

# Evaluation of the Urban Regeneration Project: Land Use Transformation and SNS Big Data Analysis

Ju-Young Kim, Tae-Heon Moon, Jung-Hun Cho

**Abstract**—Urban regeneration projects have been actively promoted in Korea. In particular, Jeonju Hanok Village is evaluated as one of representative cases in terms of utilizing local cultural heritage sites in the urban regeneration project. However, recently, there has been a growing concern in this area, due to the ‘gentrification’, caused by the excessive commercialization and surging tourists. This trend was changing land and building use and resulted in the loss of identity of the region. In this regard, this study analyzed the land use transformation between 2010 and 2016 to identify the commercialization trend in Jeonju Hanok Village. In addition, it conducted SNS big data analysis on Jeonju Hanok Village from February 14th, 2016 to March 31st, 2016 to identify visitors’ awareness of the village. The study results demonstrate that rapid commercialization was underway, unlikely the initial intention, so that planners and officials in city government should reconsider the project direction and rebuild deliberate management strategies. This study is meaningful in that it analyzed the land use transformation and SNS big data to identify the current situation in urban regeneration area. Furthermore, it is expected that the study results will contribute to the vitalization of regeneration area.

**Keywords**—Land use, SNS, text mining, urban regeneration.

## I. INTRODUCTION

### A. Background and Purpose

THE redevelopment of ‘Hanok Village (traditional Korean housing type)’ in Jeonju City, Korea is considered to be a typical and a successful urban regeneration project utilizing local historic culture. However, due to the excessive commercialization within the Jeonju Hanok Village, there are rising concerns that the identity of the traditional Hanok Village is being lost, and the direction of the regeneration project is being distorted. To cope with rapid commercialization, Jeonju City has been strengthening urban planning and building regulation. However, rather than uniform containment of commercialization, it is preferable to regulate the building use based on scrutinizing the actual land use and people’s behavior in the relevant area. To promote the regeneration projects in Jeonju Hanok Village, where attracts approximately six million visitors annually, it is needed to implement customized regeneration policies based on the accurate identification of the physical changes and the people’s awareness of the area.

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Especially, Social Network Service (SNS) data posted by visitors may provide new ideas for the regeneration process because it reflects qualitative aspects of the area.

This study intends to provide applicable insights for making better management policies and project directions of Jeonju Hanok Village through the analysis of SNS big data as a qualitative approach using sentiments of visitors towards the regeneration area, and physical land and build use as a quantitative data.

### B. Study Scope and Method

The spatial scope of the study is the Hanok Village, 620,000 m<sup>2</sup>, is located in Jeonju City, Korea, as shown in Fig. 1.

To analyze the commercializing aspects, two years of land use data were collected; 2010 and 2016. However, with the data for 2010 we utilized the results of an existing survey conducted by Mun [1], and the data of 2016 was investigated on site in April, 2016. SNS big data, Twitter and Instagram data were collected using the ‘Plus One’ program, as it is the most commonly used SNS in Korea. The data with the keyword ‘Hanok Village’ between February 14th, 2016 and March 31st, 2016 were collected. After eliminating unsuitable data, a total was 11,017 cases were collected. The frequency analysis and qualitative analysis was conducted using these big data.

The variation of land use is analyzed by comparing spatial distribution of commercial, residential and accommodation buildings through hot spot analysis using GIS. Also, SNS analysis is conducted through text mining techniques including word cloud, frequency analysis, and sentiment analysis. Sentiment analysis allows to determine whether the polarity of a textual corpus (document, sentence, paragraph etc.) tends towards positive, negative or neutral [2].

## II. RELATED STUDIES

In regards to the regeneration project of Hanok Village in Jeonju City, several studies have been conducted; Mun [1], Choi et al. [3], etc. Also, there are numerous studies on the big data analysis such as SNS data, including Liu et al. [4], Moreo et al. [5], and Taboada et al. [6]. However, the studies on the commercialization following the regeneration project in Jeonju Hanok Village are not many. Also, since numerous studies utilizing the big data analysis did not aim to identify the visitors’ opinion on the regeneration project, and it is difficult to find studies that connect the big data analysis with the regeneration project.

This study differs from the previous studies as it explores the project and policy direction by tracing the variation of the actual land use and analyzing SNS big data posted by visitors.

