

# Typological Analysis of Regional Development Gap of Baubau City and Hinterland Regency

Arief Maulid Madi

Postgraduate School of Regional Planning and Development  
Hasanuddin University Makassar, Indonesia

Muh. Yusri Zamhuri

Faculty of Economy and Business Hasanuddin University  
Makassar, Indonesia

Mahyuddin

Faculty of Agriculture Hasanuddin University  
Makassar, Indonesia

**Abstract:-** This study aims to analyze the factors affecting the development gap in Baubau City, Buton Regency, North Buton Regency, South Buton Regency, Central Buton Regency, and Wakatobi Regency. Then, formulate a typology of development gaps in Baubau City, Buton Regency, North Buton Regency, South Buton Regency, Central Buton Regency, and Wakatobi Regency. This research is descriptive research that uses a quantitative approach to analyze development gaps between regions using numerical data to draw analytical conclusions. The data required for this study are secondary data obtained from statistical publications by the Central Statistics Agency (BPS). To achieve the objectives of the study, the analysis is carried out in two stages. PCA analysis techniques, Shannon entropy index, are used to analyze the factors affecting the development gap and TOPSIS to measure the development gap between regions in the area of Baubau City and Hinterland Regency. Then to determine the typology of gaps between regions based on the characteristics of each region using quadrant analysis. The results showed that there is a significant gap in resource development between Baubau City and districts in the interior, especially in terms of accessibility, economic development, social, physical and infrastructure development, as well as regional resources. Then, based on these differences, 3 typologies of development gaps were found, namely typology 1 as a relatively developed area (Baubau City), typology 2 as a relatively rapidly developing area (Buton Regency, North Buton Regency, and Wakatobi Regency), and typology 3 (South Buton Regency, Central Buton Regency) as a relatively underdeveloped area.

**Keywords:-** Regional Development, Gap Typology, PCA, Shannon entropy index, TOPSIS, Quadrant analysis.

## I. INTRODUCTION

Regional development is a journey towards a better life for society by optimizing artificially and institutionally available natural resources [1]. However, each region has unique conditions and it is important to note that these conditions are not always the same. Baubau City is designated as a Regional Activity Center (PKW) with its service area covering the Southeast Sulawesi archipelago and serves as a transportation hub for several regions in Eastern Indonesia. As a result, there is a relationship between Baubau City and its Hinterland Regency consisting of Buton, South

Buton, Central Buton, Wakatobi, and North Buton. The city of Baubau acts as the main city or center for growth while the surrounding regency is the hinterland region.

As a center of growth, Baubau City serves as a central location for population concentration. The high population growth rate of 20.26% in Baubau City compared to the 7.72% growth rate in surrounding regencies in the last decade shows the high dependence on Baubau City and reduced development in the surrounding regencies consisting of Buton, South Buton, Central Buton, Wakatobi, and North Buton. A comparison between the economic growth rate, Gross Regional Domestic Product (GRDP) per capita and Human Development Index (HDI) between regencies/city shows that Baubau City is relatively developed, but surrounded by regencies with varying levels of development. In terms of economic development, only Baubau City and Wakatobi Regency have an economic growth rate above the growth rate of Southeast Sulawesi Province (>6.5%). However, the hinterland region experienced fluctuating and slow economic growth, even declining. This decline in economic growth causes a weakening of the economic competitiveness of each Regency / city and also as a whole interconnected region. Looking at the Human Development Index (HDI), only Baubau City has a score above the average of Southeast Sulawesi Province (>71.25), while all hinterland regencies have a score below the average [2]. In terms of basic infrastructure development, hinterland areas such as North Buton Regency, South Buton Regency, and Central Buton Regency are still inadequate. There are even some villages that are still isolated due to poor accessibility. In light of this, steps need to be taken by the Southeast Sulawesi provincial government and their respective regencies/city to prevent further widening development gaps.

The purpose of this study was to analyze the factors affecting the development gap in Baubau City, Buton Regency, North Buton Regency, South Buton Regency, Central Buton Regency, and Wakatobi Regency. Then, formulating a typology of development gaps in Baubau City, Buton Regency, North Buton Regency, South Buton Regency, Central Buton Regency, and Wakatobi Regency, can be classified based on various indicators in a multidimensional manner.

### A. Problem Statement

Based on the background above, the formulation of the problem in this study is What is the typology of the development gap in Baubau City, Buton Regency, North Buton Regency, South Buton Regency, Central Buton Regency, and Wakatobi Regency?

### B. Study Objectives

The purpose of this study was to analyze the factors affecting the development gap in Baubau City, Buton Regency, North Buton Regency, South Buton Regency, Central Buton Regency, and Wakatobi Regency. Then, formulating a typology of development gaps in Baubau City, Buton Regency, North Buton Regency, South Buton Regency, Central Buton Regency, and Wakatobi Regency, can be classified based on various indicators in a multidimensional manner.

## II. LITERATURE REVIEW

Development is explained as the progress of human beings and their efforts in organizations as a result of the action potential created by the growth of science and technological production [3]. Regional development entails a comprehensive and multidimensional undertaking that encompasses profound transformations in social frameworks, communal perspectives, and national institutions [4]. Anwar in Ratnasari argues that regional development leads to equity that supports economic growth and sustainability [5]. Based on these definitions, the purpose of development is to improve people's welfare evenly through increasing economic growth and income equality [6]. Regional development indicators can be divided into three groups, namely indicators based on regional development goals, indicators based on development resource capacity, and indicators based on development processes [7]. In another opinion, development indicators can also be divided into six dimensions, namely demography, employment, economic structure and performance; education, income and poverty; innovation and technology [8].

Inequality between regions is common and can lead to unemployment, poverty, and low quality of human resources [9]. To overcome these problems, policies are needed that

can realize balanced regional development [10]. Some factors that cause inequality between regions include differences in demographic conditions, concentration of regional economic activities, allocation of development funds between regions, differences in natural resource content, lack of smooth mobility of goods and services, and management between overlapping sectors [6], [10], [11]. The gap between regions can be seen from the economic, social, and territorial fields. Within the economic sphere, indicators used include economic performance, economic structure, development potential, and labor [13]. In the social sphere, the indicators used include the level of life of the population, social infrastructure, and social pathologies [5]. Within the territorial scope, the indicators used include physical-geographical potential, environmental, traffic infrastructure, and technical infrastructure.

There are several methods that can be used to analyze development inequalities between regions such as Principal Component Analysis (PCA), Technique for Others Reference by Similarity to Ideal Solution (TOPSIS), Shannon Entropy Index, Quadrant Analysis. Previous research has shown that there are several typologies of regions based on economic development performance indices and local resource potential [14]. Another study showed that although all countries recorded economic growth, the development gap between countries remained wide [15]. Other studies show that there are 4 types of inequality groups, namely group 1 is very advanced, group 2 is advanced, group 3 is quite advanced, and group 4 is less advanced [16].

## III. METHODS

### A. Type of Study

This research is descriptive research that uses a quantitative approach to analyze development gaps between regions using numerical data to draw analytical conclusions.

### B. Location of Study

The study was conducted in Southeast Sulawesi Province, Indonesia. Focusing on Baubau City and its hinterland regencies, consisting of Buton Regency, South Buton Regency, Central Buton Regency, Wakatobi Regency, and North Buton Regency.

