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A FUZZY LOGIC APPROACH TO THE ANALYSIS OF UANG PANAI' IN BUGIS–MAKASSAR CULTURE

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Abstrak. Logika fuzzy banyak digunakan dalam sistem pengambilan keputusan yang menghadapi ketidakpastian dan penilaian subjektif. Dalam masyarakat Bugis di Indonesia, uang panai' merupakan tradisi perkawinan berupa pemberian sejumlah uang dari keluarga calon mempelai laki-laki kepada keluarga calon mempelai perempuan. Besarannya dipengaruhi oleh faktor sosial dan ekonomi, antara lain pendidikan, pekerjaan, prestise keluarga, dan status sosial. Perbedaan kondisi serta persepsi terhadap faktor-faktor tersebut dapat menimbulkan penilaian yang beragam dan subjektif. Karena itu, diperlukan pendekatan komputasional yang sistematis untuk membantu mengestimasi uang panai' secara lebih terstruktur. Penelitian ini bertujuan mengembangkan model estimasi uang panai' menggunakan metode Mamdani Fuzzy Inference System. Tahapan penelitian meliputi identifikasi variabel, pembentukan fungsi keanggotaan, fuzzifikasi input, penyusunan basis aturan (*rule base*), inferensi Mamdani, dan defuzzifikasi untuk memperoleh nilai estimasi akhir. Model menggunakan tingkat pendidikan, pekerjaan, dan status sosial sebagai variabel linguistik utama dalam proses pengambilan keputusan. Hasil penelitian menunjukkan bahwa metode Fuzzy Mamdani dapat menghasilkan estimasi yang terstruktur, fleksibel, dan mudah diinterpretasikan. Model ini juga mampu mengakomodasi ketidakpastian serta perbedaan persepsi sosial dalam konteks budaya masyarakat Bugis. Dengan demikian, logika fuzzy berpotensi menjadi alat pendukung pengambilan keputusan dalam mengestimasi besaran uang panai' secara lebih sistematis, tanpa mengabaikan nilai budaya dalam tradisi perkawinan. Penelitian selanjutnya disarankan mempertimbangkan penambahan variabel sosial budaya dan penerapan teknik optimasi untuk meningkatkan akurasi serta kemampuan adaptasi model, dengan mempertimbangkan kondisi keluarga dan lingkungan sosial setempat.

Kata kunci: Logika Fuzzy, Fuzzy Mamdani, Uang Panai', Masyarakat Bugis, Sistem Pendukung Keputusan.

Abstract. Fuzzy logic has been widely applied in decision-making systems involving uncertainty and subjective judgments. In Bugis society in Indonesia, *uang panai'* is a marriage tradition involving a monetary contribution from the prospective groom's family to the prospective bride's family. Its amount is influenced by various socio-economic factors, including educational background, occupation, family prestige, and social status. Differences in individual circumstances and perceptions of these factors often lead to diverse and subjective assessments. Therefore, a systematic computational approach is needed to support a more structured estimation of *uang panai'*. This study aims to develop an *uang panai'* estimation model using the Mamdani Fuzzy Inference System. The research stages include identifying fuzzy variables, constructing membership functions, fuzzifying input variables, developing a fuzzy rule base, performing Mamdani inference, and applying defuzzification to obtain the final estimated value. The model employs educational level, occupation, and social status as the primary linguistic variables in the decision-making process. The results indicate that the Mamdani Fuzzy method can generate estimates that are structured, flexible, and easy to interpret. Furthermore, the model accommodates uncertainty and variations in social perceptions within the cultural context of Bugis society. Thus, fuzzy logic has the potential to serve as a decision-support tool for estimating *uang panai'* systematically while preserving the cultural values embedded in Bugis marriage traditions. Future research is recommended to incorporate additional socio-cultural variables and optimization techniques to improve the model's accuracy and adaptability while considering the diverse social conditions of the community.

Keywords: Fuzzy Logic, Mamdani Fuzzy Inference System, Uang Panai', Bugis Society, Decision Support System.

