

MITIGATING POVERTY: THE CLUSTERING OF POTENTIAL ZAKAT IN INDONESIA

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Paper received: 31 March 2022

Paper revised: 13-27 May 2022

Paper approved: 11 July 2022

ABSTRACT

The objective of this study was to examine the fuzzy c-means clustering (FCM) method to establish the optimum cluster accuracy of zakat potential in Indonesia. A spatial mapping approach is also suggested and can be considered as the first step in knowing the distribution of zakat potential in Indonesia. Furthermore, strategies that can be implemented are formulated to increase zakat collection in Indonesia. Potential zakat data from the National Amil Zakat Agency (Baznas) in 2020 consisting of bank deposits, salaries, agricultural products, plantation products, and staple foods. Each province in Indonesia is used as the proposed variable. In this paper, firstly collecting data on indicators of potential zakat. Second, the FCM clustering algorithm. Third, the results of the FCM grouping are visualized in the form of a mapping. This novel mapping study with FCM was applied in order to analyze clustering accuracy. The FCM results confirm 2 optimum clusters for zakat potential in Indonesia where cluster 2 has more members than cluster 1. Besides, the second cluster only has one variable that has a high value, namely agricultural products, while the rest is in the first cluster. This indicates that the first cluster has a higher potential for zakat. The application of fuzzy c-means (FCM) to obtain the optimum cluster on zakat potential to produce a mapping of zakat potential is a novelty in the field of Islamic economic studies. Finally, the results of the analysis with this approach provide optimum results to strengthen the zakat collection strategy in Indonesia.

Keywords: Potential Zakat; Poverty; Clustering; Fuzzy C-Mean; Fcm

INTRODUCTION

Indonesia's macroeconomic structure in 2020, spatially, is supported by the group of provinces on the island of Java at 58.75 percent, with economic performance experiencing a decline in growth of 2.51 percent. The Indonesian economy in 2020 can be measured based on data on Gross Domestic Product (GDP) at current prices reaching Rp. 15,434.2 trillion and GDP per capita reaching Rp. 56.9 million or US\$ 3,911.7. The Indonesian economy in 2020 experienced a growth decline of 2.07 percent (c-to-c) compared to 2019 (Badan Pusat Statistik, 2021).

The condition of the economic contraction

is due to the impact of the coronavirus pandemic or Covid-19. The macroeconomic contraction is suspected to have a strong impact on data on the number of poverty in Indonesia. Poverty is a multidimensional phenomenon that is quite complex, involving various factors such as economic and social. In terms of anticipating the macroeconomic impact of the Covid-19 pandemic, the central and local governments have established and distributed several policy packages to reduce the number of poverty.

Furthermore, alternative solutions are needed in the context of equal distribution of income and decreasing data on the number of

poor people in Indonesia. In this case, zakat is an alternative solution in terms of solving the challenges above (Hafriza et al, 2021). Zakat is the third pillar of Islam that must be fulfilled by Muslims if certain conditions are met (Fitri 2017) (Rohim, 2020)(Hasanah, 2021). The ultimate goal of zakat can be an instrument to reduce various kinds of socio-economic problems such as poverty (Busyro & Razkia, 2021). (Amanda et al. 2021).

Zakat is in line with the principle of social justice and when viewed from a development strategy related to the distribution of community income, equitable distribution of development activities, or poverty eradication. With zakat, on the one hand there is a transfer of consumption and ownership of economic resources, while on the other hand it is an expansion of productive activities at the lower level. This provides an opportunity for the lowest-class people to increase their income and can then save and accumulate capital collectively as one of the activities of economic resources and productive activities.

Zakat is a worship related to wealth. Islam requires the rich to help the poor and needy in meeting their needs and to carry out the public interest. Zakat must be issued to those who can afford it, from their wealth which is abundant beyond their own basic needs and dependents (Anis, 2020). This wealth includes money, merchandise, livestock, and other livestock, as well as crops in certain proportions recognized by Muslims. The collected zakat is then distributed to meet the basic needs of the poor and needy as well as to fulfill the public interest. While zakat on money and merchandise is given once a year, zakat on crops is given at every harvest (Athief & Thamrin, 2020)(Muna, Fuad, and Fitri 2021).

Zakat can be classified into worship *maliyah* *ijtima'iyah* (Nopiardo, 2016), worship in the field of property which has a very important position

in building society in general. If zakat can be managed properly, both in its collection and distribution, it will be able to raise the welfare of the community.

