



Analysis of the Relationship between Nutmeg Farm Management and Farmers Perceptions of Empowerment in Nutmeg (*Myristica fragrans* Houtt) Commodity Diversification, Indonesia

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ABSTRACT

Background: This research aims to analyze the relationship between the management of nutmeg farming businesses and farmers' perceptions of empowerment in nutmeg commodity diversification. Diversification of commodities plays a crucial role in increasing product value and reducing waste in agricultural production.

Methods: The sample in this study consists of 30 nutmeg processing entrepreneurs. Both primary and secondary data were used in this study. A qualitative analysis was conducted using NVIVO software.

Result: The results reveal that the most frequently occurring word in the relationship between the management of nutmeg farming businesses and farmers' perceptions of empowerment in nutmeg commodity diversification is "Diversification," followed by "nutmeg commodity" and "product processing." This suggests that the processing of nutmeg commodities is widely carried out through diversification, aimed not only at reducing nutmeg fruit waste but also at adding value to the product. Efforts made include innovations within the nutmeg commodity.

Key words: Commodity diversification, Empowerment, Nutmeg farming business.

INTRODUCTION

The production of nutmeg in Indonesia in 2021 was 40,639 tons, sourced from smallholder plantations, state-owned plantations and private large-scale plantations. The majority of nutmeg production in Indonesia comes from North Maluku, North Sulawesi, Aceh, West Papua and West Sumatra. Over the past five years, these six provinces have contributed 89.95% to Indonesia's nutmeg production. In 2023, nutmeg production in Indonesia reached 44,597 tons. This production is expected to increase over the next five years, with an estimated production of 49,645 tons by 2026. The average annual production increase over the next five years (2022-2026) is projected to be 5.98% (Ministry of Agriculture, 2022). Nutmeg (*Myristica fragrans* Houtt) is an indigenous plant of Indonesia that has been recognized as a spice plant, making Indonesia the largest producer of nutmeg in the world (70-75%). Most of Indonesia's nutmeg is produced by smallholder plantations, accounting for approximately 98.48% (Muhammad Munawir and Neka, 2019).

North Maluku is one of the priority areas for the national development of nutmeg, with the expectation to restore the region's glory as a spice producer. The nutmeg production in Ternate reached 1,407 tons, with a harvest area of 4,016 hectares, making it the third-largest in North Maluku (BPS, 2023). However, the prospects for processing nutmeg fruit into other products remain low. The nutmeg plant's harvest that is typically utilized is the nutmeg fruit. The fruit consists of the flesh (77.8%), mace (4%), shell (5.1%) and seed

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(13.1%). The flesh of the nutmeg fruit was once discarded as waste because local farmers only harvested the seed and mace for trade value. However, with the advancement of technology, scientists have studied the processing of nutmeg flesh into various products (syrup, dodol, gel, jam and candied fruits), creating valuable products with high economic value. This has provided additional income for farmers, increased their resilience to nutmeg seed price fluctuations, created opportunities for entrepreneurship and stimulated economic growth through industrial development (Anggraini *et al.*, 2022).

Ternate is the region that produces the most nutmeg, but given the underutilization of the nutmeg's potential by local farmers, there is a need for innovation in diversification

processes so that the nutmeg commodity, which is a hallmark of Ternate, is not wasted and can add value. This research is important to understand how the management of nutmeg farming businesses influences farmers perceptions of empowerment, particularly in the diversification of nutmeg commodities. Diversification of nutmeg products has the potential to maximize the use of resources to increase added value. Innovation in the use of nutmeg is not only focused on seeds and mace but also involves the processing of nutmeg fruit flesh (Fibriyanti *et al.*, 2022). North Maluku's superior nutmeg commodity can be managed to have added value.

This study aims to analyze the relationship between the management of nutmeg farming businesses and farmers perceptions of empowerment in the diversification of nutmeg commodities in Ternate City, North Maluku Province, Indonesia. The benefits of this research can provide insights for stakeholders, including the government, extension institutions, and farmers, in designing more effective and sustainable empowerment strategies, which can improve productivity, farmers welfare, and the contribution of the nutmeg sector to the national economy. Strong farmer institutions are essential for farmers to access the technology, information and capital needed to increase productivity. According to (Ekaria *et al.*, 2025) technology, information, and capital are required to increase productivity. These factors also provide significant advantages for diversification.

