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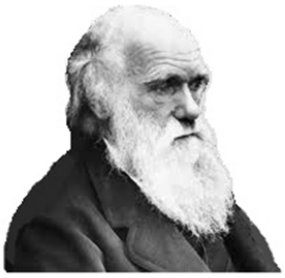

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SWOT Analysis of Honey Producers and Marketers in Cross River State, Nigeria

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ABSTRACT

Nigeria's agricultural and commercial sectors rely heavily on honey production. Despite its significance, the expansion and efficiency of the honey sector are hampered by obstacles faced by producers and marketers. Hence, the purpose of this study is to examine the strengths, weaknesses, opportunities, and threats faced by honey producers and marketers in Nigeria's Cross River State. The Electronic Kobo Toolbox Mobile application was used to sample 301 respondents using systematic and purposive sampling procedures. A semi-structured questionnaire was used for interviews with hunters and beekeepers. To confirm and improve the information, three focus groups and ten key informant interviews were held. Using descriptive statistics, the data was examined. Results showed that 90.8% of respondents recorded a decline in honey availability due to seasonality in honey production, honey adulteration, inadequate processing tools, lack of start-up capital and inefficient beekeeping practices. Rising costs, challenges to livelihoods, and possible biodiversity loss as a result of dwindling bee numbers are some of the economic and environmental effects of decreased honey availability. Production trends show that favourable colonization conditions and better yields during the harvest season contributed to increased production for 28.9% and 27.3% of respondents respectively. However, 34.9% identified lower colonization rates as the key factor driving production declines. SWOT analysis of honey production and marketing reveals strengths in indigenous knowledge, access to high-grade natural resources, and the good reputation of honey products. Weaknesses include financial limitations, poor processing technologies, and fragmented market structures. Opportunities include capacity-build initiatives, favourable government policies, and the large supply gap in the honey market, while threats such as limited governmental support, honey adulteration, and agrochemical impact on bee populations

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pose significant risks to the industry. There is a need for Government intervention to support sustainable honey production practices.

***Keywords*:** Bee, Honey, Marketing, Production, Sustainability

1. INTRODUCTION

Honey is a viscous and adhesive substance consisting mainly of carbohydrates, predominantly glucose and fructose, with small quantities of vitamins, enzymes, amino acids, and phenolic antioxidants. It is the most used bee product, made from flower nectar. It contains about 0.2% ash, 0.1–0.4% protein, and 15–17% water (James *et al.*, 2013). Bees play a significant role in agriculture and ecosystems by producing honey and pollinating a wide variety of flowering plants, including crops essential for human food production (Ugbe and Japheth, 2023a).

Honey production is a major agroforestry practice,that is widely carried out across many countries (Adekola et al., 2020). Hence, promoting honey and other forest products is crucial for sustainable forest management as it ensures a balance between society's increasing demand for forest products and the preservation of forest diversity and health.

Beekeeping requires a relatively low initial investment and can yield high returns, making it accessible to small-scale farmers and marginalized groups (Prodanovic *et al.*, 2024). This diversification reduces dependency on single crops or seasonal fluctuations, enhancing economic resilience and stability in rural areas. Also, honey production boosts local and international trade, contributing to economic growth and foreign exchange earnings for countries with robust honey export markets (García, 2018). Beekeepers and their communities can benefit economically by exporting quality honey and bee products, which often attract high prices in international markets.

Beekeeping promotes communal cohesion by promoting teamwork among beekeepers (Prodanovic *et al.*, 2024). Communities' social capital is increased through local beekeeping groups and cooperatives, which offer forums for information exchange, skill development, and group marketing (Prodanovic et al., 2024). Honey production is deeply rooted in cultural practices and traditions in many societies worldwide (Bahta, 2018). It holds cultural significance as a natural sweetener, food source, and traditional medicine, preserving local knowledge and heritage related to beekeeping practices (Nayik *et al.*, 2014). Honey production is generally considered environmentally friendly due to minimal waste generation and low energy consumption in processing (Sillman *et al.*, 2021).

Hence, natural beekeeping methods promote ecological balance and reduce the use of synthetic chemicals, contributing to environmental sustainability (Ugbe and Japheth, 2023a; Prodanovic *et al.*, 2024).

The roles of bee honey to human health, ecosystems and the economy cannot be underrated. Many studies (Nayik *et al.*, 2014; Sillman *et al.*, 2021; Prodanovic *et al.*, 2024) have been carried out on honey production, marketing and consumption in different regions, however, there are lack of studies on the analysis of the challenges of honey production and marketing.

Thus, this study aims to analyze the strengths, weaknesses, opportunities and threats of honey production and marketing in Cross Rivers State, Nigeria.

2. MATERIALS AND METHODS

2. 1. Description of the Study Area

Data was collected in Cross River State, which is in the tropical rainforest region of Nigeria, for this study. The state occupies an area of about 21,265 square kilometers and is located between latitudes 4°30'0"N and 7°0'0"N and longitudes 8°30'0"E and 9°30'0"E (Figure 1). With annual precipitation ranging from 1800 mm to 4000 mm and temperatures between 10 °C to 32 °C, it experiences a lot of rainfall throughout the rainy season (April to November). Half of Nigeria's remaining tropical high forests, including those found in Forest Reserves, Community Forests, and Cross River National Park, are found there. The forests span approximately 8,968 square kilometers and are categorized into three ecological zones: Tropical High Forest, swamp forest, and Savannah Forest.

2. 2. Sampling Method

Systematic and purposive sampling techniques were used to choose participants from the three ecological zones- Northern, Central, and Southern Ecological zones. Ten LGA were selected based on the existence of organized and unorganized honeybee farmers, bee hunters, sellers, and buyers. The Taro Yamane formula was used to determine the sample size, resulting in 301 respondents chosen for the study. This included 242 bee farmers and 59 honeybee hunters. Snowball technique was used to select honeybee hunters and keepers.