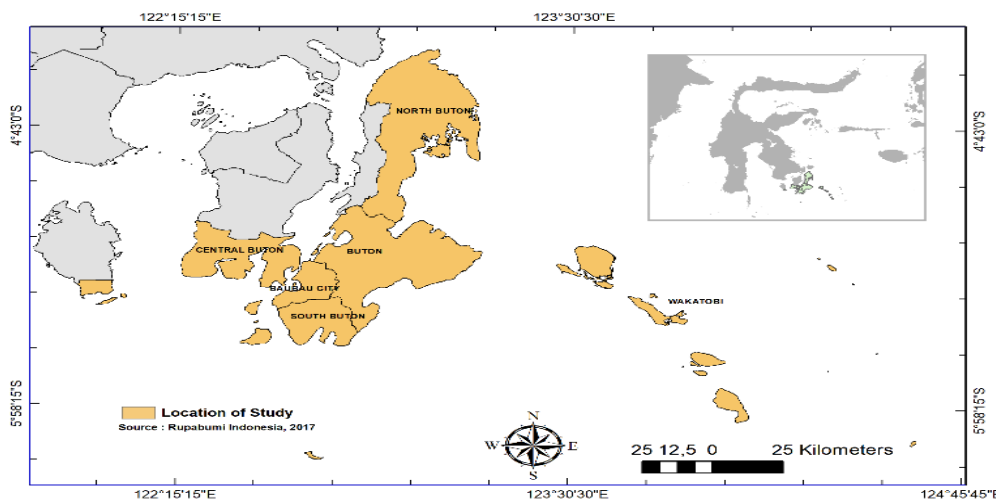


Fig. 1: Location of Study

### C. Data Collection

The data required for this study are secondary data obtained from statistical publications by the Central Statistics Agency (BPS), such as Southeast Sulawesi Province in Figures, Village Potential Data, administrative boundary maps, land use maps, and road network maps.

### D. Data Analysis

To achieve the research objectives, the analysis was carried out in three stages. The first stage is to analyze the factors that affect the development gap in the Baubau City and Hinterland Regency areas on the scale of village/kelurahan areas which measures the level of regional resource development. The second stage is to analyze the factors that affect the development gap in the scale of regencies/city and then measure the level of regional development performance gaps based on dimensions economic, social, physical and infrastructure, and regional resource development (results of analysis in the first stage). Then the third stage is to determine the typology of gaps between regions based on the characteristics of each region. The data used in this analysis are Village Potential Data for 474 villages/kelurahan from 5 regencies and 1 city in 2021, population data in 2021, land cover data in 2021, and Southeast Sulawesi in Figures 2021.

#### ➤ Analysis of the Level of Regional Resource Development

There are 25 indicators from 6 dimensions analyzed in this stage, namely: **Demographics** (number of population, population's density, number of productive age population), **Employment** (percentage of population working in the primary sector, percentage of the population working in the secondary sector, percentage of the population working in the tertiary sector), **Education Level** (percentage of population graduated from secondary education, percentage of population graduated from diploma education, percentage of population graduated from higher education), **Health Facilities** (ratio of health facilities per 1000 population, ratio of health workers per 1000 population), **EducationFacilities** (ratio of elementary schools per 1000 population, ratio of junior high schools per 1000 population), **EconomicFacilities** (ratio of financial institutions per 1000 populations, ratio of trading facilities per 1000 populations, percentage of households using PLN), **Accessibility** (distance to the regency capital, distance to regional activity centers, travel time to the regency capital, accessibility to educational facilities, and accessibility to health facilities, accessibility to economic facilities.), **Land Use** (ratio of road length to area, Ratio of agricultural land area to area, ratio of built-up land area to area) [17]–[22].

To identify factors affecting the gap in regional resource development, the Principal Component Analysis (PCA) is used. PCA is a statistical technique used to analyze data by looking for correlations between observed indicators. To determine whether an indicator is worthy of PCA analysis, several measures can be used. One method is to check the correlation of matrices between indicators. High correlation indicates that indicators can be grouped into homogeneous indicators to form general factors or constructs. Another method is to check partial correlations

between indicators while controlling for other indicators. The Anti-image indicator value must be greater than 0.5 for the indicator to be feasible. Kaiser-Meyer Olkin (KMO) and Bartlett's Test of Sphericity can also be used to determine data adequacy. KMO values must be greater than 0.50 and the significance level of the Bartlett Sphericity Test must be less than 0.05 for data to be considered worthy of analysis. PCA results are used to determine the weighted factor value by multiplying the percentage variance value as the weight and the resulting principal component factor score. The formula is as follows [17], [23]:

$$V = (W_m \times \text{Score}_n) \quad (1)$$

Description:

V = Weighted factor value

$W_m$  = Percentage variance of principal component m

Score = Principal component score

N = Village n

After obtaining the weighted Factor value using PCA Analysis, then proceed to create a composite index by normalizing the weighted factor value with a normalization method based on maximum and minimum values. The equation is as follows [24], [25]:

$$V_{ij} = \frac{(X_{ij} - X_{\min ij})}{(X_{\max ij} - X_{\min ij})} \quad (2)$$

$$V_{ij} \geq 0$$

$$V_{ij} \in [0, 1]$$

Description:

$V_{ij}$  = Composite Factor Index

$X_{ij}$  = Weighted Factor Score

$X_{\min}$  = Minimum Factor Score

$X_{\max}$  = Maximum Factor Score

The results of this analysis will then be visualized in a map with the help of Arc-GIS software.

#### ➤ Analysis of development performance gaps between regions

This stage aims to analyze the factors that affect the development gap and then to measure the level of development performance gap in each Regency/city based on regional development achievement indicators. The indicators used are grouped into 4 dimensions with the following details: **Economic Development Performance** (GDP percapita, total GDP contribution to provinces, primary sector GDP contribution, secondary sector GRDP contribution, tertiary sector GRDP contribution, primary sector GRDP LQ value, secondary sector GRDP LQ value, tertiary sector GRDP LQ value, local government revenue, number of industries, foreign investment, domestic investment), **Social Development Performance** (per capita expenditure, labor force size, gini ratio, average length of schooling, life expectancy, open unemployment rate, poverty rate, school participation rate, stunting prevalence), **Physical and Infrastructure Development Performance**

(percentage of asphalt road length, percentage of villages with clean water source from PDAM, Percentage of villages with availability of mobile phone network and internet, Percentage of villages with availability of sewage system) [6], [7], [12], [26]–[28]. The results of the analysis in the first stage will also be based on the average of composite index of each factor resulting from the PCA analysis will also be measured the level of inequality at this stage as the **Level of Regional Resource Development**.

The analysis technique used in gap analysis between regions is using the TOPSIS analysis technique. However, to determine factors that affect the development gap, PCA analysis cannot be performed because data units that do not meet the requirements for PCA, so weighting to determine factor is done using another weighting technique, namely the Shannon Entropy Index. Shannon Entropy Index is a method used to determine the weights or importance of different criteria or factors in a decision-making process. The higher the entropy value, the more important the factor [20]. The stages are as follows:

- Create a TOPSIS decision matrix as shown in the following table:

Table 1: TOPSIS Decision Matrix

	$W_1$	$W_1$	$W_j$	...	$W_m$
	$C_1$	$C_1$	$C_j$	...	$C_m$
$A_1$	$X_{1,1}$	$X_{1,2}$	$X_{1,j}$	...	$X_{1,m}$
$A_2$	$X_{2,1}$	$X_{2,2}$	$X_{2,j}$	...	$X_{2,m}$
$A_i$	$X_{i,1}$	$X_{i,2}$	$X_{i,j}$	...	$X_{i,m}$
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
$A_n$	$X_{n,1}$	$X_{n,2}$	$X_{n,j}$	...	$X_{n,m}$

Where,  $A_i$  describes the Regency/City;  $C_j$  describes regional development performance indicators;  $W_j$  describes the weight of the indicator, and  $X_{ij}$  describes the level of development of the village area of the village as measured from the indicator  $j$ .