MATERIALS AND METHODS

This research was conducted in Ternate City, North Maluku Province. The selection of the research location was purposive. The reason for choosing this location is that Ternate City is a center for nutmeg commodity production. The sample in this study consists of 30 nutmeg processing entrepreneurs. According to Mukti (2025), a sample is a portion of the population selected to represent the characteristics of that population in a study. The proper selection of a sample is crucial to ensure that the results obtained can be generalized to a larger population. Therefore, the sample taken from the population must be truly representative. The data used in this study consists of primary and secondary data from Ternate City, North Maluku Province.

Data analysis method

To answer the research objectives, the data analysis technique used is qualitative analysis with the help of NVIVO software. The qualitative analysis method is a process of systematically searching and organizing the data obtained from interviews, field notes and documentation by categorizing the data, breaking it down into units, synthesizing it, arranging it into patterns, selecting what is important, what will be studied and drawing conclusions so that it is easy to understand by both the researcher and others. NVIVO is a software that assists qualitative and mixed-methods researchers during data

analysis and even from the beginning of the research process. NVIVO is an example of QDAS (Qualitative Data Analysis Software). The steps in using NVIVO are (1) entering documents into NVIVO, (2) importing documents in Word or PDF format into NVIVO, (3) importing audio and video files into NVIVO, (4) importing photos into NVIVO, (5) importing data from databases into NVIVO and (6) importing content from websites and social media networks into NVIVO (Bandur, 2016). According to Allsop *et al.* (2022), using NVivo for qualitative data analysis helps in organizing data, managing ideas, data queries, performing open coding, determining core themes, team-based coding, maintaining audit trail, generating Numerical Content Analysis (NCA) tables and preparing the work for publication.

RESULTS AND DISCUSSION

Analysis of the relationship between nutmeg farming business management and farmers perceptions of empowerment in nutmeg commodity diversification

According to Rakhmat (2007), perception is the observation of objects, events, or relationships obtained by inferring information and interpreting messages, which are classified into three components: (a) the cognitive component, which consists of the knowledge or information a person has about the object of their attitude. From this knowledge, a particular belief about the object of the attitude is formed; (b) the affective component, which relates to feelings of pleasure or displeasure. It is evaluative in nature and closely linked to cultural values or the value system a person holds; (c) the conative component, which is the readiness of a person to behave in relation to the object of their attitude. From the explanation above, it can be concluded that perception is a process where a person infers a message or information, which can be an event or experience, based on cognitive aspects (intellectual aspects related to what is known), affective aspects (aspects that express attitudes) and conative aspects (aspects related to the ability to act). The motivation level of farmers is directly influenced by their perception and capacity and indirectly influenced by factors such as the characteristics of the farmers, external support, the role of extension officers and the role of farmer groups.

The management of nutmeg farming itself is considered essential in Ternate City, as the local population has plantations that are always planted with nutmeg trees. However, this conventional thinking needs to be changed by providing diffusion about the diversification of nutmeg commodities, where this commodity can not only be used as a spice but also for a variety of processed products. Farmers perceptions of this farming management are then directed towards the idea that in order to diversify nutmeg commodity processing, nutmeg farmers will no longer struggle to obtain raw materials. The relationship between the management of nutmeg farming and farmers' perceptions of empowerment in the diversification of nutmeg commodities can be analyzed using NVIVO.

The result of the NVivo analysis in the form of a word cloud

The relationship between the management of nutmeg farming businesses and farmers perceptions of empowerment in the diversification of nutmeg commodities is analyzed using NVivo WordCloud. The results of the analysis can be seen in the following Fig 1.

Based on Fig 1, the results of the NVivo word cloud analysis above show that the most dominant word appearing in the relationship between nutmeg farming management and farmers' perceptions of nutmeg commodity diversification is the word "Diversification," followed by



Fig 1: NVivo word cloud processing results.

"commodity" and "product." This indicates that nutmeg commodity processing is largely carried out through the diversification process, aimed not only at reducing nutmeg fruit waste but also at adding value to the product. The efforts made can include innovations. These innovations relate to process innovation, product innovation and packaging innovation. Crop yield, which is influenced by various factors such as genetics, environmental conditions, and cultivation practices, serves as an important indicator for farmers because it directly affects their livelihoods and economic well-being. In this context, crop diversification becomes a crucial strategy to enhance yield stability, reduce the risk of crop failure, and strengthen the economic resilience of farming households amid production variability (Nagendra *et al.*, 2025).

