

Development of Indonesian Geographical Small and Medium Enterprises (UMKM) Distribution Visualization Systems to Support the Improvement of People's Economy

Wenny Dhamayanthi¹, Endro Sugiartono², Nugroho Setyo Wibowo³,
and Riskha Dora Candra Dewi⁴

^{1,2} Department of Agribusiness Management, Politeknik Negeri Jember, Jember, Indonesia

³ Information Technology Department, Politeknik Negeri Jember, Jember, Indonesia

⁴ Health Department, Politeknik Negeri Jember, Jember, Indonesia

¹ wenny@polije.ac.id, ² endro@polije.ac.id, ³ nugroho@polije.ac.id ⁴ riskhadora@polije.ac.id

Abstract. The contribution of UMKM plays an important role in boosting manufacturing and economic growth in the country. The Ministry of Industry noted, for example, in 2013, 3.43 million UMKM rose to 3.52 million UMKM in 2014. UMKM are also able to absorb the most labor compared to other sectors. Absorption of labor in this sector in early 2016 reached 97.22 percent. In 2016, Bondowoso Regency is an area rich in natural products and handicrafts. There are 38 thousand UMKM that have been established until 2016. The number has exceeded the target of the Regent Amin Said Husni. But currently there is no system that can accommodate the existing UMKM and new UMKM that will emerge. Overcoming the distribution of UMKM covering one Regency, a system that is able to visualize the distribution properly is needed. This research aims to develop the Indonesian Geographical Small and Medium Enterprises (UMKM) Distribution Visualization Systems to Support the Improvement of People's Economy. From the test results show the system has been successfully developed, with a reference to the percentage of unit testing results is 100%, while the average value of system quality (4.54), information quality (4.51) and user satisfaction (4.52).

1. INTRODUCTION

The Ministry of Industry is determined to always focus on spurring the development of the national Micro, Small and Medium Enterprises (UMKM), by targeting an increase in the number of business units on average by one percent per year and employment by three percent per year. The contribution of UMKM plays an important role in boosting manufacturing and economic growth in the country [1].

The Ministry of Industry noted, the number of UMKM business units in the country continues to increase every year. For example, in 2013, 3.43 million UMKM rose to 3.52 million UMKM in 2014.

Then, they were able to reach 3.68 million UMKM in 2015, and increased to 4.41 million in 2016. In the quarter II in 2017, the number of UMKM is 4.59 million business units [2]. UMKM are also able to absorb the most labor compared to other sectors. Absorption of labor in this sector in early 2016 reached 97.22 percent. In 2016, UMKM in Indonesia grew to 165,983 units, an increase of 4.5 percent

compared to 2015 and have absorbed a workforce of 350,000 people [2]. Bondowoso Regency is an area rich in natural products and handicrafts. There are 38 thousand UMKM that have been established until 2016. The number has exceeded the target of the Regent Amin Said Husni. But currently there is no system that can accommodate the existing UMKM and new UMKM that will emerge. Overcoming the distribution of UMKM covering one Regency, a system that is able to visualize the distribution properly is needed. Geographic Information Systems (GIS) are the most widely used choice because they have the ability to visualize the distribution well, compared to using data tables [3][4]. GIS as a form of Smart City [5], is widely used as a distribution visualization medium as in research [6][7][8][9][10][11][12]. This research aims to develop the Geographical Development of Small and Medium Enterprises (UMKM) Distribution Visualization Systems to Support the Improvement of People's Economy. The GIS developed in this study facilitates related agencies in this case the Bondowoso Regency Industry and Trade Office in obtaining more in-depth information related to location, number of work, investment value data, production amount, number of UMKM, existing data centers, and distribution and mapping the development of UMKM itself. So that the hope of this research, SMEs in the District. Bondowoso can be further developed, in accordance with the goals of the ministry. UMKM, which are the dominant sector of the industrial population in the country, play an important role as the backbone of the national economy. In the midst of a weakening global economy, UMKM are hardly affected and growth is relatively more stable [2].

2. RELATED WORK

Geographic Information Systems (GIS) have become the most widely applied option for visualizing distribution, compared to using ineffective and inefficient data tables [3][4]. GIS as a form of Smart City [5], widely used as a distribution visualization medium as in [6][7][8][9][10][11][12]. This research aims to develop the **Geographical Development of Small and Medium Enterprises (UMKM) Distribution Visualization Systems to Support the Improvement of the People's Economy**.

