Development of creative economy geospatial database using an open source GIS program

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Abstract. Creativity is the principal capital in facing global challenges. In developing the creative economy, several qualified Human Resources (HR) with innovative power and high creativity are required. In many regions, they do not have a geospatial database that contains the potential of this creative economy. This research aims to develop a creative economy geospatial database GIS using open-source programs related to tourism activities in the Bekasi Regency, Indonesia. The first step was to classify the potential of the existing creative economy, then design the geospatial database that could accommodate the potential of the creative economy and visualize the data in maps. From the results of the study, it appears that in the Bekasi Regency, the most dominant subsector is the culinary sub-sector. If we see from the distribution of existing subdistricts, the Cikarang subdistrict has the most creative economic potential among other subdistricts, and with visualization of geospatial database GIS, it can support the management of creative economic data.

1. Introduction
The existence of the creative economy has become an issue that is widely discussed in many studies. Some earlier studies mention that the key to the creative economy is the union of talent; indeed, a source of original, complexity dan synergic ideas [1]. Other studies suggest that creativity contributes directly to economic development with many emerging new entrepreneurs [2]. The emergence of this new entrepreneur has not recorded well, so the potential to improve the regional economy has not maximized, this is the task of the local government to collect data on creative economy entrepreneurs spread throughout the district so that entrepreneurs can be encouraged to be more advanced or at least the government can map out whatever creative economic potential exists.

Creative industries and cultural industries become one of the drivers of economic growth [3], in the creative industry there are several essential points which are population, technology, and culture [4], the main point of this research is the application of its technology. One of the studies on the application of an economic database is to apply Big Data technology inside commercial economy management [5], in western Ireland using the FAME application to create a creative industry database based on location [6], other studies try to design cloud-based system for small and medium enterprises [7], but in this case, the use of its application is a paid application, it is still the application of a database in other creative economics.
Provide a database of the distribution of the Creative Economy according to the variety and types that will be informed the public and the government in developing the economy [8]. In other studies, many developed creative database applications with paid software [6]. The application with paid software has a disadvantage that the cost depends on the license and, in subsequent developments, will always rely on the company that issued the application. The approach that can be used to manage creative economic data is to use GIS geospatial databases, it can visualize and represent well for the four main indicators of the economy, namely the number of companies, the number of employees, profits and turnovers [9]. With GIS technology, it can collect, maintain, and analyze the geospatial database to make the right decision [10], which is expected to be applied to the development of the creative economy. This research aims to develop a creative economy geospatial database GIS using open-source program that related to tourism activities in Bekasi Regency, so the costs are low and for the future development can be more flexible.

2. Methods
The method used in the construction of creative economy databases uses logical data models and physical data models. The use of logical and physical data models is very efficient to support queries in applications [11]. The output of the database design is the conceptual database schema of the application, which contains the tables making up the database and the relations or relationships between tables. Each table will be defined attributes that describe the contents of the table, and each attribute will be written name, data type, data size, and description. The database design scheme that is logical and physical can be seen in Figure 1.

2.1. Logical design
The stages of logical design include:
- Describe how data will be displayed to users in the system input and output processes.
- The design of the user interface (user interface) is the process of describing the pattern of system interaction with the user, including designing menus, navigation, layouts, and others by paying attention to aspects of usability.

2.2. Physical design
Physical design stages include:
- Design behavior and dynamic aspects. It is the implementation of process modeling results in a model that involves classes/objects identified from the results of the analysis.
- The design of information systems architecture (static aspects) consisting of:
- Grouping several objects that have the closeness of functions and responsibilities into architectural partitions or certain subsystems (architectural partitioning)
• Improvements (if any) to the design of class diagrams using several design patterns and best practices that have been proven and tested well.
• Deployment design is a design of the physical laying aspects of the system, such as server selection, system installation plans on the server, and others.

2.3. Geospatial database
The compilation of the creative economy database uses an application that is not paid and open-source, namely PostgreSQL. PostgreSQL is a geospatial database application that has the high capability and a good load balancing process [12], PostgreSQL can store databases in spatial / location form and can query better than other spatial databases [13]. In this geospatial database, spatial data will be stored, such as company coordinates and non-geospatial data such as company type, asset data, etc.

3. Results and discussion

3.1. Result
In the data collection method, this study uses sixteen creative economy subsectors, which are included in the tourism sector in twenty-three sub-districts in Bekasi Regency. The following are sixteen creative economy subsectors:
• Application and Game Developer;
• Architecture;
• Interior Design;
• Visual Communication Design;
• Product Design;
• Fashion;
• Films, Animations & Videos;
• Photography;
• Craft;
• Culinary;
• Music;
• Issuance;
• Advertising;
• Performing Arts;
• Fine Art;
• Television and Radio.