2. 3. Data Collection and Analysis

Semi-structured questionnaires were administered to 301 respondents through the Electronic Kobo Toolbox Mobile application (version 3.0, 2022), increasing objectivity and efficiency. Ten (10) Key Informant Interviews (KII) and 3 Focus Group Discussions (FGD) were carried out to verify and enhance the information. Sample points were recorded, and locations were verified using the Global Position System (GPS). Expert consultation, revision, and GPS validation were used to ensure the instrument's validity and reliability. Data was analyzed using descriptive statistics.

3. RESULTS

3. 1. Status of Honey availability in the Study Area

The status of honey availability in the study area is shown in Figure 1. It was recorded that 1.7% of respondents consistently have honey, 7.5% experienced increase in the amount of honey available, while 90.8% reported a decrease in honey availability.

Figure 2 shows the factors contributing to changes in honey production as reported by bee producers in the study area. About 29% of respondents attributed increased honey production to favourable colonization conditions, while 27.3% reported higher yields during the harvest season. A lower number of respondents (3.9%), attributed the increase to expanding hive numbers. Also, 2.1% reported improved production resulting from enhanced management practices. Only 1.4% reported stable production despite unchanged product prices. In contrast, a substantial 34.9% indicated decreased production due to lower colonization rates, likely influenced by habitat loss or environmental stressors. Furthermore, 1.6% reported production

declines linked to wildfire incidents, underscoring the vulnerability of beekeeping operations to external factors.

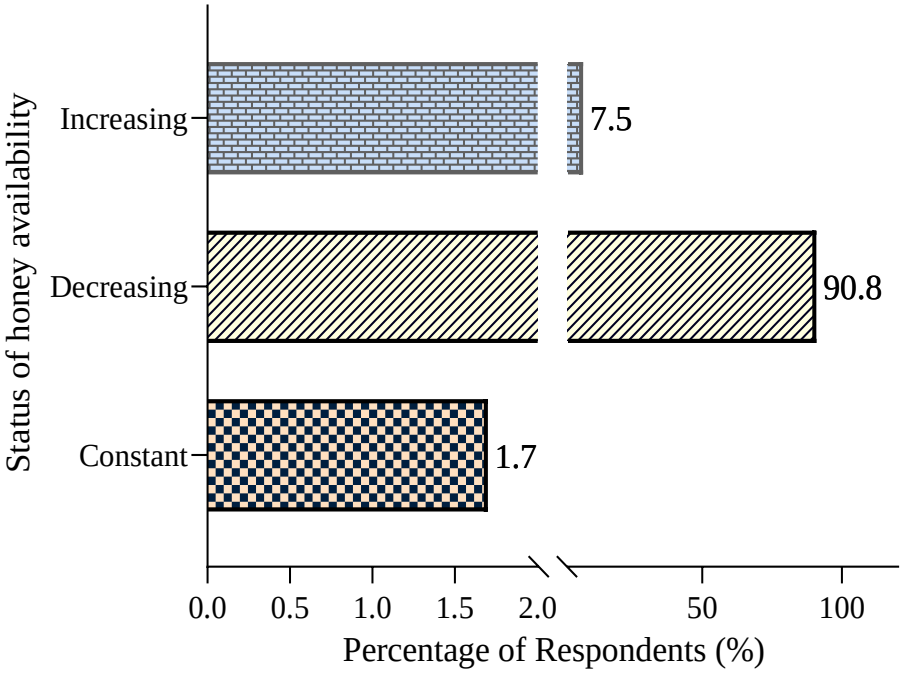

Figure 1. Status of Honey availability in the Study Area

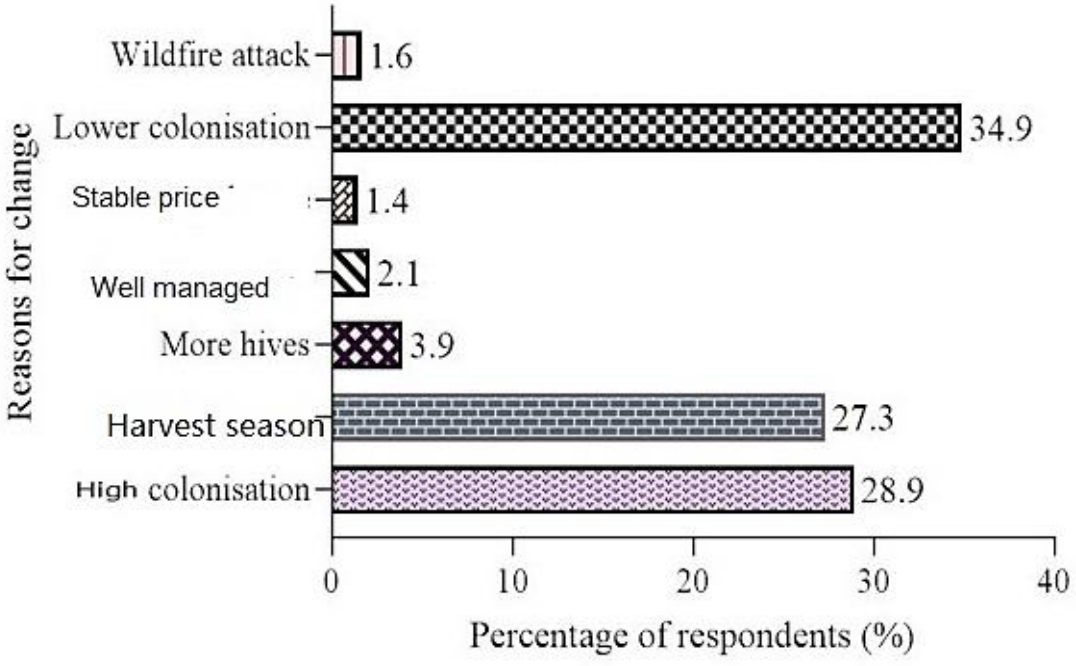

Figure 2. Drivers of Honey Production Change in 5 Years by Bee Producers in the Area

