



## Prosperity District/City Grouping Using the Smart City-Based Sharia Development Index in Aceh Province-Indonesia

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### ABSTRACT

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prosperity (Maslahah), Maqashid Syariah, Sharia Development Index, smart city, cluster analysis, prosperity cluster

This study explores the application of smart city-based sharia development indicators across various districts and cities in Aceh Province. The data collection involved FGD outcomes from 20 community members, complemented by secondary data from the Central Bureau of Statistics and related ministries. The collected data were analyzed using cluster analysis. Results demonstrate annual variations in clusters among districts and cities in terms of implementing smart city-based sharia development. Some regions consistently fall into the 'very good' and 'good' clusters, with the majority falling into the middle or 'good' cluster, representing satisfactory welfare levels. Banda Aceh consistently ranks high due to its role as the provincial capital, while several other districts maintain consistent positions within the 'good' cluster. Development disparities are linked to geographical location, social conditions, human resources, natural resources, and the pace of regional development, including governmental structures. The findings of this study can serve as a reference for policy-making related to welfare improvement through the development of sharia-based smart cities.

## 1. INTRODUCTION

Sharia development emphasizes comprehensive community welfare (Maslahah), viewing humans as both objects and subjects in the development process. This concept considers various aspects of human life, including physical, psychological, and spiritual dimensions [1]. This holistic view contrasts with capitalism, which defines development success in terms of material prosperity, as per Adam Smith's *The Wealth of Nations* (1776), which states that prosperity is determined by the quantity of goods and services produced and consumed. Similarly, socialism measures a prosperous society through equality, regulated by the central or state government [2].

In Islam, a prosperous society (Maslahah) is defined by the fulfillment of five key benefits (*al-dharûriyât al-Khams*): the protection of religion, soul, reason, offspring, and wealth. These five aspects, known as *al-Hâjât al-dharûriyât*, are considered essential to meet the basic human needs [3]. The fulfillment of these five elements requires an equitable distribution of allocated budgetary funds in the implementation of development, ensuring the achievement of basic human needs.

One economic model of Sharia development is the development model proposed by As Syatibi [4]. The concept of development based on maqasid sharia is an embodiment of Islamic Economics. Development underpinned by the Sharia concept originates from development objectives.

In order to gauge the success of societal development, it's critical to compile an index, which serves as an output of public policy. The Human Development Index (HDI) is one such policy used to assess the welfare received by a community. The United Nations Development Program

(UNDP) uses three benchmark factors to evaluate the success of development: economy, health, and education. These three factors are deemed significant in Islam, as they are considered crucial for development [5].

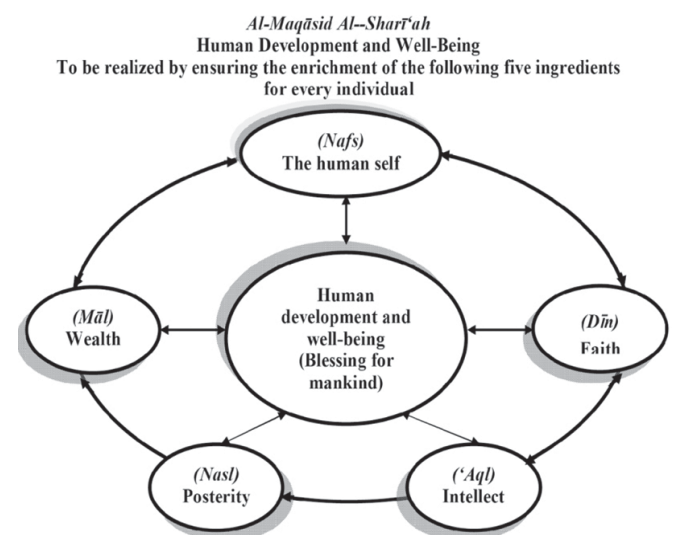


Figure 1. Maqashid Syariah development model

Figure 1 shows Development Index (I-HDI) [5]. The I-HDI is a combination of several indicators derived from the five basic needs to achieve maqasid syari'ah [6]. However, in the Sharia Development Index, seven indicators are utilized, drawn from the five basic needs of I-HDI and then redeveloped into seven indicators:

- (1) Religious Protection Index,

- (2) Life Protection Index,
- (3) Intellectual Protection Index,
- (4) Family Protection Index,
- (5) Property Protection Index,
- (6) Dignity Freedom Index,
- (7) Environmental Protection Index [7].

The main focus in Islamic development is human development, which is expanded into sharia-based development. The Sharia Development Indicator (IPS) aligns with the Maqasid Sharia principles. IPS development was evolved into an Economic Islamicity Index and an Islamic Human Development Index [8, 9].

Sharia-based development is implemented in Aceh Province, Indonesia. As a region committed to applying Islam in a comprehensive (kaffah) manner, Aceh incorporates faith (aqidah), morals, and muamalah, including its economy. Aceh, known as the "Verandah of Mecca" (Serambi Mecca), was the first place where Islam entered the Indonesian archipelago. Islamic law has been implemented in Aceh since the early 12th century AD during the Aceh Sultanate. However, it was only in 2002 that the legal framework for the implementation of Islamic law in Aceh, namely Qanun No. 5 of 2000, was promulgated on 1 Muharram 1423 Hijriyah / 15 March 2002 [10].

People's development in Aceh is built upon sharia-based smart cities. A smart city aims to make cities/regencies livable by providing adequate public facilities, improving welfare, and ensuring community comfort. The planning and development of the Smart City concept in Aceh is oriented towards the concept of sharia development [11].

The Smart City initiative has six objectives:

- (1) Creating effective, efficient, transparent, participatory, and communicative governance (Smart Governance).
- (2) Establishing a city/county that innovates by strengthening its identity as the world's smart and cultural Islamic tourist center (Smart Branding).
- (3) Boosting economic growth and community well-being by creating a setup in the industrial and economic sectors of the Sharia (Smart Economy).
- (4) Realizing an advanced urban ecosystem with quality public facilities and infrastructure integrated with a healthy, tolerant society that has a strong sense of togetherness (Smart Living).
- (5) Fostering a creative, competitive society that can protect its environment (Smart Society).
- (6) Turning cities/regencies into environmentally friendly, green, clean, resilient, and sustainable areas (Smart Environment) [12].