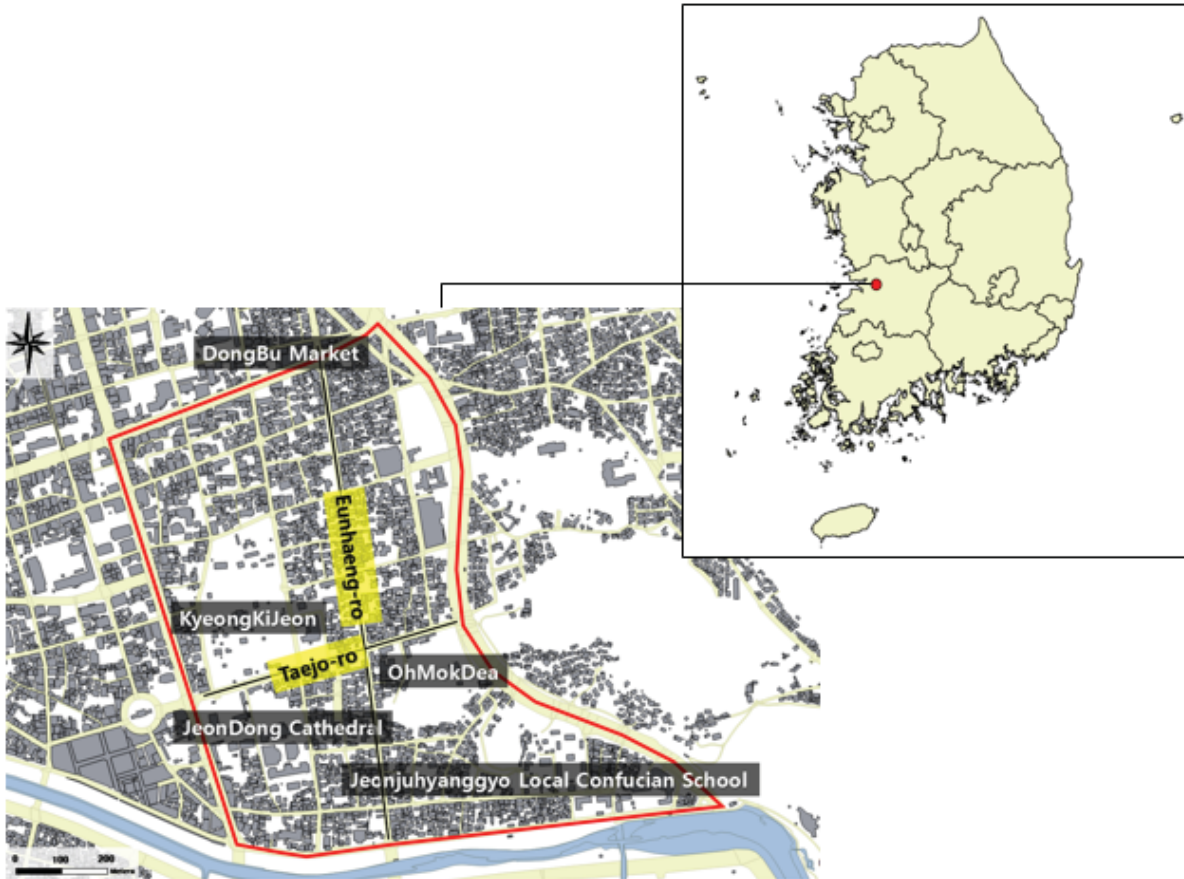


Fig. 1 Study area

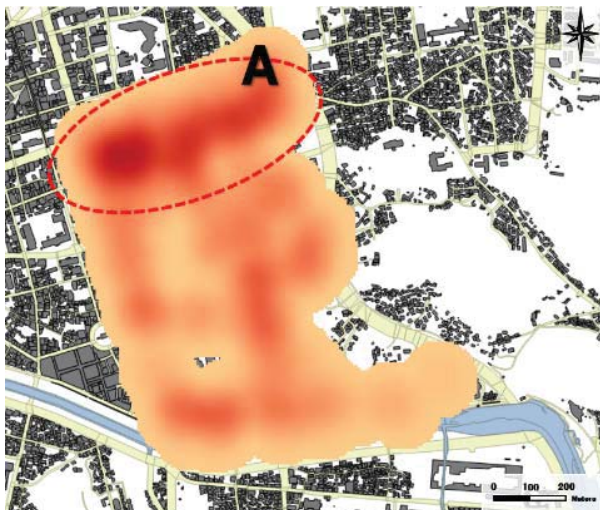


Fig. 2 Commercial building use registered in 2016

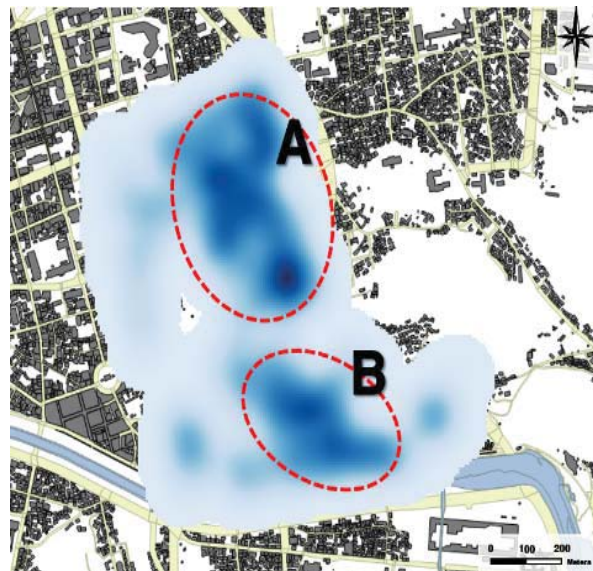


Fig. 3 Residential building use registered in 2016

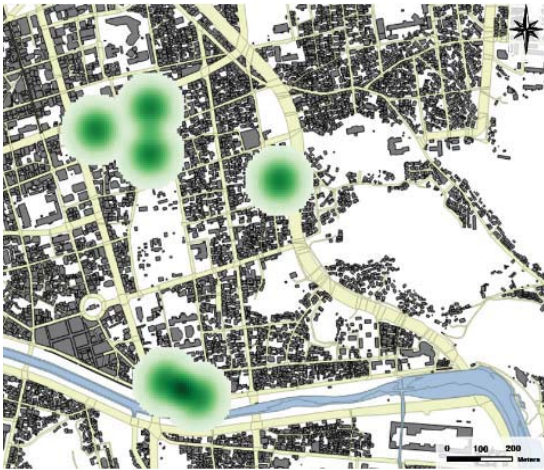


Fig. 4 Accommodation building use registered in 2016

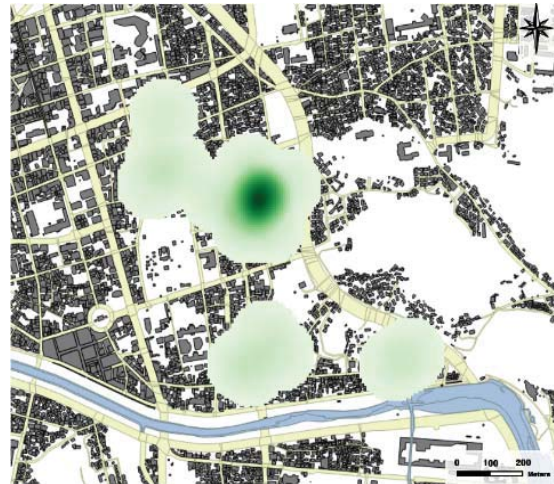


Fig. 7 Actual accommodation building use in 2010

