)	19 (38.00%)	8 (16.00%)	2 (4.00%)
Expertise of the service staff.	1 (2.00%)	11 (22.00%)	24 (48.00%)	11 (22.00%)	3 (6.00%)
Sales people are friendly	3 (6.00%)	11 (22.00%)	14 (28.00%)	13 (26.00%)	9 (18.00%)
Fast response of the service staff	1 (2.00%)	13 (26.00%)	24 (48.00%)	10 (20.00%)	2 (4.00%)

Businesses should prioritize delivering high-quality products to meet customer expectations. Additionally, training sales staff to be friendly and helpful can have a positive impact on customer satisfaction. While other factors are still important, they may not be as critical in influencing customer decisions.

Table 4. Rank for Customer Value Proposition

Factors	Mean	Rank
Quality of the products	4.24	1
Satisfied with value money	3.64	2
Sales people are friendly	3.28	3
Expertise of the service staff	3.08	4
Fast response of the service staff	2.98	5
Money back guarantee	2.74	6
Reliability of the products	2.70	7

Factors such as fast response of the service staff, expertise of the service staff, money back guarantee, and reliability of the products received lower mean values and ranks. This suggests that while these factors are still important to customers, they were considered relatively less important compared to product quality and the behavior of sales staff.

3.4 Problems Faced by Farmers

It can be inferred that Disease and Weather was perceived as the most critical issues. Nutrition and Insect pest follow closely behind, suggesting that these factors are also significant concerns in the given context. On the other hand, Irrigation had least important, indicating that it was perceived as the least significant problem among the options provided

Table 5. Problems Faced by Farmers

Problems	Rank given by Respondents					Total	Average	Rank
	1st	2nd	3rd	4th	5th			
Disease	2300 (25)	1806 (21)	243 (03)	0 (00)	76 (01)	4425	88.50	1

Weather	1472 (16)	1978 (23)	648 (08)	234 (03)	0 (00)	4332	86.64	2
Nutrition	0 (00)	2150 (25)	1701 (21)	234 (03)	76 (01)	4161	83.22	3
Insect Pest	0 (00)	516 (06)	810 (10)	1638 (21)	988 (13)	3952	79.04	4
Irrigation	92 (01)	172 (02)	729 (09)	1482 (19)	1444 (19)	3919	78.38	5

Disease having the highest mean score of 88.50, followed by Weather 86.64, Nutrition 83.22, Insect Pest 79.04, and Irrigation 78.38. These scores and rankings suggest that Disease and Weather were considered the most pressing problems, while Irrigation was perceived as the least significant.

3.4.1 Disease

According to the ratings and rankings supplied, yellow sigatoka was seen as the most significant concern, followed by bunchy top. In terms of significance, Panama and Banana Streak Virus (BSV) were placed lower.

Table 6. Disease Related Problems

Problems	Rank given by Respondents				Total	Average	Rank
	1 st	2 nd	3 rd	4 th			
Yellow Sigatoka	2484 (27)	1118 (13)	810 (10)	0 (00)	4412	88.24	1
Bunchy Top	2024 (22)	1806 (21)	324 (04)	234 (03)	4388	87.76	2
Panama	92 (01)	860 (10)	2268 (28)	858 (11)	4078	81.56	3
Banana Streak Virus	0 (00)	516 (06)	648 (08)	2808 (36)	3972	79.44	4

3.4.2 Weather

Table 7. Weather Related Problems

Problems	Rank given by Respondents			Total	Average	Rank
	1 st	2 nd	3 rd			

Uneven Rainfall	3128 (34)	1204 (14)	162 (02)	4494	89.88	1
Wind	1012 (11)	2150 (25)	1134 (14)	4296	85.92	2
Temperature Fluctuation	460 (05)	1118 (13)	2592 (32)	4170	83.40	3

Based on the provided scores and rankings, uneven rainfall was perceived as the most pressing issue, followed by wind and temperature fluctuation. Uneven rainfall refers to variations or irregularities in the distribution of rainfall, which can have significant impacts on various aspects such as agriculture, water resources, and ecosystems.

3.4.3 Nutrition

Table 8. Nutrition Related Problems

Problems	Rank given by Respondents			Total	Average	Rank
	1 st	2 nd	3 rd			
Quantity	2944 (32)	1548 (18)	0 (00)	4492	89.84	1
Quality	1380 (15)	1720 (20)	1215 (15)	4315	86.30	2
Ripening of Small Size Banana	276 (3)	1204 (14)	2673 (33)	4153	83.06	3

Quantity was the top priority, followed by quality, while the ripening of small size bananas was relatively less important. It suggests that the focus may be more on the quantity and quality aspects rather than the specific ripening process.

3.4.4 Insect Pest

Table 9. Insect Pest Related Problems

Problems	Rank given by Respondents				Total	Average	Rank
	1st	2nd	3rd	4th			
Nematode	2208 (24)	1720 (20)	324 (04)	156 (02)	4408	88.16	1
Stem weevil	2208 (24)	1204 (14)	972 (12)	0 (00)	4384	87.68	2
Aphids	184 (02)	860 (10)	2106 (26)	936 (12)	4086	81.72	3
Thrips	0 (0)	516 (06)	648 (08)	2808 (36)	3972	79.44	4

According to the scores and rankings, nematodes were the most serious pest, followed by stem weevils. Aphids and thrips are considered less important.

3.4.5 Irrigation

Table 10. Irrigation Related Problems

Problems	Rank given by Respondents			Total	Average	Rank
	1st	2nd	3rd			
Amount of Irrigation	2484 (27)	1806 (21)	162 (02)	4452	89.04	1
High pH of Water	1472 (16)	1720 (20)	1134 (14)	4326	86.52	2
Clogging Problem	644 (07)	946 (11)	2592 (32)	4182	83.64	3

Based on the provided scores and rankings, the amount of irrigation was perceived as the most pressing issue, followed by the high pH of water and the clogging problem.