- Calculate the weight of each indicator based on the initial data matrix using the Shannon Entropy Index value with the following Equation [15], [29]:

$$S = \frac{-\sum_{i=1}^n \sum_{j=1}^m P_{ij} \ln P_{ij}}{S_{\max}} \quad (3)$$

Information:

$S$  = Shannon Entropy Index

$I$  = Region

$P_i$  = Value of frequency ratio of events in Regency / City  $i$

$S_{\max}$  = Maximum Entropy value, i.e.,  $\ln(n \text{ units})$

Where:

$$0 \leq S \leq 1$$

After obtaining the Entropy Index value, the difference in the index coefficient is calculated with the following formula [15], [30]:

$$D_j = 1 - S \quad (4)$$

After obtaining the index value of the coefficient difference, the index value is normalized to obtain the final weight value of the indicator with the following formula [15], [30]:

$$W_j = \frac{D_j}{\sum_{j=1}^n D_j} \quad (5)$$

- The next step is to normalize the indicator matrix with the following formula:

$$n_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}} \quad (6)$$

- Then calculate the weighted normalization matrix using the weights of the PCA analysis results with the formula below:

$$v_{ij} = W_i n_{ij} \quad (7)$$

Description:

$V_{ij}$  = Weighted Normalized Indicator

$W_m$  = Entropy Weight

$n$  = Normalized Indicator

$ij$  = Regions  $i$  to  $j$

The determination of the positive ideal solution matrix and the negative ideal solution matrix is carried out where the positive ideal solution ( $A^+$ ) and the negative ideal solution ( $A^-$ ) can be determined based on the normalized weight ( $V_{ij}$ ) with the following formula:

$$A^+ = \{(v_1^+, v_2^+, \dots, v_n^+)\} = \{(\max v_{ij} | i \in O), (\min v_{ij} | i \in I)\} \quad (8)$$

$$A^- = \{(v_1^-, v_2^-, \dots, v_n^-)\} = \{(\min v_{ij} | i \in O), (\max v_{ij} | i \in I)\} \quad (9)$$



- The determination of the Euclidean distance between the values of each alternative with the matrix of positive and negative ideal solutions is carried out by the following formula:

$$d_i^+ = \left[ \sum_{j=1}^n (v_{ij} - v_j^+)^2 \right]^{1/2} \quad \forall_j \quad (10)$$

$$d_i^- = \left[ \sum_{j=1}^n (v_{ij} - v_j^-)^2 \right]^{1/2} \quad \forall_j \quad (11)$$

- The basis of the TOPSIS method is to choose an alternative that has the closest distance to the positive ideal solution and has the farthest distance to the negative ideal solution. The calculation of proximity relative to an ideal solution where the relative proximity of alternatives  $A_j$  to  $A^+$  is defined as follows:

$$R_j = \frac{d_j^-}{d_i^+ + d_j^-} \quad (12)$$

Where:

$$\begin{aligned} d_j^- &\geq 0 \\ d_j^+ &\geq 0 \\ R_j &\in [0, 1] \end{aligned}$$

- To measure the level of inequality in each dimension and in aggregate, the calculation of the coefficient of variation (CV) of the development dimension index

value is classified according to the regencies/city. The coefficient of variation is used to see the level of diversity of regional development in each regencies/city. The greater the value of the coefficient of variation, the greater the diversity between regional members so that the level of regional inequality that occurs is higher [17], [28]. The coefficient of variation is calculated by comparing the standard deviation of the level of regional development achievement with the average value of regional development achievement expressed in percent as in the following formula [17], [28]:

$$Cv = \frac{Sp}{P_{wil}} \times 100 \quad (13)$$

Information:

$Cv$  = variance of the coefficient

$Sp$  = Standard Deviation

$P_{wil}$  = Average value of regional development

#### ➤ Determination of regional gap typology

To determine the typology of regional gaps in 6 regencies/city, the scope of research is to use descriptive statistical methods. This method aims to synthesize the similarity of the size of each dimension that has been analyzed before, namely the Economic Development Performance Index, Social Development Performance Index, Infrastructure Development Performance Index, and Regional Resource Development Index. Mapping is done using a cartesian diagram that divides into four quadrants [5]. In this study, the division of the four quadrants is based on a horizontal line that shows the value of the first-dimension index (function  $y$ ) and a vertical line shows the value of the second-dimension index. the next step is to draw the typology results into a map using Arc-GIS software.

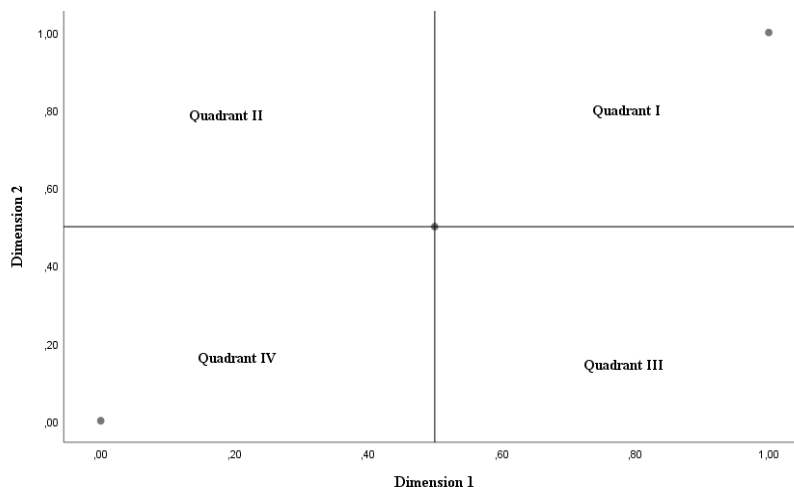


Fig. 2: Scatterplot Quadrant Analysis

There are four quadrants in the scatter plot, namely[31]

:

- First Quadrant (High-High): the region whose both dimension has a high value and can be categorized as a developed region.
- Second Quadrant (High-Low): Areas whose quadrant dimensions describe conditions are not yet ideal, but regions have the ability to develop local potential as developing areas.
- Third Quadrant (Low-High): is a quadrant that is also not ideal as quadrant II because of the slow growth of dimensions to develop local potential and can be categorized as a depressed area.

- Fourth Quadrant (Low-Low): is the least ideal quadrant because both dimensions have low values and can be categorized as underdeveloped areas.

Furthermore, a recapitulation was carried out to obtain the final typology which is the conclusion of the overall results of the previous quadrant analysis by calculating scores using a ranking system, scoring with details of the first quadrant with a score of 4, the second quadrant with a score of 3, the third quarter with a score of 2, and the fourth quadrant with a score of 1[32]. Class determination is done based on the value of  $R_j$  (total score) and standard deviation ( $S_p$ ) [24] (table 2). Then categorization is carried out and visualized on a map.

Table 2: Gap Typology Classification

Value of $R_j$	Level	Class
$R_j > (\bar{R}_j + (S_p))$	High	1
$(\bar{R}_j - (S_p)) \leq P \leq (\bar{R}_j + (S_p))$	Moderate	2
$R_j \leq (\bar{R}_j - (S_p))$	Low	3

Information:

$R_j$  = Total score

$\bar{R}_j$  = Average score

$S_p$  = Standard Deviation

#### IV. RESULTS AND DISCUSSION

##### A. Results of the analysis of regional resource development

Based on the calculation of the main component analysis method, the following results are obtained. Of the 25 variables analyzed, there were 8 variables that had to be excluded from the analysis stage because they did not meet the eligibility requirements for analysis (Anti Image value greater than 0.5 and Communality value greater than 0.5) [33].

Based on the Kayser Meyer Olkin Test (KMO) and Bartlett's Test showing a value of 0.829 where the value is greater than 0.50 and the value of Bartlett's Test Sphericity (Sig.) 0.000 is less than 0.05, the PCA analysis at this stage can be continued because it has met the feasibility requirements for analysis. Based on an eigenvalue greater

than 1, 5 factors are formed which are the main factors that are mutually free, and these five factors are able to describe a cumulative diversity of 73.066% (table 4). Based on the loading factor, it can be explained indicators that correlate with each other in a major component that is considered adequate to conduct further analysis [34], [35].

