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Simultaneous Importance-Performance Analysis based on SWOT in the Service Domain of Electronic-based Government Systems

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Abstract—Decision makers for decades have used SWOT analysis for strategic planning. However, the problems that arise in the SWOT analysis are subjective, so decision-making becomes inefficient. Therefore, SWOT analysis is often combined with other methods to make decision-making strategies more focused and measurable according to priority interests. The SWOT analysis basis in this study is Simultaneous Importance-Performance (SIPA) analysis by observing each indicator's weights. In addition, this study proposes a new method by focusing on competitor factors in strategies mapping to improve services for Electronic-Based Government Systems (SPBE). The object of this study was two local governments in Indonesia, namely the Meranti Islands Regency and the Limapuluh Kota Regency. The results showed that a SIPA-based SWOT analysis has succeeded in showing the Strengths, Weaknesses, Opportunities, and Challenges of the district government. Furthermore, based on the results of hypothesis testing, SIPA-based SWOT identification has reflected a valid organizational situation.

Keywords—Importance performance analysis; strength weakness opportunity threat analysis; service quality; electronic based government systems

I. INTRODUCTION

For approximately 60 years, Strengths, Weak, Opportunities, and Threat analysis (abbreviated as SWOT) have been a key and fundamental tool in strategic planning [1]. This analysis evaluates the organization's position to see its position in its internal and external environment. Strategic planning generally uses SWOT analysis, but the method is subjective and only focuses on solving weaknesses separately [2]–[4]. This problem is because the basis for SWOT analysis traditional approach is a qualitative analysis where SWOT factors tend to have a subjective view on the assessment of managers and planners, so they are considered inefficient and lead to wrong business decisions [2]. To prove its validity and accuracy, researchers often combine SWOT analysis with other techniques in various problems solving such as educational, industrial, agricultural, environmental, and economic [5]. The combination of SWOT analysis with other methods such as Analytical Hierarchy Process (AHP), Fuzzy AHP, Analytic Network Process (ANP), and Importance-Performance Analysis (IPA) shows that SWOT analysis is a flexible model

[2], [6]. Based on several combinations of these methods, the combination of the SWOT-IPA method is considered accurate and valid to describe the organizational situation. Initially, managers used the IPA method as a marketing tool. However, its application extended to various fields, such as tourism, teaching, food service, health care, money-saving, human resources, and data innovation [7]–[13]. We find that each indicator has equal weight in some of these areas. Nevertheless, in some instances, each measure may have a different weight and need to be compared with other research objects to see the difference.

The combined IPA and SWOT methods [14] have not involved the problem for each indicator's initial weight. However, the indicator's weight determines a value's importance and performance. In addition, the IPA method only considers internal organizational aspects and dismisses the company's external factors. One of the improvements to the IPA method, namely Simultaneous Importance-Performance Analysis (SIPA), is a modification of the IPA method that map the relationship between the importance and performance of product/service quality attributes [9], [13], [15]–[17]. The modification made by SIPA is to pay attention to competitors' aspects in an organization's analysis [18]. In order to reduce these two deficiencies, this study applied SIPA to identify SWOT based on an SPBE survey conducted by the central government and local governments (self-assessment). In order to evaluate the SPBE services in Indonesia, the government has formulated each factor's weight [19].

The authors hope that by using SWOT-based SIPA analysis, organizations (in this case, local governments) can formulate strategic planning efficiently because the SWOT factors that must be maintained and improved can be identified based on the community's point of view. This study compares two local governments, namely the Meranti Islands Regency and the Limapuluh Kota Regency. These two regencies' location is on the island of Sumatra, Indonesia, with almost the same area and population. However, the Meranti Islands Regency was only established in 2008 and is a division of the Bengkalis Regency. Therefore, to accelerate the implementation of e-government, it is necessary to map various indicators of strengths, weaknesses, opportunities, and challenges. This paper consists of six sections: Introduction,

literature review, proposed method, result, discussion, and conclusions.