3.5 Features of Precision Farming

Weather forecast alerts and package of practices was given the highest importance, respondents also recognize the significance of factors like warming of pests and diseases, availability of input market, and remote farm access. The lower-ranked factors were perceived as relatively less crucial, indicating that they may not have a significant impact on agricultural decision-making according to the respondents' perspectives.

Table 11. Features of Precision Farming

Features	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Weather forecast alerts	0 (0.00%)	1 (2.00%)	8 (16.00%)	16 (32.00%)	25 (50.00%)
Package of practices	0 (0.00%)	1 (2.00%)	14 (28.00%)	24 (48.00%)	11 (22.00%)
Forwarming of pest and disease	0 (0.00%)	5 (10.00%)	11 (22.00%)	21 (42.00%)	13 (26.00%)
Availability of input market	0 (0.00%)	3 (6.00%)	20 (40.00%)	20 (40.00%)	7 (14.00%)
Remote farm access	2 (4.00%)	7 (14.00%)	14 (28.00%)	19 (38.00%)	8 (16.00%)
Farming related videos	0 (0.00%)	8 (16.00%)	24 (48.00%)	16 (32.00%)	2 (4.00%)
Weather advisory	5 (10.00%)	10 (20.00%)	20 (40.00%)	13 (26.00%)	2 (4.00%)
Nutrition advisory	6 (12.00%)	11 (22.00%)	11 (22.00%)	17 (34.00%)	5 (10.00%)
Query management	4 (8.00%)	11 (22.00%)	14 (28.00%)	15 (30.00%)	6 (12.00%)
Crop calendar	1 (2.00%)	9 (18.00%)	20 (40.00%)	15 (30.00%)	5 (10.00%)
Precision irrigation scheduling	4 (8.00%)	6 (12.00%)	16 (32.00%)	16 (32.00%)	8 (16.00%)
Activity management	2 (4.00%)	4 (8.00%)	15 (30.00%)	22 (44.00%)	7 (14.00%)
News and articles	2 (4.00%)	5 (10.00%)	11 (22.00%)	21 (42.00%)	11 (22.00%)

Weather forecast alerts have the highest 1st rank, indicating that they are considered the most important factor among the given options. Package of practices ranks 2nd with suggesting its significant influence in agricultural practices. Factors such as warming of pest and disease, availability of input market, and remote farm access also received relatively high mean values and ranks, indicating their perceived importance.

Table 12. Rank of Features in Precision Farming

Features	Mean	Rank
Weather forecast alerts	4.3	1

Package of practices	3.9	2
Forwarning of pest and disease	3.84	3
Availability of Input market	3.62	4
Remote farm access	3.48	5
Farming related videos	3.24	6
Weather advisory	3.14	7
Nutrition advisory	2.98	8
Query Management	2.84	9
Crop calendar	2.74	10
Precision irrigation scheduling	2.64	11
Activity Management	2.28	12
News and Articles	2.28	12

4. CONCLUSIONS

Quality of products is considered the most important factor by customers, followed by the friendliness of sales staff and value for money. Customers prioritize product quality and expect a balance between the price they pay and the perceived value of the product. The top issues for farmers are disease, weather, nutrition, insect-pest, and irrigation. Disease, particularly yellow sigatoka, and weather are considered the most critical problems, while irrigation is perceived as the least significant issue among the listed concerns. Weather forecast alerts and following recommended package of practices are considered highly important features in agricultural decision-making. Climate change-related challenges, availability of input markets, and remote farm access are also recognized as significant factors affecting agricultural practices. Addressing these features effectively can lead to improved agricultural outcomes and enhance resilience in the face of challenges.

REFERENCES

- Countries by Banana Production Retrieved on 21 May 2023 from <https://www.atlasbig.com/>
- Economic survey of business standard Retrieved on 21 May 2023 from <https://www.business-standard.com/>
- Hassan, A. (2012). The value proposition concept in marketing: How customers perceive the value delivered by firms-A study of customer perspectives on supermarkets in Southampton in the United Kingdom. *International journal of marketing studies*, 4(3), 68.
- Kotler, P., & Keller, K. L. (2015). *Marketing Management 15th Edition*–Global.

National horticulture Board Banana Retrieved on 21 May 2023
https://nhb.gov.in/report_files/banana/BANANA.htm

Precision farming market size, share & industry growth analysis report by technology Retrieved on 21 May 2023 from <https://www.marketsandmarkets.com/>

Rosário, A., & Raimundo, R. (2021). Importance of value propositions in marketing: Research and challenges. *Academy of Strategic Management Journal*, 20(2), 1-23.

Session on Precision Agriculture Retrieved on 21 May 2023 from <https://www.drishtiiias.com/>

Sheth, J. N. (2019). Customer value propositions: Value co-creation. *Industrial marketing management*, 87, 312-315.

Sheth, J. N. (2019). Customer value propositions: Value co-creation. *Industrial marketing management*, 87, 312-315.

Stoorvogel, J. J., & Orlich, R. A. (2000). An integrated system for precision agriculture in bananas. In *Proceedings of the 5th International Conference on Precision Agriculture*, Bloomington, Minnesota, USA, 16-19 July, 2000 (pp. 1-14)

Vishali Priya, O., & Sudha, R. (2021). Impact of Internet of Things (IoT) in Smart Agriculture. *In Recent Trends in Intensive Computing* (pp. 40-47). IOS Press.

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