Despite significant progress in the implementation of Islamic law in Aceh, it has not yet become a blessing for all the people of Aceh, especially in the economic field. Islamic Sharia has not been able to realize prosperity and economic justice for all. Aceh is the seventh poorest province and has the highest unemployment. Similarly, domestic and foreign investment in Aceh is still very low, and Aceh's economic growth is far below the national level. Not only that, economic crimes are increasingly rampant, corruption is increasingly entrenched, and natural resources are being exploited freely, causing environmental damage. Aceh, known as an Islamic area, turns out to be one of the most corrupt provinces in Indonesia [13].

Despite abundant resources, development achievements in OIC countries, including the Aceh region, are generally

suboptimal [14]. Causes include errors in measuring development success, which only focus on physical and material aspects, and structural factors related to the country's responsibility in formulating strategies through various development policies, aiming at achieving the primary goal of development, i.e., the fulfillment of basic societal needs [15].

The classification and measurement of sharia-based development are necessary for analyzing economic development in a region, serving as a basis for policy making, reviewing the achievement of inter-regional welfare, and understanding the patterns of each region in the development process. Therefore, it is crucial to conduct research related to development achievements with the Maqasid Syariah index in Aceh Province, so that the government's efforts to distribute welfare can be measured in a structured way. The "success" of the development process over time should be targeted through clear indicator-based mapping, ensuring that development carried out in each district/city aligns with sharia principles.

This article focuses on examining the grouping of prosperous districts/cities by applying a smart city-based Sharia Development Index in Aceh Province with three cluster categories of very good (high), good (moderate), and poor (low).

## 2. METHODOLOGY

The methodology used in this research to measure the achievement of sharia-based development assessment in Aceh comprises two main components: secondary data and primary data. Secondary data collection was obtained from the Central Bureau of Statistics, the Islamic Sharia Office, and the Regional Development Planning Agency in Aceh Province by collecting published micro and macro data from their websites and direct visits to the respective offices. Meanwhile, primary data was specifically collected by the research team through Focus Group Discussions (FGD) with the community and policy stakeholders on the results of development achievements carried out in districts/cities in Aceh. Three areas were selected as regional representatives: West Aceh, Lhokseumawe, and Banda Aceh City. The FGD participants included the public, academics (consisting of lecturers and teaching staff), and a team from the Islamic Sharia Office. The number of FGD participants was 20 people. The main discussions during the FGD were centered around four questions, as follows:

- (1) How is the implementation of sharia development that has been carried out in your area?
- (2) How is the involvement of the community in making development policies?
- (3) What are the government's efforts in realizing a smart city based on sharia?
- (4) What solutions can be made in accelerating the development of sharia with a smart city concept?

The data analysis technique used in this study is cluster analysis with the help of Rstudio software to obtain sharia-based development achievement clusters carried out by the Aceh government. Cluster analysis is a statistical analysis method that belongs to the multivariate analysis family which aims to group observation units based on the similarity of There are two assumptions that must be met, as follows:

- (1) Representative sample, no overlapping variables.
- (2) There should be no multicollinearity between variables (no correlation between variables used in cluster

analysis).

Cluster assumptions have been made in this study and have been fulfilled in this research data. *K-means clustering* with *soft constraints* is used in cluster analysis to avoid errors in cluster analysis. Some of the attributes used are  $x_{im}$  which is the  $i$  object of the  $m$  complete data attribute,  $x_{jm}$  is the  $j$  object of the  $m$  data attribute,  $f$  is a member of complete data attribute. The soft constrain of  $x_{im}$  and  $x_{jm}$  are:

$$sc = - \sqrt{\sum_{f \in F_m} (x_{im}f - x_{jm}f)^2} \quad (1)$$

$sc$  is always negative, this indicates that one object has a different cluster from another. The *k-means* algorithm with *soft constraints* (KSC) adopts the stages of the *k-means* algorithm in dividing  $k$  objects into the appropriate  $c$  clusters. The stages of the KSC algorithm are:

- (1) Determine the cluster center to  $c$ .
- (2) Determine the component of the  $c$ -cluster by calculating the minimum distance of an object to- $k$  to the center of the  $c$ -cluster.

$$C = \arg \min_{C_c} \left( (1-w) \frac{V}{V_{max}} + w \frac{CV}{CV_{max}} \right) \quad (2)$$

by calculating the distance from the object to  $k$  to the  $c$ -cluster center on the complete data attribute towards  $d$  as follows:

$$V = \sum_{d \in D} dist(x_{kd}, C_c)^2 \quad (3)$$

Information:

$C_c$  = Cluster center to  $c$ ;

$w$  = Weighting factor by value  $w \in [0,1]$ ;

$V_{max}$  = Maximum variance of all attributes that contain complete data;

$CV$  = The sum of the squares of the constraints that do not contain the  $sc$  value;

$CV_{max}$  = The sum of the squares of all *constraints*;

Repeat steps 1 to 2 until it converges (until the resulting cluster is the same as the previous cluster).

The variables used in this study are derivatives of the indicators measuring the Islamic Development Index (IPS). Table 1 is a summary of the number of indicators and their derivative sub-indicators for all pillars in IPS.

**Table 1.** Research variable

| No | Pillar (Index)                          | Number of Indicators | Number of Sub-Indicators |
|----|---|----------------------|--------------------------|
| 1  | Religion Protection Index               | 5                    | 13                       |
| 2  | Life Protection Index                   | 20                   | 68                       |
| 3  | Intellectual/Knowledge Protection Index | 10                   | 40                       |
| 4  | Family/Offspring Protection Index       | 6                    | 26                       |
| 5  | Asset/Property Protection Index         | 11                   | 21                       |
| 6  | Dignity/Freedom Protection Index        | 3                    | 5                        |
| 7  | Environmental Protection Index          | 3                    | 8                        |
|    | Total                                   | <b>58</b>            | <b>181</b>               |

## 2.1 Religion protection index

The religion protection index consists of 5 indicators which are translated into 13 sub-indicators as Table 2.