II. LITERATURE REVIEW

A. SPBE Service Indicators

SPBE services, according to the Regulation of the Ministry of State Apparatus Utilization and Bureaucratic Reform of the Republic of Indonesia Number 59 of 2020 concerning Monitoring and Evaluation of Electronic-Based Government Systems, consist of measuring the organization's service capability [19]. Therefore, the indicators used to measure the maturity level of SPBE services are electronic-based government administration services and electronic-based public services. Furthermore, there are five levels of measurement for service capability maturity: information, interaction, transactions, collaboration, and optimum. Therefore, the indicators listed in the SPBE service domain can be described as the aspects of electronic-based government administration services and aspects of electronic-based public services as follows:

The aspect of Electronic-Based Government Administration Services, with the weight of each indicator (ω_i), is 0.0604.

- a) Indicator 1 Maturity Level of Planning Services.
- b) Indicator 2 Maturity Level of Budgeting Service.
- c) Indicator 3 Maturity Level of Financial Services.
- d) Indicator 4 Maturity Level of Procurement Services.
- e) Indicator 5 Maturity Level of Personnel Services.
- f) Indicator 6 Maturity Level of Dynamic Archival Services.
- g) Indicator 7 Maturity Level of State/Regional Property Management Services.
- h) Indicator 8 Maturity Level of Government Internal Supervision Services.
- i) Indicator 9 Maturity Level of Organizational Performance Accountability Services.
- j) Indicators of 10 Maturity Level of Employee Performance Service.

The aspect of Electronic-Based Public Services, with the weight of each indicator (ω_i), is 0.0659.

- a) Indicator 11 Maturity Level of Public Service Complaints Service.
- b) Indicator 12 Maturity Levels of Open Data Services
- c) Indicator 13 Maturity Level of Documentation Network and Legal Information
- d) Indicator 14 Maturity Level of Public Service Sector 1
- e) Indicator 15 Maturity Level of Public Service Sector 2
- f) Indicator 16 Maturity Level of Public Service Sector 3.

B. Simultaneous Importance-Performance Analysis (SIPA)

SIPA is a modification of IPA which added competitor factors in evaluating the organization [20]. The description for

some of the stages in conducting the SIPA analysis is as follows:

Step 1. Define the weight ω_i of each SPBE service indicator by expert or government regulation, which i is the number of attributes.

Step 2. Collect data through questionnaires performance (χ_{ij}), and importance (γ_{ij}) indicator of item i in the local government j as χ_{ij} and γ_{ij} multiplied with ω_i . Then, calculate the performance and importance as formula (1).

$$\bar{\chi}_{ij} = \omega_i \cdot \chi_{ij}; \bar{\gamma}_{ij} = \omega_i \cdot \gamma_{ij} \quad (1)$$

Step 3. The coordinates of SIPA are then divided by equation (2). Then, a judgment on the quadrant SPBE service indicator should be put on each local government (see Fig. 1).

$$\bar{\chi} = \frac{\sum_{i=1}^l \sum_{j=1}^k \bar{\chi}_{ij}}{K}; \bar{\gamma} = \frac{\sum_{i=1}^k \sum_{j=1}^l \bar{\gamma}_{ij}}{K} \quad (2)$$

Fig. 1 shows quadrant 1 (top priority), quadrant 2 (keep achievement), quadrant 3 (low priority), and quadrant 4 (excessive).

Step 4. Summarize and categorize the results as below:

If the indicator is in quadrants 1 and 4, it is labeled strength. If the indicator is in quadrants 2 and 3, it is labeled weakness.

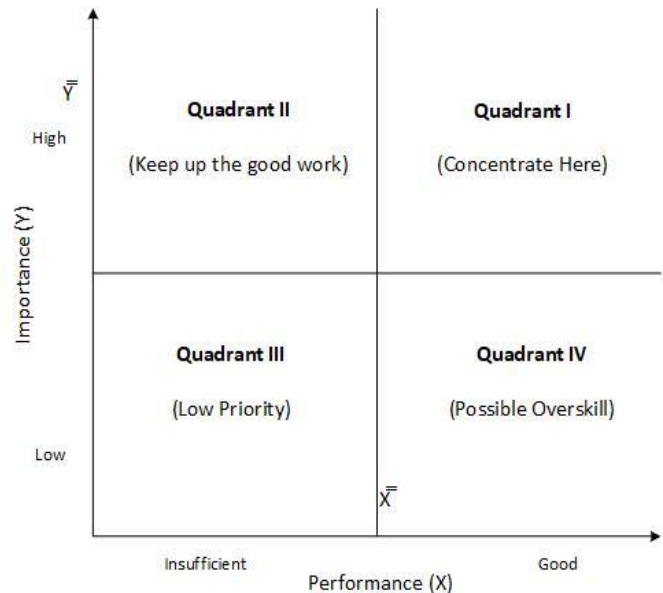


Fig. 1. IPA Matrix [21].