3. 1. 1. Challenges in Honey Marketing in the Study Area

The challenges encountered in honey production and marketing within the study area are diverse and encompass various aspects of the marketing process (Figure 3). Lack or inadequacy of processing tools (A) stands out as a major challenge, accounting for 10.7% of the reported issues. This highlights the difficulties faced due to insufficient access to tools necessary for processing honey effectively. Moreover, the absence of specific policies on honey production (B) and the lack of honey quality testing equipment (C) were also notable concerns, representing 3.1% and 7.5% of the challenges, respectively. Another critical challenge was the lack of or inadequate starting capital (E), which contributed to 10.0% of the reported problems. Figure 3 shows the challenges often encountered in honey production and marketing in the study area. Among all the challenges illustrated in Figure 3, seasonality in honey production/supply ranked the most prominent challenge (15%) in the study area, followed by honey adulteration (13.7%), inadequate processing tools (10.7%), and lack of start-up capital (10%); while lack of packaging (1.5%), lack of standard honey processing equipment (2.4%) and lack of specific policies on honey production (3.1%) were the least encountered challenges .

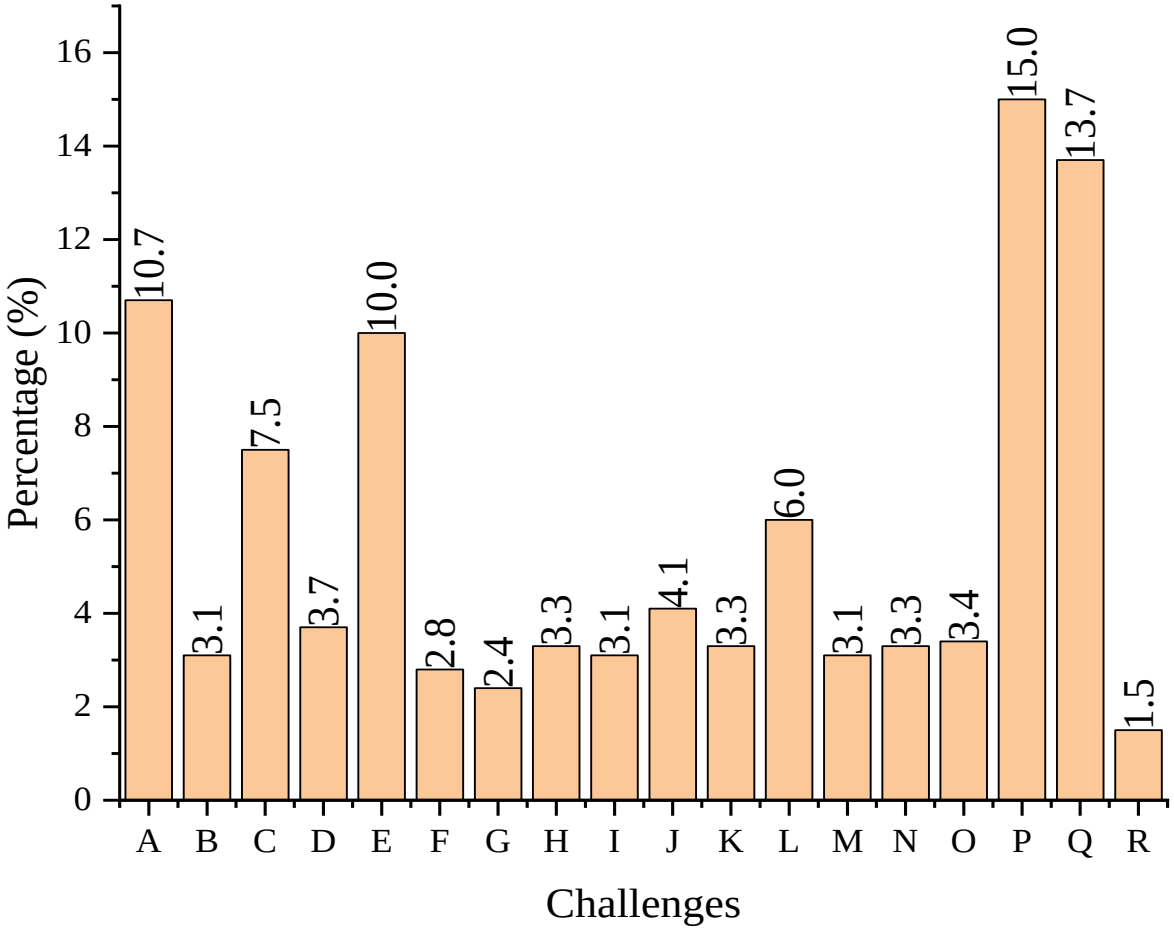

Figure 3. Challenges in Honey Marketing in the Study Area.
Note: Lack/inadequate processing tools (A), Lack of specific policy(ies) on honey production (B), Lack of honey quality testing equipment (C), Lack of honey certification (D),

Lack/inadequate starting capital (E), Poor price of honey and other bee products (F), Lack of standard honey processing equipment (G), Insufficient supply to meet high demand (H), Low demand (I), High market fees (levies and taxes) (J), Inadequate supply of honey (K), High transport cost (L), Variable purchase price (M), Market entry restriction (N), Poor storage facilities (O), Seasonality of honey production/supply (P), Honey adulteration (Q), Lack of packaging tools (R).

The challenges that are faced in honey production and in the research area are shown in Figure 4, which also shows the percentage distribution for each problem category. The most prevalent problem among those found is insufficient funding, which makes up 42.7% of the total. The difficulties in obtaining adequate funding for different production and marketing endeavors, including investment and operating expenses, are mirrored in this difficulty. This was followed by a lack of equipment, constituting 12.9% of the reported problems, indicating difficulties arising from insufficient access to necessary tools and machinery crucial for honey marketing processes.