### III. THE VARIATIONS OF LAND USE

#### A. The Building Use of Officially Registered Buildings in 2016

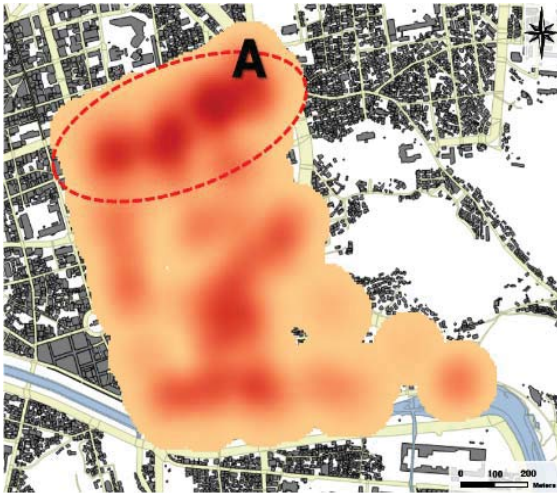


Fig. 5 Actual commercial building use in 2010

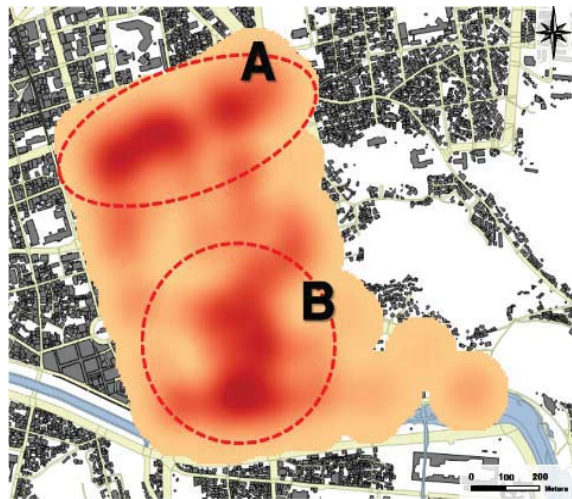


Fig. 8 Actual commercial building use in 2016

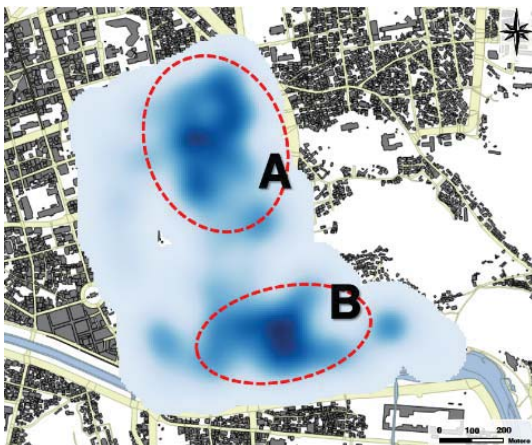


Fig. 6 Actual residential building use in 2010