The government also plays an important role, particularly in providing stimuli to encourage the growth of micro, small and medium enterprises. This is especially true for micro-enterprises, which still require significant attention in terms of capital and equipment support in order to contribute to the economic growth of Ternate City, particularly in Ngade and Marikurubu Villages. According to the Agricultural Research and Development Agency, the diversification of processed nutmeg products, such as syrup, sauce, jam, dodol and nutmeg juice, can reduce waste from nutmeg fruit and increase community income (Febiyanti *et al.*, 2022; Ministry of Agriculture, 2022). Additionally, research by Syifa Aulia and Sugeng Heri (2020) shows that product diversification, such as the production of nutmeg juice drinks, is a strategy to increase the economic value of nutmeg fruit.

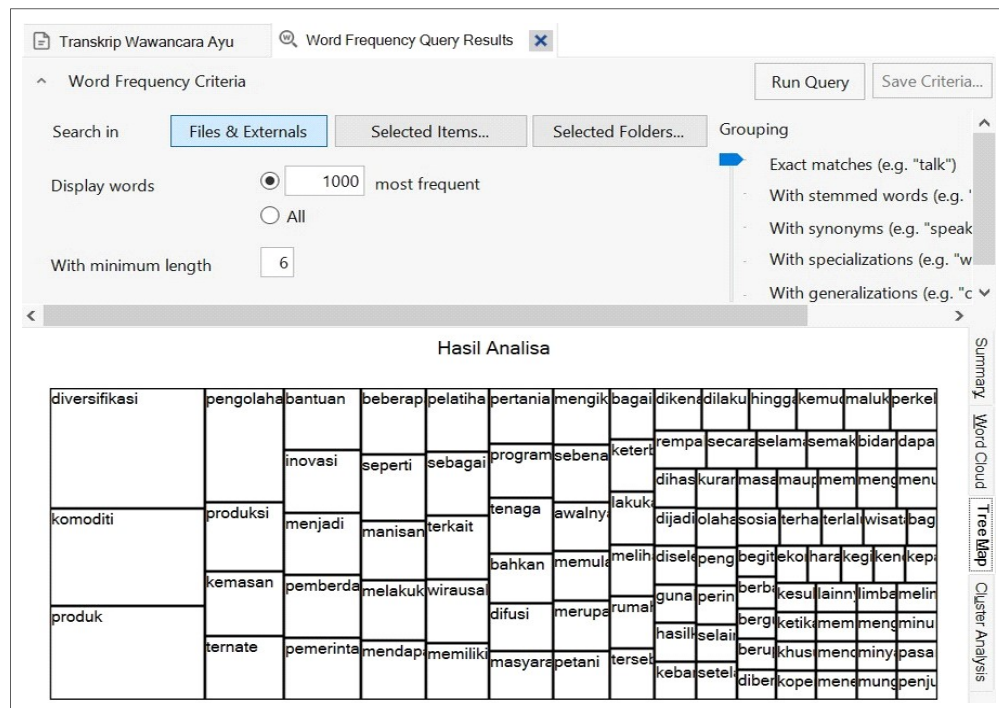


Fig 2: Tree map analysis result.