C. Strength, Weakness, Opportunity, and Threat (SWOT) Analysis

The analysis of strengths (S), weaknesses (W), opportunities (O), and threats (T) (SWOT) summarizes the central elements taken by studying the external and internal environment of each organization. Strengths include the organization's internal capabilities, resources, and positive situational factors in achieving its goals. On the other hand,

Weaknesses are internal limitations and negative situational factors that can hinder the organization [3]–[5]. The SWOT table generates the Importance-Performance analysis results, with the researchers' provisions in Table I.

TABLE I. SWOT IDENTIFICATION TABLE

Strength-Weakness		SWOT Aspect	Implication
Organization	Competitor		
S	S	S	Head-to-head competition
	W	O	Competitive advantage
W	S	T	Competitive disadvantage
	W	W	Neglected opportunities

III. PROPOSED METHOD

The method proposed in this study consists of several stages: filling out questionnaires by the central government (performance) and local governments (importance). Then the second step is to simultaneously conduct an importance and performance analysis on a local government and competitors. Finally, the results of the SIPA analysis become the basis for a SWOT analysis in a local government. Fig. 2 describes the proposed method.

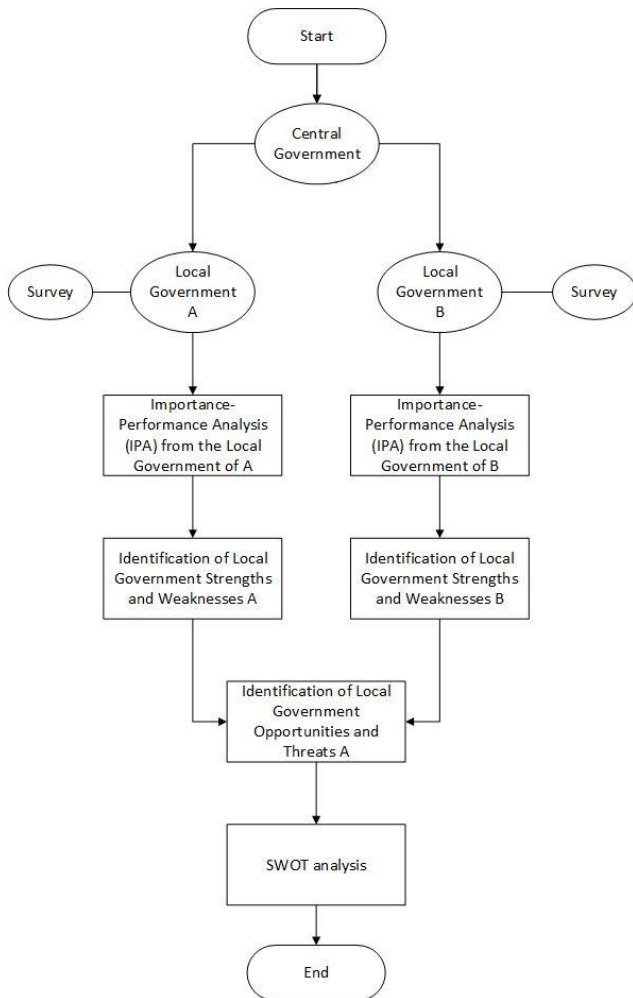


Fig. 2. Proposed Method.

IV. RESULT

A. Case Studies in the Meranti Islands Regency and Limapuluh Kota

This study reviewed two local governments of the Meranti Islands Regency and Limapuluh Kota Regency, Indonesia. These two local governments have almost the same area and population. However, the Meranti Islands local government is still quite young because of the expansion of the Bengkalis Regency. The Meranti Islands Regency has the vision to create good, clean, and responsible governance to provide excellent service, including implementing SPBE. Therefore, the Meranti Islands Regency needs a special strategy to map the appropriate needs and activities to achieve its goals.