**Component 1** shows a marked positive correlation with indicators: percentage of population graduated from college graduated education, percentage of population graduated from diploma education, percentage of population graduated from secondary education, percentage of population working in tertiary sector, number of productive age population, number of populations. This component is able to describe a variance of 38.46%. This component can be called a new factor, namely the quality of human resources. This shows that the greater a region's score in this component, the higher the added value for each of those correlated indicators.

Table 3: Anti-image value (partial correlation) and communalities

No.	Indicators	Anti-Image	Communalities
1.	Populations	0.775	0.851
2.	Number of productive age populations	0.777	0.852
3.	Percentage of populations employed in the tertiary sector	0.899	0.907
4.	Percentage of populations graduated from secondary education	0.945	0.955
5.	Percentage of populations graduated from diploma education	0.884	0.911
6.	Percentage of college graduate populations	0.909	0.914
7.	Population's density	0.781	0.772
8.	The ratio of road length to area	0.758	0.607
9.	The ratio of built-up land area to area	0.773	0.824
10.	Ratio of health facilities per 1000 populations	0.525	0.551
11.	Ratio of elementary school per 1000 populations	0.844	0.567
12.	Ratio of junior high school per 1000 populations	0.815	0.554
13.	Ratio of financial institutions per 1000 populations	0.606	0.715
14.	Ratio of trading facilities per 1000 populations	0.588	0.572
15.	Distance to regional activity center	0.655	0.564
16.	Access to educational facilities	0.769	0.678
17.	Access to health facilities	0.837	0.628

Table 4: Eigenvalue principal component

Component	Eigenvalue		Cumulative (%)
	Total	% of Variance	
1	6.537	38.455	38.455
2	1.891	11.124	49.579
3	1.587	9.334	58.913
4	1.302	7.661	66.575
5	1.104	6.491	73.066
6	.841	4.947	78.013
7	.768	4.517	82.531
8	.709	4.169	86.700
9	.618	3.638	90.338
10	.547	3.219	93.557
11	.390	2.295	95.852
12	.308	1.813	97.666
13	.195	1.145	98.811
14	.095	.558	99.369
15	.056	.331	99.700
16	.050	.295	99.995
17	.001	.005	100.000

Table 5: Factor Loading (Varimax Normalization Matrix)

No.	Indicators	Main components				
		1	2	3	4	5
1.	Percentage of college graduate populations	0.944				
2.	Percentage of populations graduated from diploma education	0.944				
3.	Percentage of populations graduated from secondary education	0.941				
4.	Percentage of populations employed in the tertiary sector	0.933				
5.	Number of productive age populations	0.784				
6.	Populations	0.780				
7.	The ratio of built-up land area to total area		0.833			
8.	Population's density		0.830			
9.	The ratio of road length to total area		0.754			
10.	Access to educational facilities			0.765		
11.	Distance to regional activity center			-0.705		
12.	Access to health facilities			0.647		
13.	Ratio of health facilities per 1000 populations				0.687	
14.	Ratio of elementary school per 1000 populations				0.672	
15.	Ratio of junior high school per 1000 populations				0.651	
16.	Ratio of financial institutions per 1000 populations					0.827
17.	Ratio of trading facilities per 1000 populations					0.633

**Component 2** is formed by a significant and positive correlation between the indicators The ratio of road length to area, the ratio of built-up land area to area, and population's density. This component is able to describe a variance of 11.12%. This component can also be referred to as a new factor, namely the level of urbanity.