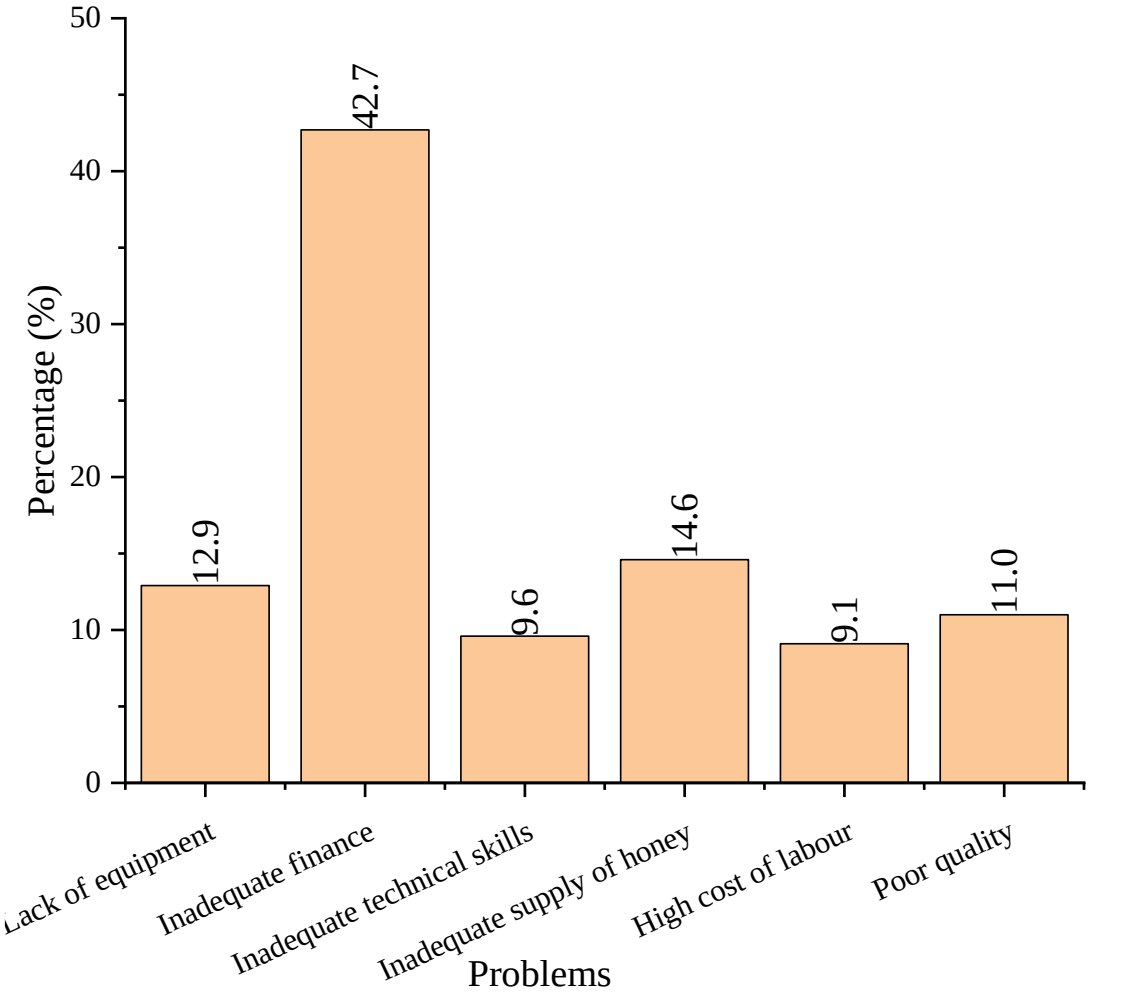

Figure 4. Challenges Facing Honey Production in the Study Area

Inadequate honey supply was another common problem, accounting for 14.6% of the total, indicating the difficulties resulting from variations in honey availability for selling. The table also lists other key problems such as low technical proficiency (9.6%), expensive labour costs (9.1%), and concerns about honey's poor quality (11.0%). These results indicate the complex nature of the problems encountered by honey marketers in the study area and the necessity of resolving them in order to improve the effectiveness and sustainability of honey marketing initiatives.

3. 2. Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis of Honey Production and Marketing

3. 2. 1. Strength of honey production and marketing in the Study Area

Various strengths support the success of honey production and marketing, as shown in this study (Figure 5). Indigenous knowledge, cited by 38.0% of respondents, stands out as a key advantage, offering valuable traditional practices. Access to distribution networks (13.5%) and a good reputation for honey products (17.3%) also contribute significantly, with a positive reputation enhancing consumer trust and brand loyalty. High-quality natural honey resources, noted by 18.1%, further strengthen product quality. Marketing contaminant-free honey due to floral diversity (5.8%) and cost savings from proprietary know-how (4.4%) were also recognized as valuable strengths.