Zakat is the third pillar of Islam, where zakat is obligatory for every Muslim who meets the criteria as *muzakki* (a Muslim or an institution owned by a Muslim who has assets that are obligated to pay zakat, whether he is an adult or not, intelligent or not) to purify his wealth by issuing part of his wealth to those who are entitled to receive zakat (*mustahiq*) (Hasanah, 2020) (Handoyo and Khanifa 2020) (Ramadan, Muhammad, and Riansyah 2020). If viewed at a macro level, zakat not only functions as a purifier of wealth for *muzakki* and helps the basic economic needs of *mustahiq*, zakat can be used as an instrument to reduce poverty. Thus, the concept of zakat has provided an example that Islam is very concerned about its people in need. In this case, zakat functions as a fair redistribution of wealth in income, which is enforced through moral obligations and fiscal policy.

In addition, Unitary State of the Republic of Indonesia (Negara Kesatuan Republik Indonesia, NKRI) is a country that has heterogeneous characteristics in each province (Umar 2017, 2019). The effect of modernization creates a modern social environment in which people are very transparent with each other. Muslim communities living in plural areas must have a view of humanity treating each other equally, namely brothers and sisters in faith, with a positive awareness of differences in economic structure, demographics, and geography. This means that there is a need for continuous collaboration between fellow Muslims in reducing poverty levels.

Therefore, the role of zakat as an alternative instrument that can contract the poverty rate should be optimized, a study of the potential of

zakat in Indonesia needs to be carried out. Karim et al (2020) have studied zakat and poverty in Indonesia using the Local Indicator Spatial Association (LISA). This study shows the results of the LISA test indicate the potential for zakat and poverty in Indonesia to have a significant and positive effect where each adjacent area has a good dependence in terms of zakat potential and poverty.

The results of these studies have not been shown in a region, while Indonesia consists of 34 provinces, where each province is strongly suspected to have different characteristics of zakat potential. Differences in characteristics or structures of economic phenomena owned by each province can cause variations in zakat potential of each region. However, this does not mean that each of these areas is independent or unaffected by one another. All of these consequences occur in areas where the potential for zakat is located, but may also spread to neighboring areas. Geographical proximity and similar characteristics between regions are strongly thought of having spillover effects. Thus, it is necessary to analyze the potential of zakat involving spatial attributes.

This research is a development of research conducted by Karim et al (2020), which states that the potential for zakat and poverty in Indonesia has a significant and positive effect. A large increase in zakat funds collected will affect poverty alleviation in the nearby area. This study uses a data mining approach that implements the fuzzy c-means (FCM) algorithm to get the optimal cluster on the potential mapping of zakat potential which is a new thing in Islamic economic studies. The advantage of Fuzzy C-Means is that it can cluster more than one variable at a time.

Literature Review

Zakat comes from the root word *zaka*

which means blessing, growing, clean, and good. Something is *zaka*, which means growing and developing, and someone is *zaka*, meaning that person is good. Zakat in Islamic terms means it will purify those who issue it and grow the reward. Whereas in economic terms, zakat is an act of transferring wealth from the rich to the poor (Oktaviani, Malik, and Adam 2020).

One of the goals of equal distribution of income is the welfare of people's lives (Srijani 2020). In this case, one of the goals of achieving a sovereign and just state in accordance with state laws and Islamic religious orders as Law Number 23 of 2011 (Al-Mubarak, Iman, and Hariadi 2021) concerning the management of zakat, the purpose of collecting zakat professionally is to help alleviate the problem of poverty (Syamsuri, Fatoni, and Bin Lahuri 2020)(Prasetio and Khotijah 2021)(Awwalunnisa 2021), besides being a symbol of harmonious human relations (Fuadi and Yustafad 2020). This can be realized when zakat collection is managed professionally by people who are experts and apply good and correct principles in accordance with the times but still guided by the zakat management procedures practiced by Rasulullah Saw, then zakat is true will be a solution to various problems of the people.

Islam has one of the five pillars oriented both vertically and horizontally, i.e., the obligation of a Muslim to pay zakat. Zakat has a simple concept, that in the wealth of the rich there are the rights of the poor that must be given (Wardayati and Imaroh 2015). This zakat is more emphasized in terms of income distribution efforts (Awaluddin and Raya 2021) (Rochmantika and Pravitasari 2021)(Rezeki et al. 2022).

Zakat means blessing, growth, and development of holiness and orderliness (Wandi et al, 2021). Meanwhile, according to the term, the scholars define it differently from one another,

but the concept is the same, namely, zakat is part of the property with certain provisions that Allah SWT requires the owner to give to the rightful according to the provisions (Nugraha and Zen 2020). Meanwhile, zakat from the economic side stimulates the owner of the property to charity to replace what has been issued from the owner. This is evident in the currency zakat which in the Islamic economic concept forbids piling it up and saving it from distribution.