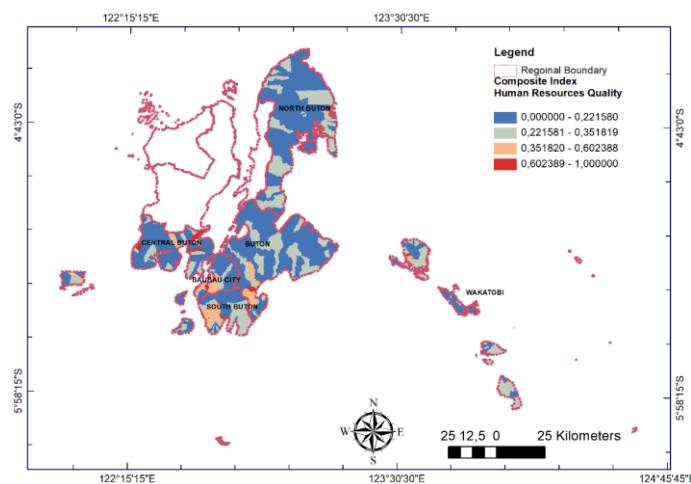


Fig. 3: Spatial distribution of human resource quality index

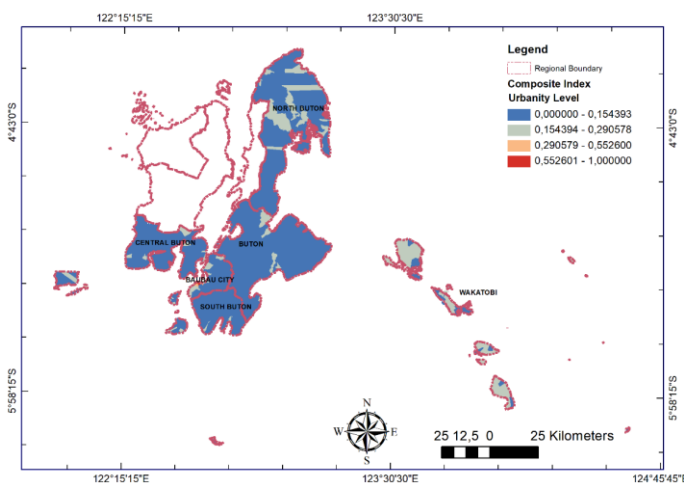


Fig. 4: Spatial distribution urbanity level index

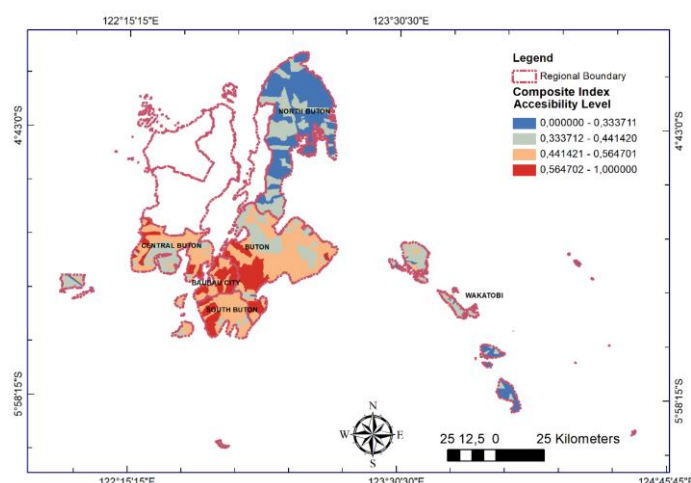


Fig. 5: Spatial distribution of accessibility level index

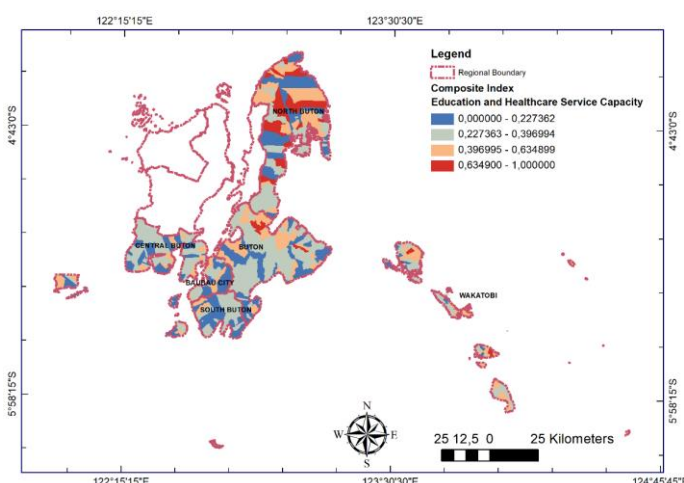


Fig. 6: Spatial distribution of education and health service

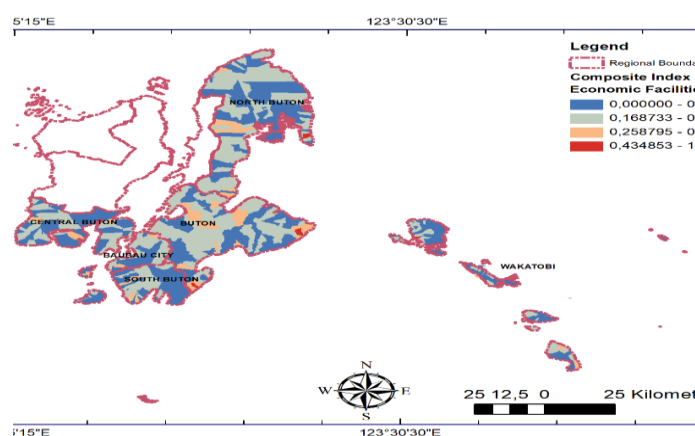


Fig. 7: Spatial distribution economic facilities capacity index

**Component 3** is formed by a significant and positive correlation between the indicators of the ratio of health facilities per 1000 populations, the ratio of elementary school per 1000 populations and the ratio of junior high schools per 1000 populations. This component is able to describe a variance of 9.33%. This component can also be

called a new factor, namely the capacity of health and education facilities.

**Component 4** is formed by significant and positive correlation is formed by indicators distance to regional activity centers, Access to educational facilities and access to health facilities. This component is able to describe a



variance of 7.66%. This component can be referred to as the level of accessibility.

**Component 5** is formed by a significant and positive correlation between the indicator the ratio of financial institutions per 1000 populations, and the ratio of trading facilities per 1000 populations. This component is able to describe a variance of 6.49%. This component is called the capacity of economic facilities.

Based on the results of the PCA analysis in **figure 3**, in general, villages or *kelurahan* that have the highest composite index value of human resource quality factors (0.602 – 1.000) are in areas close to the growth center of each regency or city. This suggests that these regions have higher populations, a higher percentage of people employed in the tertiary sector and better levels of education. Meanwhile, villages that have low composite index values in the quality of human resources are located farther from the center of growth and the center of government in each regency. Then, villages that have high composite index values of human resource quality factors tend to be in coastal villages, while villages that have low composite index values are in villages that are more to the hinterland. Based on these findings, it shows that there is a gap in the quality of human resources between villages located in areas closer to the center of growth compared to villages located farther from the center of growth. This causes a considerable backwash effect because the availability of quality human resources is only concentrated in growth centers so that the gap caused is widening. For this reason, efforts are needed to improve the quality of human resources in the hinterland region to reduce the gap between coastal areas and hinterland.

**Figure 4** shows that there is a significant gap in the composite index of urbanity level factors, where villages that have a high level of urbanity are only found in Baubau City, while in the hinterland area, the urbanity level is only in the range of 0 to 0.290. In hinterland regencies, the village that should be the center of growth in each regency only has an index between 0.154 and 0.290. This shows a fairly low urban level compared to the villages in Baubau City. Wakatobi Regency has a more moderate composite index value. This is more due to the high level of density because the area of Wakatobi Regency is quite small when compared to the population.

In **figure 5**, it is clear that the proximity factor to baubau city has a major effect on the level of accessibility of each village. The closer a village is to Baubau City, the easier the access to education and health services in the area. This can be seen from the position of south Buton Regency, buton regency, and central buton regency which have a composite index of accessibility level factors that are higher than other hinterland regencies. However, among the five hinterland regencies, North Buton Regency is the regency with the lowest accessibility index, which is between 0 to 0.333. This is due to the geographical position of North Buton Regency which is quite isolated and the low quality of road infrastructure, as well as the difficulty of access to

the regency by sea. On the other hand, although Wakatobi Regency is separated by the sea, the government's policy that establishes the regency as a national tourism strategic area, has improved the quality of accessibility both land, sea, and air in the region. This further strengthens the position of wakatobi regency as one of the leading tourist destinations in indonesia.

In **figure 6**, it can be seen that the distribution of composite factors of education and health service capacity tends to be better in hinterland regencies. This is indicated by the highest composite index value, which is 0.634-1.000, found in North Buton Regency, Buton Regency, and Wakatobi Regency. This means that the ratio of the availability of health facilities and basic education to 1000 populations in the hinterland sub-regency area is better than the Baubau City area or regencies closer to Baubau City, such as South Buton Regency and Central Buton Regency. Based on this, it can be concluded that the capacity factor of education and health facilities tends to be more evenly distributed.

**Figure 7** shows the spatial distribution of the composite index of economic facility capacity factors at the village level. Based on this figure, the distribution of the composite index of economic facility capacity factors tends to be more even, although there are several villages in the hinterland region that have quite high values, namely between 0.434 to 1.000, such as in Buton Regency, North Buton Regency, and Wakatobi Regency. This is more due to the smaller population of the village. Based on these conditions, it can be concluded that the availability of economic facilities both in terms of the availability of trade facilities and financial institutions is quite evenly distributed.

As a conclusion of this stage, the average composite index of each factor at the regency level is based on **table 6**. It can be observed that Baubau City has a higher resource development index compared to hinterland Regency, where the highest index is found in the accessibility level factor of 0.603, and the lowest in the economic capacity-facility factor of 0.209. Then followed by Buton Regency which has the highest index also at the level of accessibility and the lowest at the level of urbanity. While in other hinterland regencies, the distribution is still quite evenly distributed at a lower level than Buton Regency and Baubau City.

Table 6: Average of Composite Index Regional Resource Development Factors at the Regency/City Level

No.	Regency/City	HRQI	UI	ALI	HEFCI	EFCI
1.	Buton	0.213	0.132	0.490	0.322	0.205
2.	North Buton	0.250	0.144	0.311	0.395	0.195
3.	South Buton	0.244	0.139	0.481	0.235	0.164
4.	Central Buton	0.241	0.135	0.471	0.291	0.178
5.	Wakatobi	0.235	0.237	0.357	0.353	0.175
6.	Baubau City	0.329	0.318	0.603	0.310	0.209

**Footnote:** HRQI = Human Resources Quality Index; UI = Urbanity Index; ALI= Accesibility Level Index, HEFCI = Health and Education Facility Capacity Index; EFCI= E Economic Facility Capacity Index.

#### B. Results of the Analysis of Development Performance Between Regions

Based on weighting carried out using the shannon entropy index value (**table 7**), it was found that the performance dimensions of physical development and infrastructure had the highest average weighting. While the indicators with the highest weight sequentially are the urbanity level indicator (0.570) on the resource development level dimension, the percentage of villages with the availability of waste disposal

systems (0.475) on the physical and infrastructure development performance dimension, the domestic investment indicator (0.425) on the economic development performance dimension, and the open unemployment rate indicator (0.355) on the social development performance dimension. Furthermore, the weighted value of each indicator is reanalyzed using TOPSIS analysis to produce an output index of development performance on each dimension.