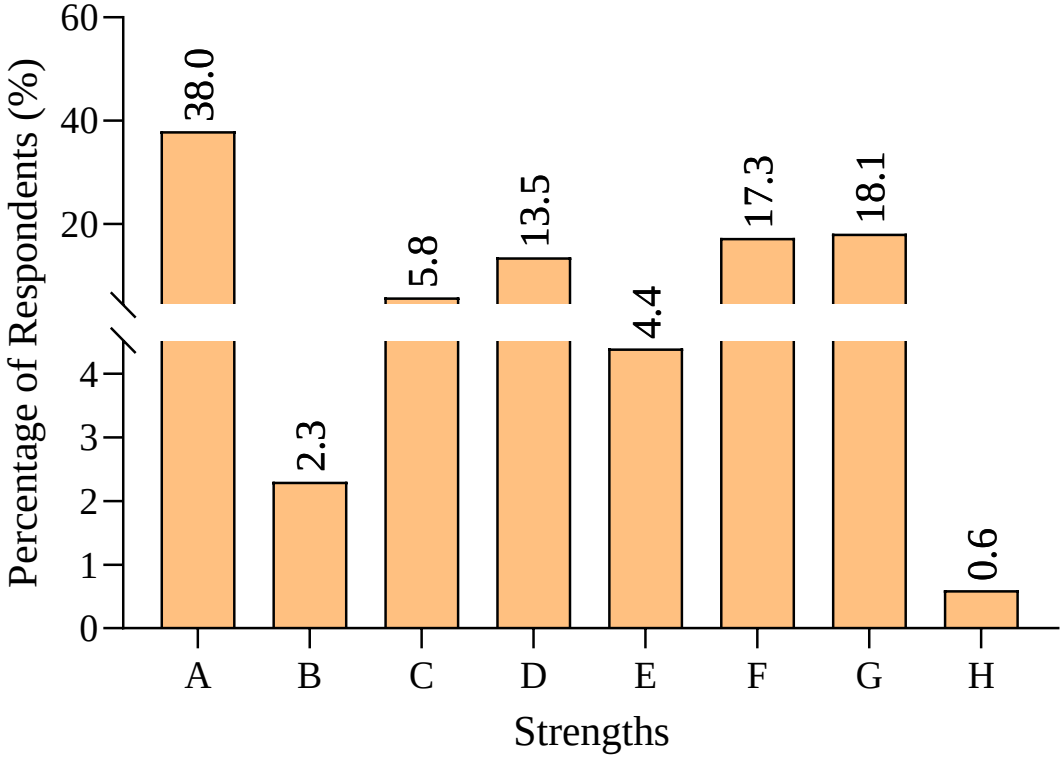

Figure 5. Strength in Honey Productions and Marketing in the Study Area
Where: A = Indigenous knowledge, B= Marketing of hive products (bee wax, pollen, royal jelly), C = Marketing of contaminant-free honey due to floral diversity in production location,

D = Access to distribution networks, E = Cost savings from proprietary know-how, F = Good reputation of honey products, G = Access to high-grade natural honey resources, H = Others.

3. 2. 2. Weaknesses of honey production and marketing in the study area

The weaknesses in honey production and marketing in the study area are shown in Figure 6. Eight (8) weaknesses were identified by the respondents, with limited availability of financial resources (32.3%) being the major weakness. This is followed by poor processing technologies (20.8%) and lack of honey testing equipment (19.7%). The absence of alternate species to aggressive and absconding bees accounted for 6.2%, highlighting issues related to managing bee colonies. Small-scale, fragmented beekeeping markets posed a weakness, representing 6.7%. The lack of access to key distribution channels (4.3%) and limited access to high-grade natural honey resources (7.3%) were also noted. The low quality of hive products was the least significant weakness, recorded at 2.7%.

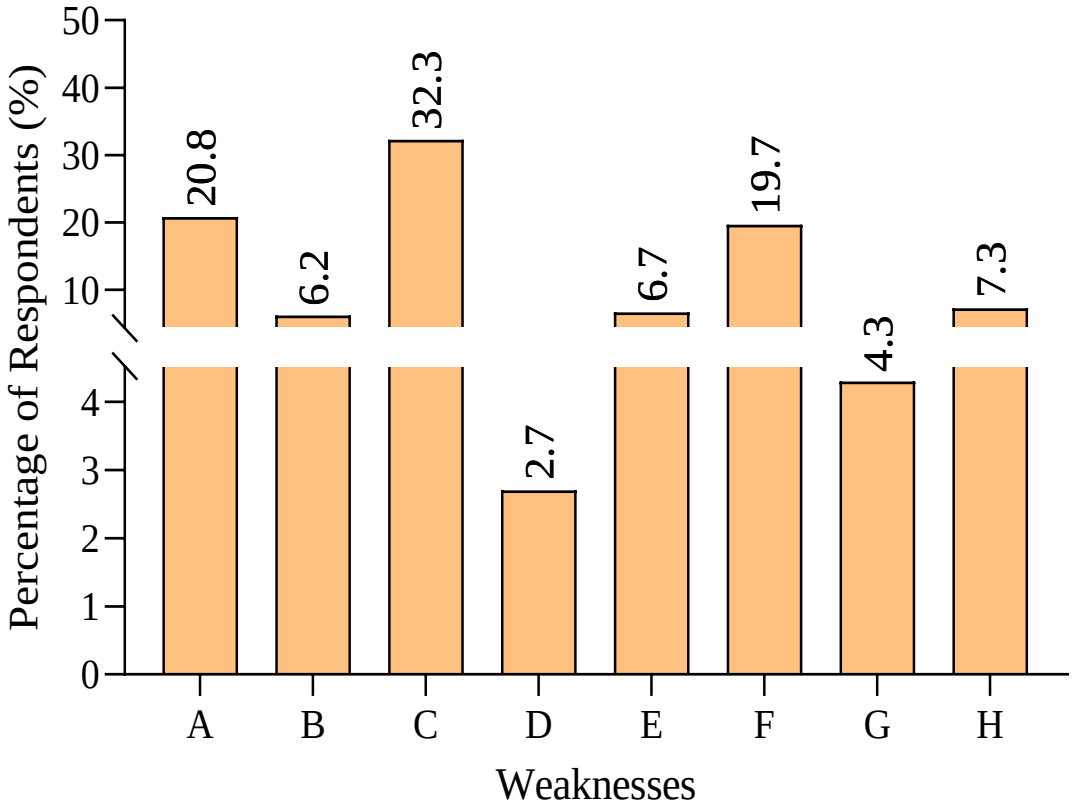

Figure 6. Weaknesses in Honey Production and Marketing in the Study Area
Where: A = Poor appropriate processing technologies, B = non-availability of alternate species to aggressive and absconding bees, C = Limited availability of financial resources, D = Low quality of hive products, E = Participation of small-scale fragmented beekeeping /market, F = Lack of honey testing equipment to ascertain honey quality, G = limited access to key distribution channels, H = limited access to high-grade natural honey resources.