3. RESEARCH METHODS

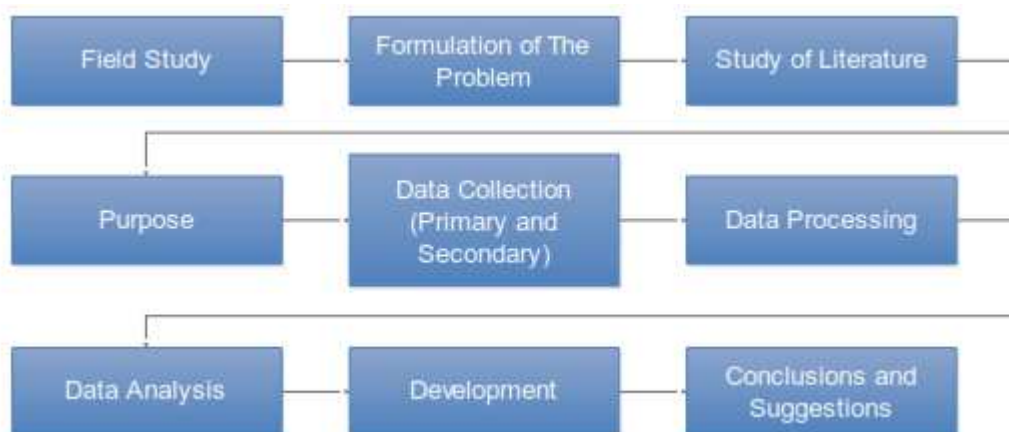


Figure 1. Reserach Method

The method in this study is shown in Figure 1. The initial stage in this research is a field study which in this case conducted information gathering on the main sources, namely the Office of Cooperatives, Industry and Trade (DISKOPERINDAG) of Bondowoso Regency. Then the next step is formulating the problem. As stated in the previous chapter, the main problem is that there are many UMKMs that have been established, but there is no media or platform that is able to accommodate business activists to market their products. In addition, from the government side, the main problem faced is the

difficulty of the data collection process and the collection of information related to UMKM itself. The next step is to study the literature and formulate a goal to draw the common thread in the form of a solution. The solution offered in this research is to do the Geographical Development of Small and Medium Enterprises (UMKM) Distribution Visualization Systems to Support the Improvement of Community Economy. The next step is data collection and data processing.

After the UMKM data is obtained in an exhaustive manner, both pre-existing data and additional data which the user can input directly, then the data is processed and made into system variables. The results of this process were continued with the development of the application, the development of this application involved the Department of Cooperatives, Industry and Trade (DISKOPERINDAG) of Bondowoso Regency. Partner involvement in the development process aims to produce research products that not only have novelty, but can actually solve partner problems. At this stage the Analysis process is also carried out related to the performance of the information system that has been made. The last step is conclusions and suggestions coming forward so that the information system can be even more useful.

4. DISCUSSION

K Nearest Neighbors - Classification is method that using majority vote of its neighbors, with the case being assigned to the class most common amongst its K nearest neighbors measured by a distance function. If $K = 1$, then the case is simply assigned to the class of its nearest neighbor. Choosing the optimal value for K is best done by first inspecting the data. In general, a large K value is more precise as it reduces the overall noise.

This study uses KNN because this algorithm is in accordance with the case handled by the study.

This study aims to classify the UMKMs in Bondowoso Regency for each district. An overview of the system is shown in Figure 2.

Based on Figure 2, the system will provide UMKM search services, which are divided into two types of information. The first information is in the form of UMKM profile data and the second is in the form of UMKM distribution data on the Map (GIS). If the UMKM data cannot be found in both the profile and distribution on the map, this indicates that the UMKM has not been registered in the system. Then the system facilitates the added feature of UMKM data, this feature is owned by the administrator of the system. The Black Box test results show that all features represented by the unit (testing) have been successfully completed, meaning that the system is running 100%. While the KNN adopted in this study was used to determine the distribution of UMKMs in each district.

$$\sqrt{\sum_{i=1}^k (x_i - y_i)^2} \quad (1)$$

KNN for the distribution of UMKMs in this study uses a configuration of $K = 10$, this selection is based on the test results that using $K = 10$ results in the lowest execution time (0.02 seconds) with an accuracy value of 92%, for 100 test data. This study uses the Euclidean Distance Function, shown by Equation 1, meaning that the study will compare each new input data with 10 neighbors (K), after this class of new data based on the shortest distance obtained.