A. Introduction

Indonesia is widely recognized as a multicultural nation characterized by extensive ethnic, cultural, linguistic, and religious diversity distributed across both rural and urban

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regions. These cultural variations form distinctive local identities that differentiate one region from another and contribute to the richness of Indonesian social life. The pluralistic nature of Indonesian society has significantly influenced social interactions, customs, and traditional practices, particularly in the institution of marriage, where cultural values continue to be preserved and transmitted across generations (Lathifah, 2021). Among the many ethnic groups in Indonesia, the Bugis community in South Sulawesi is well known for maintaining strong traditional values that reflect social identity, honor, and collective cultural norms.

One of the most fundamental philosophical principles in Bugis culture is *siri' na pacce*, which represents dignity, self-respect, solidarity, and social responsibility. The concept of *siri'* refers to personal and family honor that must be maintained within society, whereas *pacce* reflects firmness, empathy, integrity, and strong social commitment (Rinaldi et al., 2022). These cultural values strongly influence social behavior, including traditional marriage practices. Consequently, marriage in Bugis society is not merely viewed as a personal relationship between two individuals, but also as a social and cultural institution involving family prestige, social recognition, and communal expectations.

One important element in Bugis-Makassar marriage traditions is *uang panai'*, which refers to a financial contribution provided by the groom's family to the bride's family to support wedding ceremonies and customary obligations. In contemporary society, the determination of *uang panai'* has become a complex socio-cultural phenomenon influenced by multiple factors, including educational background, occupation, family status, economic capability, and social prestige. The amount is generally negotiated before marriage and often reflects symbolic social value rather than solely economic necessity (Chaesty & Muttaqin, 2022). In many cases, high *uang panai'* values are associated with family honor and social status, leading to public perceptions that lavish wedding ceremonies represent prestige and dignity within the community.

Despite its cultural significance, the determination of *uang panai'* frequently involves subjective considerations, uncertainty, and inconsistent social interpretations. Different families may apply different standards based on their social environment, economic conditions, and cultural perspectives (Ramzi Ghulam Syam et al., 2023). This ambiguity creates challenges in establishing a rational and systematic framework for determining an appropriate *uang panai'* value. Therefore, a scientific and computational approach is required to model the decision-making process more objectively while still respecting the cultural values embedded within the tradition.

In recent decades, Fuzzy Logic has become one of the most widely used approaches for handling uncertainty, ambiguity, and qualitative reasoning in complex decision-making systems. Introduced by Lotfi A. Zadeh through the theory of fuzzy sets (Zadeh, 1965), fuzzy logic enables qualitative linguistic variables such as "high," "moderate," and "low" to be represented mathematically using membership functions. Unlike classical binary logic, fuzzy logic provides flexible reasoning mechanisms capable of accommodating human perceptions and subjective judgments. Furthermore, the Mamdani Fuzzy Inference System developed by Mamdani (1975) has been extensively implemented in intelligent decision-support systems because of its interpretability and ability to model human reasoning processes.

Several previous studies have discussed *uang panai'* from sociological, cultural, and economic perspectives (Chaesty & Muttaqin, 2022; Ramzi Ghulam Syam et al., 2023; Rinaldi et al., 2022). In addition, Side et al. (2020) demonstrated the application of mathematical logic in analyzing social issues related to *uang panai'* within Bugis-Makassar society. However, limited studies have specifically integrated fuzzy inference systems with socio-cultural variables to construct a quantitative model for estimating *uang panai'*. Consequently, there remains a significant research gap concerning the development of computational approaches capable of systematically representing cultural decision-making under uncertainty.

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Based on these considerations, this study aims to develop a fuzzy logic-based model for estimating *uang panai'* using the Mamdani inference method. The proposed model incorporates several socio-cultural variables, including educational level, occupation, and social status, as determinants in the estimation process. By integrating fuzzy logic with descriptive statistical analysis, this research seeks not only to describe empirical social patterns but also to construct a mathematical framework capable of supporting more rational, transparent, and systematic decision-making. The findings of this study are expected to contribute theoretically to the development of computational social science and practically to the understanding of cultural-economic decision systems within Indonesian society.