3. 2. 3. Opportunities for honey production and marketing in the study area

Opportunities for the growth and development of the honey industry are presented in Figure 7. Capacity-building training, identified by 27.5% of respondents, stands out as a major opportunity, indicating the need for education and skill enhancement to boost productivity and innovation in beekeeping and honey marketing. The honey supply gap, reported by 7.9% of respondents, presents a market opportunity for increasing production to meet demand.

Supportive government policies on beekeeping and entrepreneurship, highlighted by 10.1%, offer a favourable environment for growth, while social resources provided by the government (19.4%) and NGOs (2.9%) further aid industry development through funding, infrastructure, and market linkages.

Initiatives such as the UN-REDD pilot project and UNDP renewable fuel wood project, along with the ban on honey importation, create opportunities (8.3%) for sustainable beekeeping and local market expansion. Finally, the perception of premium-quality honey in the study area, accounting for 9.1%, offers honey marketers the chance to build a strong local brand and differentiate their products.

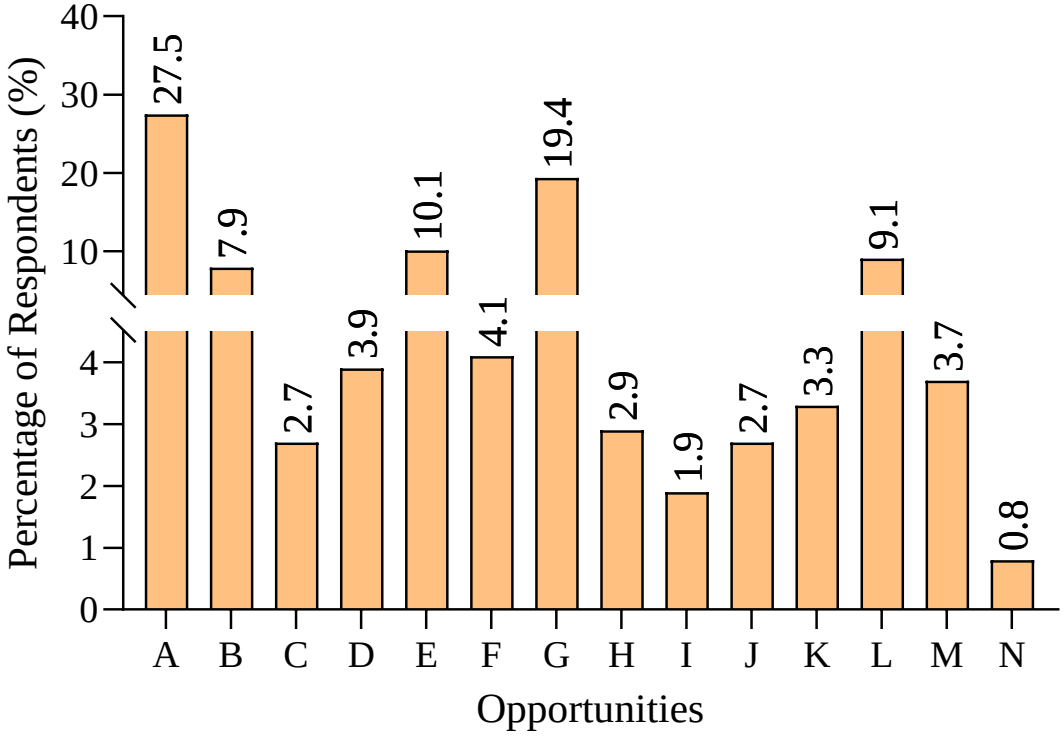

Figure 7. Opportunities in Honey Production and Marketing in the Study Area

Key: A = skills improvement through capacity building training, B = Large supply gap for honey, C = Large supply gap for other hive products, D = Dense flora distribution that supports the production of high-quality honey, E = Favourable government policy on beekeeping development and entrepreneurship, F = Specific sector appointment by the government for beekeeping development and entrepreneurship, G = Provision of social resources by government, H = Provision of social resources by non-governmental organizations like WCS, CUSO, I = Implementation of UN-REDD pilot project in Cross River State, J = Implementation of UNDP renewable fuel wood project in Cross River State, K = Ban on importation of honey

to promote local production and marketing, L = Consumers' perception that honey produced in Cross River State is premium quality, M = Easing of transnational honey trade restrictions to promote export of honey, N = Others.

3. 2. 4. Threats of honey production and marketing in the study area

Figure 8 shows various threats and challenges in honey production and marketing initiatives in the study area. These include obstacles such as limited knowledge among agricultural development program agents regarding beekeeping (7.2%), inadequate governmental support (11.9%), risk of honey product adulteration (12.1%), and lockdown restrictions during the COVID-19 pandemic (14.2%). The absence of government incentives for honey production (17.4%) is also a significant challenge. Other threats include the lack of patent protection, policies on beekeeping, the destruction of beehives by herders, and the negative impact of agrochemicals on bee populations. There is also a concern about the smuggling of uncertified honey products and the overlapping responsibilities of government agencies. These challenges could hinder the growth and sustainability of the honey marketing sector, affecting product quality, market demand, and revenue generation.

