

Construction of Rice Milling Unit (RMU) as an Effort to Provide Price Certainty for Farmers and Meet the Rice Needs of the Community

I Ketut Arnawa, I Made Budiasa and Made Suryana
Mahasaraswati University Denpasar, Bali, Indonesia

Corresponding Author : I Ketut Arnawa
E-mail : Arnawaiketut1962@gmail.com
Submitted June 24, 2025 ; Approved July 19, 2025

ABSTRACT

BACKGROUND AND OBJECTIVES

Farmers in Badung Regency face uncertainty in rice prices, which affects their welfare. Price instability makes it difficult for farmers to earn a decent and sustainable income. To overcome this problem, constructing a Rice Milling Unit (RMU) is one strategic solution, as it can guarantee the price of rice received by farmers. This study aims to analyze the feasibility of RMU development from three main aspects: rice availability, community rice demand, and financial feasibility.

METHODS

This descriptive study was conducted in Badung Regency, Bali Province. Data collection was carried out through questionnaires and interviews with farmers, business actors, and relevant policymakers. The feasibility analysis of rice availability and rice demand was conducted descriptively. Meanwhile, financial feasibility was analyzed using several investment criteria, namely Net Present Value (NPV), Net Benefit Cost Ratio (Net B/C), Internal Rate of Return (IRR), and Payback Period.

FINDINGS

The study's results indicate that the construction of an RMU is feasible in Badung Regency. This region has production and consumption potential that supports the project in terms of rice availability and demand. From the financial aspect, the project shows profitable results with an NPV of Rp. 171,931,999.193, Net B/C of 1.2900, IRR of 25.05%, and a Payback Period of 1.44 years.

CONCLUSION

The construction of a rice milling unit in Badung Regency is an appropriate solution to address the uncertainty farmers face in paddy prices. In addition to ensuring stable paddy prices, this development supports rice availability for the community at stable prices.

Keywords: Government; Rice; Paddy; Rice; Subak; Farmers

INTRODUCTION

Rice is a staple food consumed by 90% of Indonesians, including the people of Bali. People consume rice in the form of cooked rice as their staple food. The Bali Statistics Agency projects that the population of Bali in 2023 will reach 4,467,700. Meanwhile, the projected

population of Badung Regency will reach 549,527. Based on the above population figures, the rice requirement in Badung Regency is estimated to reach 48,270.45 tons, assuming an average consumption of 87.84 kg per year or equivalent to 7.32 kg per month (1).

The rice availability in Badung Regency in 2022 is estimated to reach 69,472.86 tons. In 2023, the average consumer price for rice ranged from Rp. 10,900 to Rp. 13,900 per kilogram, while the price of dried harvested paddy (GKP) based on the HPP reached Rp. 5,000 per kilogram, whereas at the farmer level, it reached Rp. 4,200 per kilogram. Rice production in Badung Regency throughout 2022 reached 122,291.04 tons of milled rice (GKG) from 18,621.02 hectares of harvested area.

Production and harvested area throughout 2022 experienced fluctuations, causing the price of harvested dry paddy (GKP) at the farmer level to fluctuate. The lowest price occurred in April, reaching Rp 4,169/kg, slightly below the HPP of Rp 4,200/kg. The actions of intermediaries often cause the low price of rice at the farmer level, so the government's role is needed to help increase farmers' income. One effort can be made by establishing Rice Milling Units (2)(3).

According to the 2023 Agriculture and Food Department report, there are 46 Rice Milling Units in Badung Regency, with the capacity to absorb 96,206.5668 tons of farmers' paddy per year while farmers' production reaches 122,291.04 tons per year. The price farmers receive for their paddy is unpredictable and tends to be lower than the government-set price. Similarly, the involvement of intermediaries results in lower prices (2)(4).

The Badung Regency government's construction of Rice Milling Units aims to purchase farmers' paddy at the government-set price and process it into rice. The rice produced is distributed to the community, including the Badung Regency Government employees. Research (5) and (6) on developing rice milling units in Indonesia prioritizes large-scale units. In contrast, out of the 46 units in Badung Regency, only three are large-scale, and 43 are small-scale. Thus, there is certainty regarding the price of paddy rice received by farmers and the availability of rice for the community at a controllable (stable) price. In 2023, the rice requirement for employees within the Badung Regency Government reached 161,835 kg/month.