B. Research Methodology

This study employed a quantitative research design using a survey-based data collection approach to investigate the socio-cultural phenomenon of *uang panai'* within Bugis–Makassar society in South Sulawesi, Indonesia. Primary data were collected through questionnaires distributed to respondents from several regions in South Sulawesi. A total of 45 respondents participated in the study. Based on age distribution, 38 respondents (84.4%) were between 20–29 years old, while 7 respondents (15.6%) were between 30–39 years old. In terms of gender, the respondents consisted of 31 females (68.9%) and 14 males (31.1%). Regarding ethnic background, most respondents were from the Bugis ethnic group (55.6%), followed by Makassar (28.9%), while the remaining respondents came from other ethnic groups such as Javanese, Minang, Duri, Mandar, and mixed ethnic backgrounds.

The educational background of respondents was dominated by undergraduate degree holders, accounting for 53.3% of the sample, followed by senior high school graduates (22.2%), postgraduate and diploma graduates (11.1% each), and junior high school graduates (2.3%). Based on occupational categories, respondents included employees (33.3%), entrepreneurs (20.0%), housewives (15.6%), students (13.3%), educators (11.1%), and others (6.7%). Furthermore, most respondents resided in urban areas (62.2%), while others lived in regency areas (24.5%) and rural villages (13.3%).

The collected demographic data were initially analyzed using descriptive statistical methods to identify respondent characteristics and social tendencies related to *uang panai'*. Subsequently, respondents' perceptions regarding the determination of *uang panai'* were transformed into logical premises representing relationships among several variables, including educational level, occupation, residential area, and the estimated amount of *uang panai'*. These premises were formulated into mathematical implication rules in the form of IF–THEN statements to model the decision-making process systematically.

To accommodate uncertainty and ambiguity in social perceptions, this study implemented Fuzzy Logic using the Mamdani Fuzzy Inference System approach. Fuzzy logic was selected because it effectively handles qualitative and subjective variables through linguistic representations such as "low," "medium," and "high." The integration of fuzzy inference and descriptive statistical analysis enabled the study to quantitatively represent socio-cultural decision-making patterns associated with *uang panai'* determination.

1. Research Design

This research applied a quantitative computational approach using the Mamdani Fuzzy Inference System to estimate the appropriate amount of *uang panai'* based on several socio-cultural variables. The Mamdani method was selected due to its flexibility in handling uncertainty and its capability to model human reasoning through linguistic fuzzy rules.

2. Research Variables

The study utilized three input variables and one output variable. The input variables consisted of:

1. Educational Level
2. Occupation

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3. Residential Area

The output variable was the estimated amount of *uang panai'*. Each input variable was categorized into three linguistic levels: low, medium, and high. Similarly, the output variable was classified into three linguistic categories: low, moderate, and high amounts of *uang panai'*.

3. Research Procedures

The implementation of the Mamdani fuzzy method was conducted through several stages as follow

3.1 Fuzzification

Fuzzification is the process of transforming numerical input values into fuzzy membership values within specific fuzzy sets. In this study, the variables of educational level, occupation, and residential area were divided into three fuzzy sets: low, medium, and high. Each variable was represented by a membership degree ranging from 0 to 1.

3.2 Construction of Fuzzy Rules

Fuzzy rules were formulated using IF–THEN logical structures connecting input variables to the output variable. Since each input variable consisted of three linguistic categories, the total number of fuzzy rules generated was:

$$3 \times 3 \times 3 = 27$$

Thus, 27 fuzzy inference rules were constructed. Examples of the rules are presented as follows:

- IF Education is Low AND Occupation is Low AND Residential Area is Low THEN *Uang Panai'* is Low
- IF Education is High AND Occupation is High AND Residential Area is High THEN *Uang Panai'* is High

3.3 Mamdani Fuzzy Inference Process

The inference stage was performed to determine fuzzy output values based on the established fuzzy rules. The Mamdani inference mechanism utilized the MIN operator to compute the α-predicate value for each rule. This value represents the activation degree of each rule according to the membership values of the input variables.