B. SIPA Analysis

Based on the results of the SIPA analysis, the importance value was obtained from an independent assessment by Meranti Regency (district A) and Limapuluh Kota Regency (B). Meanwhile, the researchers used a questionnaire to obtain the performance value from a central government assessment through the Ministry of Administrative and Bureaucratic Reform of the Republic of Indonesia. The questionnaire to fill out is on the web <https://monev.spbe.go.id/>. Each indicator value is multiplied by its weight and entered in the corresponding quadrant. The quadrant determination is as follows:

- 1) If the performance value (χ_{ij}) is less than the overall average value $\sum \chi_{ij}$, it falls into the insufficient category. On the contrary, if the performance value exceeds the overall average value, it falls into the good category.
- 2) If the value is importance (γ_{ij}) less than the average value of the overall importance $\sum \gamma_{ij}$, then it falls into the low category. On the contrary, the importance value is more than the overall average value, so it falls into the high category.

Table II shows that in District A, the indicators in quadrant 1 (Q1) are 9, 13, and 14. While in quadrant 2 (Q2) is indicator number 1-4, 12, 15-16. In quadrant 3 (Q3), there are indicator numbers 6-8 and 10-11. District B's indicators in quadrant 1 (Q1) are 2, 4, 11, and 15. In Q2, its indicator number is 16; in Q3, the indicator numbers are 6-9 and 13. Finally, in quadrant 4 (Q4), the indicator is 1, 3, 5, 12, 14.

Fig. 3 and Fig. 4 show more detail on the IPA matrix. The pictures show that the value in quadrant 1 is an indicator value with high importance (high) and good performance (good), so the indicators in this quadrant can be maintained. Whereas quadrant 2 shows high importance indicator values (high) but poor performance values (insufficient), it is an indicator that must be aware. Organizational concentration needs to focus on increasing the value of these indicators. Quadrant 3 contains the indicators of importance value that are less important (low) and have poor performance (insufficient), so they are indicators with low priority. Quadrant 4 contains low importance indicators (low) but good performance (good), so the indicators in this quadrant are excessive, allowing them to be the final priority.

TABLE II. IMPORTANCE-PERFORMANCE OF THE TWO DISTRICT

Indicator	District A			District B		
	I	P	IPA Quadrant	I	P	IPA Quadrant
Indicator 1	0.181	0.060	Q2	0.181	0.242	Q4
Indicator 2	0.181	0.060	Q2	0.242	0.242	Q1
Indicator 3	0.181	0.060	Q2	0.181	0.242	Q4
Indicator 4	0.181	0.060	Q2	0.242	0.242	Q1
Indicator 5	0.181	0.060	Q2	0.181	0.242	Q4
Indicator 6	0.060	0.060	Q3	0.181	0.181	Q3
Indicator 7	0.060	0.060	Q3	0.181	0.181	Q3
Indicator 8	0.060	0.060	Q3	0.181	0.181	Q3
Indicator 9	0.181	0.121	Q1	0.181	0.181	Q3
Indicator 10	0.060	0.060	Q3	0.181	0.181	Q3
Indicator 11	0.066	0.066	Q3	0.264	0.264	Q1
Indicator 12	0.198	0.066	Q2	0.198	0.264	Q4
Indicator 13	0.198	0.132	Q1	0.198	0.132	Q3
Indicator 14	0.198	0.132	Q1	0.198	0.330	Q4
Indicator 15	0.198	0.066	Q2	0.264	0.264	Q1
Indicator 16	0.198	0.066	Q2	0.264	0.198	Q2
Average	0.149	0.074	-	0.207	0.222	-