The results of the study (7) on the feasibility analysis of rice milling businesses in South Sumatra are financially viable, with a Gross B/C ratio of >1.32 – 1.52 , an NPV of Rp 143.64–160.77 million, and an IRR ranging from 39.21–41.91%. The study (8) on rice milling businesses in Cirebon Regency is feasible to operate with an NPV of Rp 21,804,273, an IRR of 23%, a Net B/C Ratio of 1.18, an ARR (Average Rate of Return) of 58%, and a payback period of 3 years, 6 months, and 7 days. Furthermore, the study (9) on rice milling businesses in Pringgasela Subdistrict, East Lombok Regency, has two R/C values of 2.28, making the business viable. The R/C values for MT-1 are 2.29, MT-2 are 2.29, and MT-3 are 2.24.

The novelty of this study is the analysis of the feasibility of constructing a rice milling unit from the perspective of rice availability at the farmer level, with rice purchases at government-set prices and meeting the community's rice needs at stable prices. This is crucial because rice prices tend to rise due to reduced rice supply during the lean season, while rice demand tends to increase. The increase in rice prices is one of the causes of inflation in Badung Regency (10). Therefore, the objectives of this study are to analyze (1) the feasibility of constructing a rice milling unit from the perspective of rice availability and rice demand and (2) the feasibility of constructing a rice milling unit from a financial perspective.

RESEARCH METHOD

The research was conducted in Badung Regency, considering that the government in that area has plans to build a rice milling unit. The research was conducted from May to July 2023. The research population included rice milling unit entrepreneurs, subak leaders (pekaseh), and farmers. Seven rice milling unit entrepreneurs, eight subak leaders, and 45 farmers were selected because they had already collaborated with the government regarding constructing rice milling units. Data collection was conducted using survey techniques and interviews based on questionnaires. The data collected included primary and secondary data, such as rice availability, rice demand, investment requirements, operational costs, and benefits.

To address objective (1), the feasibility of constructing a rice milling unit from the perspective of rice availability and rice demand was analyzed using descriptive techniques. To address objective (2), the feasibility of constructing a rice milling unit from a financial perspective was analyzed using investment criteria such as Net Present Value (NPV), Net Benefit-Cost Ratio (Net B/C), Internal Rate of Return (IRR), and Payback Period, with the following formula (11).

Net Present Value (NPV)

$$NPV = \sum_{t=1}^n \frac{(B_t - C_t)}{(1 + i)^t}$$

NPV is the Net Present Value, B_t is the net benefit in year t (Rp), C_t is the cost in year t (Rp), i is the applicable interest rate, n is the economic life of the RMU, and t is the year. If $NPV > 0$, then the construction of the RMU is feasible, and if $NPV < 0$, the construction of the RMU is not feasible.

Net Benefit Cost Ratio (Net B/C)

$$\text{Net B/C} = \frac{\sum_{t=1}^n \frac{(B_t - C_t)}{(1 + i)^t}}{\sum_{t=1}^n \frac{(C_t - B_t)}{(1 + i)^t}}$$

Net B/C is the Net Benefit Cost Ratio, B_t is the net benefit in year t (Rp), C_t is the cost in year t (Rp), i is the applicable interest rate, n is the economic life of the RMU, and t is the year. If $\text{Net B/C} > 1$, then the construction of the RMU is feasible, and if $\text{Net B/C} < 1$, the construction of the RMU is not feasible.

Internal Rate of Return (IRR) Criteria

$$IRR = i_1 + \frac{NPV^+}{(NPV^+ - NPV^-)} (i_2 - i_1)$$

i_1 is the first discount rate value to obtain a positive NPV, i_2 is the second discount rate value to obtain a negative NPV. If the Internal Rate of Return (IRR) of the proposed RMU construction investment is greater than the prevailing interest rate at the time the RMU construction investment is undertaken, it is deemed feasible; conversely, if the IRR is less than the prevailing interest rate at the time the RMU construction investment is undertaken, it is deemed unfeasible.

Payback Period (PP)

$$\text{Payback Period} = \frac{\text{investment value}}{\text{net cash inflow}} \times 1 \text{ year}$$

The feasibility study criterion is that the shorter the Payback Period, the better the investment, which indicates smoother capital turnover.

