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Optimization of The Skin Crackers Business in Tambang District, Kampar Regency (Case Study: UD Kerupuk Kulit Jon Kenedi)

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Abstract

Purpose of Study: This study aims to analyze the optimal production combination of beef skin crackers and buffalo skin crackers and to examine the allocation of resources owned by entrepreneurs producing beef and buffalo skin crackers in order to achieve optimal production conditions.
Methodology: This research uses a case study approach. The sampling technique used was purposive sampling, with the criteria being that the business employed the most workers and had been established the longest, since 2011, in Tambang District, Kampar Regency. This research was conducted at UD Kerupuk Kulit Jon Kenedi Tambang District, Kampar Regency. Data were analyzed using Linear Programming with the simplex method to determine the optimal production combination and resource allocation.
Main Findings: The results show that the optimal production strategy for maximum profit is to produce 2,122 kilograms of cowhide crackers per month and not produce buffalo hide crackers. This is due to the relatively high price of buffalo hide as a raw material and its limited availability. This condition occurs because the price of buffalo skin as a raw material is relatively higher and its availability is limited. Therefore, entrepreneurs are advised to focus on increasing cowhide cracker production by increasing capital through loans, investments, or other financing sources to address raw material limitations and increase production capacity.
Novelty/Originality of This Study: Remaining resources, such as supporting materials and labor hours, should be optimally utilized through product diversification, for example, by producing raw (semi finished) crackers. This effort is expected to improve resource efficiency, reduce production costs, and expand market share.

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INTRODUCTION

Background of the study:

Background of the study: Agroindustry is one of the agricultural development sectors that supports industry, society, and supports income generation. Kampar Regency has the highest population of beef cattle and buffalo in Riau Province, at 42,808,000. One agro-industry producing cowhide and buffalo crackers in Kampar Regency is UD Kerupuk Kulit Jon Kenedi. This business has been operating for the longest time in Tambang District, since 2011, and has the largest workforce, with 7 employees.

In accordance with previous research, the background to this study is the results of research conducted by (Afifah et al., 2024), which showed that UD Kerupuk Kulit Jon Kenedi had a Value Added Ratio (RNT) of <50%, namely 30.09% for cowhide crackers and 28.62% for buffalo hide crackers. According to (Suprianto & Sarifudin, 2021), if the RNT is <50%, it is considered low,

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indicating that agro-industrial activities have not yet contributed optimal economic value and therefore need to be optimized.

Literature review: Agroindustry is an industrial activity that utilizes agricultural products as primary raw materials to produce new products with higher added value through processing (BPS, 2024). Skin crackers are a traditional food made from cow or buffalo hides through a series of steps: cleaning, boiling, drying, and frying, resulting in a crispy, economically valuable product (Lilir et al., 2021). This product has a high protein content and is popular as a snack or as a side dish.

In its production process, the skin cracker agro-industry requires various production factors, such as raw materials, labor, capital, technology, and entrepreneurship, which are interrelated in determining production levels and business profits. Production is the activity of processing inputs into outputs with higher utility value. In the skin cracker business, the production process is influenced by the use of production factors such as capital, labor, raw materials, and technology (Wati et al., 2018). Furthermore, production costs are a crucial component in determining business efficiency and profitability, consisting of fixed and variable costs.

Fixed costs include equipment depreciation, rental space, and permanent labor wages, while variable costs include raw materials, auxiliary materials, cooking oil, gas, and plastic packaging (Afifah et al., 2024). In production decision-making, one method that can be used is linear programming. Linear programming is an optimization method used to optimally allocate limited resources to achieve maximum profit or minimum costs (Huwaida, 2020). Linear programming problems can be solved using the simplex method, especially for problems with more than two variables and constraints. This method can help determine the optimal production combination based on resource limitations such as capital, raw materials, labor, and production costs.

Gap analysis: Previous research on the skin cracker business has focused on analyzing the income and added value generated from agro-industrial activities. The results of this study indicate that the skin cracker business is able to generate income for entrepreneurs, but the resulting added value is still relatively low. This finding indicates that the utilization of available production resources has not been optimal, thus the potential for increasing profits and added value can still be increased. Therefore, there is a research gap in the aspects of optimizing resource use and production combinations that have not been analyzed in previous studies. Based on these conditions, further research on optimizing the skin cracker business is needed to determine the production combination and resource allocation that can generate maximum profits.

Rationale of the study: The skin cracker agroindustry is a business capable of generating income and creating added value for entrepreneurs. However, previous research indicates that the resulting added value is still relatively low. This condition indicates that the utilization of production resources, such as raw materials, labor, capital, and production time, is not being optimally utilized. If available resources can be allocated more efficiently, the opportunity to increase profits and business added value will be greater. Therefore, an optimization analysis is needed to determine the most profitable production combination and the most efficient use of resources. Through this optimization, it is hoped that the skin cracker business can achieve maximum profit levels and increase the added value obtained by entrepreneurs.