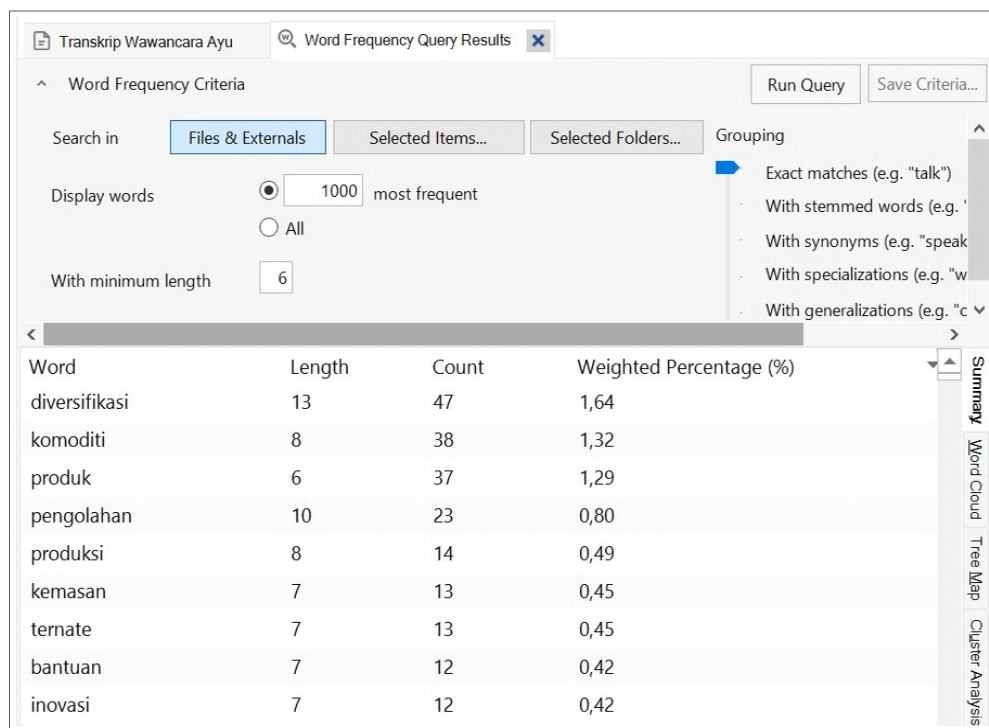


Fig 3: Word query percentage analysis result

The results of the NVivo analysis in the form of a Tree Map

Farmers perceptions of empowerment activities in nutmeg commodity diversification were analyzed using the NVivo Tree Map. The results of the analysis can be seen in the following Fig 2.

Before analyzing the data using the NVivo Tree Map, the researcher selected several sample words such as processing, product, empowerment, diversification, commodity, production, diffusion, innovation, packaging, training, etc. Based on the results of the analysis above, it shows that "diversification," "commodity," and "product" are the three most frequently occurring words. This means that these three words are the main drivers of empowerment activities. Therefore, it can be concluded that in the empowerment activities carried out using this analysis, nutmeg commodity diversification is well-accepted and can be effectively implemented.

Product diversification has indeed proven to be one of the effective empowerment strategies in the agribusiness sector, including in the nutmeg commodity. According to Palijama *et al.* (2024), product diversification, such as the processing of nutmeg juice, not only reduces waste but also adds value for farmers and micro, small and medium enterprises (MSMEs).. This study shows that diversification contributes significantly to increasing farmers' income and the competitiveness of products in both local and international markets. Furthermore, research by Handayani and Wijayanti (2021) emphasizes that innovation, both in products and packaging, plays a crucial role in supporting

the success of commodity diversification. This innovation includes the development of varied processed products and attractive packaging designs, which not only increase the selling value but also open up export opportunities. Moreover, Susilawati and Basri (2020) identify that empowerment based on product diversification requires strong support from the government, particularly in terms of training, provision of equipment and funding. This aligns with the needs of farmers to utilize diversification as a way to improve production efficiency and optimize local resources.

The results of the NVivo analysis in the form of Word Query Percentage

In addition to using the Tree Map, the relationship between the management of nutmeg farming and farmers' perceptions of empowerment in the diversification of nutmeg commodities can be explained numerically by looking at the percentages that appear in the results of the NVivo Word Query Percentage analysis in the following Fig 3.

Before conducting the analysis, the researcher selected the most frequently mentioned words across all the research data sources. These words include commodity, processing, innovation, packaging, diversification, product, production, assistance and Ternate. After these words were imported and analyzed, the frequency of the most and least frequently occurring words was obtained. For example, the most frequently mentioned word was 'diversification' with a frequency of 1.64%, followed by the word 'commodity' with a frequency of 1.32%. Meanwhile, the least mentioned word was 'innovation' with a frequency of 0.42%.

CONCLUSION

Based on the NVivo analysis in the form of a word cloud, it shows that the most dominant word appearing in the relationship between nutmeg farming management and farmers' perceptions of nutmeg commodity diversification is the word "Diversification." This indicates that the processing of nutmeg commodities is largely carried out through the diversification process, with the goal of not only reducing nutmeg fruit waste but also adding value to the product. The efforts made can include innovations.

Based on the NVivo analysis in the form of a Tree Map, it shows that "Diversification," "Commodity," and "Product" are the three most frequently occurring words. Additionally, the NVivo analysis in the form of Word Query Percentage reveals that the most frequently mentioned word is "diversification," with a frequency of 1.64%, followed by "commodity" with a frequency of 1.32%. The least mentioned word is "innovation," with a frequency of 0.42%.

Disclaimers

The findings generated through Nvivo-based analysis, including the word cloud, tree map and word query should be understood as descriptive interpretations that reflect the frequency of term occurrences in the textual data, rather than as direct representations of field practices or the effectiveness of nutmeg commodity diversification strategies. The dominance of terms such as "diversification," "commodity," and "product" indicates a discursive focus within nutmeg processing, particularly in relation to efforts to reduce waste and enhance product value. Nevertheless, the success of nutmeg commodity diversification remains highly dependent on broader external factors, including institutional support, market access, innovation capacity, as well as the active roles of government, community organizations and the private sector.

Informed consent

The author did not use animal experiments.

Conflict of interest

The authors say that there is no conflict of interest.

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