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Customer value proposition for precision farming & problem faced by banana farmers in Petlad and Borsad Talukas of Anand district

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Abstract

India holds a prominent position in the global agricultural sector, serving as a vital source of livelihood for a substantial portion of its population. Agriculture contributing around 17 per cent to the country's economy. This research aims to explore the customer value proposition for precision farming and identify problems faced by banana farmers in the Borsad and Petlad Talukas of Anand District. The research adopts a descriptive research design and employs a non-probability sampling method known as purposive sampling. The sample consists of farmers from different categories, including small, medium, and large-scale farmers. A total of 50 farmers from Petlad and Borsad Talukas were selected to conduct the study. The survey was conducted over a span of 90 days, utilizing a semi-structured research instrument. This study focuses on customer value perception (CVP) and key challenges in the agricultural sector. Quality and reliability emerged as crucial factors for customers, supported by attributes such as expertise, fast response, guarantees, and value for money. Weather, disease, nutrition, irrigation, and pests were identified as significant problems, highlighting specific issues like Yellow sigatoka, Nematode, Quantity, and Uneven rainfall. Product demonstration, quality product and reliability on product is influencing factor so focus in that area may result better results.

Keywords: Customer value proposition, precision farming, problems, banana farmers

1. Introduction

India's agriculture sector plays a vital role in the country's economy, employing a significant portion of the population and contributing around 17 per cent to country's GDP. However, it faces numerous challenges including declining productivity, the impact of liberalization, climate change, soil degradation, water scarcity, and low productivity. Additionally, farmers in India struggle with financial difficulties due to low prices for their produce and rising input costs, leading to widespread distress in the farming community (ibef.org).

Precision agriculture (PA) is an innovative approach that utilizes advanced sensor and analysis tools to optimize crop yields and aid in management decisions. This emerging field has gained global recognition as a means to enhance production, reduce labor requirements, improve the efficient utilization of fertilizers and irrigation methods (Mulla, 2013) [7]. Precision agriculture (PA) is a modern and optimized approach to field-level management in agriculture, with the primary objective of improving resource productivity on agricultural fields. It involves the application of advanced techniques and strategies to provide farmers with the ability to optimize inputs such as water and fertilizer, resulting in enhanced productivity, improved crop quality, and increased yields. By leveraging precise data, PA empowers farmers to make informed decisions about the allocation of resources, allowing for more efficient and effective farming practices. (Gebbers and Adamchuk, 2010) [3].

Precision agriculture technologies have seen a surge in popularity in recent years, with GPS-guided tractors, drones, and sensors being widely adopted by farmers across the globe. Market research reports predict that the global precision farming market will reach a value of \$12.9 billion by 2027, growing at a CAGR of 13.2 per cent from 2020 to 2027 (Fortune business insights). Additionally, the market for precision irrigation systems, which includes technologies such as drip irrigation and soil moisture sensors, is expected to expand rapidly, reaching a projected value of \$2.7 billion by 2025, with a CAGR of 13.9 per cent from 2020 to 2025. These projections highlight the growing interest in precision agriculture technologies and their potential to transform the agriculture industry by improving crop yields, reducing waste, and optimizing resource use. (Market and market)

A customer value proposition refers to the collection of benefits that a company offers to its customers in order to fulfill their needs. It serves as a strategic tool that enables organizations to effectively communicate their ability to provide resources and deliver a superior value package to their target customers. By clearly articulating the benefits and value that customers can derive, a well-crafted customer value proposition becomes a powerful tool for driving customer satisfaction, engagement, and business success (Payne *et al.* 2017) [9].

Banana, a member of the Musaceae family, is a significant and long-standing fruit in tropical regions. India holds the top position globally and ranks third in terms of cultivation area among fruit crops. With 13 per cent of the total fruit crop area and 33 per cent of the total fruit production, India's banana industry is substantial. Maharashtra leads in banana production, followed by Tamil Nadu, Karnataka, and Gujarat. In Gujarat, prominent districts for banana production include Surat, Vadodara, Anand, Kheda, Junagadh, Narmada, and Bharuch (nhb.gov.in).