**Table 2.** Indicators and sub-indicators religion protection index

| Pillar (Index)      | Sub-Indicators   | Indicators                           |
|---------------------|--|--------------------------------------|
| Religion Protection | Number of Mosques/ 100,000 Population                  | Ease of Access to Worship Facilities |
|                     | Number of Registered Hajj Pilgrims/ 100,000 Population | Access to Hajj                       |
|                     | Realization of Zakat / GDP                             | Zakat Worship Instrument             |
|                     | Village Theft / 100,000 Population                     |                                      |
|                     | Theft with Violence Per Village/ 100,000 Population    |                                      |
|                     | Fraud / Embezzlement Per Village / 100,000 Population  | Bad Behavior (Criminality)           |
|                     | Drug abuse/circulation/ 100,000 population             |                                      |
|                     | Gambling/ 100,000 Population                           |                                      |
|                     | Trafficking in Persons/ 100,000 Population             |                                      |
|                     | Persecution Per Village / 100,000 Population           |                                      |
|                     | Burning/ 100,000 Population                            | Bad Behavior (Violence)              |
|                     | Rape/Crime Against Decency/100,000 Population          |                                      |
|                     | Murder / 100,000 Population                            |                                      |

## 2.2 Life protection index

The Life Protection Index consists of 20 indicators which are translated into 68 sub-indicators as Table 3.

**Table 3.** Indicators and sub-indicators life protection index

| Pillar (Index)  | Sub-Indicators  | Indicators                   |
|-----------------|---|------------------------------|
| Life Protection | Population Growth (Soul)  | Population growth            |
|                 | Population Density (Person/km) IPM (2016)                                   | Population density           |
|                 | Life Expectancy Rate (2016)   | IPM                          |
|                 | Gender Ratio (Soul)   | Life Expectancy Rate         |
|                 | Youth Dependency Ratio (Soul)   | Sex Ratio                    |
|                 | Old Age Dependency Ratio (Soul)   | Dependency Ratio             |
|                 | Percentage of Population without Health Complaints in the Last 1 Month      |                              |
|                 | Average Length of Sickness in the Last 1 Month (Days)                       |                              |
|                 | Percentage of Severely Ill People in the Last 1 Month                       | Population Health Conditions |
|                 | Percentage of Population Going for Outpatient Treatment in the Last 1 Month |                              |
|                 | Hypertension Prevalence   | Disease Prevalence           |

|  |                                      |  |  |
|--|--------------------------------------|--|--|
| Prevalence of Injury   |                                      | Number of Health Centers and Health Facilities: Mobile Health Centers (Cars) / 100,000 Population            |  |
| Prevalence of Diabetes Mellitus  |                                      | Number of Health Centers and Health Facilities: Mobile Health Centers (Motorized Boats) / 100,000 Population |  |
| Prevalence of Mental Disorders   |                                      | Number of Health Centers and Health Facilities: Ambulance / 100,000 Population                               |  |
| Prevalence of Central Obesity  | Health Social Security               | Proportion of Subdistricts Having Sufficient Doctors Per Population  |  |
| Prevalence of Oral Dental Disease  |                                      | proportion of villages that have sufficient midwives per population  | Adequacy of Basic Medical Personnel and Posyandu |
| Pneumonia Prevalence   | Immunization and breastfeeding       | Proportion of Villages Having Sufficient Posyandu  |  |
| Percentage of Population Using Health Insurance in the Last 1 Month                                  |                                      | Number of Community Group Fights / 100,000 Population  |  |
| Percentage of Population with Access to Health Insurance   | Baby Birth                           | Number of Incidents of Mass Fights: Community Groups Between Villages/ 100,000 Population                    |  |
| Percentage of Toddlers Who Get Complete Immunization   |                                      | Number of Incidents of Mass Fights: Community Groups with Security Forces / 100,000 Population               | Unrest in Society                                |
| Percentage of Infants < 2 Years Still Getting Breast Milk  |                                      | Number of Incidents of Mass Fights: Community Groups with Government Officials/ 100,000 Population           |  |
| Average Child Born Alive (Person)  |                                      | Number of Incidents of Mass Fights: Students or Students / 100,000 Population                                |  |
| Percentage of births in medical rooms (hospitals, clinics, health centers, etc.)                     |                                      | Number of Incidents of Mass Fights: Between Tribes / 100,000 Population                                      |  |
| Percentage of Births Assisted by Medical Personnel (Doctors, Midwives, Nurses, Other Health Workers) | Health workers                       | Number of Orphanages and Foster Children (Units and souls)   | Protection of Abandoned Children                 |
| General Practitioner/ 100,000 Population   |                                      | Number of Foster Children/ Total Population  |  |
| Specialist Doctors / 100,000 Population  |                                      | Percentage of Population > 5 Years Who Have Not Smoked in the Last Month                                     | Smokers and Number of Cigarettes                 |
| Dentist/ 100,000 Population  |                                      | Smoking Proportion Average Per Week (Cigarettes)   |  |
| Master of Health M.Kes/M.Ph / 100,000 Population   |                                      | Abuse/Drug Distribution Per Number of Villages   |  |
| Community Health Workers / 100,000 Population  |                                      | Percentage of Population Becoming Crime Victims from March 2015-February 2016 Male (Person)                  |  |
| Pharmacy Personnel: Pharmacists / 100,000 Population   |                                      | Percentage of Population Becoming Crime Victims from March 2015-February 2016 Female (Person)                | Victims of Crime                                 |
| Pharmacy Staff: Pharmacy / 100,000 Population  |                                      | Percentage of Population Becoming Crime Victims from March 2015-February 2016 Male and Female (People)       |  |
| Nurses / 100,000 Population  | Health Facilities and Infrastructure | IPKM 2013  | IPKM   |
| Midwives / 100,000 Population  |                                      | Proportion of Correct Hand Washing Behavior  | Healthy Living Behavior                          |
| Dental Technicians / 100,000 Population  |                                      |  |  |
| Nutritional Health Personnel/ 100,000 Population   |                                      |  |  |
| Medical Technical Personnel: ATRO / 100,000 Population   |                                      |  |  |
| Medical Technical Personnel: APIKES / 100,000 Population   |                                      |  |  |
| Medical Technical Personnel: ATEM / 100,000 Population   |                                      |  |  |
| Health Analyst / 100,000 Population  |                                      |  |  |
| Non-Health Workers / 100,000 Population  |                                      |  |  |
| Number of Health Centers and Health Facilities: Health Centers / 100,000 Population                  |                                      |  |  |
| Number of Health Centers and Health Facilities: Supporting Health Centers / 100,000 Population       |                                      |  |  |
| Number of Community Health Centers and Health Facilities: Polindes / 100,000 Population              |                                      |  |  |

Proportion of Physical Activity Enough

### 2.3 Intellectual/knowledge protection index

The Intellect Protection Index consists of 10 indicators which are broken down into 40 sub-indicators as Table 4.