In terms of fiqh, zakat is a name or designation for certain assets that are required by Allah to be given to a legitimate channel (*mustahiq*). As a law determined by religion, zakat has certain instructions in its implementation, including requirements such as full ownership, growth, fulfilling nisab, meeting one's normal basic needs, being free from debt (perfect ownership), and being due in a full year. The types of zakat itself are zakat on wealth (*zakah al-maal*) and zakat on body (*zakah fitrah*). The law of zakat is obligatory *'aini*. The meaning of obligatory *'aini* is an obligation determined for oneself and cannot be imposed on others, even though in its implementation zakat can be represented by other people (Nopiardo, 2017).

Zakat has important elements in the pillars of zakat, such as people who give zakat, assets that are zakat, and people who get zakat. Regarding the conditions attached to each of these pillars, there are provisions or things that must be fulfilled in each of these elements to be obliged to zakat (Tafsiruddin 2020).

People who are entitled to receive zakat sequentially are as follows: (1) *Faqir* people, *faqir* people are people who do not have the property to maintain their basic life. The cause of this poverty is the inability to earn a living due to physical incapacities, such as elderly people and people with disabilities; (2) Poor people, different from the *faqir* people mentioned above, poor people

are people who do not have assets for basic life, but can earn a living. It is just that their income is not enough to fulfill their basic life for their own life or their family; (3) *Amil* is a person appointed by a legitimate authority to administer zakat, including collection, maintenance, distribution, and utilization as well as other officers related to zakat management; (4) *Muallaf*, people who have just converted to Islam and need a period of stabilization in Islam; (5) *Riqab*, in the language *riqab* means slavery; (6) *Gharimin*, *gharim* means those who have debts and cannot escape the bondage of debt unless there is help from outside; (7) *Sabilillah*, literally the word *sabilillah* means "the way of Allah". When connected with *lafadz fi* that preceded it, it means for upholding Islam; (8) *Ibn Sabil*, people who are on a journey not for immorality, who run out of money on their way and are unable to continue their journey except with outside help (Dzulqurnain and Sari 2020).

The requirements for people who pay zakat or muzakki are Muslims who have reached puberty, are reasonable, and have assets that meet the requirements. Assets that are to be zakat have conditions that are good assets, perfect ownership of those who pay zakat, amounting to one nisab or more, and stored for one *qamariah* year or haul. The conditions for people who receive zakat are clear whether they are people or institutions (Gumilang 2020).

Zakat is part of the wealth of a Muslim that is intended for other poor Muslims (Zainuddin et al. 2020). It can also be defined as an obligatory levy imposed on a Muslim to make excess money or wealth from relatively wealthy members of the Muslim community and give it to the poor and needy. Economically, zakat in theory will produce economic prosperity because zakat is paid from those who have excess, to the poor (Aziz and Susetyo 2020). This will increase the purchasing power of the poor, resulting in higher demand for goods. Purification of wealth is the intent and

purpose of zakat (Samsul 2020), this includes purifying the wealth of contributors because, in relatively capable wealth, some of it is the rights (rights) of others. The concept of wealth in Islam views that all wealth is given by Allah as a trust. The real owner of wealth is Allah SWT.

Definition of poverty in this study refers to the Statistics Indonesia or Badan Pusat Statistik (BPS), where BPS defines the poor using concept of the basic needs approach (Badan Pusat Statistik 2022). With this approach, poverty is seen as an economic inability to meet basic food and non-food needs as measured from the expenditure side. BPS records poverty data through the National Socio-Economic Survey (Susenas). Furthermore, the population is said to be poor when the average monthly per capita expenditure is below the poverty line (Garis Kemiskinan). The Poverty Line is the sum of the Food Poverty Line and the Non-Food Poverty Line (Saputri and Anwar 2019)(Putri et al. 2020)(Setiawan Arya Marsudi et al. 2022).

The Food Poverty Line (GKM) is defined as the value of spending on minimum food needs which is equivalent to 2100 kilocalories per capita per day. Basic food commodities consist of 52 types of commodities such as grains, tubers, fish, meat, eggs and milk, vegetables, nuts, fruits, oils and fats, and others. The Food Poverty Line is the total expenditure value of 52 basic food commodities that are consumed by the population, which is then equivalent to 2100 kilocalories per capita per day. This standard refers to the results of the 1978 Food and Nutrition Widyakarya (Ansori 2021)(Kasus et al. 2020)(Triani et al. 2020). The equalization of the expenditure value for the minimum food needs is carried out by calculating the average calorie price of the 52 commodities.