Table 7: Weighting of indicators based on shannonentropy index value

No.	Dimension	Indicators	Entropy Weight
1.	Economic Development Performance	GDP per capita	0.011
		GDP Contribution to Provinces	0.038
		Primary Sector Contribution	0.019
		Secondary sector contribution	0.012
		Tertiary Sector Contribution	0.016
		Primary Sector LQ Value	0.020
		Secondary Sector LQ Value	0.012
		Tertiary Sector LQ Value	0.022
		Local Government Revenue	0.068
		Number of Industries	0.109
		Foreign Direct Investment	0.251
		Domestic Investment	<b>0.423</b>
2.	Social Development Performance	Per capita expenditure	0.074
		Total Workforce	0.204
		Gini Ratio	0.017
		Average Length of School	0.060
		Life expectancy	0.003
		Open Unemployment Rate	<b>0.355</b>
		Poverty Rate	0.136
		School Enrollment Rate	0.094
		Prevalence of Stunting	0.056
3.	Physical and Infrastructure Development Performance	Percentage of Asphalt Road Length	0.025
		Percentage of villages with Clean Water source from PDAM	0.188
		Percentage of villages with availability of mobile phones and internet networks	0.312
		Percentage of villages with available garbage disposal systems	<b>0.475</b>
4.	Regional Resources Development	HR Quality Index	0.088
		Urbanity Index	<b>0.570</b>
		Accessibility Level Index	0.197
		Health and Education Facility Capacity Index	0.110
		Economic Facility Capacity Index	0.036

In **table 8**, the number of TOPSIS Index values for the aggregate of all dimensions is presented, namely the economic development performance dimension, social development performance dimension, infrastructure

development performance dimension, and regional resource development dimension. Based on the table, it is known that Baubau City has the highest Index value compared to other regencies, which is 0.751. While hinterland regency consists

of two categories, namely Buton Regency and Wakatobi Regency, having a medium performance level index. Meanwhile, North Buton Regency, South Buton Regency, and Central Buton Regency have low performance levels.

Furthermore, based on the value of the coefficient of variance of 0.595, this shows that the level of regional development performance gap in Baubau City and hinterland regencies is still at a moderate level.

Table 8: TOPSIS index and aggregate rating of all dimension

No.	Regency/City	Index TOPSIS	Rating
1.	Buton	0.342	3
2.	North Buton	0.191	5
3.	South Buton	0.192	4
4.	Central Buton	0.177	6
5.	Wakatobi	0.368	2
6.	Baubau City	0.751	1
	CV	0.595	Moderate

From **table 9**, it can be seen that the performance of economic development in the Baubau City area and the hinterland area of the Regency is still at a moderate performance level, based on an average Index value of 0.239. Although the performance level of economic development in Baubau City is high, which is 0.812, this figure cannot be matched by hinterland Regency. North Buton Regency (0.041), South Buton Regency (0.027), and Central Buton Regency (0.028) had the lowest performance on this dimension. This significant difference causes a high level of inequality in the Baubau City area and the hinterland area of the Regency in the dimension of economic development performance, which is 120.26%.

The striking difference is due to the gap that occurs in indicators of local original income, the number of industries, foreign investment, and domestic investment. This shows that the hinterland region which has low performance on the dimension of economic development has not become an attractive investment destination for investors who want to invest in the region. This also has implications for low industrial growth and has not been optimal for the region in increasing local original income through regional original income.

Table 9: TOPSIS index and economic development performance rating

No.	Regency/City	Index TOPSIS	Rating
1.	Buton	0.395	2
2.	North Buton	0.041	4
3.	South Buton	0.027	6
4.	Central Buton	0.028	5
5.	Wakatobi	0.129	3
6.	Baubau City	0.812	1
	CV	120.26%	Very High

In **table 10**, it shows the level of social development performance in the area of Baubau City and its hinterland Regency. Based on the average performance level of each region, which is 0.592, it can be stated that the level of social development performance in the Baubau City area and internal regencies is at a moderate level. In social development performance, Hinterland Regency has a better Index value compared to Baubau City as the center of growth, where Buton Regency (0.722) and Wakatobi Regency (0.772) have the highest scores. While Baubau City has the lowest value compared to its Hinterland Regency, which is 0.329. While North Buton Regency (0.638), South Buton Regency (0.525), and Central Buton Regency (0.563) have medium performance levels. Based on these figures, it is known that the level of inequality that occurs is still at a low level, which is 24.47% because the difference in performance levels in this dimension is not so large.

From these findings, it can be concluded that there is a gap in the level of social development performance, although not so large. This is due to differences in indicators of open unemployment, labor force, and poverty rate, each of which has the highest weight. Baubau City has the highest open unemployment rate indicator compared to hinterland Regency. However, Baubau City also has the lowest poverty rate and the highest labor force compared to hinterland regency. This condition affects the value of the performance level of each region, so the level of gap that occurs is also not so large.

Table 10: TOPSIS index and performance rating of social development

No.	Regency/City	Index TOPSIS	Rating
1.	Buton	0.722	2
2.	North Buton	0.638	3
3.	South Buton	0.525	5
4.	Central Buton	0.563	4
5.	Wakatobi	0.772	1
6.	Baubau City	0.329	6
	CV	24.47%	Low

**Table 11** presents the performance level of physical and infrastructure development in the Baubau City area and hinterland area. Based on this analysis, it is known that Wakatobi Regency (0.485) and Baubau City (0.817) are the regencies / city with the highest performance level value compared to other regencies, while North Buton Regency (0.119) and Central Buton Regency (0.165) are hinterland regencies that have the lowest performance level. The results of this analysis show that Baubau City has significant differences with its hinterland Regency. This condition causes a high level of inequality in the performance dimension of regional physical and infrastructure development, which is 79.71%.

These findings show significant gaps in indicators shaping the performance level of physical development and infrastructure of the region. The difference in percentage indicators with the availability of mobile phone and internet networks and the availability of temporary waste disposal systems that have the highest weight contribute significantly to the high level of inequality in this dimension. This condition shows that hinterland regencies such as North Buton Regency and Central Buton Regency which have low performance level values require more attention to the availability of communication infrastructure and supporting infrastructure for environmental comfort such as the availability of temporary waste disposal systems.

Table 11: TOPSIS index and performance rating of physical and infrastructure development

No.	Regency/City	Index TOPSIS	Rating
1.	Buton	0.208	4
2.	North Buton	0.119	6
3.	South Buton	0.222	3
4.	Central Buton	0.165	5
5.	Wakatobi	0.485	2
6.	Baubau City	0.817	1
	CV	79.71%	High

**Table 12** presents the level of development of regional resources in Baubau City and its hinterland region. Based on the analysis that has been done, it is known that Baubau City (0.951) has the highest Index, followed by Wakatobi Regency (0.542), while in addition to the two regencies/city have a low Index value Buton Regency with (0.131), North Buton Regency (0.113), South Buton Regency (0.128), and Central Buton Regency (0.119). Based on these results, it is known that there is a significant difference in numbers between Baubau City and Wakatobi Regency and other

regencies. This condition causes a very high gap rate of 104.9%.

This high inequality condition is caused by significant differences in indicators of urbanity and accessibility levels in each region. This shows that between Baubau City and its hinterland Regency, there is still a high rural-urban gap. This is also known based on previous PCA analyses. Similarly, there are differences in accessibility conditions in each region, where areas that tend to be closer to Baubau City have better accessibility.