1.1 Review of Literature

Mehazabeen *et al.* (2021) [6] concluded that sample farmers in banana production and marketing face several significant constraints. These include electricity problems, price fluctuations, the absence of cooperative and regulated markets, inadequate infrastructural facilities such as cold storage and godowns, the lack of banana processing industries, insufficient labor availability, and high commission charges. Furthermore, it recommends encouraging investments in banana processing industries and providing relevant training opportunities.

Kirchberger *et al.* (2020) [4] in which they explain about the purpose of a customer value proposition is not to provide an exact measurement of customer value, but rather to offer a technology startup a tangible and evolving comprehension of customer value. Adopting a customer-centric approach is essential for leveraging customer value propositions effectively

Kumari *et al.* (2018) [5] in which they concluded that the perishability of bananas poses a significant constraint in both production and marketing. The price of bananas has been highly volatile, leading to substantial losses for farmers and providing little benefit to consumers. To improve the profitability for actual growers, it is crucial to focus not only on enhancing productivity but also on improving the quality of bananas.

The objective is to develop a customer value proposition specifically tailored for banana farmers, highlighting the unique benefits and value they can expect from engaging with agricultural products or services aimed at their needs and requirements and identify and understand the challenges and issues faced by banana farmers in their agricultural practices, including problems related to cultivation, disease management and market access. This knowledge will help in finding appropriate solutions and support systems to address the specific concerns of banana farmers.

2. Materials and Methods

This study employed a combination of primary and secondary data collected to achieve the specified objectives. Primary data was gathered through interviews with banana farmers

using a semi-structured schedule, while secondary data was collected from various sources. The research adopts a descriptive research design and employs a non-probability sampling method known as purposive sampling. The sample consists of farmers from different scales, including small, medium, and large-scale farmers. A total of 50 farmers from Petlad and Borsad Talukas were selected in the study. The survey was conducted over a span of 90 days, utilizing a semi-structured research instrument. The study includes only Banana crop

2.1 Analytical tools

The Weighted Average Mean was used to study the Customer value proposition.

Statistically, the formula which is used to determine the weighted mean is given below:

$$\text{Weighted Average Mean (X)} = (F_1X_1 + F_2X_2 + F_3X_3 + F_4X_4 + F_5X_5) / X_t$$

Where:

F = Weight given to each response

X = Number of responses

X_t = Total number of responses

The Garrett's ranking technique was used to study the objective of problem faced by banana farmers. Garrett's ranking technique was employed to rank the preferences expressed by the respondents for various factors. In this method, participants were requested to assign ranks to each factor, and the results of the ranking were converted into score values using the following formula:

$$\text{Percent position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij} = Rank given for the *i*th variable by *j*th respondents

N_j = Number of variables ranked by *j*th respondents

The per cent position of each rank was converted to scores by referring to the table given by Garrett and Woodworth (1969) Then for each factor, the scores of individual respondents were summed up and divided by the total number of respondents for whom scores were gathered. The mean score for all factors were ranked following the decision criteria that the higher value, the more important is the order of preference by respondents

3. Results and discussions

3.1 Formulate Customer Value Proposition

The attributes were ranked based on their WAM (Weighted Average Mean) scores. The quality of the products received the first rank with a WAM score of 3.54, indicating its importance to customers. Followed by the reliability of the products, ranked second with a WAM score of 3.4. The expertise of the service staff ranked third, with a score of 3.32, while the fast response of the service staff came in fourth with a score of 3.2. Money back guarantee, friendly salespeople, and satisfaction with the value for money were also considered important attributes, although they received lower ranks compared to the top three attributes.

Table 1: Factors for Customer Value Proposition

| Factors | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|------------------------------------|-------------------|----------------|----------------|----------------|----------------|
| Quality of the products | 1 (2.00%) | 6 (12.00%) | 18 (36.00%) | 15 (30.00%) | 10 (20.00%) |
| Satisfied with the value for money | 4 (8.00%) | 4 (8.00%) | 18 (36.00%) | 18 (36.00%) | 4 (8.00%) |
| Reliability of the products | 9 (18.00%) | 15 (30.00%) | 13 (26.00%) | 13 (26.00%) | 0 (0.00%) |
| Money back guarantee | 4 (8.00%) | 10 (20.00%) | 18 (36.00%) | 16 (32.00%) | 2 (4.00%) |
| Expertise of the service staff. | 6 (12.00%) | 12 (24.00%) | 24 (48.00%) | 8 (16.00%) | 0 (0.00%) |
| Sales people are friendly | 5 (10.00%) | 13 (26.00%) | 14 (28.00%) | 7 (14.00%) | 11 (22.00%) |
| Fast response of the service staff | 2 (4.00%) | 16 (32.00%) | 24 (48.00%) | 6 (12.00%) | 2 (4.00%) |