Furthermore, the Non-Food Poverty Line is the minimum need for housing, clothing, education, and health. The basic non-food

commodities are represented by 51 types of commodities in urban areas and 47 types of commodities in rural areas. The Non-Food Poverty Line is the sum of the minimum needs of selected non-food commodities which include housing, clothing, education, and health. The value of the minimum need for non-food commodities/sub-groups is calculated using a ratio of expenditures for these commodities/sub-groups to the total expenditure on commodities/sub-groups recorded in the Susenas data on the consumption module.

Clustering is a grouping of data objects based on information that is only found in data that describes objects and their relationships. The goal is that objects in a group are similar (related) to each other and different (unrelated to) from objects in other groups (Govender and Sivakumar 2020)(Syakur et al. 2018)(Utari 2021).

Clustering is included in multivariate statistical analysis with interdependent methods. As an interdependent analysis tool, the purpose of cluster analysis is not to connect or differentiate with other samples or variables (Iaboni dkk, 2020) (Kunis and Nagel 2020)(Galimberti and Soffritti 2020). Cluster analysis is one of the analytical tools that are useful in summarizing data or several variables to make it smaller (Roux, 2021). Cluster analysis is a tool for exploration. Cluster analysis shows relationships and arrangements according to data regardless of the reason why it happened. Cluster analysis will show important results for decision making (Khan, 2021) (Yu, 2021) (Zhang, 2021) (Medrios, 2014).

The use of a data mining approach with fuzzy c-means (FCM) algorithm to group regions based on zakat potential aims to obtain the optimum number of clusters, then based on the optimum cluster mapping of zakat potential is carried out for each zakat potential indicator (Gusman & Kurniawan, 2021).

Fuzzy C-Means (FCM) was first introduced by Jim Bezdek (Bezdek, Ehrlich, and Full 1984) (Pal, Bezdek, and Hathaway 1996)(Bezdek et al. 1987)(Hathaway and Bezdek 1988). FCM is a clustering method to determine the optimal cluster in a vector space based on the Euclidean normal form for the distance between vectors (Kismanti and Maidah 2018)(Juniata et al. 2020). FCM will group data, where the position of each data point in a cluster is determined by the degree of membership (Herlinda and Darwis 2021; Sinaga 2021). The first phase of FCM is to determine the cluster center, which will mark the average position for each cluster (Siringoringo and Jamaluddin 2019; Wei et al. 2017). At first, the position of the center of this cluster was not completely accurate. Each data point has a degree of membership for each cluster so that it belongs to a certain cluster. Repeatedly, the cluster center will be recalculated, so that the position of the cluster center will gradually repeat itself. Likewise, the degree of membership of each point will move towards the right position (Gao et al. 2018) (Wibisono and Mujiyono 2018) (Chusna, Chusna, and Rumiati 2021).

FCM is an algorithm used to form clusters of data where the existence of each data point in a cluster is determined by a level or degree of membership. (Aminah et al. 2019) (Lauro & Herwindiati, 2020). FCM uses a fuzzy clustering model with a fuzzy index using Euclidean Distance (Kusuma et al ,2018(, Thus the data can be members of all classes, or clusters are formed with different levels or degrees of membership between 0 to 1. In general, the technique of fuzzy clusters is to minimize the objective function. The objective function of FCM is,

$$J_m(\tilde{U}, v) = \sum_{k=1}^n \sum_{i=1}^c (\mu_{ik})^m (d_{ik})^2$$

$$d_{ik} = d(x_k - v_i) = \left[\sum_{j=1}^m (x_{kj} - v_{ij})^2 \right]^{\frac{1}{2}}$$

Where is the membership value of k of group i , $0 \leq \mu_{ik} \leq 1$, d_{ik} is distance value from data point x_k ke to center group, v_i is center values group i , x_k is point data, n is the number of research objects, c is the desired number of groups, and m is fuzziness, parameters used to measure the level of the obscurity of the grouping results, $m > 1$.

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RESEARCH METHOD

The data used in this study is secondary data originating from the National Amil Zakat Agency (Baznas) in 2020. The unit of observation in this study is all provinces in Indonesia. The data analysis method used is fuzzy c-means (FCM), FCM is one of the clustering methods of data mining that is used to group multidimensional objects, namely objects that can be described with several characteristics. (Oreški dkk, 2017)(Lurka 2021)(Khalili-Damghani dkk, 2018). One of the tasks in data mining is the clustering process. The main purpose of this process is to group several data/objects into a cluster so that each cluster will contain as much data as possible (Nurjanah, dkk, 2014). In cluster analysis, it is possible to group large data so that its use becomes more practical (Violetto and Noro 2020)(Ramos dkk, 2015)(Alguliyev, Aliguliyev, and Sukhostat 2021) (Kuchеров and Kurenkov 2017).