Purpose or Hypotheses of the study: This study aims to analyze the optimal production combination of cowhide crackers and buffalo hide crackers and examine the resource allocation of cowhide and buffalo hide cracker producers to achieve optimal conditions. The hypothesis in this study is that there is an optimal combination of cowhide and buffalohide cracker production and appropriate resource allocation so that it can produce maximum profits in the skin cracker agro-industry business.

METHOD

Research Design:

The research location was selected purposively (Sugiyono, 2018; Mukhlis et al., 2019; Mukhlis et al., 2024; Asgaf et al., 2025). This research was conducted at Graha Bintungan V Housing Block C 6 Number 7, Tarai Bangun Village, Tambang District, Kampar Regency, at the agro-industry of UD Kerupuk Kulit Jon Kenedi. This research was conducted for 6 months from May 2025 to October 2025.

This research is a case study research where the sample determination uses a purposive sampling method (Sugiyono, 2022; Mukhlis et al., 2022; Ogari et al., 2026), namely the determination of the research location intentionally (Raharjo, 2017) based on the consideration that the agro-industry uses the most workers, namely 7 people and has had the longest business establishment period, namely since 2011 in Tambang District, Kampar Regency. This case study method utilizes real-world data obtained from informants (Raharjo, 2017), namely individuals involved in the business who have comprehensive knowledge of the ongoing business. The informants in this study were Mr. Jon Kenedi, the owner and leader of UD Kerupuk Kulit Jon Kenedi, and seven workers with different tasks in the cracker-making process. The research was conducted through direct interviews in the field. The data used in this study comprised primary and secondary data. Primary data was obtained from field surveys and direct observations aimed at verifying the consistency of previous research data with actual conditions in the field through interviews with the business owner and workers. Secondary data used in this study was obtained from previous research conducted by (Afifah et al., 2024), the data collected included business profile information, respondent identity data (age, education, number of family members, and business experience), equipment usage (type of equipment, quantity, value, and price), raw material and supporting material usage, labor usage, production process and technology usage, initial capital data, labor hours, production costs, production profits, and marketing data, as well as data from other sources such as literature studies, the Central Statistics Agency (BPS), the internet, and other literature from print and online media related to the research. The data analysis used in this study was quantitative descriptive analysis. Descriptive analysis was used to provide an overview of the state of the agro-industry business, UD Kerupuk Kulit Jon Kenedi. Quantitative analysis in this study was used to analyze data to maximize profits at UD Kerupuk Kulit Jon Kenedi using a Linear Programming model using the simplex method. The simplex method was chosen based on the characteristics of the optimization problem, which has two decision variables and nine constraints. Therefore, graphical methods were not used due to their limitations in handling a large number of constraints. Data processing was performed using the POM-QM program for Windows.

Participant:

The participants in this study were the owners of the skin cracker agro-industry, which was the object of the study. The business owners were selected as participants because they possessed information regarding the use of production resources, production costs, production volume, revenue, and business profits. Furthermore, the workforce involved in the production process could serve as supporting informants to obtain information on work time usage and the production process.

Population and the methods of sampling Instrumentation:

The population in this study comprised all business activities at the UD Kerupuk Kulit Jon Kenedi Agroindustry. Purposive sampling was used, selecting respondents intentionally based on the research results of (Afifah et al., 2024), which found that UD Kerupuk Kulit Jon Konedi has a relatively low product value-added ratio of IDR 15,753/kg for cowhide, representing a value-added ratio of 30.09%, and IDR 16,221/kg for buffalo hide, representing a value-added ratio of 28.62%, representing a value-added ratio of less than 50%. The calculation of added value can determine whether an agro-industry is classified as low or high value-added. If the ratio is less than 50%, the added value is considered low, indicating that the business needs further optimization. If the ratio is greater than 50%, the added value is considered high, indicating that the business is already developing well (Suprianto & Sarifudin, 2021). The location selection was also based on the advantages of UD Kerupuk Kulit Jon Kenedi, which has advantages compared to other similar businesses in Tambang District, Kampar Regency. This is because it is the oldest business, having been established for 14 years, and the largest skin cracker business in Kampar Regency, employing the largest workforce, with 7 workers.

Instrument:
The instruments in this research are business profile, respondent identity, use of raw materials, use of labor, initial business capital, production costs, and production profits obtained from previous research.

Procedures and if relevant, the time frame:
This research was conducted over a period of six months, from May 2025 to October 2025, encompassing a series of activities, including surveys, data collection, data processing, report preparation, and data analysis, leading to the writing of the final thesis.