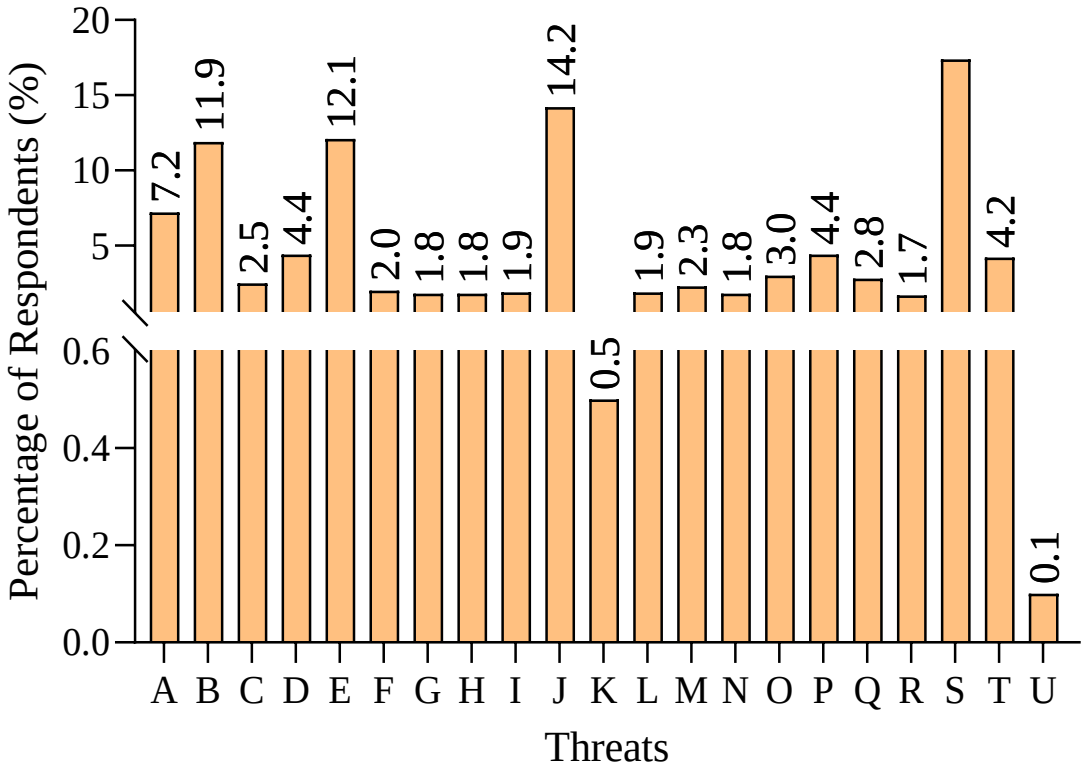

Figure 8. Threats in Honey Production and Marketing in the Study Area.
Key: A = Limited knowledge of agents of agricultural development program on beekeeping development and entrepreneurship, B = Limited support by government, C = Lack of patent protection, D = Lack of explicit policy on beekeeping in Cross River State, E = Adulteration of honey products along value chain before final consumption, F = Non-existence of honey certification agency, G = Poor reputation of honey producers, H = Low price of sugar an

alternative sweetener to honey, I = Decreasing preference for honey as a sweetener because of its taste and smell, J = Lockdown restrictions in a pandemic outbreak limiting the distribution of honey and other hive products, K = Destruction of bee hives by herders, L = Adverse effect of agrochemical use in commercial farms on bee population, M = Adverse effect of chemical use in honey harvesting, N = Wildfires, O = Smuggling of uncertified honey products, P = Lack of quality testing facilities or technologies, Q = Appointment of focal adviser with no relevant background on beekeeping development, R = Non enforcement of relevant policies on beekeeping development, S = Zero incentives by government to promote honey production, T = Duplication of duties by government agencies that hinders policy implementation, U = Others.

3. 2. 5. Recommended Actions to Promote Honey Consumptions in the Study Area

Figure 9 shows the recommended methods for increasing honey intake in the study area according to the opinions of the participants. The highest concern was quality control, with 50.8% of participants supporting efforts to guarantee the quality of honey goods. This emphasizes the importance of implementing rigorous criteria in the manufacturing and delivery processes to establish credibility with customers.

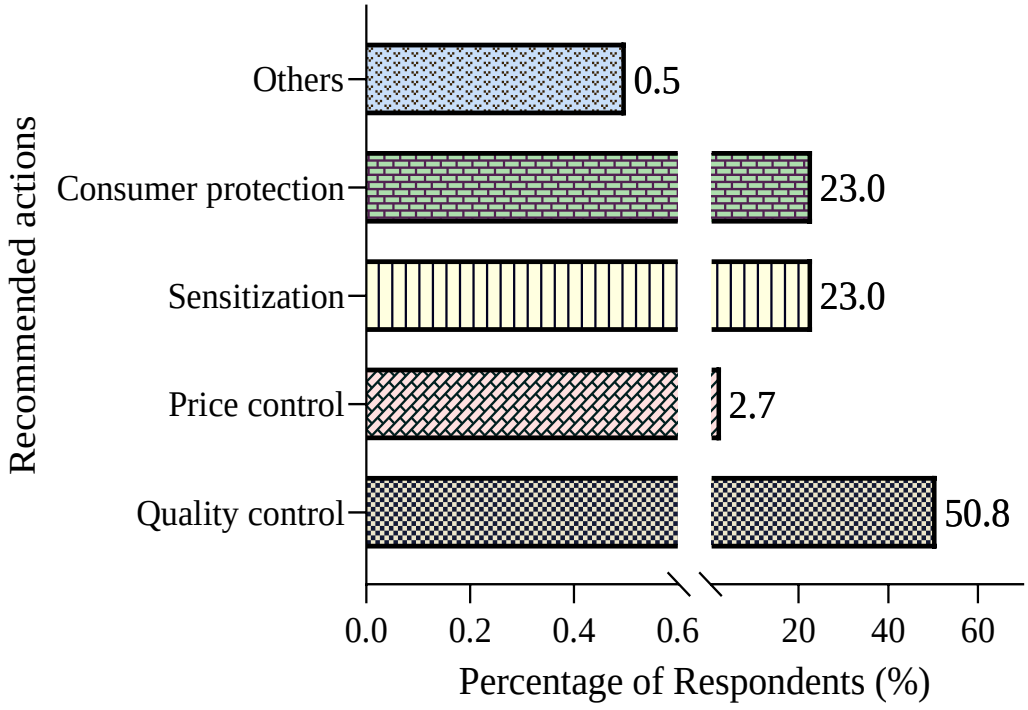

Figure 9. Recommended Actions to Promote Honey Consumptions in the Study Area

Moreover, 23.0% of participants recommended public awareness campaigns as essential, underscoring the significance of informing the public about nutritional benefits and environmental importance of honey. An equal fraction (23.0%) suggested measures for

protecting consumers, highlighting the importance of rules to deter fraud and guarantee honest pricing and clear labelling. These approaches play a crucial role in boosting honey consumption and securing market expansion in the studied region.