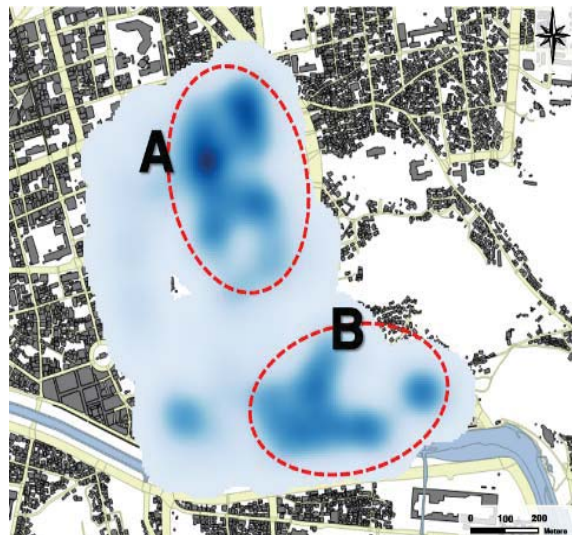


Fig. 9 Actual residential building use in 2016

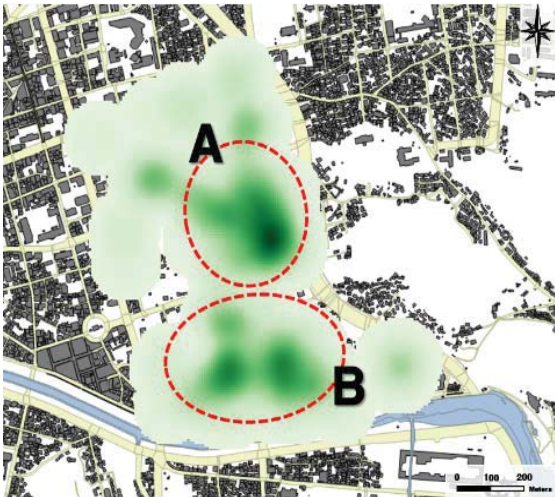


Fig. 10 Actual accommodation building use in 2016

Commercial, residential, and accommodation buildings within the Hanok Village in 2016 were counted, as in Table I, which yields 760 residential, 284 commercial, and 5 accommodation use. The number of residential building shows 2.5 times more than others.