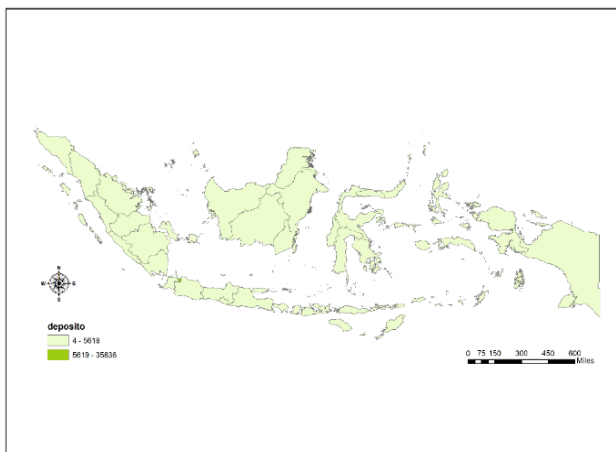
RESULT AND DISCUSSION

Description of Potential Zakat

Indonesia is a unitary state consisting of 34 provinces, whose economic structure has different characteristics, so the potential for zakat has different potentials. The zakat potential is divided into three major groups, namely the national household and individual zakat potential, the national medium and large industrial zakat potential, BUMN zakat, and the national savings zakat potential. Based on the mapping of the national zakat potential below, there is a very large gap between the potential for zakat. This means that there is a problem with zakat management.

Figure 1

Distribution of potential zakat from deposit banks for each province in Indonesia



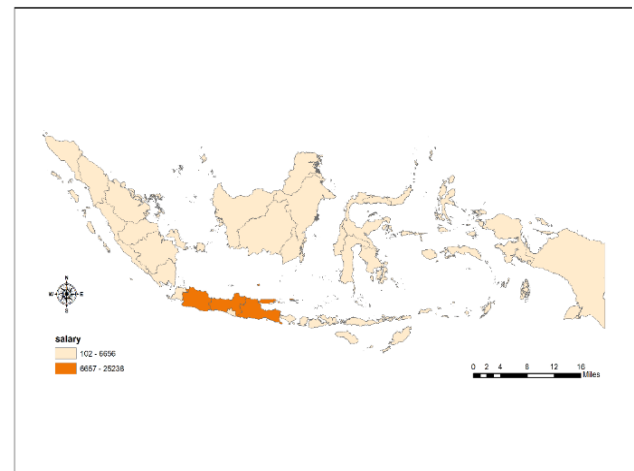
Data source: Badan Amil Zakat Nasional

The distribution of potential zakat from deposit banks is shown in Figure 1. The figure shows that the darker the color of the location, the higher the value of deposit banks in the province. It can be seen that the province with the largest bank deposit value ranges from 5619 to 35836, while the province with the least bank deposit value ranges from 4 to 5616. Special Capital Region of Jakarta Province is a province that has the highest zakat potential from deposit banks. This result is in line with research conducted by

Dhita (2020), namely the relationship between locations and the level of deposits in a province

Figure 2

Distribution of potential zakat from salary for each province in Indonesia

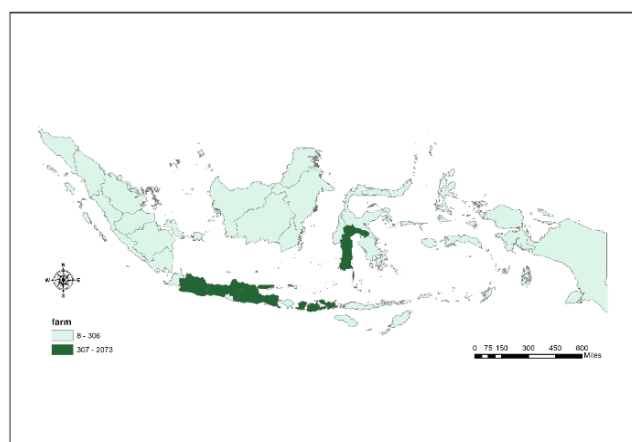


Data source: Badan Amil Zakat Nasional

The distribution of potential zakat from salaries for each province is shown in Figure 2. The figure shows that the darker the color of the location, the higher the salary in that province. It can be seen that the provinces with the highest salaries ranged from 6657 to 25238, while the provinces with the least salaries ranged from 102 to 6656. Provinces in Java dominated having the highest zakat potential from salaries compared to those outside Java. This result is in line with research conducted by Adilah et al (2022). This is essential based on ijtiḥad of several contemporary Shari'ah scholars who obliged zakat on salary earned from any professions/jobs

Figure 3

Distribution of potential zakat from agricultural products for each province in Indonesia

