A Study on the GIS Applied to Livestock Field as the National Spatial Data Project

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Abstract

The National Geographic Information System (NGIS) configuration project that started from 1995. The GIS projects led by the nation were conducted for a wide range of fields for around 20 years, yet there was no national GIS project executed in the field of livestock.

The study is intended to examine the previous national GIS projects, propose the databases and application systems to be built for GIS application and promote applicability of GIS in the field of livestock based on these examination and proposal.

Keywords: National Geographic Information System(NGIS), GIS, Livestock GIS DB, Livestock GIS Application

1. Introduction

Since the late 1980s, the project on configuration of Geographic Information System has commenced in Korea. This project was implemented by building an individual database per institution. The location of actual gas pipes for the subway construction in the early 1990s did not correspond to that marked in the design drawings, which led to an explosion as the pipes were contacted during the subway construction. There were explosions at the subway construction sites in Ahhyeon-dong in 1992 and in Daegu in 1994 respectively. In this regard, the government organized the project on configuration of geographic information system led by the nation since 1995.

The National Geographic Information System (NGIS) configuration project that started from 1995 is in its fourth phase named as the National Spatial Data Project, as it went through the first phase by 2000, the second phase by 2005 and the third phase by 2010.

The GIS projects led by the nation were conducted for a wide range of fields for around 20 years, yet there was no national GIS project executed in the field of livestock.

The study is intended to examine the previous national GIS projects, propose the databases and application systems to be built for GIS application and promote applicability of GIS in the field of livestock based on these examination and proposal.

The studies on GIS application in the field of livestock were mostly on analyses of water pollution.

An Effective Survey & Management of Rural Amenity Resource Information using GIS[4] explains how efficiently the resources of public interest that the rural region possess can be managed as the environmentally-friendly living space and the space for traditional culture and for green environment, and how the application system in use of this can be built.

Recently, there have been studies conducted in the field of livestock using the ubiquitous technology such as Design of the Communication Protocol for a Stall Management System based on IT [1] and Design for Global-Scale Ubiquitous Stable Monitoring System[2].

2. NGIS (National Geographic Information System) Project

NGIS Project was performed by 5-year phase since 1995, which was implemented with the goals of Phase 1: 'GIS Infrastructure Building', Phase 2: 'Expansion of GIS Application' and Phase 3: 'GIS...
Integration'. Phase 1(1995~2000) concentrated on computerizing national base maps which are the basis of national spatial data including but not limited to digital mapping of topographical maps, common thematic maps, underground utility maps and cadastral maps, and database configuration. Phase 2(2001~2005) focused on building and applying a wide range of application systems utilizing such spatial data. Phase 3(2006~2010) emphasized on promoting synergy effects by connecting and integrating the data built by area and institution with the application systems.

Among the NGIS application projects, there are 27 projects on general application, which are the application systems built to support GIS-based administrative works and advance services. There are various sectors depending on the characteristics of each project including the underground, water resources, cultural assets, environment, agriculture and forestry, marine and statistics, and when it comes to agricultural sector, the projects regarding agricultural water management and information, agricultural amenity resources as well as GIS-based agricultural environment information system were implemented. Other than the ones mentioned above, there were no national GIS projects in the field of agriculture and livestock.

3. The Current Status on Livestock GIS of Statistics Korea

According to the Korean Statistical Information Service, the statistics related to livestock include estimation of Korean livestock production cost and statistics on livestock trend. The statistics on livestock trend identifies the number of livestock farming houses per scale of livestock farming and the number of farming animals by male/female and by age, and it is surveyed quarterly for the purpose of using it as the basic data for establishment of livestock policies and studies related to the livestock industry. In case of the Korean native cattle, beef cattle, dairy cattle, pigs and ducks, the number of livestock farming houses and of farming animals per city/province/scale of livestock farming and the number of farming animals per city/province/age/female and male, and as for chickens, the number of livestock farming houses and of farming animals per city/-gun/district(-gu)/usage are provided as the data. These figures are marked on the maps.

![Figure 1. Example of the Statistics on Livestock Trend by the Statistics Korea](image-url)
However, these are simply figures of the livestock farming scale per city/province and by livestock type, which implies that it is necessary to build a basic GIS database for application in various livestock-related studies.

4. Strategy for Configuration of DB and Application Systems for GIS Application in the Field of Livestock

This study examines to what extent the statistical data regarding the field of livestock are built which are provided by the NGIS project and the nation. Yet, the data currently provided are the general number of farming animals and of livestock farming houses, the text-based data. Since the livestock industry includes a wide range of geography-related information, high usability of GIS is anticipated. Therefore, the study is aimed to propose a strategy of improving its usability by generally considering what database is to be built and what application system(s) is to be used.

5. Configuration of Basic GIS DB for the Field of Livestock

The basic GIS DB for the field of livestock can be classified into the location (for instance, the location of stable), graphic information and attribute data. In case of the location of stable and graphic information, the existing data on the numerical topographical maps or cadastral maps made mostly during the NGIS project can be used.

However, it is believed that the attribute data related to livestock should be newly built, and the data types to be built and interconnected include the number of farming animals and of livestock farming houses per livestock type and the number of farming animals per male/female/age, which will be used to build the required database. In addition, the information regarding the location of stable and its scale, and the basic data for livestock excretion treatment-related system including the amount of livestock excretion generated, the amount treated and the information related to the trucks that handle livestock excretion can be built. As the farming animals are buried owing to the recent occurrence of foot and mouth disease, it is necessary to build the database on information of where the buried animals are located and the status of its burial, and such data should be interconnected for use as well.

6. Development of GIS Application System for the Livestock Industry

After the GIS DB in the field of livestock is built as specified above, the GIS application system for the livestock industry shall be built for various uses. The GIS application system for the livestock industry can be interconnected to a wide range of fields that are relevant to the livestock industry including agriculture, forestry, administration, environment and health. In other words, all the Internet or mobile based application systems that are being serviced can be the interconnected.

The fields that can be serviced through interconnection and integration in the initial stage include the non-point source pollution analysis system, the integrated management system for livestock excretion, the stable information system, the livestock information system and the management system for regions where the farming animals are buried owing to the foot and mouth disease.

In the era of ubiquitous technologies, these types of GIS application systems should be capable of handling GIS and interconnected DB in realtime to provide the necessary services and they should be built in a way so that they can be used in various types of smart devices.

7. Conclusion

The study examined how the projects on the field of livestock among national GIS projects were implemented and how the national spatial data project will be executed in the future. Furthermore, it looked into the statistical values provided by the Statistics Korea in relation to the livestock industry, and to what extent such figures are used in the maps. With such examination, the study proposed the
databases and application systems to be generally configured to promote the use of GIS in the field of livestock. The field of livestock is a highly significant area which provides food for human, yet informationization and GIS application were not so active up to now. From now on, advanced information and communication technologies including GIS, satellite images and ubiquitous technologies should be adopted to encourage efficient works. To do so, the experts in the field of livestock and information & communications should come up with a concrete road map, and such road map should be followed by the whole government as part of the national spatial data project.

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9. References