3.4 Defuzzification

Defuzzification is the process of converting fuzzy inference results into a single crisp numerical value. This study employed the Centroid or Center of Gravity method using the following equation:

$$Z = \frac{\sum(\alpha_i z_i)}{\sum \alpha_i}$$

where:

- Z= defuzzification result,
- α_i= membership degree of the i-th rule,
- z_i= crisp output value of the i-th rule.

The resulting crisp value represents the recommended amount of uang panai' generated by the fuzzy system.

3.5 Model Evaluation

The performance of the proposed fuzzy model was evaluated by comparing the defuzzification results with actual observed data using two evaluation metrics: Mean Absolute Error (MAE) and Root Mean Square Error (RMSE).

The MAE formula is defined as:

$$MAE = \frac{1}{n}\sum | y_i - \hat{y}_i |$$

The RMSE formula is defined as:

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$$RMSE = \sqrt{\frac{\sum(y_i - \hat{y}_i)^2}{n}}$$

Smaller MAE and RMSE values indicate that the fuzzy inference system has better predictive accuracy in estimating the value of uang panai'.

C. Result and Discussion

1. Fuzzification Process

The first stage of the Mamdani fuzzy inference system involved the fuzzification of all input and output variables associated with the determination of *uang panai'*. In this study, three input variables were utilized, namely educational level, occupation, and residential area, while the output variable was the estimated amount of *uang panai'*. Each variable was represented using linguistic categories and corresponding membership functions to accommodate uncertainty and subjective social perceptions.

Table 1 presents the domain ranges and categorical descriptions of all input and output variables used in the fuzzy system.

Table 1 Domain and Variable Classification

Variable Type	Variable	Domain	Description
Input	Education	[1,5]	1 = Junior High School, 2 = Senior High School, 3 = Diploma, 4 = Bachelor Degree, 5 = Postgraduate
Input	Occupation	[1,4]	1 = Unstable Employment, 2 = Entrepreneur, 3 = Civil Servant, 4 = Professional
Input	Residential Area	[1,3]	1 = Rural Area, 2 = Suburban Area, 3 = Urban Area
Output	Uang Panai'	[25,100] million IDR	Based on questionnaire results

The fuzzification process transformed numerical input values into membership degrees ranging from 0 to 1. This process enabled qualitative variables such as "low," "medium," and "high" to be mathematically represented within the fuzzy inference system.

a. Educational Variable

The educational variable was divided into three fuzzy sets: low, medium, and high. These categories represented respondents' educational attainment levels. The membership functions for the educational variable are illustrated as follows:

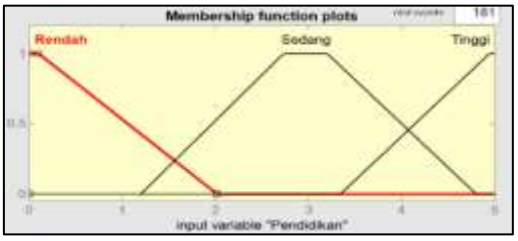


Figure 1. education membership function

- Low education membership function:

$$\mu_{education_low}(x) = \begin{cases} 1, & x \leq 1 \\ \dfrac{3-x}{3-1}, & 1 \leq x \leq 3 \\ 0, & x \geq 3 \end{cases}$$

- Medium education membership function:

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$$\mu_{education_medium}(x) = \begin{cases} 0, & x \leq 1 \text{ or } x \geq 5 \\ \dfrac{x-1}{3-1}, & 1 \leq x \leq 3 \\ \dfrac{5-x}{5-3}, & 3 \leq x \leq 5 \end{cases}$$

- High education membership function:

$$\mu_{education_high}(x) = \begin{cases} 0, & x \leq 3 \\ \dfrac{x-3}{5-3}, & 3 \leq x \leq 5 \\ 1, & x \geq 5 \end{cases}$$