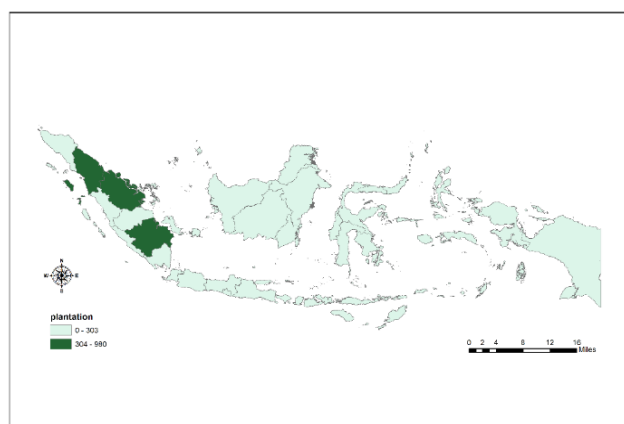


Data source: Badan Amil Zakat Nasional

The distribution of potential zakat from agricultural products for each province is shown in Figure 3. The figure shows that the darker the color of the location, the more agricultural products in the province. It can be seen that the provinces with the most agricultural products ranged from 307 to 2073, while the provinces with the least agricultural products ranged from 8 to 306. Provinces on the islands of Java, NTB, and South Sulawesi dominated having the highest zakat potential from agricultural products compared to other provinces.

Figure 4

Distribution of potential zakat from plantation products for each province in Indonesia

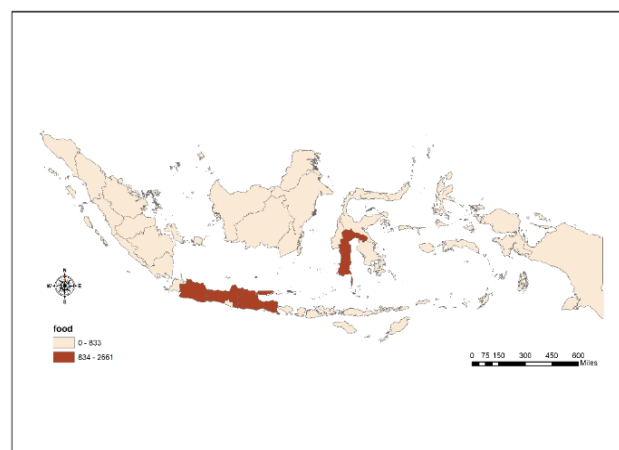


Data source: Badan Amil Zakat Nasional

The distribution of potential zakat from plantation products for each province is shown in Figure 4. The figure shows that the darker the color of the location, the more agricultural products in that province. It can be seen that the provinces with the highest plantation yields ranged from 304 to 980, while the provinces with the least agricultural yields ranged from 0 to 303. Provinces on the island of Sumatra dominated having the highest zakat potential from plantation products compared to other provinces.

Figure 5

Distribution of potential zakat from food staples for each province in Indonesia



Data source: Badan Amil Zakat Nasional

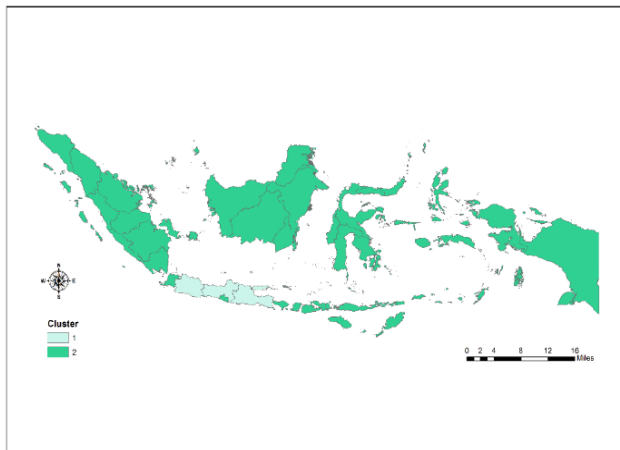
The distribution of potential zakat from food staples for each province is shown in Figure 5. The figure shows that the darker the color of the location, the more agricultural products in that province. It can be seen that the provinces with the most staple foods ranged from 834 to 2661, while the provinces with the least staple foods ranged from 0 to 833. Provinces on the islands of Java and South Sulawesi dominated having the highest zakat potential from food staples compared to other provinces.

Potential Zakat Clustering

The distribution of the results of clustering with the number of clusters 2 is illustrated in Figure 5, with a bright green map showing

provinces that fall into cluster 1 and dark green showing provinces belonging to cluster 2. Each cluster tends to clump together as in the first cluster, it tends to cluster in provinces within one island, namely Java. Meanwhile, the second cluster tends to cluster in provinces outside Java.

