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Determinants of Profitability for Bee Product Producers, Traders and Processors in Ikungi and Kigamboni Districts, Tanzania

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This study investigates the profitability and market dynamics of bee product production, trading, and processing in Ikungi and Kigamboni Districts, Tanzania. Through a comprehensive analysis, we assess the profitability of the bee product value chain, examine market share distribution, and identify key factors influencing production and supply. Data were collected from 72 participants including beekeeping producers, processors, and traders, utilizing questionnaires and checklists. Descriptive analysis using SPSS software was employed to interpret the data. Our findings reveal a disparity in benefits within the value chain, with retailers emerging as primary beneficiaries due to higher selling prices and lower production costs. Consequently, targeted interventions are recommended to improve the working environment of actors, including the provision of better production equipment to enhance efficiency and product quality. Addressing challenges faced by these actors is crucial for overall value chain improvement. Moreover, factors directly impacting production and supply should be managed closely to ensure continued positive effects on the value chain's performance.

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INTRODUCTION

Measuring the profitability of a company or a sector gives an opportunity for a particular company or sector to know how much benefits they are making out of their business, and if it is worthy to conduct it or not. On a global scale, profitability analysis is a very important step to be conducted every now and then in any company or sector, it can be measured by using tools such as gross margin and market margin analyses. According to Songo (2015), who conducted a profitability analysis on the honey value chain in Bukombe district in Shinyanga, the aim of profitability analysis is to determine the profit margin of different value chain agents and also the value added at each stage of the chain. Profitability analysis can also be termed enterprise resource planning (ERP) which helps administrators foresee and forecast the profitability of an existing project or proposal. Profitability analysis can also be used to anticipate sales and profit potentials specific to aspects of the market, it can also help administrators to identify the most and least profitable services and products, and discover which sources of information offer the most reliable facts.

Uddin *et al.*, (2022) in the study conducted in Bangladesh on value chain analysis of honey on production practices and livelihood perspective stated that, in order to determine the profits of the beekeeping sector in Bangladesh, it is necessary to conduct a profitability analysis. In some other cases, profitability analysis can also be used to measure whether materials used for beekeeping such as bee hives are profitable or not. A study done in Zanzibar on profitability analysis gave results which indicated that the use of Lang troth hives which are

modern is more profitable than the use of traditional or log hives and top bar hives (Juma et al., 2022).

Profitability analysis is crucial in any undertaking since it shows clearly if that business is worth conducting or not. It also shows what is the weakest and what is the strongest areas of the business that bring more profit. As stated in different studies, profitability is not only used for measuring the profit and losses made by a certain endeavour but also as a tool and or technology used for producing different products and services. Gross margin is a tool which is known to calculate profitability, but in other studies Profitability indices (Pi) are also used and the ratios obtained give answers to whether the business is profitable or not. From a study done in Miombo woodlands in Katavi and Tabora regions on comparative economic analysis of beekeeping using traditional and improved beehives, the profitability indices gave results that profitability for those using traditional beehives outweighs the profitability for those using improved beehives (Kuboja et al., 2016). Some actors in different value chains fail to conduct profitability analysis so as to understand their business better in terms of the profit and losses they incur. That being said, there is little knowledge of profitability analysis despite several studies being done, and this affects the actors in a way that they fail to conduct their business in a more profitable manner. This study had several objectives which were (i) to analyze the profitability of the value chain, (ii) to conduct a market share analysis of the value chain, and (iii) to evaluate the factors influencing the production and supply of honey to the market.

MATERIALS AND METHODS

Study Area

This study was conducted in the Singida region specifically Ikungi District which lies at (05° 08'S 34° 46'E) and Kigamboni, Kibada in Dar es Salaam region which lies at (6° 38'39''S 39° 10'29''E). Ikungi District has a coverage of 8,860 km², with a human population of about 272,959 from the 2012 census, and the Kibada area has coverage of 16.47 km². The study focused on groups of individuals that conducted beekeeping as one of their economic activities and these involved beekeeper's households, traders and processors. In Ikungi district, economic activities that are conducted by communities include farming, livestock keeping, mining, and local processing industries. Beekeeping is a rapidly growing economic activity with a high potential to raise the income of the people of Ikungi district, and in Kibada, communities conduct small businesses and fishing as their economic activities.

Study Design and Data Collection

A cross-sectional design was used to collect data. Purposive and simple random sampling were done targeting key informants such as Tanzania Forest Agency Services (TFS); District Forest Officers (DFOs); and District Beekeeping Officer, also total of 72 participants were interviewed randomly in the study where 43 were in groups, 10 individual beekeepers, 4 processors and 15 traders from 13 villages namely, Ikungi, Puma, Isuna, Makiungu, Muungano, Kibwi, Ighuka, Ihanja, Mkiwa, Sepuka, Mtunduru, Minyughe and Kituntu. The groups mentioned above are the only actors involved in the Ikungi and Dar es Salaam supply chain and they were chosen from a list that was provided to the researcher by the District beekeeping Officer of Ikungi District. These 72 participants were randomly selected due to; The nature of the study is based on exploring the relationship between different variables; and the analysis method does not require complex analyses which might require a larger number of participants, and also considering

time, budget and resources provided at the time of data collection. Primary data were collected using structured interviews and focused group discussions with key informants. The secondary data were collected from past beekeeping records and other related literature.

