

Application of the MOORA and TOPSIS Methods in the Evaluation of Tax Administration Strategies based on Taxpayer Identification Numbers (NPWP), Services, Sanctions, and Taxpayer Understanding

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Abstract

Taxpayer compliance is a crucial factor in optimizing state revenue through the taxation sector. Although the number of taxpayers in Indonesia continues to increase, the level of voluntary compliance is still relatively low, so an effective tax administration strategy is needed to improve it. This study aims to analyze the influence of the benefits of Taxpayer Identification Number (NPWP), service quality, administrative sanctions, and tax understanding on taxpayer compliance, and determine the most optimal tax administration strategy using the Multi-Objective Optimization on the Basis of Ratio Analysis (MOORA) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods. This approach was chosen because it is able to provide objective and measurable analysis results based on complex criteria. The MOORA method is used to normalize and weight each criterion, while TOPSIS is used to determine the most ideal strategic solution. The results show that the strategy of increasing tax socialization and sending warning letters to taxpayers who violate is the most effective step to increase taxpayer compliance. Sensitivity analysis shows that the MOORA method has a better level of stability of results with an average sensitivity value of -1.61%, compared to TOPSIS at -7.96%. Thus, the MOORA method is considered more appropriate for use in the context of evaluating tax administration strategies. This research significantly contributes to the development of data-driven tax policies and enriches the literature on the application of multicriteria decision-making methods in tax administration in Indonesia.

Keywords: Tax Administration, Taxpayer Compliance, MOORA, Tax Understanding, TOPSIS.

INTRODUCTION

Taxpayer compliance is a key pillar in optimizing state revenue through the tax sector. In the Indonesian context, despite the increasing number of taxpayers, voluntary compliance remains relatively low. (Atarwaman, 2020) This emphasizes the importance of an effective tax administration strategy to improve compliance. (Dwi Istiqomah and Zifi, 2021). Factors such as the benefits of having a Taxpayer Identification Number (NPWP), the quality of tax services, administrative sanctions, and the level of taxpayer understanding of tax provisions are believed to influence taxpayers' decisions to comply or not. (Dwi Istiqomah and Zifi, 2021) To evaluate and prioritize the most effective strategies based on these factors, multi-criteria decision-making methods such as MOORA (Multi-Objective Optimization on

the Basis of Ratio Analysis) and TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) can be used because they are able to provide objective and measurable analysis results. (Brauers and Zavadskas, 2009; Trung, 2021)

The problem solving offered in this study has advantages compared to previous studies which tend to only analyze the relationship between variables such as tax understanding, sanctions, and service quality on compliance partially or using simple regression analysis. (Pravasanti, 2020) This study presents a multi-criteria approach by combining the MOORA and TOPSIS methods which are capable of evaluating and ranking various tax administration strategies simultaneously based on the weights and preferences of complex criteria. (Yazdani-Chamzini et al., 2013) The novelty of this research lies in the integration of two

complementary decision-making methods: MOORA to normalize and weight the criteria, and TOPSIS to determine the most ideal strategic solution.(Trung, 2021)This approach allows for more objective, comprehensive, and effective results in the context of data-driven tax policymaking. Furthermore, this research enriches the Indonesian tax literature with a quantitative approach, which is still rarely used in the context of tax administration, particularly in determining policy strategies aimed at improving taxpayer compliance.

The research problem formulation is: How do the benefits of NPWP, service quality, sanctions, and tax understanding influence taxpayer compliance, and which tax administration strategy is most optimal according to the MOORA and TOPSIS methods? The urgency of this research lies in the importance of analytical and systematic data in formulating tax strategies that are responsive to taxpayer behavior, in order to improve the tax administration system and encourage sustainable compliance. This research is also expected to be a reference for tax authorities in formulating more targeted and data-based policies.

LITERATURE REVIEW

1. Tax Administration

Tax Administration is all activities related to the management of the tax system, starting from taxpayer registration, determination, collection, to supervision and enforcement of tax law.(Lumban Gaol and Sarumaha, 2022)The primary goal of tax administration is to create an efficient, transparent, and fair system to ensure optimal state revenue. Good administration also plays a role in improving taxpayer compliance through effective service delivery and the application of strict sanctions for violations. Furthermore, modernizing tax administration through data digitization helps strengthen oversight and reduce the potential for tax leakage.(Atarwaman, 2020; Adiman, 2025).

2. Taxpayer Compliance

Taxpayer compliance is a condition in which taxpayers voluntarily and timely fulfill all their tax obligations in accordance with

applicable laws and regulations. This compliance includes reporting, calculating, and paying taxes correctly without coercion from the tax authorities. The level of compliance is influenced by factors such as tax understanding, the quality of tax authorities' services, the fairness of the tax system, and sanctions for violations. High compliance reflects public awareness of the importance of taxes as a primary source of state revenue.(Pravasanti, 2020).