Based on the creative economy database in Bekasi Regency, there are ten sub-sectors available from sixteen sub-sectors. The ten subsectors are:
• Application and Game Developer
• Interior Design
• Product Design
• Visual Communication Design
• Fashion
• Craft
• Culinary
• Publishing
• Performing Arts Advertising
• TV and Radio

From the survey, there are three sectors that dominant on the creative economy in Bekasi Regency, and the first is the culinary sector, which exists in twelve districts, the second is the craft sector which exists
in eight districts, and the third is fashion sector that exists in six districts. With focusing on developing and promoting this two-sectors, the government can improve economic growth [3]. The district that has the most diverse creative economy is the South Cikarang Subdistrict, and it has seven sectors of the creative economy.

At the stage of creating a database is the translation of the results of analysis and design into a geospatial database scheme using a predetermined DBMS. The database system created using client-server architecture so that it can connect to a computer network that already exists in Bekasi Regency. The structure of the creative economy database that show in Figure 2. From Figure 2, can be seen that the structure is consist of twenty two non-geospatial table which is: cabang table, desa table, kecamatan table, sektor kegiatan table, jenis usaha table, badan usaha table, perusahaan table, komoditi table, pengusaha table, jenis produk tabel, produk table, peralatan tabel, periode table, omset table, jenis satuan table, jenis aset table, asset table, pemasaran table, bahan baku table, tenaga kerja table, perijinan table and jenis pekerjaan table. All off the structure table was obtained through interviews with the stakeholder. The geospatial database table can be seen in figure 3; the table is shown geospatial data such as coordinate column and geometry column.

The geospatial database system built can help the search for entrepreneurs or companies that were classified as creative economy subsector criteria. The search for these criteria can be done based on districts, villages, activity sectors, types of commodities, types of business entities within a specified period. The results of the creative economy database application, which is a combination of the PostgreSQL database and PHP programming language, is presented in the form of a map that utilizes leaflet maps, as can be seen in Figure 4. The application in figure 4 shows a visualization map of database geospatial that contains information about the location of the entrepreneurs in the Bekasi Regency.

![Figure 2. Non-Geospatial database structure of the creative economy.](image-url)
3.2. Discussion
From many of sector of the creative economy which exists in Bekasi Regency, there only ten sectors that important to the whole of the creative economy in Bekasi Regency which is Application and Game Developer, Interior Design, Product Design, Visual Communication Design, Fashion, Craft, Culinary, Publishing, Performing Arts Advertising, and TV and Radio. From these results, this becomes an input
to the government, and if they want to escalate the creative economy for economic growth [3,8] in Bekasi Regency, they can be focused on these eleven sectors.

The geospatial database of the creative industry in the Bekasi Regency is shown in figure 4. When we compared the application that had build in Ireland [6], they use commercial software to build databases of economy creative, but in Bekasi Regency, we use non-commercial or opensource program that which allows the development of the program can continue. Because the spatial geodatabase application that we use is opensource, there are no fees for purchasing any program license, the cost that we spent is only for developers. Hence, the price for developing this application is very low.

The contents of the developed database are derived from the results of the survey team in the field. The survey team visited each location of the creative economy with the survey data format discussed earlier. Survey results from the field survey, show the diversity of the data obtained, and this is because the data available in each creative economy is also diverse, but is not a problem, it can be adjusted easily with the existence of the developer.

4. Conclusions
Based on the creative economy database in Bekasi Regency, there are only ten sub-sectors that important to the whole of the creative economy. The ten subsectors are: Application and Game Developer, Interior Design, Product Design, Visual Communication Design, Fashion, Craft, Culinary, Publishing, Advertising, and TV and Radio Performing Arts. The most dominant sub-sector in Bekasi Regency is the Culinary Sub-Sector, it spread in twelve sub-districts in Bekasi District, and the second is the Craft Sub-Sector in eight sub-districts in Bekasi District and the third is the Fashion Sub-Sector in six sub-districts in Bekasi Regency. For the sub-districts that have the most diverse creative economy, sub-sectors are the South Cikarang Sub-District, which is seven sub-sectors.

From the results of the development of the geospatial database using an open-source program, it produces a geospatial database with low development cost, and the system is flexible because it can be customized based on the situation of data that we get from the field. It can be utilized in the documentation of data related to the creative economy, and it can visualize the distribution of creative economy locations by using GIS technology. From this visualization map of the geospatial database GIS application, the government can use this to manage and see the spread of the distribution location of the creative economic potential in the Bekasi Regency.

Two steps can be recommended for the development of a creative economy geospatial database, which is: train a Database Administrator (DBA) that have a task to implement the geospatial database and train a web-based developer, so the Creative Economy website information services in Bekasi Regency can be developed continuously and with low-cost development.

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