Figure 6
 Visualization of Potential Zakat Clustering
 Results Using FCM



Data source: Badan Amil Zakat Nasional

Thus, the distribution of clustering results shows that some clusters have members that are geographically close together. More complete results of the map illustration above can be seen in Table 1 below. Based on table 2, it can be seen that the number of provinces included in cluster 2 is more than in cluster 1, where cluster 1 consists of 4 provinces and cluster 2 consists of 30 provinces. Furthermore, in table 2 it appears that on average the variables in the first cluster have four high-value variables, while in the second cluster there is 1 high-value variable. Therefore, areas belonging to the first cluster have high zakat potential.

Table 1. Result of Clustering Potential Zakat

No	Cluster 1	No	Cluster 2
1	Special Capital Region of Jakarta	1	Aceh

2	West Java	2	North Sumatera
3	Central Java	3	West Sumatera
4	East Java	4	Riau
		5	Jambi
		6	South Sumatera
		7	Bengkulu
		8	Lampung
		9	Bangka Belitung Islands
		10	Riau Islands
		11	Special Region Yogyakarta
		12	Banten
		13	Bali
		14	West Southeast Nusa
		15	East Southeast Nusa
		16	West Kalimantan
		17	Central Kalimantan
		18	South Kalimantan
		19	North Kalimantan
		20	North Sulawesi
		21	Central Sulawesi
		22	South Sulawesi
		23	Sulawesi Southeast
		24	Gorontalo
		25	West Sulawesi
		26	Maluku
		27	North Maluku
		28	West Papua
		29	Papua
		30	East Kalimantan

Table 2. Average Based on FCM Result Indicator

Cluster	Potential zakat from deposit banks	Potential zakat from salary	Potential zakat from agricultural products	Potential zakat from plantation products	Potential zakat from food staples
1	11686.55	21235.58	81.26	1150.83	1968.79
2	439.31	2042.18	180.15	186.46 230.10	230.10

Strategy for Collection of Zakat Based on Potential Clustering of Zakat

The phenomenon that we still see today is that most of the Muslim community still views zakat as worship that is independent of its relation to economic and social issues. Therefore, zakat must be seen as a source of economic strength for the people that can be used to solve various social problems of Muslims. Currently, zakat still does not reach the community and is still not right on target. Another phenomenon is the strong tendency of the community to issue zakat individually.

Zakat should be collected by the state or an institution mandated by the state and on behalf of the government acting as a representative of the poor. Management under the authority established by the state is far more effective in carrying out its functions and impacts in building the welfare of the people which is the goal of zakat itself, compared to when zakat is collected and distributed by institutions that run alone without coordination.

Payment of zakat is a legal individual obligation, while zakat management is a collective obligation or *fardhu kifayah*, namely the obligation of a group of people in a country to do it, which is called *amil*. The main responsibility of the *amil* is to take zakat from *muzakki* and

distribute it to *mustahiq* in accordance with sharia principles so that benefit is achieved.

The payment of zakat is a real step to build social synergies that can be developed in the context of modern life. *Muzakki* who have assets can distribute zakat to the Amil Zakat Agency or the Amil Zakat Institution to be utilized. Furthermore, by the institution, the zakat funds are realized in the form of providing skills and capital to be given to *mustahiq* after the basic needs of the eight *mustahiq asnaf* are met. Furthermore, through the skills and capital received, it is hoped that business activity in the form of a home industry will be created. In addition to raising the standard of living of *mustahiq*, there will also be job opportunities for family members of *mustahiq* and the surrounding community.

Based on such a pattern of zakat empowerment, *muzakki*'s assets will be able to continue to be developed for other *mustahiq* so that the value of zakat assets will increase for *mustahiq* who acquire skills and capital. This is expected to be able to develop their home industry so that their welfare will increase so that over time the *mustahiq* predicate will turn into *muzakki*. Zakat will be more effective if zakat is handed over to an official institution because in addition to zakat as an obligation to Allah, it also fulfills aspects of the welfare of fellow people (Rohim 2020b).

In zakat operations, the Prophet has delegated these tasks by appointing *amil zakat*. The appointment of *amil zakat* provides an understanding that zakat is not managed by individuals but is managed professionally and organized. *Amil zakat* has a responsibility towards his duties, namely, collecting, storing, and distributing zakat assets to those who are entitled to receive them.