**Table 4.** Indicators and sub-indicators intellectual/knowledge protection index protection index

| Pillar  | Sub-Indicators  | Indicators                            |
|---|---|---------------------------------------|
| Intellect Protection  | Number of Santri/ Islamic Boarding School (Person/ Unit)                    | Equality of Religious Education       |
|   | Average Number of Tengku/ 100,000 Population                                |                                       |
|   | Old School Hope (Person)  |                                       |
|   | Average Length of School (Person)   |                                       |
|   | Ability to Read and Write > 15 Years: Latin Letters (Person)                |                                       |
|   | Ability to Read and Write > 15 Years: Arabic Letters (Person)               |                                       |
|   | Percentage of Population Who Have Ever Been to School > 5 Years (Person)    |                                       |
|   | Percentage of Population Who Have Ever Been to School 7 - 24 Years (People) |                                       |
|   | Ratio of Population Completing 12 Years of Education (> 5 Years)            |                                       |
|   | Ratio of Population Completed 12 Years of Education (5-24 Years)            |                                       |
| Number of College Residents > 5 Years (People)  | General Education Equality  |                                       |
| Total College Residents 7-24 Years Old (People)   |   |                                       |
| Average APS 5-18 yrs  |   |                                       |
| APM SD  |   |                                       |
| SMP APM   |   |                                       |
| APM SMA   |   |                                       |
| Teacher:Primary Student Ratio (Person)  |   |                                       |
| Teacher:Junior High School Students Ratio (Persons)   |   |                                       |
| Teacher:High School Student Ratio (Person)  |   |                                       |
| Teacher:Vocational School Student Ratio (Person)  |   | Distribution of Educators (general)   |
| Total Dayah Salafiyah (Unit)  |   |                                       |
| Number of Integrated Dayak (Unit)   |   |                                       |
| Teaching Staff in Gampong (Person)  |   |                                       |
| Number of State Kindergartens (Units)/ Number of State Kindergarten Students                |   |                                       |
| Number of Private Kindergarten (Unit)/ Number of Private Kindergarten Students              |   |                                       |
| Number of Public Elementary Schools (Units)/Number of Students of Public Elementary Schools |   |                                       |
| Number of Private SD (Unit)/ Number of students of Private SD                               |   |                                       |
|   | Equal distribution of religious education services                          |                                       |
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|   |   | Equality of Public Education Services |
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Number of State Junior High Schools (Units)/ Number of Public Middle School Students

Number of Private Middle Schools (Units)/ Number of Private Middle School Students

Number of Public High Schools (Units)/ Number of Public High School Students

Number of Private High Schools (Units) / Number of Private High School Students

Number of State Vocational Schools ( Units) / Number of State Vocational Schools Students

Number of Private Vocational Schools (Units)/ Number of Private Vocational School Students

Number of State MI (Unit)/ Number of Students of State MI

Number of Private MI (Unit)/ Number of Private MI Students

Number of State MTs (Unit)/ Number of Students of State MTs

Number of Private MTs (Unit)/ Number of Students of Private MTs

Number of State MA Students (Units)/ Number of State MA Students

Number of Private MA (Unit)/ Number of Private MA Students

Percentage of Education Affairs Budget in APBD

Education Budgeting

### 2.4 Family/offspring protection index

The Family Protection Index consists of 6 indicators which are translated into 26 sub-indicators as Table 5.

**Table 5.** Indicators and sub-indicators on the famil protection index

| Pillar (Index)  | Sub-Indicators  | Indicators                        |
|---|---|-----------------------------------|
| Family Protection                                       | Percentage of Ownership of Birth Certificates 0-17 Years                  | Ownership of Resident Documents   |
|   | Percentage of Ownership of Birth Certificates 0-4 Years                   |                                   |
|   | Percentage of NIK Ownership > 5 Years                                     |                                   |
|   | Percentage of KTP Ownership > 17 Years                                    |                                   |
|   | Percentage of NIK Ownership 0-4 Years                                     |                                   |
|   | RTs Receiving Social Protection Card (KPS)/ Family Welfare Card (KKS) (%) |                                   |
|   | JPK's Scope of Ownership  |                                   |
|   | Age of First Marriage for Women >= 16 Years (%)                           |                                   |
|   | Never Use of Categorical Family Planning (%)                              |                                   |
|   | Proportion of KB Users (MKJP)   |                                   |
| Babies Born / 100 Population                            |   |                                   |
| Average Number of Families in One Census Building/House |   |                                   |
| Percentage of Living Divorced                           |   |                                   |
| Number of LBW/100 Babies Born                           |   |                                   |
| Malnutrition/100 Babies Born                            |   |                                   |
|   |   |                                   |
|   |   |                                   |
|   |   |                                   |
|   | Family Planning   |                                   |
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|   |   |                                   |
|   |   | Divorce Infant and Toddler Health |
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|---|--|
| Prevalence of Malnutrition and Under-5 Children             | Maternal Health and Childbirth Process |
| Prevalence of Very Short and Short Toddlers                 |  |
| Toddler Weighing Coverage                                   |  |
| Neonatal Visit Coverage (KN1)                               |  |
| Complete Immunization Coverage                              |  |
| Prevalence of Obese Toddlers                                |  |
| Prevalence of Diarrhea (Toddlers)                           |  |
| ARI Prevalence (Toddlers)                                   |  |
| Pregnancy Checkup Coverage (K4)                             |  |
| Prevalence of SEZ in WUS                                    |  |
| Coverage of Delivery by Health Workers in Health Facilities |  |

## 2.5 Asset/property protection index

The Asset/Property Protection Index consists of 11 indicators which are translated into 21 sub-indicators as Table 6.