These membership functions indicate that higher educational attainment tends to increase the estimated value of uang *panai'*, reflecting the socio-cultural perception that education contributes to social prestige within Bugis-Makassar society.

b. Occupational Variable

The occupation variable was also classified into three fuzzy categories: low, medium, and high occupational status. The membership functions are formulated as follows:

$$\mu_{occupation_low}(x) = \begin{cases} 1, & x \leq 1 \\ \dfrac{2-x}{2-1}, & 1 \leq x \leq 2 \\ 0, & x \geq 2 \end{cases}$$

$$\mu_{occupation_medium}(x) = \begin{cases} 0, & x \leq 1 \text{ or } x \geq 4 \\ \dfrac{x-1}{2-1}, & 1 \leq x \leq 2 \\ \dfrac{4-x}{4-2}, & 2 \leq x \leq 4 \end{cases}$$

$$\mu_{occupation_high}(x) = \begin{cases} 0, & x \leq 2 \\ \dfrac{x-2}{4-2}, & 2 \leq x \leq 4 \\ 1, & x \geq 4 \end{cases}$$

The fuzzy representation of occupation demonstrates that respondents with more stable and prestigious occupations generally correspond to higher *uang panai'* estimations.

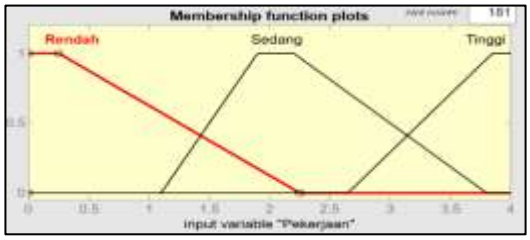


Figure 2. occupations membership function

c. Residential Area Variable

The residential area variable was categorized into village, suburban, and urban classifications. The membership functions are defined below:

$$\mu_{village}(x) = \begin{cases} 1, & x \leq 1 \\ \dfrac{2-x}{2-1}, & 1 \leq x \leq 2 \\ 0, & x \geq 2 \end{cases}$$

$$\mu_{suburban}(x) = \begin{cases} 0, & x \leq 1 \text{ or } x \geq 3 \\ \dfrac{x-1}{2-1}, & 1 \leq x \leq 2 \\ \dfrac{3-x}{3-2}, & 2 \leq x \leq 3 \end{cases}$$

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$$\mu_{urban}(x) = \begin{cases} 0, & x \leq 2 \\ \dfrac{x-2}{3-2}, & 2 \leq x \leq 3 \\ 1, & x \geq 3 \end{cases}$$

The residential area variable reflects socio-economic differences among respondents, where urban residence generally correlates with higher social expectations and larger *uang panai'* values.

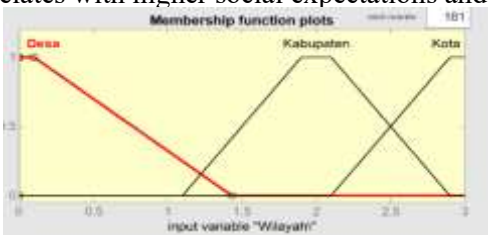


Figure 3. residential area membership function

d. Output Variable: Uang Panai'

The output variable, namely *uang panai'*, was divided into three linguistic categories: low, medium, and high monetary values. The corresponding membership functions are given below:

$$\mu_{low}(x) = \begin{cases} 1, & x \leq 25 \\ \dfrac{50-x}{50-25}, & 25 \leq x \leq 50 \\ 0, & x \geq 50 \end{cases}$$

$$\mu_{medium}(x) = \begin{cases} 0, & x \leq 25 \text{ or } x \geq 100 \\ \dfrac{x-25}{50-25}, & 25 \leq x \leq 50 \\ \dfrac{100-x}{100-50}, & 50 \leq x \leq 100 \end{cases}$$

$$\mu_{high}(x) = \begin{cases} 0, & x \leq 50 \\ \dfrac{x-50}{100-50}, & 50 \leq x \leq 100 \\ 1, & x \geq 100 \end{cases}$$

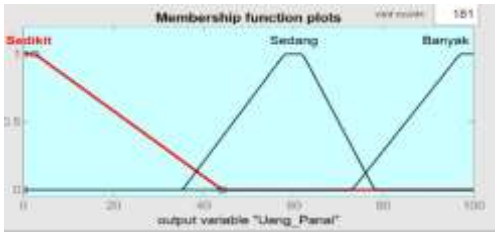


Figure 4. *Uang Panai'* membership function

These functions indicate that the estimated *uang panai'* amount gradually increases according to the combined influence of education, occupation, and residential area.