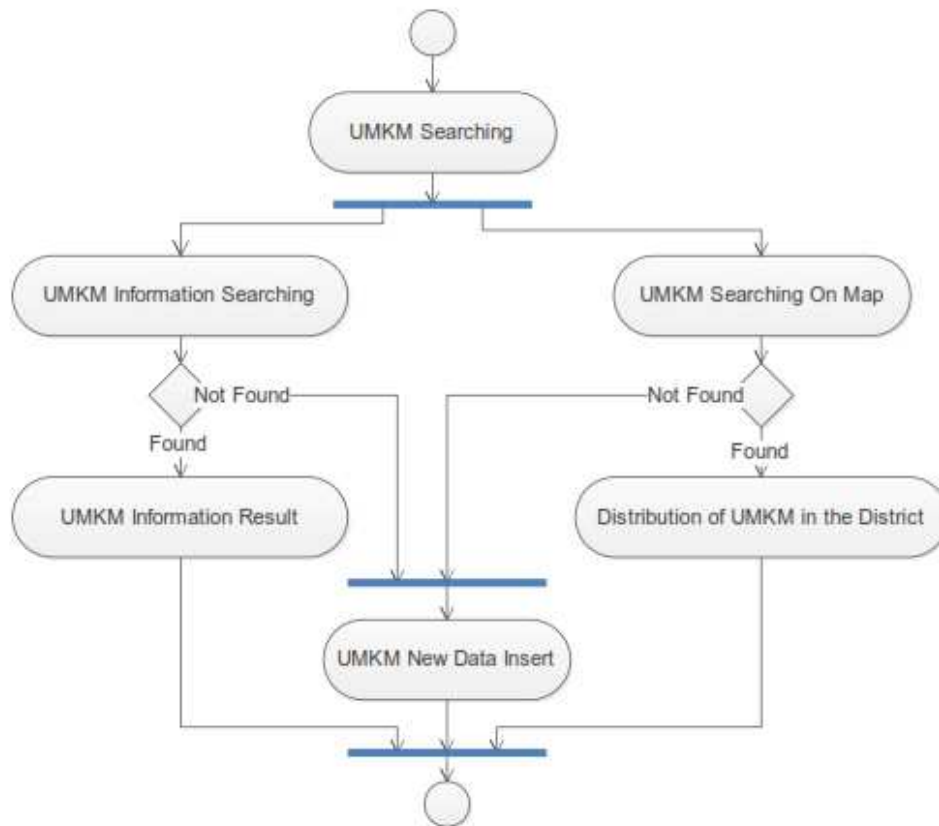


Figure 2. A ctivity Diagram

After the research successfully developed the UMKM GIS, the study continued by conducting a public test application. This test covers three aspects of System Quality, Information Quality and User Satisfaction. Each indicator uses the Linkert scale (5), the test results are shown in Table 1. In Table 1 it can be seen that the average value of 100 respondents for System Quality, Information Quality and User Satisfaction are 4.54, 4.51 and 4.52.

Table 1. System Quality Testing

Aspects	Result
System Quality	4.54
Information Quality	4.51
User Satisfaction	4.52

5. CONCLUSION

Bondowoso Regency is an area rich in natural products and handicrafts. There are 38 thousand UMKM that have been established until 2016. The number has exceeded the target of the Regent Amin Said Husni. But currently there is no system that can accommodate the existing UMKM and new UMKM that will emerge. Overcoming the distribution of UMKM covering one Regency, a system that is able to visualize the distribution properly is needed. Based on the Black Box test results that show 100%, KNN test results that show an accuracy value of 92%, it can be concluded that the system has been well developed. In addition, the system was also well received by users, this was indicated by a questionnaire (100 respondents) which showed a number for System Quality, Information Quality and User Satisfaction of 4.54, 4.51 and 4.52.

The GIS developed in this study facilitates related agencies in this case the Bondowoso Regency Industry and Trade Office in obtaining more in-depth information related to location, number of work, investment value data, production amount, number of UMKM, existing data centers, and distribution and mapping the development of UMKM itself. So that the hope of this research, SMEs in the District. Bondowoso can be further developed, in accordance with the goals of the ministry. UMKM, which are the dominant sector of the industrial population in the country, play an important role as the backbone of the national economy.

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