**Table 6.** Indicators and sub-indicators on the asset/property protection index

| Pillar (Index)   | Sub-Indicators  | Indicators                               |
|--|---|--|
| Property Protection  | Home Ownership Status: Own (%)  | Housing area                             |
|  | percentage of households using PLN electricity source   | PLN electricity access                   |
|  | percentage of computer use (PC, laptop, notebook, etc.) in the last 3 months, population > 5 years            | Utilization of IT Facilities             |
|  | Percentage of Population > 5 Years Accessing the Internet in the Last 3 Months                                |  |
|  | Percentage of Internet Access Through Public Access to Internet (Free)  |  |
|  | Percentage of households that have computers/laptops  |  |
|  | Percentage of RT Recipients of Cash Assistance Related to the Transfer of Fuel Subsidies in the Last 6 Months |  |
|  | Percentage of RTs Buying/Receiving Raskin Rice  | Allocation of Social Economic Assistance |
|  | Percentage of RTs Receiving Business Credit in the Last 1 Year (%)  |  |
|  | Percentage of RT Recipients of Poor Student Assistance (BSM) in the Last 1 Year                               | Social Security Ownership                |
|  | Percentage of households that have/received social security in the last 1 year: Retired                       |  |
| Percentage of households that have/received social security in the last 1 year: old age        |   |  |
| Percentage of households that have/received social security in the last 1 year: work accidents |   |  |
| Percentage of households that have/received social security during the last 1 year: Deaths     |   |  |

|   |                        |
|---|------------------------|
| GDP/ Capita (Million Rupiah)                                    | Per Capita GDP         |
| Economic growth   | Economic growth        |
| Poverty level   | Poverty level          |
| Expenditure Per Capita (Thousand Rupiah)                        | Per capita expenditure |
| Percentage of Working Population to Labor Force                 | Workforce              |
| Percentage of the Work Force Against the Working Age Population |                        |
| Gini Ratio  | Gini Rasio             |

## 2.6 Dignity/freedom protection index

The Dignity Protection Index consists of 3 indicators which are described in 5 sub-indicators as Table 7.

**Table 7.** Indicators and sub-indicators on the dignity protection index

| Pillar (Index)     | Sub-Indicators   | Indicators                       |
|--------------------|--|----------------------------------|
| Dignity Protection | Layoffs  | Job Protection Guarantee         |
|                    | Length of National Road Type of Asphalt Surface (Km)                           | Ease of Access to Transportation |
|                    | Length of Provincial Road Type of Asphalt Surface (Km)                         |                                  |
|                    | Percentage of Length of Provincial Roads in Good Condition (Km)                |                                  |
|                    | Percentage of Number of Completion of Criminal Acts According to Resort Police | Legal Protection Guarantee       |

## 2.7 Environmental protection index

The Environmental Protection Index consists of 3 indicators which are translated into 8 sub-indicators as Table 8. The limitations of this research methodology are that the indicators used are not complete, such as entering information regarding the availability of educational, health and religious facilities due to limited tools for analyzing data through Rstudio software and the process of running data requires more sophisticated technology.

**Table 8.** Indicators and sub-indicators on the environmental protection index

| Pillar (Index)           | Sub-Indicators   | Indicators           |
|--------------------------|--|----------------------|
| Environmental Protection | Percentage of Households with Clean Drinking Water Sources   | Water and Sanitation |
|                          | Percentage of Ownership of Private Drinking Water Facilities |                      |
|                          | Access Coverage and Clean Water Sources (x29)                |                      |
|                          | Sanitary Access Coverage (x30)                               | Defecation Facility  |
|                          | Percentage of Ownership of Private BAB Facilities            |                      |
|                          | Proportion of Correct Defecation Behavior (x17)              | Mutual cooperation   |
|                          | Habits of Mutual Cooperation of Residents                    |                      |

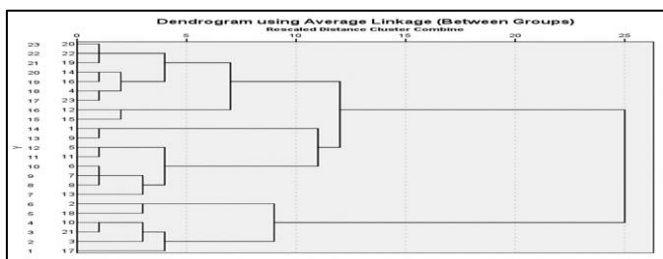


### 3. RESULTS AND DISCUSSIONS

Sharia development carried out by the Government of Aceh has experienced significant changes from year to year. Along with these changes, an analysis will be carried out on the average data of development indicator modifiers based on indicators contained in each *Sharia Maqasid criterion* through grouping districts / cities in Aceh Province based on the same characteristics possessed. Increasing the success of sharia-based development that has been carried out by the Aceh government in order to realize the welfare of the people can be done through the following criteria:

- (1) The district/city group that has a high level of people's welfare if it has a difference in the score of the first main component ( $W_1$ ) is greater than the average difference of  $W_1$  plus one standard deviation.
- (2) The district/city group that has a moderate level of people's welfare if it has a difference in the score of the first main component ( $W_1$ ) which is in the interval: the average difference of  $W_1$  minus one standard deviation and the average difference of  $W_1$  plus one standard deviation.
- (3) The district/city group that has a low level of people's welfare if it has a difference in the score of the first main component ( $W_1$ ) is smaller than the average difference of  $W_1$  minus one standard deviation.

The results of the grouping of districts / cities in Aceh Province based on sharia-based development in 2016 are as follows:

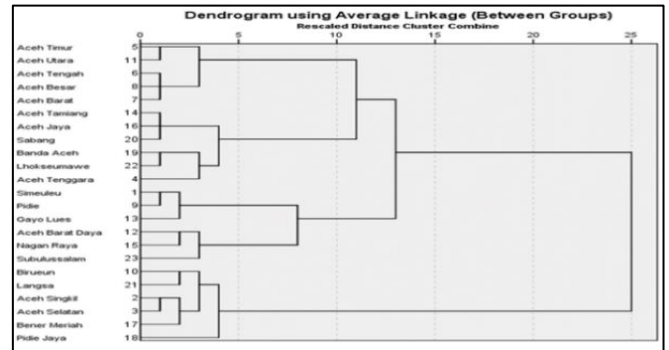


**Figure 2.** Results of the 2016 district/city grouping

Figure 2 shows the results of the achievements of district / city sharia development in Aceh Province in 2016 are as follows:

- (1) Members of district/city groups in Aceh Province with a good level of implementation of sharia-based development, namely Nagan Raya Regency, Southwest Aceh, Subulussalam City, Southeast Aceh, Aceh Jaya, Aceh Tamiang, Banda Aceh City, Lhokseumawe, Sabang.
- (2) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with medium criteria, namely Simeuleu, Pidie, East Aceh, North Aceh, Central Aceh, West Aceh, Aceh Besar, Gayo Lues.
- (3) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with poor criteria are Aceh Singkil, Pidie Jaya, Bireuen, Langsa, South Aceh, Bener Meriah.

