기본연구보고서 2017-2

빅데이터를 활용한 건축·도시 미래정책 개발체계 연구

Policy Development Framework of Architecture and Urbanism using Big Data

조영진 Cho, Young Jin
유광흠 Yu, Kwang Heum
김신성 Kim, Shin Sung

(aur

Policy Development Framework of Architecture and Urbanism using Big Data

SUMMARY

Cho, Young-Jin
Yoo, Kwang-Heum
Kim, Shin-Sung

Evidence-based policy making is an approach of policy development that is effective in the field of architecture and urbanism where public interest is high, civil affairs are often generated, and policy demand is changing quickly. However, to date, there have been very few researches on this issue. In order to improve the quality of the architecture and urban policy, it is urgent to study the evidence-based policy making formulation method.

Advanced countries are actively adopting big data as a technology innovation and a new problem solving method for policy development. In Korea, there is a need to introduce big data such as public data and social data into policy development. In particular, it is necessary to develop a methodology that can diagnose and predict the demand and change of rapidly changing architecture and urbanism policies by using big data.

The first objective of this study is to find out how to use big data in the field of architecture and urbanism. The second purpose is to derive a policy development method that uses big data in the field of architecture and urbanism. The final objective is to present a policy development framework for evidence-based policies in the field of architecture and urbanism.

The characteristics of big data are described according to data volume, velocity, variety, veracity, and value. Depending on the type of data, it can be classified into formal, informal, and semi-formal data. Formal data refer to data stored in a certain field, and can be managed by a database such as building information, while informal data refer to data such as blogs, social data, news media, and the like, which are not defined in an item.

Policy process theory is a theory that deals with the process from the recognition of policy problems to the finalization of policy through the process of goal setting, alternative analysis, decision making, legalization, enforcement, and evaluation. The representative policy process model that is used in policy studies is Anderson's model (1975). It is composed of five steps: problem identification and agenda formation, formulation, alternative adoption, implementation, and evaluation. The scope of policy development corresponds to problem identification and agenda formation, formulation, alternative adoption in the five stages of the policy process model.

The problem identification and agenda formation stage is necessary to monitor public opinion on specific topics and issues. The formulation stage is focused on creating policy alternatives by combining and linking various information. The alternative adoption stage is to find the best alternative among the various alternatives derived from the formulation stage.

The big data based architecture and urbanism policy development framework proposed in this study is composed of 'development of query', 'determination of analysis contents', 'comprehension of data types and characteristics', 'design analysis method', 'data collection and processing', 'analysis and interpretation of results'. Pilot test was conducted for building maintenance policy to verify the framework.

In order to verify the problem identification and agenda formation stage, main questions of the building maintenance policy were derived. Based on the extracted key questions, public opinion analysis on building maintenance policy was conducted. The analysis model used is keyword frequency analysis, related keyword analysis, time series trend analysis, and emotional analysis. For the purpose of publicity analysis, social and news data from April 1, 2014 to April 30, 2017 were collected using a web crawler.

As a result of the keyword analysis of the maintenance of the building, the urgent keyword to solve the policy problem was 'safety'. Next, the result of detailed analysis of 'safety' keyword revealed that the keyword with the highest number of

buzz was 'fire', which showed that public opinion about 'fire' was the most interested. Finally, based on the results of public opinion analysis, 'fire safety of buildings' was chosen as the policy agenda.

In order to verify the formulation stage, main questions of fire safety of buildings were derived. The analysis model was designed based on the derived query and analyzed. The data used for the analysis were fire statistics, building register information, weather information, and census information from 2012 to 2016.

As a result of the analysis, it was confirmed that the building fire occurred most in the residential space and the casualties were also concentrated there. Combined analysis of fire statistics and meteorological data revealed that a 10% drop in monthly average humidity could increase the incidence of fire by about 19%. Combined analysis of fire statistics and census showed that most of the villages had very little fire, but very few villages had very frequent fires, which revealed the power law between village and fire frequency. In addition, according to the combined analysis of fire statistics and building property information through machine learning, the specific types of buildings where fire is frequent were found.

Through case studies, three policy alternatives related to fire safety were developed in the maintenance management policies of buildings: 1) improvement of the fire safety of non-residential buildings, 2) prevention of large-scale fire in industrial facilities, 3) establishment of flexible fire fighting system among local governments.

The big data based policy development framework developed in this study demonstrated through the research that it can develop objective and scientific data based policies as a methodology to implement evidence-based policy. This evidence-based policy development framework could be transparent to the decision-making process, and policy agenda and policy alternatives could also be implemented based on the objective data. In addition, evaluations and feedback could be easier because they are developed based on data. Therefore, it is expected that policy development through quantitative analysis of data would enhance the credibility and rationality of policy.

Keywords :

Big Data, Policy Development Framework, Evidence-based Policy, Building Maintenance, Building Fire