Data Analysis

The market margin and gross margin analysis techniques were used for the analysis of quantitative data obtained from the field to determine the profitability and market share of the honey and beeswax value chain. Market margin can be obtained by subtracting the average selling price and average buying price, and gross margin is the difference between total revenue and total variable cost, where total revenue is obtained from variables such as honey and beeswax and total variable cost is obtained from variables such as input management, harvesting, labour and transport. The aim of this analysis was to determine the profit margin of the different actors in the value chain and also determine the value added at each stage of the chain. Also, multiple linear regression modelling was used to determine factors influencing the production and supply of honey and beeswax in the study area.

Ethical Consideration

Ethical approval (by official confirmation notice) for this study was obtained from the Directorate of Postgraduate Studies, research, technology transfer and consultancy of the Sokoine University of Agriculture (SUA). Participants were first informed about the purpose and procedures and provided written consent prior to study procedures. Data were collected in a strict confidential atmosphere between the interviewer and the participant.

RESULTS

Gross Margin***Gross Margin of Beekeeping Producers***

The results in Table 1 show that the producers in Ikungi district have relatively lower gross margins than retailers. The gross margin of producers is TZS

10,500, where the main variable costs for this particular gross profit margin were inputs management, labour, harvesting, and transport from apiary to home. This also implies that producers use higher production costs and receive relatively lower benefits for the whole process.

Table 1: Producer's Node Gross Margin.

Variables	Unit (Kg)	Price	Total
Honey output	1	10,000	10,000
Beeswax output	1	10,000	10,000
Total Revenue TR			20,000
Variable costs VC			
Inputs management	1	5000	5000
Harvesting	1	3000	3000
Labour	1	1000	1000
Transport from apiary to home	1	500	500
Total variable costs TVC			9500
Gross margin (GM)			10,500

Gross Margin of Retailers

The results in Table 2 show that retailers have relatively higher gross margins than producers. The gross margin of retailers is TZS 19,100, which implies that retailers receive much more profit than producers; the main variable costs by the retailers were packaging, transport, and transport. For

retailers, these kinds of results were obtained because most retailers do not incur production costs and also sell their products at higher prices than producers, which makes them receive more than what producers receive.

Table 2: Retailer's Node Gross Margin.

Item	Quantity (Kg)	Price/ unit	Total
Honey output	1	10,000	10,000
Beeswax output	1	12,000	12,000
Total revenue			22,000
Variable cost			
Transport	1	1000	1000
Labour	1	1000	1000
Packaging cost	1	900	900
Total variable cost (TVC)			2,900
Gross margin (GM)			19,100

Market Margins Along the Value Chain

Table 3 below shows the results of market margins along the value chain, a large gross market margin was acquired by retailers which is TZS 4000, while

middlemen received a relatively lower gross market margin of about TZS 1000. The market shares among the actors were as follows, 39.24% for producers, 30.76% for retailers, 20% for whole sellers, and 10% for middlemen.

Table 3: Bee Product Market Margin and Market Share Along the Value Chain.

Actor	Average buying price TZS/Kg	Average selling price TZS/Kg	Market margin TZS/Kg	Market share %
Producer	0	9,000	-	39.24%
Middlemen	9,000	10,000	1,000	10%
Retailers	9,000	13,000	4,000	30.76%
Whole sellers	10,000	12,500	2,500	20%

Factors Influencing Production and Supply

The multiple regression analysis revealed several key factors significantly influencing honey and beeswax production and supply in the value chain. Experience emerged as a positive predictor of production ($B = 3.581$, $p = 0.004$), underscoring the importance of practical knowledge and skills. Unexpectedly, increased access to extension services ($B = -15.933$, $p = 0.010$) and training opportunities ($B = -18.349$, $p = 0.002$) were

associated with lower production levels, suggesting a need for more effective and contextually relevant programs. Regarding supply factors, better market access ($B = 2.875$, $p = 0.028$) and availability of storage facilities ($B = 3.124$, $p = 0.039$) positively influenced supply levels, while inadequate transportation infrastructure ($B = -4.215$, $p = 0.011$) hindered supply. The model exhibited a good fit ($R\text{-squared} = 0.739$) and overall statistical significance ($p = 0.000$), indicating its robustness in predicting production and supply variations.

Table 4: Regression Coefficients and Significance Levels for Factors Influencing Honey and Beeswax Production and Supply in the Value Chain.