4. DISCUSSION

4. 1. Challenges of Honey Production and Marketing Cross River State

The lack of processing tools, absence of specific policies on honey production, lack of honey quality testing equipment, inadequate starting capital, seasonality of honey production/supply, high transport costs, honey adulteration, and insufficient supply to meet high demand are among the challenges encountered by the honey producers and marketers in the area. This result aligns with the report of Gebrehiwot (2015). The lack of processing tools and inadequate starting capital are significant challenges, and portray the difficulties faced by honey producers and marketers in accessing the necessary resources to initiate or sustain their operations (Mukaila *et al.,* 2023). The absence of specific policies on honey production and the lack of honey quality testing equipment also pose concerns, emphasizing the importance of regulatory frameworks and quality control measures in ensuring the integrity and standards of honey products. Seasonality of honey production/supply is another critical challenge, which emphasizes the impact of fluctuating production levels on the consistency of honey availability in the market. High transport costs, honey adulteration, and insufficient supply to meet high demand are also significant challenges. These were in line with the factors reported by Damto (2021) in a similar study.

4. 2. Strengths, Weakness, Opportunities and Threats (SWOT) Analysis of Honey Production and Marketing

Indigenous knowledge emerges as a predominant strength, emphasizing the importance of traditional knowledge and practices in honey production and marketing as revealed by this finding. Access to distribution networks and a good reputation for honey products are also crucial strengths, facilitating market access and reach, and enhancing consumer trust and brand loyalty. The study also reveals the importance of access to high-grade natural honey resources, marketing contaminant-free honey, and cost savings from proprietary know-how as notable strengths. This result is consistent with previous studies that emphasize the role of traditional knowledge, market access, and product quality in the success of agricultural marketing initiatives.

Several weaknesses pose challenges to the effectiveness and efficiency of honey production and marketing efforts in the study area. The lack of appropriate processing technologies and limited availability of financial resources emerge as significant weaknesses, hindering the quality, efficiency, and scalability of production processes and impeding investment in essential business operations. The non-availability of alternate species to aggressive and absconding bees, low quality of hive products, and participation of small-scale fragmented beekeeping markets also pose challenges to honey production and marketing activities. Furthermore, the lack of honey testing equipment, non-access to key distribution channels, and limited access to high-grade natural honey resources underscore the importance of quality control measures, market access, and sourcing high-quality resources in ensuring the competitiveness and sustainability of honey production and marketing.

This result aligns with previous studies that emphasize the role of technology, finance, and market access in the success of agricultural marketing initiatives.

Several opportunities for growth, innovation, and development in the honey industry were identified from this study. Capacity-building training and skills improvement emerge as significant opportunities, revealing the need for educational and training initiatives to enhance the competencies of industry participants. The supply gap in the market for honey products presents a viable opportunity for honey marketers to increase production levels, reach a wider audience, and satisfy consumer demand. Favourable government policies and the provision of social resources by government and non-governmental organizations also present opportunities for honey marketers, including funding, infrastructure, technical assistance, and market linkages. The implementation of various projects, such as the UN-REDD pilot project and UNDP renewable fuel wood project, also creates favourable conditions for honey marketing activities. Furthermore, the perception of premium quality honey produced in the study area presents an opportunity for honey marketers to leverage the local brand reputation and differentiate their products in the market.

A limited understanding of agricultural development program agents regarding beekeeping development and entrepreneurship emerges as a significant threat, implying a knowledge gap among key stakeholders. Inadequate governmental support, the risk of honey product adulteration, and lockdown restrictions imposed during the COVID-19 pandemic outbreak also pose substantial threats to the industry's growth and sustainability. The absence of government incentives to promote honey production and the lack of supportive policies and subsidies further hinder the sector's expansion and competitiveness. Other notable threats include the absence of patent protection, lack of explicit policy on beekeeping, destruction of beehives, adverse effects of agrochemical use, smuggling of uncertified honey products, and duplication of duties by government agencies.

This significant decline in honey availability raises concerns about the state of the honey industry and its broader implications. Various factors contribute to this decline, including environmental pressures such as climate change, habitat loss, and extreme weather events, which impact bee foraging areas and honey production. The prevalence of pests and diseases within bee colonies, coupled with challenges in beekeeping practices, further exacerbates the issue.

The implications of decreasing honey availability extend beyond the economic sphere, this includes environmental, social, and cultural dimensions. Economically, reduced honey availability may lead to increased prices for honey products, affecting consumers and businesses alike, while also jeopardizing the livelihoods of beekeepers and the economies of regions reliant on honey production. Moreover, the environmental consequences of declining honey availability are profound, as bees play a key role in pollinating plants and maintaining ecosystem health. A decline in honey availability could signal broader environmental degradation and biodiversity loss, with implications for global food security and ecosystem resilience.

5. CONCLUSION

The main cause of changes in honey consumption levels was inadequate supply, followed by increased costs. The decline in honey availability is attributed to environmental pressures,

pests, and diseases affecting bee colonies, and challenges in beekeeping practices. This decline has economic, environmental, social, and cultural implications, including increased prices, livelihood threats, and ecosystem degradation. Challenges facing honey producers and marketers include inadequate finance, lack of equipment, and inadequate supply of honey. Opportunities for growth and innovation include capacity-building training, a supply gap in the market, and favourable government policies. Thus, it is recommended that training and capacity-building programs for honey producers and marketers should be provided to improve their technical skills and adopt modern beekeeping practices. Also, increases access to finance and equipment for honey producers and marketers, particularly for women and small-scale producers. Furthermore, there is a need to implement measures to address environmental pressures, pests, and diseases affecting bee colonies, such as integrated pest management and habitat conservation.

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