Analysis plan:
Optimization analysis is carried out by determining the decision variables, namely two variables, namely cowhide crackers (X1) and buffalohide crackers (X2), determining the objective function, namely maximizing profits, and determining research constraints, namely, capital constraints, raw materials, supporting materials, labor hours, and production costs. Furthermore, optimization analysis is carried out with the Linear Programming model using the simplex method using the POM-QM program for Windows.

Scope and/or limitations of the methodology you used:
This research is limited to the use of production data and resources available during the research period, so that the optimization results reflect the business conditions during the research period. The Linear Programming model used assumes that the relationship between decision variables and the objective function is linear, all parameters such as profit, resource requirements, and resource availability are fixed during the analysis period, and does not consider changes in market demand, fluctuations in raw material prices, production risks, consumer preferences, or other external factors that may influence production decisions. Therefore, the research results are more focused on internal optimization of resource use in the skin cracker business.

RESULTS AND DISCUSSION

Result:
Optimization analysis was conducted using the Linear Programming method with the help of the POM-QM program for Windows. The optimization model was compiled based on the objective function to maximize business profits by considering various constraints faced, namely capital, raw materials, supporting materials, labor hours, and production costs. The decision variables in this study consisted of the production of cowhide crackers (X_1) and buffalo hide crackers (X_2). The results of the Linear Programming analysis showed the optimal production combination and the level of resource utilization that could generate maximum profits. The results of the optimization calculation using the simplex method are presented in the following table.

Table 1. Comparison of actual and optimal production of UD Jon Kenedi skin crackers

Variable	Actual Production (Kilograms/Month)	Optimal Production (Kilograms/Month)
X_1	1.088,75	2.122,00
X_2	637,50	0,00
Profit (Rp)	25.552.960,00	31.276.317,00

Table 2. Optimal resource analysis of UD Jon Kenedi skin crackers

Resource	Constraint	Unit	Dual Value
Capital	1,00	IDR	0,27
Leather raw materials	2,00	Kg	0,00
Supporting ingredients for spices	3,00	Kg	0,00
Salt supporting ingredients	4,00	Kg	0,00
Gas support material	5,00	Kg	0,00
Cooking oil supporting ingredients	6,00	Kg	0,00

Resource	Constraint	Unit	Dual Value
Plastic supporting materials	7,00	Kg	0,00
Labor working hours	8,00	Hour	0,00
Production cost	9,00	IDR	0,00

Discussion:

Table 1 shows that the leather cracker agro-industry activities carried out by UD Kerupuk Kulit Jon Konedi are not yet optimal. Of the two types of products produced, namely cowhide crackers and buffalo hide crackers, it can be seen that cowhide crackers are produced below their optimal level, while buffalo hide crackers are produced above their optimal level. The results of the optimization analysis show that to obtain maximum profits, UD Kerupuk Kulit Jon Konedi should focus production activities on cowhide crackers only because it produces a value of 2.12,00 kilograms per month and does not produce buffalo crackers because it produces a value of 0,00 kilograms per month, so that it will obtain a profit of IDR 31.276.317,00 per month, but in actual conditions, UD Kerupuk Kulit Jon Konedi still produces cowhide crackers of 1.088,75 kilograms per month and buffalo skin crackers of 637,50 kilograms per month, so that the profit obtained is smaller, namely IDR 25.552.960,00 per month.

Based on the results of the analysis, it can be concluded that UD Kerupuk Kulit Jon Kenedi must increase the production of cowhide crackers by 1.031,25 kilograms per month and reduce the production of buffalo skin crackers by 637,50 kilograms per month or not produce buffalo skin crackers. The results of the analysis suggest to focus production activities only on cowhide crackers and not produce buffalo skin crackers, because the cost of raw materials for buffalo skin crackers is higher than the cost of raw materials for cowhide crackers and the availability of buffalo skin is also less so that the price of buffalo skin raw materials is relatively more expensive, so that the problem of high raw material costs for buffalo skin crackers can be overcome by focusing production activities on cowhide crackers only, then if seen in terms of profit per month, cowhide crackers provide a greater profit per month than buffalo skin crackers, in addition, the sales system is carried out in a mixed manner with the same price for both types of products shows no difference in terms of price to increase the profit of buffalo skin crackers, then entrepreneurs are advised to focus production activities on cowhide crackers only because it is considered the most efficient and profitable strategy based on the results of the optimization analysis, this is in accordance with the actual conditions where the availability of cowhide raw materials is more abundant so it is easy to get, and the profit per month obtained is higher.