3. Multi-Objective Optimization method on the basis of Ratio Analysis (MOORA)

The MOORA method was introduced by Brauers and Zavadkas (2006) as a multi-criteria decision-making method. This method has a high degree of flexibility and is easy to understand because it is able to separate the objectives of a process into decision-weighted criteria with several decision-making criteria.(García-Cascales and Lamata, 2012). In addition, the MOORA method also functions to optimize the objectives of each criterion, both beneficial and cost-effective, thereby helping decision-makers determine the best alternative objectively and measurably.

4. Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)

According to(Brauers and Zavadskas, 2009; Hwang et al., 2021)The TOPSIS method is based on the concept that the best alternative is the alternative that has the closest distance to the positive ideal solution and the furthest distance from the negative ideal solution. Furthermore, according to Kusumadewi et al. (2006), the TOPSIS method is used to determine the optimal solution by considering the relative proximity of each alternative to the ideal solution, thus being able to provide more objective and measurable decision-making results.

5. HTML

HTML (Hypertext Markup Language) is a page description language for creating hypertext or hypermedia documents. HTML inserts control codes at specific locations within a document at points you can specify that create links (hyperlinks) to other parts of the document or to other documents elsewhere on the World Wide Web. HTML embeds control codes within the ASCII text

of a document that display titles, headings, graphics, and multimedia components, as well as hyperlinks.(Nugroho, H., & Santoso, 2023)(Kusuma, A., & Wibowo, no date).

METHOD

This study uses a quantitative approach with a Multi-Criteria Decision Making (MCDM) method. This approach is applied to analyze and determine the most optimal tax administration strategy based on several criteria affecting taxpayer compliance. The research was conducted at the Demak Primary Tax Service Office (KPP Pratama Demak) in 2025. The selection of the research location was based on the need to evaluate tax administration strategies related to taxpayer compliance in the area. The population of this study consisted of all taxpayers receiving tax services at KPP Pratama Demak. The sample was determined using purposive sampling techniques, resulting in 100 respondents who had experience with tax services and understood tax administration procedures. Data collection in this study was carried out using two types of data sources:

Primary Data

Primary data were obtained through direct interviews with employees of KPP Pratama Demak and questionnaires distributed to taxpayers.

Secondary Data

Secondary data were collected from tax administration documents, scientific journals, literature reviews, and taxpayer visitor data at KPP Pratama Demak.

This study used four main criteria influencing taxpayer compliance, namely:

Code	Criteria
C1	Taxpayer Identification Number (NPWP)
C2	Service Quality
C3	Sanctions
C4	Taxpayer Understanding

The alternatives used in this research consisted of 100 taxpayer respondents.

This study applied the MOORA and TOPSIS methods to determine the best tax administration strategy.

- a. MOORA Method (Multi-Objective Optimization on the Basis of Ratio Analysis)

The steps of the MOORA method are as follows:

1. Constructing a decision matrix based on alternatives and criteria values.
2. Normalizing the decision matrix.
3. Determining criteria weights using the Rank Order Centroid (ROC) method.
4. Calculating the optimization value for each alternative.
5. Ranking alternatives based on the highest optimization value.

The MOORA method was selected because it provides objective and stable results in multi-criteria decision-making problems.

- b. TOPSIS Method (Technique for Order Preference by Similarity to Ideal Solution)

The TOPSIS method consists of the following steps:

1. Constructing the decision matrix.
2. Normalizing the decision matrix.
3. Creating the weighted normalized decision matrix.
4. Determining the positive ideal solution and negative ideal solution.
5. Calculating the distance of each alternative from the ideal solutions.
6. Computing preference values.
7. Ranking the alternatives based on preference values.

The TOPSIS method is used to identify alternatives that are closest to the positive ideal solution and farthest from the negative ideal solution.

Sensitivity analysis was conducted to measure the stability level of the MOORA and TOPSIS methods regarding changes in criteria weights. The analysis was performed by modifying the criteria weights and comparing the resulting changes in alternative rankings.

The method with the smallest sensitivity value is considered more stable and more appropriate for determining the optimal tax administration strategy.

RESULTS AND DISCUSSION

1. Data Types and Sources

To collect primary data, researchers conducted interviews with several members of the Demak Pratama Tax Service Office (KPP). Secondary data collection involved collecting visitor data from 100 visitors.

2. Research Variables

- Alternative (Ai)

The alternative variable used is the number of visitors to the Demak Pratama Tax Office in 2025, which consists of 100 visitors.