RESULTS AND DISCUSSION

Farmer Grain Availability

During the harvest season in early 2023, the average price of GKP received by farmers in Badung Regency ranged from Rp 4,200/kg – Rp 4,500/kg, lower than the government-set price (HPP) established by the National Food Agency, which sets the price of harvested dry rice (GKP) at the farmer level at Rp 5,000/kg and GKP at the milling level at Rp 5,100/kg. Meanwhile, for milled rice (GKG) at the milling stage, the price is Rp 6,200, and GKG at the Perum Bulog warehouse is Rp 6,300. Farmers receive a lower price than the HPP if they sell to intermediaries, with the average price at the intermediary level ranging from Rp 250,000/are to Rp 280,000/are, resulting in an average price received by farmers of between Rp 4,032/kg and Rp 4,516/kg. The government is expected to purchase paddy at the HPP price and not through middlemen (12).

The average rice productivity of 6.2 tons/ha is still low compared to the results of the Agricultural Research and Development Agency's research from 2008 to 2021, which shows that rice productivity should be at least 8 tons/ha. Research in China (13) shows that technology can quickly increase rice productivity. Research (14) in China indicates that urbanisation significantly influences rice productivity.

The potential rice/paddy production in Badung Regency in 2023 is highest in the Mengwi subak area, at 18,926.17 tons, followed by the Abiansemal subak area at 17,886.42 tons, while the lowest is in the Kuta subak area at 40.34 tons. According to research (15), rice paddy production estimates can be determined from the height of the rice plants and the greenness of their leaves.

Rice production (GKG) in Badung Regency from 2017 to 2022 showed an increasing trend, rising from 115,097.74 tons in 2017 to 122,291.04 tons in 2022, equivalent to 69,412.86 tons of effective rice (16). This reinforces the research (17) that rice productivity in Indonesia is positive at 2.0%.

Furthermore, when comparing the 2022 paddy production of 122,291.04 tons (GKG) with the rice milling capacity of companies in Badung Regency, which is 60,360 tons of rice (96,206.5668 tons (GKG) (Table 1), assuming a GKG yield of 62.74%, there is still an unsold rice paddy surplus of approximately 26,084.4732 tons, which is sold outside Bali, reaching 10-20%. Therefore, the government should consider building a rice milling unit.

Table 1. Number and Capacity of Rice Milling Units (RMU) in Badung Regency in 2023

No	RMU		Capacity	
	Description	Number	Description	Rice (tons)
1	Large (1.5–2 tons/hour)	3	Hours	19.90
2	Medium (1–1.5 tons/hour)	7	Days	251.50
3	Small (0.1–0.8 tons/hour)	36	Months	5,030
4			Annual	60,360

Total

46

Source: Badung Regency Agriculture and Food Office (2023)

Rice Requirements in Badung Regency

Paddy purchased from farmers is processed into rice using a rice milling unit. Rice production is distributed to employees within the Badung Regency Government. The number of employees in Badung Regency is 14,132. Table 2 shows the number of employees and the amount of rice required.

Table 2. Number of Employees and Amount of Rice Required in the Badung Regency Government in 2023

No	Description	Number of Employees (Persons)	Rice Allocation (Kg)	Rice Requirement (Kg/month)
1	Echelon 2 Officials	37	30	1,110
2	Level 3 Officials	169	20	3,380
3	Level 4 Officials	248	15	3,720
4	Specific Functional Staff	3,331	15	49,965
5	General Functional Staff	38	15	570
6	PPPK	42	10	420
7	Contract	10,267	10	102,670
Total		14,132		161,835

Source: Quoted from the Badung Regency Agriculture and Food Office (2023)

The Badung Regency Government's rice requirement reaches 161,835 kg/month or 19,420.2 tons/year. This represents a highly potential market for the rice milling unit being constructed. Therefore, the government must ensure the quality of the rice distributed and carry out distribution quickly and accurately as part of excellent service.

Table 3. Rice Demand in Badung Regency's General Market in 2022

No	District	Rice Demand (Tons)
1.	South Kuta	11,544.72
2.	Kuta	5,209.18
3.	North Kuta	8,383.27
4.	Mengwi	11,696.69
5.	Abiansema	8,706.96
6.	Petang	2,729.63
Badung		48,280.45

Source: Badung Regency Agriculture and Food Office (2023)

The total rice demand in the general market of Badung Regency reaches 48,280.45 tons/year, as shown in Table 3. The highest rice demand is in Mengwi Subdistrict at 11,696.69 tons/year, followed by South Kuta Subdistrict at 11,544.72 tons/year, and the lowest is in Petang Subdistrict at 2,729.63 tons/year. According to research (18) and (19) in Burma, meeting rice demand is highly dependent on the availability of irrigation infrastructure. Rice demand in the

general market of Badung Regency tends to exceed these figures, considering that Badung is the leading tourist destination in Bali. Hotels and restaurants are sure to require rice, and employees of hotels and restaurants who do not reside in Badung Regency constitute a potential rice market for the planned rice milling unit.