The results of the grouping of districts/cities in Aceh Province based on sharia-based development in 2017 are as follows:

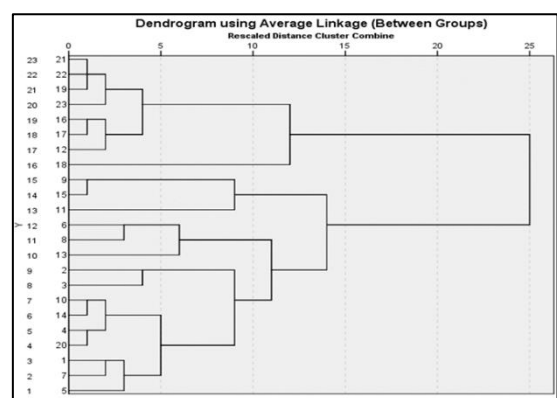


**Figure 3.** Results of the 2017 district/city grouping

Figure 3 shows the results of the achievements of sharia development districts/cities in Aceh Province in 2017 are as follows:

- (1) Members of district/city groups in Aceh Province with a good level of implementation of sharia-based development, namely Southeast Aceh, Lhokseumawe, Banda Aceh City, Sabang, Aceh Jaya Regency, Aceh Tamiang, West Aceh, Aceh Besar, Central Aceh, North Aceh, East Aceh.
- (2) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with medium criteria, namely Subulussalam City, Nagan Raya Regency, Southwest Aceh, Gayo Lues, Pidie, Simeuleu.
- (3) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with poor criteria are Pidie Jaya, Bener Meriah, South Aceh, Aceh Singkil, Langsa City, Bireuen Regency.

The results of the grouping of districts/cities in Aceh Province based on sharia-based development in 2018 are as follows:



**Figure 4.** Results of the 2018 district/city grouping

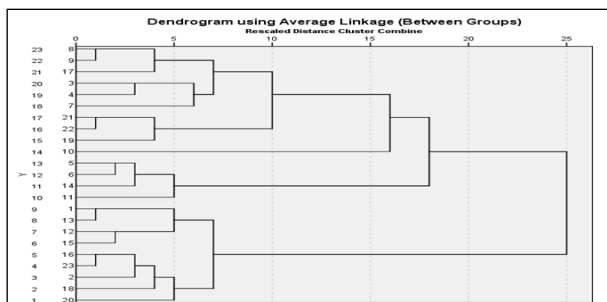
Figure 4 shows the results of the achievements of district / city sharia development in Aceh Province in 2018 are as follows:

- (1) Members of district/city groups in Aceh Province with a good level of implementation of sharia-based development, namely Pidie Jaya, Southwest Aceh, Bener

Meriah, Aceh Jaya, Subulussalam City, Banda Aceh, Lhokseumawe, Langsa.

- (2) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with medium criteria, namely South Aceh, Aceh Singkil, Gayo Lues, Aceh Besar, Aceh Tengah, Aceh Utara, Nagan Raya, Pidie.
- (3) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with poor criteria are East Aceh, West Aceh, Simeulue, Sabang City, Southeast Aceh, Aceh Tamiang, Bireuen.

The results of the grouping of districts / cities in Aceh Province based on sharia-based development in 2019 are as follows:

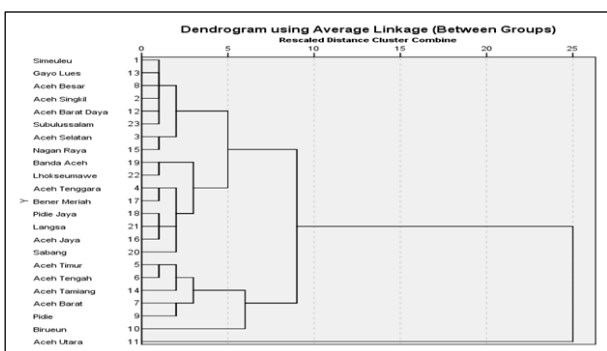


**Figure 5.** Results of the 2019 district/city grouping

Figure 5 shows the results of the achievements of district / city sharia development in Aceh Province in 2019 are as follows:

- (1) Members of district/city groups in Aceh Province with a good level of implementation of sharia-based development, namely Bireuen Regency, Banda Aceh City, Lhokseumawe, Subulussalam, West Aceh Regency, Southeast Aceh, South Aceh, Bener Meriah, Pidie, Aceh Besar.
- (2) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with medium criteria, namely North Aceh, Aceh Tamiang, Central Aceh, East Aceh.
- (3) Members of district/city groups in Aceh Province with a level of implementation of sharia-based development with poor criteria are Sabang City, Pidie Jaya Regency, Aceh Singkil, Subulussalam, Aceh Jaya, Nagan Raya, Southwest Aceh, Gayo Lues, Simeulue.

The results of the grouping of districts/cities in Aceh Province based on sharia-based development in 2020 are as follows:

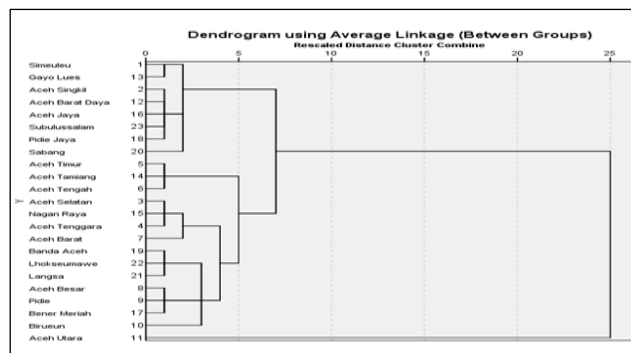


**Figure 6.** Results of the 2020 district/city grouping

Figure 6 shows the results of the achievements of district / city sharia development in Aceh Province in 2020 are as follows:

- (1) Members of district/city groups in Aceh Province with a good level of implementation of sharia-based development, namely Nagan Raya Regency, South Aceh, Subulussalam City, Southwest Aceh, Aceh Singkil, Aceh Besar, Gayo Lues, Simeulue, Banda Aceh City.
- (2) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with medium criteria, namely Sabang City, Aceh Jaya Regency, Langsa City, Pidie Jaya Regency, Bener Meriah, Southeast Aceh, Lhokseumawe City.
- (3) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with poor criteria are North Aceh, Bireuen, Pidie, West Aceh, Aceh Tamiang, Central Aceh, East Aceh.