Table 2: Factors of customer value proposition for banana farmers

| Sr. No | Factors | WAM Score | Ranks |
|--------|------------------------------------|-----------|-------|
| 1 | Quality of the products | 3.54 | 1 |
| 2 | Reliability of the products | 3.4 | 2 |
| 3 | Expertise of the service staff | 3.32 | 3 |
| 4 | Fast response of the service staff | 3.2 | 4 |
| 5 | Money back guarantee | 2.96 | 5 |
| 6 | Sales people are friendly | 2.88 | 6 |
| 7 | Satisfied with the value money | 2.76 | 7 |

garret’s score of 85.96 and 84.02 respectively. Majority gave third rank to Nutrition followed by irrigation and insect pest. The results revealed that Weather-condition and Disease incidents were two major problems, that affects the production of banana in the in the study area. This implies that there is need to focus on weather parameters and weather forecasting to overcome the weather problems. There is also need to focus on incidents of pest and disease and apply appropriate insecticide and pesticide and other remedial measures. Overall, the table provides valuable insights into the severity and ranking of various problems, emphasizing the need to address weather, disease, nutrition, irrigation, and insect pest-related challenges in the evaluated system.

3.2 Problems faced by banana farmer

Majority of the banana farmers gave first rank to “weather” as their major problem followed by ‘Disease’ with an average

Table 3: Problems Faced by Banana Farmers

| Problems | Rank given by Respondents | | | | | Total | Average | Rank |
|-------------|---------------------------|-----------------|-----------------|-----------------|-----------------|-------|---------|------|
| | 1 st | 2 nd | 3 rd | 4 th | 5 th | | | |
| Weather | 1748 | 1290 | 648 | 156 | 456 | 4298 | 85.96 | 1 |
| Disease | 1104 | 1376 | 567 | 546 | 608 | 4201 | 84.02 | 2 |
| Nutrition | 736 | 1118 | 972 | 312 | 988 | 4126 | 82.52 | 3 |
| Irrigation | 1012 | 0 | 972 | 936 | 1140 | 4060 | 81.2 | 4 |
| Insect pest | 184 | 774 | 891 | 1482 | 684 | 4015 | 80.3 | 5 |

3.2.1 Weather Related Problems

Among all the weather related parameters, uneven rainfall was the major problem faced banana farmers with an average Garret’s score of 89.18 in the study area. This implies that uneven rainfall has significant impact on crop production. The second major problem among all weather related problem was temperature fluctuation with an average Garret’s score of

86.18 indicating that temperature fluctuations might have high impact on production of banana crop. Wind was the ranked as third major problem which was faced by farmers in the study area, with an average Garret score of 83.64 on the whole , the result reveals that uneven rainfall and temperature fluctuations were the major weather related factors that affects banana production

Table 4: Weather Related Problems

| Problems | Rank given by Respondents | | | Total | Average | Rank |
|-------------------|---------------------------|-----------------|-----------------|-------|---------|------|
| | 1 st | 2 nd | 3 rd | | | |
| Uneven rainfall | 2668 | 1548 | 243 | 4459 | 89.18 | 1 |
| Temp. fluctuation | 1748 | 860 | 1701 | 4309 | 86.18 | 2 |
| Wind | 184 | 1892 | 2106 | 4182 | 83.64 | 3 |

3.2.2 Disease Related Problems

Among all disease related problem, Yellow sigatoka ranked first with an average Garret’s score of 89.02 indicating the higher incidence of those disease in the study area which ultimately affecting the production of banana crop. Panama

disease was the second major among disease related problem followed by bunchy top and BSV. Occurrence of disease directly affects crop yield so it is need to focus on disease for reducing cost and increase production.