2. Construction of Fuzzy Rules

The fuzzy rule base was developed using IF–THEN logical statements connecting the three input variables with the output variable.

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Table 2. Fuzzy Rule Base for the Mamdani Inference System

Rule	Education Level	Occupational Status	Residential Area	Estimated *Uang Panai'*
R1	Low	Low	Rural	Low
R2	Low	Low	Suburban	Low
R3	Low	Low	Urban	Medium
R4	Low	Medium	Rural	Low
...	...	...	...	...
...	...	...	...	...
R26	High	High	Suburban	High
R27	High	High	Urban	High

Table 2 presents the complete fuzzy rule base used in the Mamdani inference system for estimating the amount of *uang panai'*. Based on the combinations of the three input variables—Educational Level, Occupational Status, and Residential Area.

3. Mamdani Fuzzy Inference Results

The fuzzy inference stage combined educational level, occupational status, and residential area to estimate the uang panai' category (low, medium, or high). Each rule followed IF–THEN logic using the Mamdani Fuzzy Inference System, with the MIN operator applied to determine the activation degree (α-predicate) of each rule.

Table 3. Results of Mamdani Fuzzy Inference Analysis

No	Education	Occupation	Residential Area	Activated Rules	Output Category	α (Alpha)	Final Inference Result
1	2.1	1.5	1	R1, R4	Low	0.65, 0.30	Low: 0.65
2	2.8	2.2	2	R5, R8	Medium	0.55, 0.40	Medium: 0.55
3	3.5	3.0	2	R17, R23	High	0.60, 0.45	High: 0.60
4	4.0	2.0	1	R22	Medium	0.50	Medium: 0.50
5	4.5	3.5	3	R27	High	0.80	High: 0.80
6	3.0	1.5	2	R11, R12	Medium	0.45, 0.30	Medium: 0.45
7	2.5	2.8	3	R6, R9	Medium, High	0.40, 0.35	Medium: 0.40
8	1.8	3.0	2	R8	Medium	0.50	Medium: 0.50
9	3.2	2.5	3	R24	High	0.55	High: 0.55
10	4.2	3.8	3	R27	High	0.85	High: 0.85

Table 3 presents the Mamdani fuzzy inference results for estimating uang panai' based on educational level, occupational status, and residential area. Multiple rules may be activated simultaneously due to overlapping membership functions. For example, Observation 7 activated Rules R6 and R9, producing medium and high categories with membership degrees of 0.40 and 0.35, respectively, resulting in a medium classification. Higher educational attainment, professional occupations, and urban residential areas generally showed stronger activation in the high category. Observation 10 recorded the highest activation degree of 0.85 under Rule R27. These findings demonstrate the ability of the Mamdani Fuzzy Inference System to capture nonlinear relationships and uncertainty among socio-cultural factors in estimating uang panai'.

4. Defuzzification Results

Defuzzification Process and Crisp Output Analysis

Following the fuzzy inference stage, the resulting fuzzy outputs were converted into crisp numerical values through defuzzification using the Centroid or Center of Gravity method. This

method calculates the weighted average of output values based on their membership degrees, providing a representative result for each observation.

The complete results of the defuzzification process are presented in Table 4.

Table 4. Defuzzification Results Using the Centroid Method.