The government's role is very necessary for terms of zakat management. Socialization and education on matters relating to zakat to the public need to be carried out by a special institution appointed by the government to collect and distribute zakat funds, in this case, Badan Amil Zakat Nasional (Baznas). Based on traditional Islamic law, the government's role is an instrument in the implementation of zakat in Muslim countries. The government is responsible for collecting zakat and distributing it. The government must issue a regulation governing the newly emerging amil zakat institutions. So that the orientation of equitable distribution of income and wealth as well as reducing inequality in society can be realized.

Baznas is the official and only body established by the government based on the Decree of the President of the Republic of Indonesia No. 8 of 2001 which has the task and function of collecting and distributing zakat, infaq, and alms at the national level (Deswan, Fahlefi, and Zainuddin 2020).

The clustering analysis and spatial mapping presented in the previous section are important considerations in formulating an appropriate zakat collection optimization strategy that describes the characteristics that are appropriate for each region in Indonesia. Regional differences result in different zakat collection strategies, there are different strategies between provinces that have a high potential value of zakat from bank deposits; between provinces that have a high potential for zakat from salaries and those that have little; between provinces with high potential for zakat from agricultural products and those with little; between provinces that have a high potential for zakat from livestock products and those with little; and between provinces that have a high potential for zakat from basic commodities and those with little.

It is recommended that the formulation of a targeted zakat collection strategy refers to regional conditions based on the clustering above. Clustering does not only aim to explore the potential of zakat, but more than that, it is to explore the appropriate zakat collection strategy for each region. Based on the results of the clustering in the previous section, the socialization of the programs of Baznas in each province through online media, government, and private institutions can be carried out as a medium of socialization in the community in the work area. This process is carried out so that the public can find out information on how to pay zakat through digital platforms such as e-commerce and banks which have made it easier for people to issue zakat. Through online media, the diversity of economic structure, demographics, and geography is not a major challenge because it is very relevant in disseminating programs. Therefore, the role of the provincial Baznas collaboration with digital platforms in conveying a message of public awareness to distribute the obligation to pay zakat needs to be increased.

Baznas socialization activities in each province are expected to always have a dimension of social change, it should be directed to the social reality of humanity to synergize social conditions, namely improvement and development in a better direction amidst the still high poverty rate. The framework of the purpose of zakat lies in efforts to improve and develop a better direction of social change, in this case, it can change the paradigm of inequality conditions towards equality, poverty to prosperity, and backwardness to progress.

Therefore, to socialize zakat receipts in each province in a heterogeneous society, socialization materials can be more directed in the form of social values such as the *gotong-royong* movement, mutual help, and other positive human values. The socialization activities above instilled attitudes and awareness in the form of

wisdom in responding to helping reduce poverty in each province.

The following is a socialization model that can be applied in the context of the potential clustering of zakat above: (1) Based on the above mapping, the Baznas area by province can be developed into a social setting for the task area. The socialization of zakat receipts between provinces, both in the first and second clusters, must be carried out with a comprehensive and collaborative approach. This means that areas that have higher zakat potential in the first cluster can be the basis for the development of zakat acceptance programs in areas that are included in the second cluster. Thus, the clustering of the zakat map area can be of significant benefit for social change; (2) Baznas in each province collaborate with district/city Baznas, mosques, prayer rooms, Islamic boarding schools, which are the basis for the environment that can be optimized to be more productive based on the needs of the population/community. Houses of worship other than places of worship rituals-madhah should be able to function as a central institution for socializing zakat receipts so that they become the driving force of the people's economy, and provide solutions to social problems of the community. In this context, the role of large organizations such as Nahdlatul Ulama (NU) and Muhammadiyah can be optimized.

CONCLUSION

This research contributes to the development of zakat studies in Indonesia. This study uses a clustering analysis approach. The clustering analysis algorithm used in this study is fuzzy c-means (FCM) to optimize the clustering results. The potential for zakat owned by each province in Indonesia is different, which has a specific pattern of cluster formation. The results of the FCM analysis indicate that the members of each cluster tend to clump together, as, in the

first cluster, they tend to cluster in provinces located on the island of Java, while the second cluster tends to cluster in provinces outside Java. Furthermore, the average variable in the first cluster has four high-value variables, while in the second cluster there is one high-value variable. Therefore, areas belonging to the first cluster have high zakat potential.

The results of this study are expected to be a reference for the National Amil Zakat Agency (Baznas) or the Regional Amil Zakat Agency (Bazda) in determining zakat collection strategies at the National or Provincial level. Further research is expected to examine the potential of zakat by expanding the scope of indicators and using other clustering methods that can also be used to characterize the potential of zakat.

ACKNOWLEDGEMENT

The article has been prepared with the financial support of the BOPTN Universitas Islam Negeri Walisongo Semarang 2021 (Project: Penelitian peningkatan kapasitas/ pembinaan).

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