Financial Aspects of the Rice Milling Unit Development

The investment cost for the building is Rp. 10,549,125,000. Next is the investment cost for the dryer and rice processing plant machinery, totalling Rp. 5,325,214,750. Additionally, to support the operational activities of the RMU, investment costs are required for procuring 6-wheeled trucks and single-axle trucks, as well as electricity connection costs from PLN. The total investment cost requirement amounts to Rp. 18,635,339,750.

The total operational cost amounts to Rp 54,000,216,988. The highest operational cost is for purchasing paddy rice, which is related to the target rice production of 500,000 kg/month or 6,000,000 kg/year, assuming a paddy rice yield of 60%, thus requiring 10,000,000 kg of paddy rice per year. The HPP price of paddy at the beginning of 2023 was Rp.5,000/kg, resulting in a total paddy purchase cost of Rp. 50,000,000,000/year. Another relatively high operational cost is for packaging bags, assuming packaging is calculated at 5 kg/piece.

Table 4 shows the main benefits of constructing a rice milling unit: premium rice, by-products such as husks and bran, and charcoal husks, which are not calculated to avoid double counting, as they are already included in the husk calculation.

Table 4. Annual Benefits (Bt) of RMU Construction in Badung Regency

No	Benefit	Production (kg)	Unit Price (Rp)	Value (Rp)
1	Premium Rice	6,000,000	12,500	75,000,000,000
2	Rice Husk*	1,320,000	1,500	1,980,000,000
3	Bran**	780,000	4,800	3,744,000,000
Total				80,724,000,000

Source: Primary Data Analysis

Notes: * Rice husks account for 22% of rice production

** Rice husks account for 13% of production

Feasibility analysis of the financial aspects using NPV, Net B/C, IRR, and Payback Period. Unlike the investment criteria used for lemongrass oil production (20), which does not use NPV but instead uses Percent Return on Investment (ROI) and Break-Even Point (BEP). Furthermore, the study (21) on the feasibility of soil and water conservation in oil palm plantations only uses B/C and IRR.

Table 5. Results of the Feasibility Analysis of the RMU Construction Investment in 2023

Criteria	Value	Feasibility Indicator	Result
NPV	Rp. 171,931,999.193	NPV > 0	Feasible
Net B/C	1.2900	Net B/C > 1	Feasible
IRR	25.05 %	IRR > DF	Feasible

Payback Periode 1.44 years
Source: Primary Data Analysis

Net Present Value (NPV) over the economic life period is Rp 171,931,999.193 ($NPV > 0$), or an average net profit of Rp 8,596,599.65/year for the rice milling unit construction, making it feasible to proceed as it is profitable. This study aligns with research (22) on the feasibility of financial analysis and sensitivity in rice milling operations in Cirebon Regency, which is profitable based on the NPV value. However, its value is significantly lower at Rp 21,804,273.

The Net B/C ratio of 1.2900 indicates the efficiency of investment costs in constructing a rice milling unit, where an investment of Rp 1,000 will yield a return of Rp 1.2900. A Net B/C ratio greater than one means that the investment generates benefits greater than the costs incurred. This aligns with the study (8) results in Cirebon but with a lower Net B/C Ratio of 1.18.

Based on the IRR analysis, the internal rate of return (IRR) is 25.05%, meaning the internal rate of return on the investment in the rice milling unit is 25.05%. This aligns with the research (23) in Banyuasin, South Sumatra, but with a higher IRR value of 39.21-41.91%.

The payback period value of 1.44 years indicates a payback period shorter than the economic lifespan. This also indicates that the investment payback period for the rice milling unit construction project, which is 1 year, 4 months, and 4 days, is shorter than the economic lifespan of the rice milling unit construction project. The results of the study (24) on the feasibility of constructing a rice milling unit in Lampung show a more extended payback period of 3.18 years.