TABLE I  
BUILDING USE THAT IS OFFICIALLY REGISTERED (2016) [7]

| Building use | Commercial |      | Residential |      | Accommodation |     |
|--------------|------------|------|-------------|------|---------------|-----|
|              | No.        | %    | No.         | %    | No.           | %   |
| Count        | 284        | 27.1 | 760         | 72.4 | 5             | 0.5 |

TABLE II  
ACTUAL BUILDING USE (2010) [1]

| Building use | Commercial |      | Residential |      | Accommodation |     |
|--------------|------------|------|-------------|------|---------------|-----|
|              | No.        | %    | No.         | %    | No.           | %   |
| Count        | 306        | 27.9 | 766         | 69.8 | 25            | 2.3 |

TABLE III  
ACTUAL BUILDING USE (2016)

| Building use | Commercial |      | Residential |      | Accommodation |      |
|--------------|------------|------|-------------|------|---------------|------|
|              | No.        | %    | No.         | %    | No.           | %    |
| Count        | 488        | 41.7 | 486         | 41.5 | 196           | 16.8 |

The spatial distribution of each building use is shown in Figs. 2-4. Commercial buildings are concentrated in area A, where Choongkyungro crossroad, Dongbu Market crossroad are located. Residential buildings are relatively evenly distributed throughout the whole area, although are found a little more concentration in area A and B. The residential buildings consist of 72.4%, which represents that Hanok Village is still a residential-oriented area.

#### B. Actual Building Use in 2010

The actual building use among commercial, residential, and accommodation buildings in 2010 is shown in Table II.

The result shows 766 residential, 306 commercial, and 25 accommodation buildings, where the number of residential building is 2.3 times more than others. The spatial distribution is shown in Figs. 5-7, which is similar to those of 2016.

Although residential buildings were concentrated a little in area A and B, they spread out through the whole area. The overall aspects of building use and their spatial distribution in 2010 represents that commercial buildings are densely crowded in area A. Residential buildings consist of 69.8% of all buildings, and therefore Jeonju Hanok Village in 2010 is closer to a residential-oriented area.

#### C. Actual Building Use in 2016

The building use in 2016 is as shown in the Table III.

The result is 486 residential buildings, 488 commercial buildings, and 196 accommodation buildings, showing a steep increase in the number of commercial buildings, and decrease of residential buildings. Among the total of 1,170 buildings, the proportions of commercial and residential buildings were 41.7% and 41.5%, respectively. The thing that we note is that the number of accommodation building had increased rapidly from 25 (2.3%) in 2010 to 196 (16.8%) in 2016. Since accommodation buildings are a sort of commercial use, we may conclude that there has been progressing fast commercialization between 2010 and 2016 in this area.

The spatial distribution of each building use is shown in Figs. 8-10. Analyzing the building use officially registered in 2016, commercial buildings are densely distributed in area A. However, the actual building use in 2016 showed that area B began to gather commercial buildings. Because area B is near to Jeondong Cathedral, Taejoro and Eunhaengro crossroads, where many tourists are visiting, shops for street food, 'Hanbok (Korean traditional costume)' hire and other fancy goods stores, and so on, began to open rapidly.

In case of accommodation buildings, new concentrated areas A and B appeared, which are different from the official registered building data in 2016 and actual building use data in 2010. The reason why the accommodation buildings had increased overall in study area is the rise in there interest of Korean people in traditional housing, the Hanok, and prefer the experience of staying at such hotels as opposed to western-style hotels. On the other hand, the number of residential buildings has decreased significantly, as shown in Figs. 6 and 9.

However, the rapid commercialization in Jeonju Hanok Village has brought an undesirable phenomenon which leads to gentrification, the loss of tradition and identity. To cope with these variations, local government considers several measures; for instance, strengthening the regulations of land use and building use. However, these could not be considered a fundamental solution.

## IV. RESULTS OF THE SNS ANALYSIS

#### A. Word Cloud and Frequency Analysis of SNS Big Data

After eliminating unsuitable data, the total SNS data was 11,017 cases. The frequency and word cloud analysis of the collected SNS data was conducted to learn what visitors are thinking about and interested in. As a result, the keywords 'best restaurants', 'travel', 'picture', 'Bibimbap (Korean traditional rice menu)', 'Hanbok (Korean traditional Clothing)', 'café', 'food', 'cathedral' were most frequently mentioned (Fig. 11).