The results of the grouping of districts/cities in Aceh Province based on sharia-based development in 2021 are as follows:



**Figure 7.** Results of the 2021 district/city grouping

Figure 7 shows the results of the achievements of district/city sharia development in Aceh Province in 2021 are as follows:

- (1) Members of district/city groups in Aceh Province with a good level of sharia-based development implementation, namely North Aceh, Bireuen, Bener Meriah, Pidie, Aceh Besar, Langsa City, Lhokseumawe, Banda Aceh City.
- (2) Members of district/city groups in Aceh Province with the level of implementation of sharia-based development with medium criteria, namely West Aceh, Southeast Aceh, Nagan Raya, South Aceh, Central Aceh, Aceh Tamiang, East Aceh.
- (3) Members of district/city groups in Aceh Province with a level of implementation of sharia-based development with poor criteria are Sabang City, Pidie Jaya Regency, Subulussalam City, Aceh Jaya Regency, Southwest Aceh, Aceh Singkil, Gayo Lues, Simeulue.

There are three district/city clusters to classify and identify districts/cities in Aceh Province based on sharia-based development indicator data. To determine the grouping categorization, the initial stage is standardization of the variables. Regency/city grouping is done based on the minimum distance of an object to a predetermined cluster center. The initial cluster center is determined from the



average value of districts/cities that are close to each other in terms of the geographical location of the districts/cities. The characteristics of a cluster of regencies/cities in Aceh Province in terms of similarity. The similarity of the characteristics of each group can be seen from the high and low indicators of sharia-based development in each district/city.

From the results of the district/city group using the cluster method it is said that the districts/cities that are in a cluster with a low level of sharia-based development are members of the third cluster. Moderate sharia-based development level, namely members of the second cluster and districts/cities with a high level of sharia-based development, namely the first cluster. Based on the results of data analysis of all indicators, the trend of movement in grouping regions with very good (high) development shows fluctuating results. In 2016, there were 9 regions in this cluster and increased in 2017 to 11 regions. But unfortunately that number decreased in 2018 to only 8 regions and moved up to 9 regions in 2019. After that the trend showed a decrease to 9 regions in 2020 and decreased again to 8 regions in 2021.

In general, districts/cities in Aceh Province already have a level of implementation of sharia development with medium (moderate) criteria. This can be seen from the results of the cluster analysis, which produced an average percentage of districts/cities that have a level of implementation of sharia-based smart city development with moderate criteria greater than 50% of the total presentation of all districts/cities in Aceh Province. This is evidenced by the value of the accuracy of the cluster. Every year there are changes in the district/city group in Aceh Province based on the level of sharia-based development which refers to the Sharia Development Index, the districts/cities that experience these changes are Simeulue District, Aceh Singkil, East Aceh, Central Aceh, Aceh Besar, Pidie, Aceh North, Southwest Aceh, Aceh Jaya, Bener Meriah, Pidie Jaya, Sabang City, Langsa City, and Subulussalam District. While the City of Banda Aceh has always been in a good position in the sharia-based development group, this is most likely due to the fact that Banda Aceh City is the capital of Aceh Province which is the center of all human activities so that it has better sharia-based development indicators compared to other districts/cities. in Aceh Province and the districts of South Aceh, Southeast Aceh, West Aceh, Bireuen, Gayo Lues, Aceh Tamiang, Nagan Raya, Lhokseumawe are also always included in the district/city group with a moderate level of development and can be increased further in the development process to become development-based better sharia.

The first index that is measured is protection of religion, where access to worship facilities, ease of pilgrimage, access to paying zakat, crime rates, and levels of bad behavior and violence. The high and low indicators become a benchmark in dividing the clusters into very good (high), moderate (medium), and not good (low). In this case, Aceh province is in accordance with several smart city missions, namely smart branding as a province that implements Islamic law as stipulated in UUPA No. 11 of 2006. One of the important aspects of upholding Islamic law in Aceh is the economic dimension aimed at realizing social welfare based on Islamic law, for example the wide opening of Islamic/halal tourism and the implementation of the Qanun on Islamic Financial Institutions which requires conventional financial institutions to open sharia business units. This also supports the mission of smart governance and smart economy in implementing smart cities. The characteristic of a city that builds with

Islamic development is that the city has modern Islamic financial institutions and complete facilities [17]. Smart city-based development must maintain cultural values originating from religious values which also prove useful in directing government efforts in achieving human welfare goals in the right direction [18].

The smart city concept can be adopted in various types of public services, for example in health services [19]. Utilization of digitalization technology in the health sector with the aim of increasing the effectiveness of human resources, improving the quality of services and reducing the cost of health services. The smart city mission in terms of smart living and smart society factors is also closely related to the life protection index in measuring sharia development. Where population growth control, gender equality, health conditions and the existence of social health insurance for the population already exist, accompanied by adequate health facilities and infrastructure including the number of medical personnel. In terms of the implementation of healthy lifestyle behaviors by the community, the number of active smokers, as well as the number of victims of crime also reflect the second index measurement, namely the life/life protection index, the results of which determine areas with very good (high), moderate (medium) and poor development (low).

The third index is related to the protection of reason/knowledge which can be seen from the distribution of religious and general education services throughout the region, as well as the number and number of adequate and qualified educators. The level of ability to read and write as well as the maximum absorption of the education budget also explains how the intellectual protection index is divided into three clusters, namely very good, medium and low. Furthermore, the fourth index, family or heredity is also one of the indicators that supports the development of a region and its levels can be categorized from the highest to the high, medium and low as the index results decrease. Factors that influence this include well-documented population data, each family has health social security (mother and child), and the controlled population in each region. A smart city based on the mission of smart governance, smart living and smart economy is closely related to two indicators of protecting minds and families. The government's role in providing easily accessible and equitable facilities in all regions supported by the implementation of sophisticated technology and information sectors is what accelerates development growth.