Table 5: Disease Related Problems

| Problems | Rank given by Respondents | | | | Total | Average | Rank |
|-----------------|---------------------------|-----------------|-----------------|-----------------|-------|---------|------|
| | 1 st | 2 nd | 3 rd | 4 th | | | |
| Yellow sigatoka | 2852 | 1032 | 567 | 0 | 4451 | 89.02 | 1 |
| Panama | 1012 | 1376 | 1782 | 78 | 4268 | 84.96 | 2 |
| Bunchy Top | 644 | 1290 | 891 | 1326 | 4151 | 83.02 | 3 |
| BSV | 92 | 602 | 810 | 2496 | 4000 | 80 | 4 |

3.2.3 Nutrition Related Problems

Nutrition is needed for plant growth and certain activities like flowering, fruiting and ripening also depends on amounts of certain nutrients. Quantity issue ranks first among all nutrition related problem with an average Garret's score of 88.98

followed by quality and ripening of small size banana. This implies that due to lack of nutrition quality and quantity of the crop deteriorated and sometimes premature ripening of the crop is also observed.

Table 6: Nutrition Related Problems

| Problems | Rank given by Respondents | | | Total | Average | Rank |
|-------------------------------|---------------------------|-----------------|-----------------|-------|---------|------|
| | 1 st | 2 nd | 3 rd | | | |
| Quantity | 2668 | 1376 | 405 | 4449 | 88.98 | 1 |
| Quality | 1472 | 1978 | 891 | 4341 | 86.82 | 2 |
| Ripening of Small Size Banana | 460 | 1118 | 2592 | 4170 | 83.4 | 3 |

3.2.4 Irrigation Related Problems

Amount of irrigation is the topmost problem among all irrigation related problems with an average Garret's score of 88.36 followed by high pH of water with an average Garret's

score of 86.56 and clogging problem with an average Garret's score of 84.3. This implies that there is proper irrigation facility available in middle Gujarat. Farmers facing problem of sufficient water availability.

Table 7: Irrigation Related Problems

| Problems | Rank given by Respondents | | | Total | Average | Rank |
|----------------------|---------------------------|-----------------|-----------------|-------|---------|------|
| | 1 st | 2 nd | 3 rd | | | |
| Amount of Irrigation | 2116 | 1978 | 324 | 4418 | 88.36 | 1 |
| High pH of Water | 1656 | 1376 | 1296 | 4328 | 86.56 | 2 |
| Clogging Problem | 920 | 946 | 2349 | 4215 | 84.3 | 3 |

3.2.5 Insect Pest Related Problems

There were several insect and pest related problem faced by farmers. All the problem related to insect pest were ranked by farmers in the study area and shown in the below table. Nematode problem ranked first with an average Garret's score 88.04 followed by Thrips problem with an average Garret

score 81.22, Aphid problem with an average Garret's score of 83.42 and Stem weevil Garret's score of 79.44. These implies that Nematode problem was the major problem that might affects farmers in crop production. So, it was suggested that farmers should follow remedial measure for control of insect and pests.

Table 8: Insect Pest Related Problems

| Problems | Rank given by Respondents | | | | Total | Average | Rank |
|-------------|---------------------------|-----------------|-----------------|-----------------|-------|---------|------|
| | 1 st | 2 nd | 3 rd | 4 th | | | |
| Nematode | 2116 | 1806 | 324 | 156 | 4402 | 88.04 | 1 |
| Thrips | 1104 | 1376 | 729 | 1014 | 4223 | 81.22 | 2 |
| Aphids | 1012 | 516 | 1863 | 780 | 4171 | 83.42 | 3 |
| Stem weevil | 368 | 774 | 891 | 2028 | 4061 | 79.44 | 4 |

4. Conclusions

In the study, several attributes and problems were ranked based on their respective scores. The attributes were ranked according to their WAM scores, with Quality of the products receiving the highest rank, followed by Reliability of the products and Expertise of the service staff. The top two problems identified were Weather and Disease, which had the highest positions in terms of their Garret scores and mean scores. Other problems include nutrition, irrigation, and pest management related problems. These rankings highlight the importance of addressing issues such as uneven rainfall, temperature fluctuation, yellow sigatoka disease, quantity of nutrition, amount of irrigation, and nematode pests. By understanding the significance of these factors, appropriate measures should be taken to improve the overall system and

meet the needs and expectations of farmers.

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