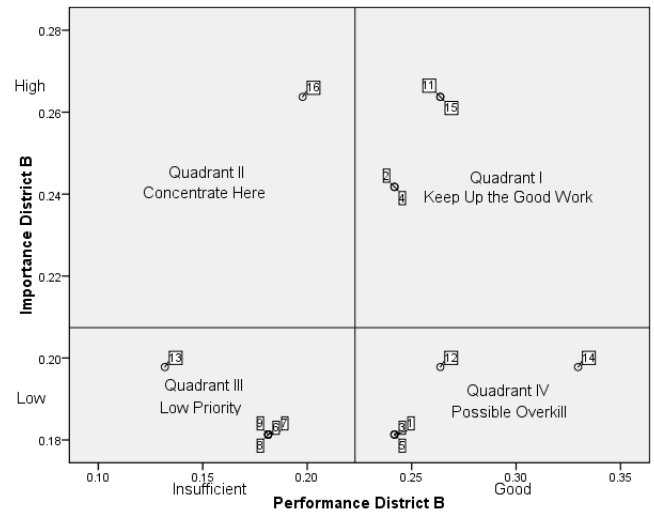


Fig. 4. IPA Quadrant for District B.

15 Based on the results in Fig. 3 and Fig. 4, the next step is to create the Strength-Weakness table. If the indicator is in quadrants 1 and 4, the label is strengths, and if it is in quadrants 2 and 3, the label is weakness. According to the SWOT identification in Table I, a SWOT analysis was formed for District A. The researchers calculate the aggregate weight value from the importance value multiplied by the final performance. The sign (-) indicates Threat or Weakness, while the sign (+) on the Aggregate Weight indicates Strength or Opportunity. Table III shows the SWOT analysis of District A in detail.

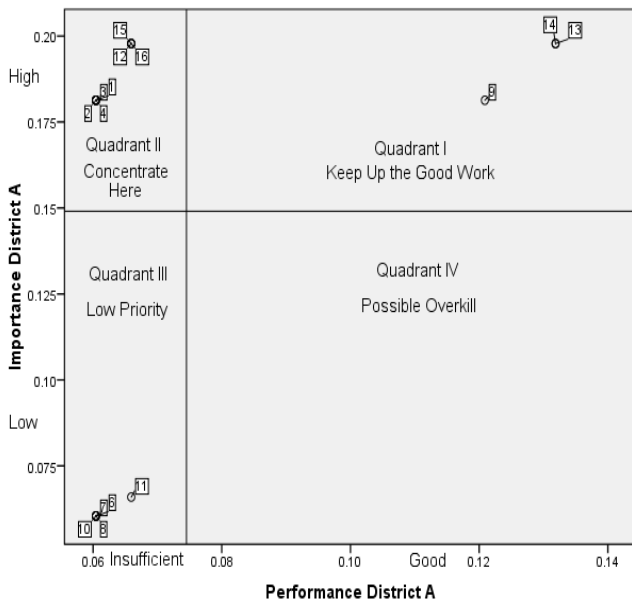


Fig. 3. IPA Quadrant for District A.

TABLE III. STRENGTH-WEAKNESS OF DISTRICT A

Indicator	Strength-Weakness		SWOT District A	Aggregate weight*
	District A	District B		
Indicator 1	Weakness	Strength	Threat	-0.0109
Indicator 2	Weakness	Strength	Threat	-0.0109
Indicator 3	Weakness	Strength	Threat	-0.0109
Indicator 4	Weakness	Strength	Threat	-0.0109
Indicator 5	Weakness	Strength	Threat	-0.0109
Indicator 6	Weakness	Weakness	Weakness	-0.0036
Indicator 7	Weakness	Weakness	Weakness	-0.0036
Indicator 8	Weakness	Weakness	Weakness	-0.0036
Indicator 9	Strength	Weakness	Opportunity	0.02191
Indicator 10	Weakness	Weakness	Weakness	-0.0036
Indicator 11	Weakness	Strength	Threat	-0.0043
Indicator 12	Weakness	Strength	Threat	-0.0130
Indicator 13	Strength	Weakness	Opportunity	0.02608
Indicator 14	Strength	Strength	Strength	0.02608
Indicator 15	Weakness	Strength	Threat	-0.0130
Indicator 16	Weakness	Weakness	Weakness	-0.0130

* Compute by multiplying the importance by positive/negative performance (for strength, opportunity/weakness, threat)

Table III shows the indicators in the SWOT category in District A,

Strength:

Indicator 14 Maturity Level of Public Service Sector 1.