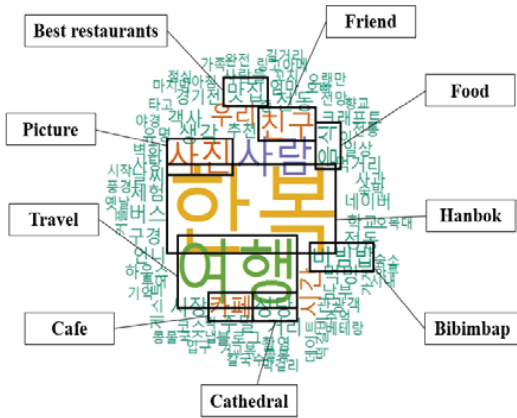


Fig. 11 SNS sentiment analysis of Jeonju Hanok Village

The words of high frequency mean that visitors are more interested in and experience more frequently.

The results show in Fig. 12, visitors posted commercial terms such as food, Hanbok, cafe rather than major tourist sites such as cathedral, Omokdae (a monument of Jeollabuk-do metropolitan area), and Kyungkijeon (a treasure of Korea #1578). This represents the necessity to redefine the direction of the overall regeneration project because visitors are requiring popular common commercialization facilities which have nothing to do with the original purpose of the Hanok Village regeneration project.

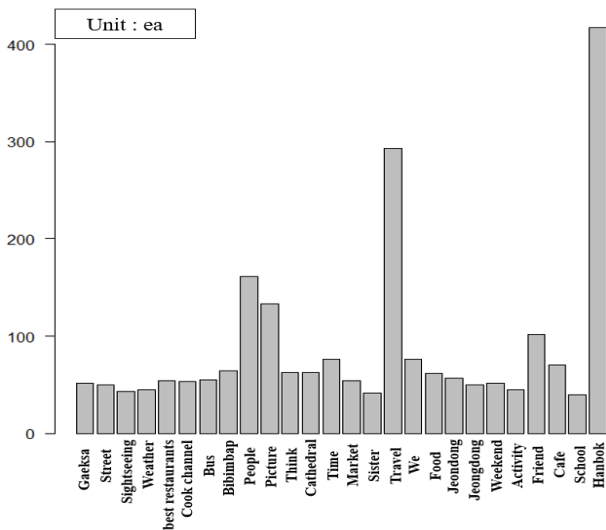


Fig. 12 SNS frequency analysis of Jeonju Hanok Village

*B. Sentiment Analysis of SNS*

The sentiment analysis is a categorizing technique on whether texts that visitors post as their opinions are positive or negative on a given subject, Hanok Village in this study.

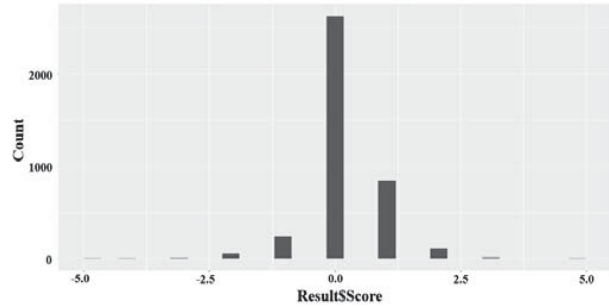


Fig. 12 SNS sentiment analysis of Jeonju Hanok Village

The sentiment score represents positive if it is higher than 0, neutral at 0, and negative if the score becomes less than 0 [8]. The SNS sentiment analysis in case of Hanok Village, when excluding neutral opinions of which the sentiment value are close to 0, shows that positive opinions are three times higher than the negative opinions. The result presents, when considering with the text frequency analysis results, visitors use commercial facilities more than other elements. Excluding positive and negative opinions close to 0 sentiment score, the overall opinion tends to be positive with an average score of 0.189 (Fig. 13).

In regards to Hanbok, the positive opinions included ‘fun’, ‘want to wear’, ‘beautiful’, ‘good’ and ‘brings back memories’, while negative opinions appeared as ‘uncomfortable’, ‘expensive’ and ‘so-so’.

In regards to food, positive opinions were posted such as ‘cook channel’, ‘tasty’, ‘want to eat’, ‘good’, ‘beautiful’ and ‘variety of food’, while negative opinions were ‘not tasty’, ‘so-so’ and ‘expensive’. Lastly, in regards to the overall Hanok Village, positive opinions were ‘many places to go’, ‘good’, ‘beautiful’, ‘fun’, ‘brings back memories’, while the negative opinions were ‘too many people’, ‘so much trash’, ‘difficult to park’, ‘congested’, ‘commercialized’, ‘no smoking area’, ‘gentrification’, ‘expensive’, ‘so-so’, ‘lacking uniqueness’, ‘loss of identity’ and ‘boring’. Excluding ‘tiresome’, ‘fun’, ‘boring’ and ‘good’, of which the meaning varies with each person, the overall opinions of visitors showed that the village is pretty and has many places that bring back memories, while it has too much trash, is crowded with people, hard to find a parking space, insufficient restrooms, excessive commercialized, and loss of its identity.