Table 12: TOPSIS index and performance rating of regional resource development

No.	Kabupaten/Kota	Index TOPSIS	Rating
1.	Buton	0.131	3
2.	North Buton	0.113	6
3.	South Buton	0.128	4
4.	Central Buton	0.119	5
5.	Wakatobi	0.542	2
6.	Baubau City	0.951	1
	CV	104.9%	Very High

### C. Results of Typology Analysis of Development Gaps Between Regions

In **figure 8** presented a typology of gaps based on economic development performance and social development performance, Baubau City has a relatively high economic

development performance, but not followed by social development performance where Baubau City has the lowest social development performance compared to surrounding regencies. The best performance was actually recorded by Buton Regency which had high economic development

performance and was also followed by high social development performance. This shows that Buton Regency is able to maintain the consistency of socio-economic development even though there has been a division of its territory up to 5 times.

Wakatobi Regency and North Buton Regency have good social development performance but are not followed

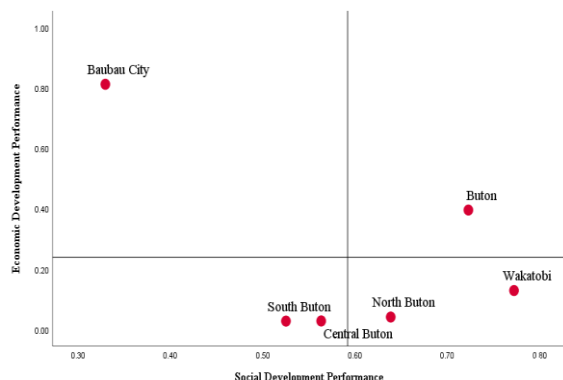


Fig. 8: Gap typology based on economic development performance index and social development performance index

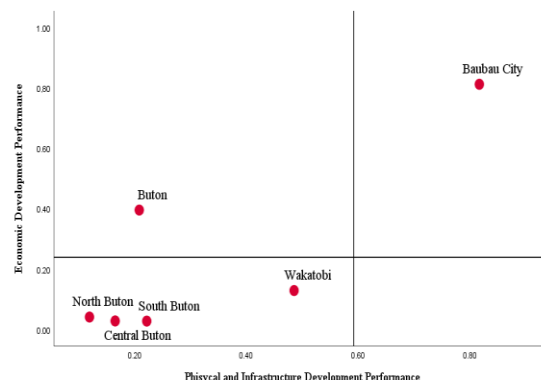


Fig. 9: Gap typology based on economic development performance index and physical and infrastructure development performance index

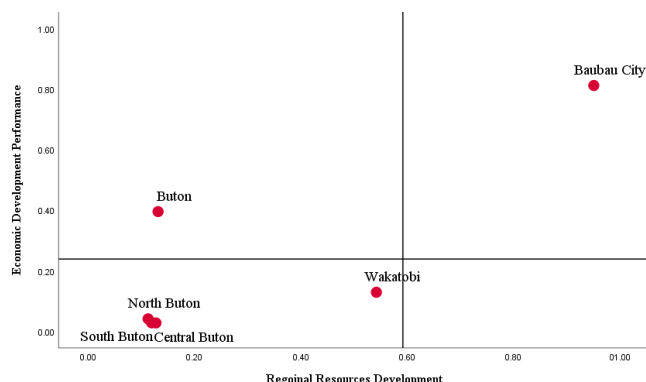


Fig. 10: Gap typology based on economic development performance index and regional resource development index

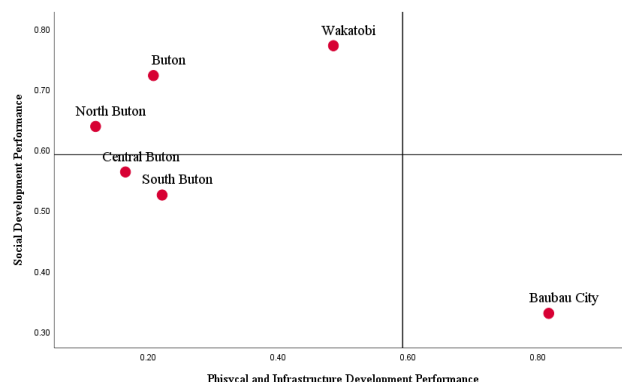


Fig. 11: Gap typology based on social development performance index and physical and infrastructure development performance index



Fig. 12: Gap typology based on social development gap index and regional resource development index

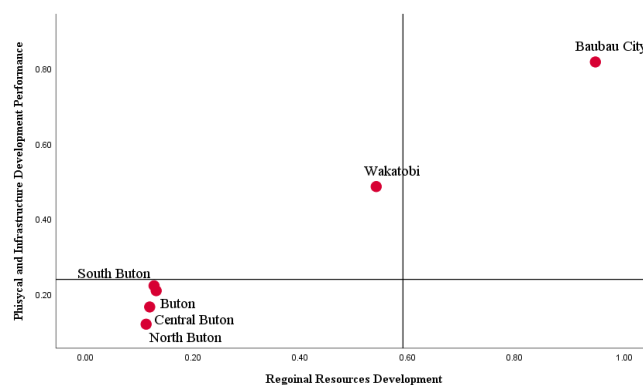


Fig. 13: Gap typology based on physical and infrastructure development performance index and regional resource development index

by good economic development performance so that based on these two dimensions of development, North Buton Regency and Wakatobi Regency are included in the category of depressed areas. While South Buton Regency and Central

where economic development performance is relatively high and physical and infrastructure development performance is also relatively high. Buton Regency is included in the category of regencies that have rapid growth due to their high



economic development performance even though they have physical and infrastructure development performance that is still at a low level. Wakatobi Regency is included in the category of depressed areas because although the performance of physical and infrastructure development is good, it is not followed by the performance of economic development where the economic development performance of Wakatobi Regency is still lower than Buton Regency and Baubau City, while North Buton Regency, South Buton Regency and Central Buton Regency are included in the category of relatively underdeveloped areas because they have these two dimensions.

In **figure 10**, presented a typology of gaps based on the economic development performance index and regional resource development index. Based on this typology, Baubau City is better positioned due to its high economic development performance and relatively high regional resource development index. then followed by Buton Regency which is included in the category of fast-growing regions because although the regional resource development index is relatively low, Buton Regency is able to accelerate economic development performance. Wakatobi Regency is in an area that is included in the depressed category because although Wakatobi Regency has local potential Based on the regional resource development index, it is still unable to accelerate the performance of economic development in the region. Meanwhile, North Buton, South Buton, and Central Buton are included in the category of relatively underdeveloped regions because they have low values in both dimensions.

In **figure 11**, presented a typology of gap based on the social development performance index and the physical and infrastructure development performance index. Based on the typology of the region, it can be seen that Wakatobi Regency is in a better condition than Baubau City and other hinterland regencies. Where, Wakatobi Regency has a high social development performance index and a high physical and infrastructure development performance index. Meanwhile, Buton Regency and North Buton Regency are included in the category of creative areas that are growing rapidly because although Buton Regency and North Buton Regency have lower physical and infrastructure development performance, on the other hand they also have higher social development performance.

Baubau City is included in the category of depressed areas because although it has better infrastructure development performance than hinterland regency, Baubau

City has lower social development performance than hinterland regency. This shows that although Baubau City has advantages in physical and infrastructure development, it is not followed by better social development performance. Meanwhile, Central Buton Regency and South Buton Regency have low social development performance and low physical and infrastructure development performance, so these two regencies are included in the category of relatively underdeveloped areas.

**Figure 12** presents a typology of gaps based on the social development performance index and the regional resource development index. Based on this typology, wakatobi regency is in an area that is relatively more developed than baubau city and other hinterland regencies. This is due to wakatobi regency which has a high regional resource development performance index, as well as a higher social development performance index. As for Buton Regency and North Buton Regency, although they have a low regional resource development index, they are still able to optimize the potential of their regional resources so that they have higher social development performance. Therefore, both regencies can be categorized as fast-growing regions in terms of social development performance. Baubau City has the best regional resource development index compared to hinterland regency, but it is not followed by good social development performance. In fact, its index value is the lowest compared to hinterland counties. So, it can be said that although baubau city has much better resource development, it has not been optimal in improving social development performance. Meanwhile, central buton regency and south buton regency have low social development performance, as well as low regional resource development performance. Therefore, the two regencies can be categorized as relatively underdeveloped areas.