Opportunity:

1) Indicator 9, Maturity Level of Organizational Performance Accountability Services.

2) Indicator 13, Maturity Level of Documentation Network and Legal Information.

Threat:

1) Indicator 1, Maturity Level of Planning Service.

2) Indicator 2, Maturity Level of Budgeting Service.

3) Indicator 3, Maturity Level of Financial Services.

4) Indicator 4, Maturity Level of Procurement Services.

5) Indicator 5, Maturity Level of Staffing Services.

6) Indicator 11, Maturity Level of Public Service Complaints Service.

7) Indicator 12, Maturity Level of Open Data Services.

8) Maturity Level of Public Service Sector 2.

Weakness:

1) Indicator 6, Maturity Level of Dynamic Archival Service.

2) Indicator 7, Maturity Level of State/Regional Property Management Services.

3) Indicator 8, Maturity Level of Government Internal Oversight Services.

4) Indicator 16, Maturity Level of Public Service Sector 3.

Thus, 8 threat and 4 weakness indicators should be an important concern of stakeholders in determining the priorities of the SPBE implementation strategy in District A.

V. DISCUSSION

We tested the results using a questionnaire to ascertain whether the proposed method has met stakeholders' satisfaction. We used another questionnaire of 6 District A staff respondents to clarify these findings. The survey is done for evaluation purposes since there is no direct method or tool to validate the effectiveness of an IPA-based SWOT analysis [2]. The evaluation questionnaire consisted of closed questions asking the respondents' approval level in District A for the results of the IPA-based SWOT analysis shown in Table IV. Each question uses a score of a four-point Likert scale (1 = Strongly disagree to 4 = Strongly agree) without a midpoint that acts as a neutral choice. The hypothesis formulated is as follows:

H_0 : The mean response is equal to 2.5.

H_a : The mean response is not equal to 2.5.

The tested hypothesis is at a significance level of 5%, with one sample t-test analysis shown in Table IV.

TABLE IV. STRENGTH-WEAKNESS OF DISTRICT A

Variable	Mean	SD	Mean difference	t	df	Sig. (2-tailed)
W_{avg}	3.08	0.10	0.58	12.124	3	0.001
O_{avg}	3.58	0.12	1.08	13	1	0.049
T_{avg}	3.25	0.31	0.75	6.87	7	0.000

Table IV shows that the average respondent's weakness, opportunity, and threat assessments are at 3.08, 3.58, and 3.25. Whether to accept or reject the hypothesis shown from the calculated t values on weakness, opportunity, and threat, respectively, namely 12.124, 13, and 6.87, with degrees of freedom 3, 1, and 7. This data shows that the table t values for weakness, opportunity, and threat are 3.182, 12.71, and 2.365.

The decision-making is done by comparing the calculated t -values and t of the table. When observed, the calculated t values for weakness, opportunity and threat are greater than t of the table; this means the results reject H_0 . Similarly, when viewed from the significance values of the three variables below 0.05, it also rejects H_0 . This result means that the respondent (District A staff) agreed with the IPA-based SWOT results Strengths, Weaknesses, Opportunities, and Threats. Based on the analysis, this model is recommended for decision-making by considering the weight of the criteria and competitor factors.

VI. CONCLUSION

This research results from implementing a SIPA based SWOT analysis that measures the level of importance as a representation of expectations from the organization to performance assessed by other parties. This method also considers the weights on each of the indicators and also the competitors of an organization. Taking into account internal and external factors, shows that district A has 8 indicators of threat and 4 indicators of weakness out of 16 indicators of electronic-based government system services. In this analysis, respondents confirmed and approved the results regarding the Strengths, Weaknesses, Opportunities, and Threats of District A on the SPBE service indicator. Thus, this model can be used for decision-making by considering the weights of indicators and competitor factors in various cases. The future work in this research is to combine the SWOT method with other methods, such as the Simple Additive Weighting (SAW), Technique for Order by Similarity to Ideal Solution (TOPSIS), Profile Matching (PM), and other appropriate procedures. Further development can also be focused on the number of additional research objects.

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