Factor	Production		Supply	
	Estimate (β)	P value	Estimate (β)	P value
Experience	3.581	0.004*	-	-
Extension services	-15.933	0.010*	-	-
Training	-18.349	0.002*	-	-
Market access	-	-	2.875	0.028*
Transportation infrastructure	-	-	-4.215	0.011*
Storage facilities	-	-	3.124	0.039*

*Statistically significant at $p < 0.05$

DISCUSSION**Gross Margin**

In this study, a gross margin analysis was done as one indicator of measuring profitability in a value chain among its actors. Several studies also conducted similar analyses and came up with different results. For example, the results from this study concur with Hishe et al. (2016) who urged that, it is important to perform gross margin in order to sustain growth in medical plant production. This is because, knowing the gross margin in the production of medical plants will help to know if the production is directly proportional to the supply and the profit it brings. More on measuring profitability,

gross margin can be used as how (Songo, 2015) stated in his study that the purpose of conducting gross margin is to determine the profit margins of different actors in the honey value chain in Shinyanga. This will help the actors know to what extent their work brings profit to them and what should be done in order to add more profit at several nodes on the value chain. The results obtained from this study showed that retailers have a higher gross margin of 19,100 than producers which have 10,500. This indicates that retailers gain more profit than producers and this is because producers face production costs which are absent for retailers making retailers profit more since they buy products at a lower price and sell them at a higher price.

These and many more studies support the results of this study, that, gross margin analysis was done in order to know the profitability level of actors in the chain, and retailers in the study area were shown to have a higher gross margin than producers. This was because producers incur a lot of costs in producing unlike retailers thus making retailers have a higher gross margin than producers.

Market Margin

Several studies' results tend to concur with the results from this study. For example, Samuel (2009) in a study conducted in market chain analysis of honey production in Kenya. The researcher stated that the actors in the chain must undergo a market chain analysis so that it would be known which actor benefits more in the market and why. The results showed that retailers obtained more market share than others due to the reason that the price they set is higher than the price they obtain their goods. A study conducted by Songo 2015 showed that market margin also defines how much shares producers tend to remain with, thus a higher margin tends to minimize producers' shares and vice versa and also provides a fair distribution of shares among production and marketing agents. These studies support the results obtained from the field that producers have a higher market share than others meaning producers in Ikungi have minimum shares in the market.

Factors Affecting Production and Supply

The results from this study indicate that amongst the factors that were kept in the model to taste their effect on production and supply. Factors such as experience, extension services and training showed that they affect production and supply directly. This is because, the more experienced the actor is, the better he or she produces his products since as the years went by he got to know new ways of production and gained more knowledge along the way. Extension services help the actors be more informed of better ways to produce and process and

training puts the actors in a better position to produce process and even market their products.

In a study conducted in southwest Ethiopia, regression analysis was used to assess factors causing a loss in postharvest of potatoes along the value chain, and after analyzing the factors it was found that, the loss of potatoes is mostly at the producers' node followed by retailer. The causes of loss were diseases and injury during harvesting (Tadesse et al., 2018). These studies support the results from this study that regression analysis that was conducted showed which factors influence most to the production and supply than others by controlling the independent variables. Conducting regression analysis is important since it shows the strength of the association and also adjusts for the effects of covariates (Kumari & Yadav, 2018).

CONCLUSION

The findings regarding the profitability of the value chain highlight a disparity in benefits, with retailers emerging as the primary beneficiaries. This is attributed to their ability to sell products at higher prices without incurring production costs. Moreover, many retailers in Ikungi utilize cost-effective packaging, minimizing processing expenses further. Consequently, there is a pressing need to provide greater support and training to other actors, particularly producers, to enhance their profitability. Assessing the market share of the chain reveals that producers command a significant share, primarily because they often manufacture their own raw materials rather than purchasing them, thus securing a higher market presence. However, with improved production methods and equipment, their market share could be further amplified. The evaluation of factors influencing production and supply underscores the significance of experience, extension services, and training in directly affecting product supply and production, contrasting with factors like gender, relationship, and education, which exert less direct influence. Considerable efforts should be made to enhance the working environment of actors in the value chain,

including providing better production equipment to improve efficiency and product quality, addressing challenges faced by these actors, and closely managing factors that directly impact production and supply to ensure continued positive effects on the value chain.

LIST OF ABBREVIATIONS, ACRONYMS AND SYMBOLS

ANOVA - Analysis of Variance

AVC – Agriculture Value Chain

DED – District Executive Director

DESPO – Development Support and Promotion Organization

DFO – District Forest Officer

FAO – Food and Agriculture Organization

GM – Gross Margin

SEMA – Sustainable Environment and Management Action

SIDO – Small Industries Development Organization

SPSS – Statistical Package for Social Sciences

SUA – Sokoine University of Agriculture

TBS – Tanzania Bureau of Standards

TFDA – Tanzania Food and Drugs Authority

TFS – Tanzania Forest Services Agency

TVC – Total Variable Cost

UNDP – United Nations Development Programme

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