CONCLUSION

This study concludes that, based on data on grain production, rice production, rice demand, and the rice commodity market in Badung Regency, it is feasible to build a rice milling unit from a financial perspective. In order to increase farmers' income, provide certainty regarding grain prices, and ensure the availability of grain for the rice milling unit to be built, it is recommended that a cooperation contract be established with several subak. This is important to prevent price manipulation by intermediaries, which results in low selling prices for farmers' paddy.

RECOMMENDATIONS

Research on the development of rice milling units is still limited and has weaknesses in calculating labour use, as it only uses labour cost calculations based on a percentage of production. Therefore, it is necessary to use actual machine operational labour and production processes, so this research must continue.

REFERENCES

1. Harini R, Ariani RD, Supriyati, Satriagasa MC. Analisis Luas Lahan Pertanian Terhadap Produksi Padi Di Kalimantan Utara. *J Kawistara*. 2019;9(1):15–27.
2. Hermanto, Saptana. Kebijakan Harga Beras Ditinjau Dari Dimensi Penentu Harga. *Forum Penelit Agro Ekon* [Internet]. 2017;35(1):31–43. Tersedia pada: https://www.researchgate.net/publication/323641936_Kebijakan_Harga_Beras_Ditinjau_dar_i_Dimensi_Penentu_Harga
3. Wahed M. Pengaruh Luas Lahan, Produksi, Ketahanan Pangan dan Harga Gabah Terhadap Kesejahteraan Petani Padi di Kabupaten Pasuruan. *JESP J Ekon dan Stud Pembang* [Internet]. 2015;7(1):68–74. Tersedia pada: www.bkp.deptan.go.id

4. Simanjuntak JF, Sari AP, Syahputri AN. Implementasi Fuzzy Tsukamoto Dalam Menentukan Harga Gabah Pada Petani. Brahmana J Penerapan Kecerdasan Buatan. 2020;1(2):121–5.
5. Suryaningrat IB, Fianeka A. Developing Strategy for Rice Milling Unit Selection Process Using Analytical Hierarchy Process (AHP) Method: A Case of Agroindustry in Indonesia. Adv Sci Lett. 2018;23(12):11787–92.
6. Paman U, Khairizal K, Riau UI. Farm Machinery Demand and Power Requirement for Mechanizing Small Rice Farming in Kampar Region , Indonesia Written for presentation at the An ASABE Global Initiative Conference Spo ... Farm Machinery Demand and Power Requirement for Mechanizing Small Ric. 2016;(October).
7. Wildayana E. Kecamatan Tanjung Lago Banyuasin Sumatera Selatan Financial Feasibility of Rice Milling Business in Tanjung Lago Banyuasin District , South Sumatra. Habital,Volume. 2016;26(2):130–5.
8. Aisyah S, Fachrizal MH. Analisis Finansial Dan Sensitivitas Usaha Penggilingan Padi. Paradig Agribisnis. 2020;3(1):50–63.
9. Raniatun I, Maryati S, Wathoni N. Analisis Ekonomi Usaha Penggilingan Padi (Rice Milling Unit) Di Kecamatan Pringgasela Kabupaten Lombok Timur [Internet]. Universitas Mataram; 2017. Tersedia pada: https://eprints.unram.ac.id/31623/2/JURNAL_IMRAN_RANIATUN-C1G018066.pdf
10. Rachmania SD, Imaningsih N, Wijaya RS. Analisis Penyerapan Tenaga Kerja pada Sektor Pariwisata (Sektor Perdagangan, Hotel dan Restoran) Di Kabupaten Badung. Eksis J Ilm Ekon dan Bisnis. 2021;12(1):23–30.
11. Ekowati T, Prasetyo E, Sumarjono D, Setiadi A. Studi Kelayakan dan Evaluasi Proyek [Internet]. Semarang: Universitas Diponegoro; 208M. 1–178 hal. Tersedia pada: http://eprints.undip.ac.id/82300/2/Buku_SKEP.pdf.
12. Hindarti S, Rohmatul Maula L, Khoiriyah N. Income Risk and the Decision on Onion Farming. SOCA J Sos Ekon Pertan. 2021;15(1):202–9.
13. Ding L, Kinnucan HW. This document is discoverable and free to researchers across the globe due to the work of AgEcon Search . Help ensure our sustainability . J Gender, Agric Food Secur. 2011;1(3):1–22.
14. Shi X. Heterogeneous effects of rural-urban migration on agricultural productivity: Evidence from China. China Agric Econ Rev. 2018;10(3):482–97.
15. Nuarsa IW, Nishio F, Hongo C. Rice Yield Estimation Using Landsat ETM+ Data and Field Observation. J Agric Sci. 2012;4(3):45–56.
16. Bali BPSP. Luas Panen dan Produksi Padi di Provinsi Bali [Internet]. 2022. Tersedia pada: <https://bali.bps.go.id/id/pressrelease/2023/04/03/717845/luas-panen-dan-produksi-padi-di-provinsi-bali-2022--angka-tetap-.html>
17. Pudjiastuti AQ, Arisena GMK, Krisnandika AAK. Rice Import Development in Indonesia. SOCA J Sos Ekon Pertan. 2021;15(2):390–405.
18. Nati Aïssata Delphine B, W Aurelie Létissia T, Ousseini S, Issa S. Status of the Use of Groundwater during the Dry Season at 5 and 7 Blocks of the Irrigated Rice Plain of Bama, Burkina Faso. Am J Water Resour. 2020;8(5):232–6.
19. Keerthi MM, Babu R, Venkataraman NS, Subramanian E, Kumutha K. Effect of Varied Irrigation Scheduling with Levels and Times of Nitrogen Application on Yield and Water Use Efficiency of Aerobic Rice. Am J Plant Sci. 2018;09(11):2287–96.
20. Bimantio MP, Wardoyo ADH. Sensitivity and Feasibility Analysis of Citronella Oil Business.