Data	Education	Occupation	Residential Area	Fuzzy Output (α and z)	Defuzzification Result	Category
1	2.1	1.5	1	Low: 0.65 ($z = 40$)	$Z = \frac{0.65 \times 40}{0.65} = 40.00$	Low
2	2.8	2.2	2	Medium: 0.55 ($z = 65$)	$Z = \frac{0.55 \times 65}{0.55} = 65.00$	Medium
3	3.5	3.0	2	High: 0.60 ($z = 90$)	$Z = \frac{0.60 \times 90}{0.60} = 90.00$	High
4	4.0	2.0	1	Medium: 0.50 ($z = 65$)	$Z = \frac{0.50 \times 65}{0.50} = 65.00$	Medium
5	4.5	3.5	3	High: 0.80 ($z = 90$)	$Z = \frac{0.80 \times 90}{0.80} = 90.00$	High

Table 4 presents the final estimation results of uang panai' using the Mamdani Fuzzy Inference System through the Centroid defuzzification method. Each observation includes the input values of educational level, occupational status, and residential area, along with the fuzzy output category, membership degree (α-predicate), crisp output value (z), and final defuzzification result. The results indicate that higher educational attainment, better occupational status, and urban residential areas generally produce higher uang panai' estimates. For example, Observation 2 generated a membership degree of 0.55 in the Medium category, corresponding to a crisp value of 65 million IDR. When multiple output categories are activated, the centroid method calculates the weighted average of their respective values, allowing the system to generate more flexible numerical estimates. Overall, the results demonstrate that the Mamdani Fuzzy Inference System can transform qualitative socio-cultural factors into quantitative estimates while accommodating uncertainty and gradual transitions among categories.

5. Model Evaluation and Performance Analysis

The final evaluation stage compared the defuzzification results generated by the Mamdani Fuzzy Inference System $Z_{prediction}$ with the actual uang panai' values Z_{actual} to assess model accuracy and reliability. Model performance was evaluated using two metrics: Mean Absolute Error (MAE), which measures the average absolute difference between predicted and actual values, and Root Mean Square Error (RMSE), which gives greater weight to larger prediction errors. Thus, RMSE is more sensitive to significant deviations than MAE.

Table 5. Evaluation Results of the Mamdani Fuzzy Model

Evaluation Metric	Value
MAE	2.30
RMSE	2.47

Table 5 presents the evaluation results of the Mamdani fuzzy model, yielding MAE and RMSE values of 2.30 and 2.47, respectively. These values indicate relatively small differences between predicted and actual uang panai' amounts. The results suggest that the model provides satisfactory estimation performance by capturing the relationships among educational level, occupational status, and residential area. Furthermore, the Mamdani approach accommodates uncertainty and subjective socio-cultural factors through fuzzification, rule-based inference, and defuzzification. Overall, the proposed model

offers a systematic and quantitative framework for analyzing uang panai' estimation and demonstrates the potential of fuzzy logic in modeling complex socio-cultural decision-making processes.

D. Conclusion

This study developed a Mamdani Fuzzy Inference System to estimate *uang panai'* in Bugis–Makassar society by integrating three socio-cultural variables: educational level, occupational status, and residential area. The model addresses the uncertainty and subjectivity involved in determining *uang panai'*, which are influenced by social prestige, economic conditions, and cultural perceptions. Through fuzzification, fuzzy rule construction, inference, and defuzzification, the system transforms qualitative socio-cultural indicators into quantitative estimates.

The findings show that the model captures nonlinear relationships among the input variables and generates flexible estimations of *uang panai'*. Higher educational attainment, more stable occupational status, and urban residential areas generally correspond to higher estimated values. Model evaluation produced a Mean Absolute Error (MAE) of 2.30 and a Root Mean Square Error (RMSE) of 2.47, quantifying the differences between estimated and actual *uang panai'* values.

This study contributes to computational social science by integrating fuzzy logic into the analysis of socio-cultural decision-making in traditional marriage practices. The proposed approach offers a systematic and transparent framework for representing cultural-economic practices characterized by uncertainty and subjective interpretation. It also highlights the potential of fuzzy logic for modeling complex social phenomena involving qualitative variables and uncertain reasoning.

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