- Criteria (Cj)

The criteria variables for this case study include:

C1: Taxpayer Identification Number

C2: Service

C3: Sanctions

C4: Taxpayer Understanding

3. Analysis Steps

- Finding weights using Rank Order Centroid weighting

a. Determine the importance of each criterion

b. ROC weight calculation

- Multi-Objective Optimization on the basis of Ratio Analysis (MOORA)

a. Create a table of suitability ratings for each alternative for each criterion as in Table 1.

b. Create a decision matrix (X) formed from a table of suitability ratings for each alternative on each criterion.

c. Perform decision matrix normalization.

d. The results of the normalized performance rating values (r_{ij}) form a normalized matrix (R).

e. Calculate the optimization value by multiplying the ROC weight value by the criteria value.

- Preference by Similarity to Ideal Solution (TOPSIS)

a. Create a table of suitability ratings for each alternative on each criterion.

b. Create a normalized decision matrix based on the alternative data for each criterion.

c. Create a weighted normalized decision matrix.

d. Determine the positive ideal solution

matrix and the negative ideal solution matrix.

e. Determine the distance between the value of each alternative with the positive ideal solution matrix and the negative ideal solution matrix.

f. Determines the preference value for each alternative in the document.

g. Make a ranking based on preference values to obtain selection results.

h. Make a ranking based on preference values to obtain selection results.

- Perform sensitivity analysis to select the best method.

4. Weight Calculation

It can be seen that the number of research data used for each criterion is the same, namely 100. Based on Table 2, it can be seen that criterion C1 has an average value of 69.2 with a scoring range between 0 and 97.5, C2 has an average value of 192.6 with a scoring range between 110.5 and 331.5.

Table 1. Overall Data Description

Data	N	Min	Max	Average
C1	100	0	97.5	69.2
C2	100	110.5	331.5	192.6
C3	100	0	34.8	19.6
C4	100	0	1	0

5. Sensitivity Analysis

The ranking of MOORA and TOPSIS methods showed different results, so a sensitivity analysis is necessary to determine the best method. The steps in a sensitivity analysis are as follows:

a. Normalize the weights for each criterion obtained in step (a) by dividing the weights by 1.1.

b. Applying the new criteria weights obtained in step (b) in the MOORA and TOPSIS methods.

Table 2. MOORA ROC and TOPSIS ROC Method Preferences

Ran king	Alternative	MOORA ROC	Alternative	TOPSIS ROC
1	A63	0.08319	A63	0.96209
2	A49	0.07884	A49	0.90604
71	A35	0.03989	A95	0.46925

Table 3. MOORA Method Preferences on Changes in **C₁** and **C₂** Weights

Ran king	Alternative	MOORA 1	Alternative	MOORA 2
1	A63	0.08083	A63	0.08203
2	A49	0.07676	A49	0.07721
71	A53	0.04029	A65	0.04017

Table 4. MOORA Method Preference on Change of Weight of **C₃** and **C₄**

Ran king	Alternative	MOORA 3	Alternative	MOORA 4
1	A63	0.08230	A63	0.10999
2	A49	0.07766	A49	0.10604
71	A15	0.04009	A35	0.03626

Table 5. TOPSIS Method Preferences on Changes in **C₁** and **C₂** Weights

Ran king	Alternative	TOPSIS 1	Alternative	TOPSIS 2
1	A63	0.96047	A63	0.96037
2	A49	0.91025	A49	0.88756
71	A91	0.50333	A46	0.46414

Table 6. TOPSIS Method Preferences on Changes in **C₃** and **C₄** Weights

Ran king	Alternative	TOPSIS 3	Alternative	TOPSIS 4
1	A63	0.96382	A63	0.97729
2	A49	0.90351	A49	0.94362
71	A47	0.47729	A71	0.27598

- c. Calculate the percentage change in ranking (degree of sensitivity)

The percentage change in ranking calculated based on the 71 best alternatives is done by comparing how much ranking changes occur when compared to when using ROC weights. The percentage change in ranking from rank *i* can be calculated using the formula as in Equation (11).

Table 7. Percentage of Sensitivity

Criteria	MOORA	TOPSIS
C1	0.72022	7,03638
C2	0.36251	-0.85235
C3	0.44273	1.41420
C4	-7.94667	-39,44750
Average	-1.60530	-7.96232

In Table 7, the average sensitivity value of the MOORA method is -1.61%, while the TOPSIS method is -7.96%. So it can be concluded that the most appropriate method that can be used to obtain an optimal alternative solution in this case is the MOORA method.

CONCLUSION

Based on the results and discussion in this study, the government can obtain the right strategy to increase taxpayer compliance by increasing tax socialization efforts to help taxpayers increase their tax knowledge, as well as increasing the number of warning letters sent to taxpayers who violate as an effort to pressure them to carry out their obligations in accordance with the provisions of the law.

Meanwhile, the average sensitivity percentage value obtained for the MOORA method (-1.61%) was greater than that of the TOPSIS method (-7.96%). Therefore, it can be concluded that the most appropriate method to use in this case is the MOORA method.

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