- SOCA J Sos Ekon Pertan. 2020;14(2):313–24.
21. Murtalaksono K, Darmosarkoro W, Sutarta ES, Siregar HH, Hidayat Y, Yusuf MA. Feasibility of soil and water conservation techniques on oil palm plantation. *AGRIVITA, J Agric Sci.* 2011;33(1):63–70.
 22. Winantara IMY, Bakar A, Puspitaningsih R. Analisis Kelayakan Usaha Kopi Luwak Di Bali. *J Online Inst Teknol Nas.* 2014;2(3):118–29.
 23. Wildayana E. Kelayakan Finansial Usaha Penggilingan Padi Di Kecamatan Tanjung Lago Banyuasin Sumatera Selatan. *Habitat.* 2015;26(2):130–5.
 24. Kabuli KK, Indriani Y, Situmorang S. Analisis Kelayakan Finansial Usaha Penggilingan Padikelilingdi Kabupaten Pringsewuprovinsi Lampung. *J Ilmu-Ilmu Agribisnis.* 2018;6(2):196–204.

ACKNOWLEDGEMENTS AND FUNDING

On this occasion, the author would like to express his gratitude to the esteemed Director of the Regional Public Company for Markets and Food Mangu Giri Sedana, Badung Regency, for the funding, trust, encouragement, and cooperation, as well as to the rice milling unit entrepreneurs and farmers for their cooperation and support for the research program on the development of rice milling units, Agreement/Contract Number: K.26/IV/UM/MGS/2023.

AUTHOR CONTRIBUTIONS

1	Prof. Dr. Ir. I Ketut Arnawa, M.P.	
	Institution	Lecturer at the Faculty of Agriculture and Business, Mahasaraswati University, Denpasar, Jalan Kamboja 11 A Denpasar. Indonesia.
	Contributions	Coordinating research activities, data analysis and writing drafts for publication
	Homepage	https://sinta.kemdikbud.go.id/authors/profile/5987834
3	Ir. I Made Budiasa, M.Agb	
	Institution	Lecturer at the Faculty of Agriculture and Business, Mahasaraswati University, Denpasar, Jalan Kamboja 11 A Denpasar. Indonesia
	Contributions	Research activities, data analysis and writing drafts for publication
	Homepage	https://sinta.kemdikbud.go.id/authors/profile/6735818
4	Ir. I Made Suryana, M.Si	
	Institution	Lecturer at the Faculty of Agriculture and Business, Mahasaraswati University, Denpasar, Jalan Kamboja 11 A Denpasar. Indonesia
	Contributions	Research activities, data analysis and writing drafts for publication
	Homepage	https://sinta.kemdikbud.go.id/authors/profile/5995329

GRAPHICAL ABSTRACT