V.CONCLUSION

The study utilized land and building use data as a quantitative analysis, and analyzed SNS big data as a qualitative approach. The results may provide an insight for rebuilding legislative and policy directions through the identification of the physical urban changes and peoples’ recognition on the Hanok regeneration project. The findings are as follows:

First, the land use and officially registered building usage in Hanok Village showed that the Hanok Village used to be a residential-oriented area in 2010. However, in 2016, the area has changed rapidly to a commercial area. Also, the hot spot

analysis of the collected data showed that the commercial buildings, including accommodation buildings, have increased, especially along Taejoro and Eunhangro streets. The residential building has changed to suit commercial and accommodation uses. The results suggest the necessity to reexamine the overall directions of the regeneration project, as commercialization is in progress too rapidly and this is resulting in the loss of valuable historic and cultural heritage.

Second, the word cloud and frequency analysis of the SNS data collected from the visitors in Hanok Village showed that the major tourist sites, such as Kyeongkijeon and Omokdae, were less frequently mentioned compared to Hanbok. Through the results, the study found that visitors have more interest in the commercial elements than major tourist sites of the village.

Third, the sentiment analysis of the SNS big data revealed that most visitors are positive about Hanok Village, of which the sentiment score is 0.189. Also, visitors tend to be more interested in and have positive opinions on the commercial elements.

The results above suggest we should reexamine the regeneration direction to enhance the value of the historic cultural elements and allow more people to experience them. People are mostly interested in commercial facilities and various elements in this area. However, this leads to unfavorable outcomes against the original intentions to utilize historic cultural heritage and improve the living environment. It is more serious that the visitors' reaction to commercialization are positive.

Though it is important to improve the visitors' convenience in Hanok Village, which attracts approximately six million visitors annually, the excessive commercialization should be reconsidered to prevent loss of identity, gentrification, and deterioration of the living environment. However, for reestablishing the regeneration project, we need more deliberate analysis of changing land and building use. In addition, qualitative data, such as SNS, covering a more diverse field and a longer period needs to be analyzed.

The study successfully identified the issues and realistic vitalization policy direction of the regeneration project through the land use and SNS big data analysis. Also, the study expects to contribute to promote an active Hanok Village regeneration project and establish better planning and institutional management policies.

#### ACKNOWLEDGMENT

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#### REFERENCES

- [1] B. U. Mun, A Study on the Characteristics of Land Use Changes of the Surrounding Areas Due to the Activation of Traditional Residential Areas -Focused on the Jeonju Hanok Village-, Master Thesis, the University of Chonbuk, Korea, 2016.
- [2] E. Kontopoulos, C. Berberidis, T. Dergiades, and N. Bassiliades, "Ontology-based sentiment analysis of twitter posts," *Expert Systems with Applications Journal*, vol.40, 2013, pp. 4065-4074.
- [3] J. Y. Choi, D. H. Kim, "A study about Land value of neighborhood influenced by Development of Old Downtown -the part of Jeonju Hanok Village-," *Journal of The Korea institute of Electronics Communication Science*, vol. 6, no. 1, 2013, pp. 127-133
- [4] Y. Liu, X. Huang, A. An, and X. Yu, "ARSA: A sentiment-aware model for predicting sales performance using blogs," In *Proceedings of the 30th annual international ACM SIGIR conference on research and development in information retrieval*. Amsterdam, The Netherlands. July 2007, pp. 607-614.
- [5] A. Moreo, M. Romero, J. L. Castro, and J. M. Zurita, "Lexicon-based comments-oriented news sentiment analyzer system," *Expert Systems with Applications*, vol. 39, no. 10, 2012, pp. 9166-9180.
- [6] M. Taboada, J. Brooke, M. Tofiloski, K. Voll, and M. Stede, "Lexicon-based methods for sentiment analysis," *Computational Linguistics*, Vol. 37, No. 2, 2011, pp. 267-307.
- [7] Korea National Spatial Data Infrastructure Portal official website, March 2016, retrieved from <http://www.nsd.go.kr/>
- [8] D. H. Lim, *Big data analysis Using R*. 2015, pp. 1-334.