Based on Table 2, it can be seen that capital resources are included in active resources, while other resources, namely raw material resources, supporting material resources, labor hour resources, and production cost resources, are included in passive or excess resources. The dual value of IDR 0.27 indicates that every additional unit of capital (IDR) will increase profits by IDR 0.27, in other words, the factor is fixed (ceteris paribus), this indicates that capital is the main limiting factor in achieving maximum profits. Meanwhile, other resources are resources that have not been fully utilized.

Implications:

The results of the study indicate that the actual production mix implemented by UD Kerupuk Kulit Jon Konedi is not yet optimal. Therefore, entrepreneurs need to adjust their production strategy by focusing production activities on cowhide crackers and reducing or stopping the production of buffalo hide crackers. This strategy can increase business profits from IDR 25,552,960.00 per month to IDR 31,276,317.00 per month. In addition, the analysis results also show that capital is a resource that is the main obstacle in achieving maximum profits. Therefore, additional business capital has the potential to increase profits obtained as long as other production factors remain constant.

Research contribution :
This research contributes to the development of agro-industry studies, particularly regarding the application of the Linear Programming method to determine the optimal production combination and efficient resource allocation in the skin cracker business. This research also complements previous research that focused solely on revenue and value-added analysis by adding business optimization analysis to increase profits. This research produces concrete recommendations for entrepreneurs regarding optimal production volume, efficient resource use, and profit-enhancing strategies based on the actual conditions faced by the company.

Limitations:
This research has several limitations. First, the research was conducted using a case study approach on a single business unit, namely UD Kerupuk Kulit Jon Kenedi, so the results cannot be generalized to all kerupuk kulit businesses in other regions. Second, the study used data sourced from previous research, so the analysis is highly dependent on the accuracy and completeness of the available data. Third, the Linear Programming model used assumes that all parameters, such as selling price, production costs, profit per unit, and resource availability, are fixed throughout the analysis period, whereas in real conditions, these parameters can change at any time. Fourth, the study only considers aspects of economic profit and the use of internal company resources, so it does not include external factors such as changes in market demand, consumer preferences, fluctuations in raw material prices, the level of business competition, or production risks that can influence production decisions. Furthermore, the use of secondary data from previous research prevented the researcher from directly observing changes in business conditions at the time of the study. Therefore, the optimization results obtained reflect conditions based on data available from the previous research period.

Suggestions:
1. To achieve optimal production and profit levels, entrepreneurs are advised to increase the production of cowhide crackers, namely by producing 2.122,00 kilograms per month and not producing buffalo hide crackers. However, to maintain the possibility of product diversification, entrepreneurs can seek alternative buffalo hide suppliers at other slaughterhouses to address the limited availability of raw materials. 2. To achieve optimal conditions, entrepreneurs are advised to increase capital through loans, investments, or other financing sources to address the limited availability of raw materials and increase production capacity. Remaining resources, such as supporting materials and labor hours, should be optimally utilized through product diversification, for example by producing raw (semi-finished) crackers. These efforts are expected to increase resource efficiency, reduce production costs, and expand market share.

CONCLUSION

The research results indicate that the production combination that yields maximum profit is producing 2,122.00 kilograms of cowhide crackers per month and not producing buffalo hide crackers (0.00 kilograms per month). The company needs to increase cowhide cracker production by 1,031.25 kilograms per month and discontinue buffalo hide cracker production. Under these conditions, the potential profit reaches IDR 31,276,317.00 per month, higher than the actual profit of IDR 25,552,960.00 per month.

The research results also indicate that capital resources are active resources or limiting factors affecting the achievement of maximum profit, while raw materials, supporting materials, labor hours, and excess fixed production costs (passive resources) are passive resources. The capital multiple of IDR 0.27 indicates that each additional rupiah of capital has the potential to increase profit by IDR 0.27, assuming other factors remain constant. The company is advised to increase capital to increase its production capacity and achieve optimal profits.

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AUTHOR CONTRIBUTION STATEMENT

The Author Contributions Statement can be up to several sentences long and should briefly describe the tasks of individual authors. Please list only 2 initials for each author, without full stops, but separated by commas (e.g. JC, JS). In the case of two authors with the same initials, please use their middle initial to differentiate between them (e.g. REW, RSW). The Author Contributions Statement should be included at the end of the manuscript before the References.

AI DISCLOSURE STATEMENT

The author used [TOOL/SERVICE NAME] during the preparation of this work for [REASON]. After using the tool/service, the author thoroughly reviewed and edited the content as needed and takes full responsibility for the content of the publication.

The authors declare that this research was prepared, researched, written, and edited without the aid of artificial intelligence (AI) techniques.

CONFLICTS OF INTEREST

The authors confirm the presence or absence of any potential conflicts of interest—financial, institutional, or personal—that could influence the conduct of this study, the analysis of data, the preparation of the manuscript, or its publication.

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