**Figure 13** illustrates the typology of gaps based on the physical and infrastructure development performance index and the regional resource development index. Based on this typology, baubau city and wakatobi regency are in a relatively more advanced category than other hinterland regencies because they have higher resource development and higher physical and infrastructure development performance. Meanwhile, South Buton Regency, Buton Regency, Central Buton Regency, and North Buton Regency have low development performance and low regional resource development so that these four regencies can be categorized as relatively underdeveloped areas.

Table 13: Recapitulation of gap typology assessment based on quadrant analysis

Regency/City	Q1	Q2	Q3	Q4	Q5	Q6	Total Score	Class
Buton	4	3	3	3	3	1	17	2
North Buton	2	1	1	3	3	1	11	2
South Buton	1	1	1	1	1	1	6	3
Central Buton	1	1	1	1	1	1	6	3
Wakatobi	2	2	2	4	4	4	18	2
Baubau City	3	4	4	2	2	4	19	1
Footnote: Q= Quadrant Typology							(S <sub>p</sub> )	5.459
							(R <sub>j</sub> )	12.833

After gap typology analysis, the results of the analysis are summarized into a recapitulation and each quadrant position for each Regency/city is given a score value. The total score is divided into 3 typology groups based on standard deviation and mean value ( $R_j$ ). The range of score scores has been divided into grade 1 ( $R_j > 18.814$ ), grade 2 ( $6.853 < R_j < 18.14$ ), and grade 3 ( $R_j > 6.853$ ). Based on this division, Baubau City and Hinterland Regency can be divided into 3 typological groups (Fig. 14.), which are as follows:

- **Typology 1** is the area with the highest score (19) considered as high development area, namely Baubau City. The characteristics of this typology are that people have high intelligence, high population density with intensity and land use dominated by developed areas that are also high. Then the availability of trade facilities and financial institutions is better so that economic activities are also better when compared to the hinterland area of the Regency, then in terms of the availability of education and health facilities are also better. In this typology also the performance of economic development is much better and the performance of physical development is better. Compared to hinterland regency however, despite the positive performance on economic, physical and infrastructural dimensions, it was not followed by good social development performance due to the high unemployment rate in the Baubau City area.
- **Typology 2** is considered as relatively moderate development area, namely Buton Regency (17), Wakatobi Regency (18), and North Buton Regency (11). The characteristic of the region in this typology is that there are people who have high intellect seen from the distribution of education levels and types of work of populations but are still concentrated in the capital of their respective regencies and there are still many populations

in the region in this typology whose intellectual quality is still low, especially in rural areas. In terms of urbanity, population density is still at a moderate level, and land use intensity is still at a moderate level. Accessibility conditions in this typology are mostly low, especially in rural areas. Then the condition of availability of educational, health and economic facilities tends to be quite evenly distributed. Then the area in this typology has a fairly good economic development performance, especially in Buton and Wakatobi regencies, while North Buton Regency excels in the social development performance dimension of other regencies. However, the three regencies have not been supported with a better level of accessibility.

- **Typology 3** is considered as underdevelopment area, namely Central Buton Regency (6), and South Buton Regency (6). The characteristic of the region in this typology is that the average intellectual quality of the population is still at a low level even though there are some populations in the Regency capital who have a fairly good level of education and type of work even though most of the population works in the primary sector, especially in rural areas. The level of urbanity is also still very low (rural) where the area of built-up areas is also still low. In terms of accessibility level, the area in this typology tend to be better than typology 2, because the position of the area is closer to the growth center of Baubau City (growth center). The availability of educational facilities, health facilities, and economic facilities tends to be quite evenly distributed. Meanwhile, in terms of economic development performance, social development performance and infrastructure development performance, the area in this typology is the most lagging compared to Baubau City and other hinterland regencies.

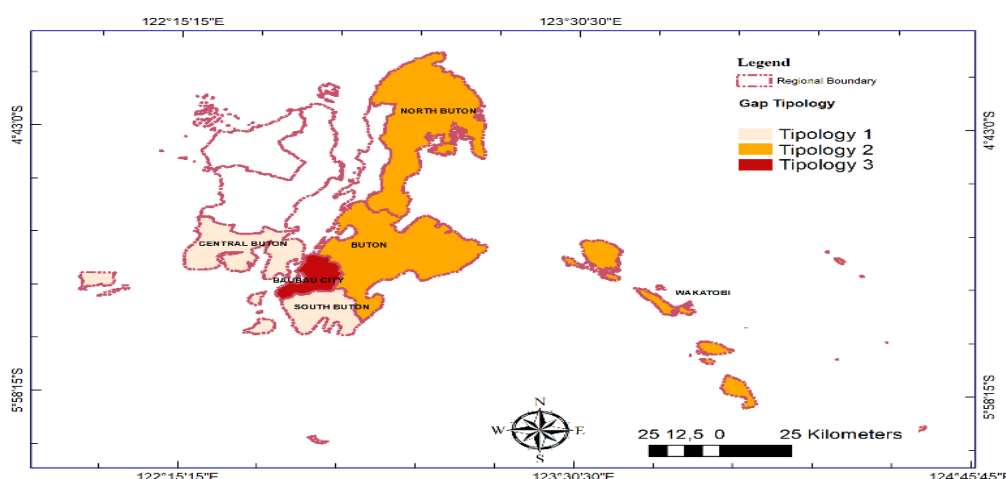


Fig. 14: Typological map of assessment of the development gap between Baubau City and the hinterland region

## V. CONCLUSION

In terms of regional resource development, there is a significant development gap between Baubau City and hinterland Regency in the quality of human resources between villages located close to growth centers and those further away. This is due to the backwash effect caused by the concentration of quality human resources in growth

centers. Coastal villages tend to have higher human resource quality index scores than hinterland villages. Similarly, the level where the high level of urbanization is only found in Baubau City and the low level in the hinterland region. Its proximity to Baubau City has a significant impact on accessibility levels, with areas closer to the city having better access to education and health services. Equitable distribution of education and health service capacity tends to

be better in the hinterland region. Similarly, the availability of economic facilities is relatively evenly distributed.

In terms of regional development performance, there is a significant gap in economic development performance between Baubau City and hinterland regency, with Baubau City having high economic development performance but low social development performance. Hinterland regencies such as North Buton and Wakatobi have good social development performance but low economic development performance. There is a significant gap in physical and infrastructure development performance between Baubau City and hinterland Regency, with Baubau City having high physical and infrastructure development performance but low social development performance.

Suggestions that can be given for each typology of the region based on the results of the study:

- **Typology 1 (Baubau City):** Although Baubau City has good economic development performance and good physical and infrastructure development performance, its social development performance is still low. Therefore, the suggestion for Baubau City is to improve the quality of social development through targeted and quality programs to reduce unemployment and improve community welfare.
- **Typology 2 (Buton Regency, Wakatobi Regency, and North Buton Regency):** These regencies have good social development performance but have not been supported by good levels of accessibility. Therefore, the suggestion for these regencies is to improve accessibility through the construction of adequate transportation infrastructure to support economic growth and improve the quality of life of the people.
- **Typology 3 (Central Buton Regency and South Buton Regency):** These regencies have low development performance on all dimensions. Therefore, suggestions for the Regency are to improve the quality of human resources through targeted and quality education and training programs, optimize local potential through the development of superior sectors according to the characteristics of their respective regions, and increase accessibility through the development of adequate transportation infrastructure.

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