The urgency of discussing the fulfillment of these five main points has a priority scale that requires equitable distribution of budgeted allocation of funds in the implementation of development or protection, so that the fulfillment of basic human needs is achieved, which can be measured by the protection index according to maqasid sharia, in line with previous research that maqasid sharia will always in line with the fulfillment of primary human needs [20]. After discussing the five protection indices, the sixth protection index is the dignity/freedom protection index. The research results obtained can be explained by looking at the guarantee of job protection, ease of access to transportation, and guarantees of legal protection. So that the indicator can explain the dignity protection index for the three clusters, namely high, medium and low. the dignity protection index that has been achieved by a region in Aceh Province, can also describe the achievement of the Smart City dimension, namely creating an advanced urban ecosystem of quality public facilities and infrastructure that is integrated with a society that is healthy,

tolerant, and has a strong sense of togetherness Smart Living.

The fifth protection according to As-Syatibi is protection of property. This research obtains the results of the property protection index which can be explained by looking at the ownership of a residence or house, the availability of electricity, the ease of obtaining internet facilities, the allocation of socio-economic assistance, the existence of social security facilities, growth in per capita income, economic growth, poverty level, spending per capita, labor force, and gini ratio. So that the indicators can explain the index of property protection for the three clusters, namely very good (high), moderate (medium), and not good (low). The index of property protection that has been achieved can also describe the achievement of the Smart City dimension, namely increasing economic growth, and social welfare by realizing the arrangement in the industrial sector and the Smart Economy sharia economy.

The last protection Index In this study Is the environmental protection index. The research results obtained from the environmental protection index are explained by looking at aspects of fulfilling access to clean water and proper sanitation, community concern for the environment, and community participation in mutual cooperation. So that the indicators can explain the environmental protection index for the three clusters, namely very good (high), moderate (medium), and not good (low). Thus the achievement of the environmental protection index in the three cluster areas also reflects the achievement of the Smart City dimension, namely turning cities/regencies into cities that are environmentally friendly, green, clean, resilient and sustainable. (Smart Environment).

#### 4. CONCLUSIONS

Every year there is a change in clusters in the district/city groups in Aceh Province in implementing smart city-based sharia development. However, there are also cities/regencies that are consistently included in cluster 1 and also cluster 2. The districts/cities that experienced the cluster change were Simeulue District, Aceh Singkil, East Aceh, Central Aceh, Aceh Besar, Pidie, North Aceh, Southwest Aceh, Aceh Jaya, Bener Meriah, Pidie Jaya, Sabang City, Langsa City, and the Districts Subulussalam.

The city of Banda Aceh has always been in the position of a very good sharia-based development level group (cluster 1) due to it is the capital city of Aceh Province which is the center of all people activities so that it has better indicators compared to other districts/cities. Banda Aceh also applies the best smart city concept to public services where there are reliable services and information is easily accessible to the public. This is where various enabling technologies come into play to prove a holistic environment that is transparent, automated, inclusive, scalable, secure, flexible, and easy to manage [21].

The districts of South Aceh, Southeast Aceh, West Aceh, Bireuen, Gayo Lues, Aceh Tamiang, Nagan Raya, Lhokseumawe are also always included in the district/city group with a moderate level of development (cluster 2) and can be increased further in the development process to become better sharia-based development.

In general, districts/cities in Aceh Province already have a level of implementation of sharia development with medium (moderate) criteria in cluster 2. This can be seen from the results of the cluster analysis, which produced an average percentage of districts/cities that have a level of

implementation of sharia-based smart city development with moderate criteria greater than 50% of the total presentation of all districts/cities in Aceh Province. This is evidenced by the value of the accuracy of the cluster. As similar research shows that the application of sharia development in Muslim-majority areas shows a moderate (medium) average level of welfare achievement [22].

Smart city-based sharia development implemented in Aceh has not been evenly distributed. Cluster 1 has shown a very good application of the concept of smart city-based sharia development, indicated by the development of sharia development that is implemented with technological advances towards smart cities as a whole. As for cluster 2 and 3 areas, the success rate of sharia-based smart city-based development is still not high, so that maqasid sharia or the objectives of the development itself have not been realized properly. Such as the implementation of the index for the protection of religion, soul, mind, family, property, dignity and the environment. If in implementing sharia development in an area it is not careful, then the level of welfare will experience ups and downs, [23] although other studies show that the wealth of a country is not directly related to the development of smart cities [24, 25], the role of the local/city government in maximizing the budget to invest in realizing a smart city is emphasized [26].

The causes of high, medium and low levels of sharia-based development of cluster members include the geographical location of districts/cities, socio-cultural conditions, human resources (HR), natural resources and the progress of regional development which includes government structures. The members of the first cluster are, on average, districts/cities that have experienced expansion, the center of the economy, government and tourism of the Province of Aceh. Members of the second cluster are regencies/cities whose territory is located around the coast. Members of the third cluster are districts/cities located in the highlands.

Recommendations based on research results are as follows:

- (1) The research results are expected to become a reference for the Aceh Provincial government in adopting development policies aimed at increasing the level of welfare of the people of Aceh Province based on fair and civilized humanity within the sharia framework so as to achieve the goals of Maqasid Syariah, in order to produce human beings who are ready to compete with modern technological developments which continues to grow.
- (2) For the Regional Government in Aceh Province to pay more attention to regencies/cities that are classified as underdeveloped. The Provincial Government of Aceh has an important role in creating programs that are in favor of empowering existing human resources, to improve the quality of human development based on sharia-based smart city development.
- (3) There is a need for synergy between the government and the community in order to increase the achievement of sharia development, as well as optimize the use of available funds so that equality of welfare (maslahah) is achieved to reach maqasid sharia based on smart cities that are oriented towards sustainable development.
- (4) Reflecting on the smart city program implemented by the Banda Aceh City government, it is hoped that other district/city governments can follow this program.

This research area is limited to 23 districts and cities in Aceh Province- Indonesia, using a variable (index) of seven limited indexes and sub-indicators. It is hoped that further research will be able to take more variables/indices and sub-indicators and expand the research area to other provinces in Indonesia.

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