Enhancing the User Environment of Road Name Address in Republic of Korea: A Collaboration between Public and Private Sectors[1]

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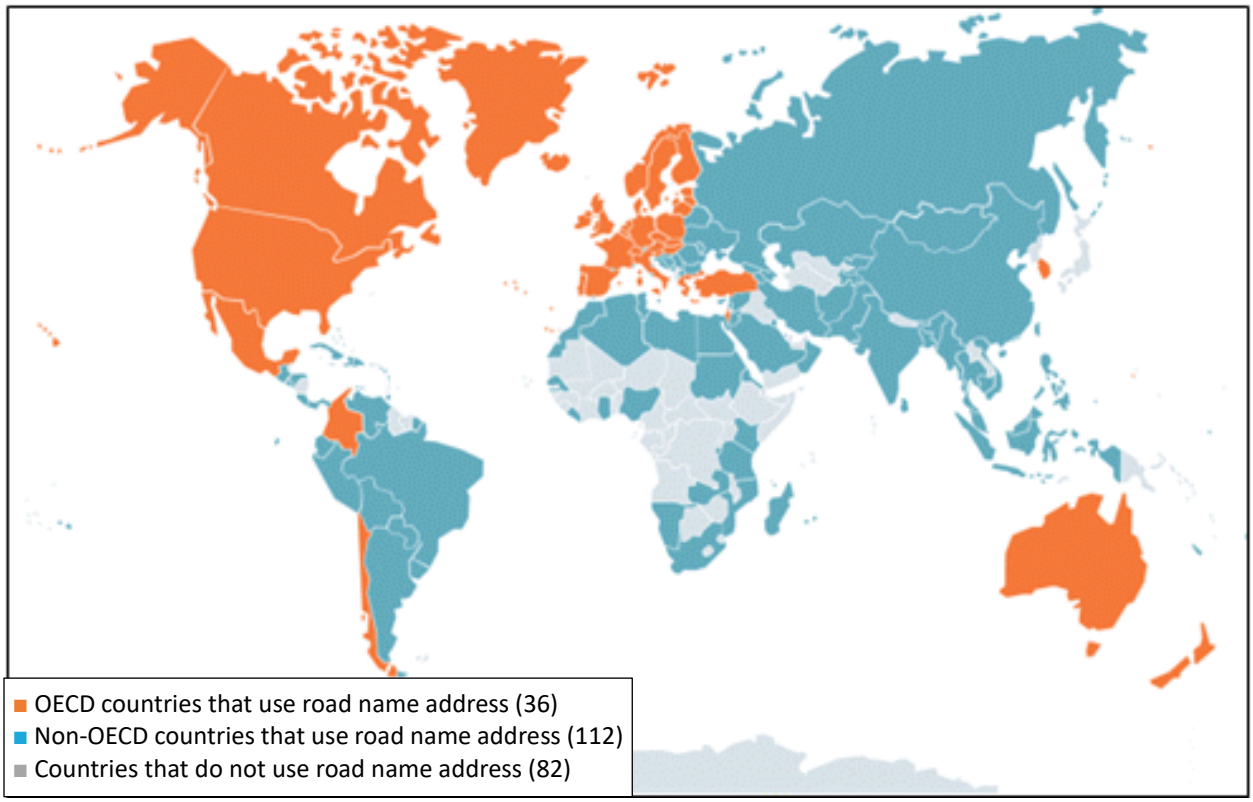
1. Introduction: Road Name Addresses Policy in Korea is Incomplete

No one can explain why a particular country pursues a certain policy without understanding its history (Diamond, 2019). Since modern times, countries worldwide have adopted the road name address system, which is a system of naming each road and numbering each building adjacent to the road in a certain direction, and is still in use today (Figure 1). However, the reasons for adopting the address system vary among countries and are closely related to each country's history. For example, Europe established the road name addresses as a modern address system from the 17th to the 19th centuries, with its origins traced back to England and France (Ministry of the Interior and Safety, Republic of Korea (ROK MOIS), 2017). In America, Southeast Asia, Oceania, and some countries in Africa, immigrants may have introduced the road name address systems to these regions since the address system that they originally used in their home countries was the road name address system. China might have been influenced by Russia's use of road name addresses during the Russification process (Zhang and Marsh, 2016), leading to the adoption of road name address system (ROK MOIS, 2017).

In Korea, land-lot-based addresses were established as Japan forced the use of them through land surveys during the 1910-1945 Japanese occupation. After the liberation, the ROK

[1] This article summarizes part of Jun, Y. (2021), *A Study on the Factors of Occurrence of Time Difference of Experience for a Transferred Policy: focusing on Address Policy in Republic of Korea*, [Master's thesis, Seoul National University]. https://hdl.handle.net/10371/176254

Figure 1. Jun, Y. (2021), Thematic map of types of addresses used by country. Data Source: Universal Postal Union(www.upu.int) and ROK MOIS(2017:14-27)



government made voluntary attempts to reform the address system multiple times, but these efforts were unsuccessful. In the meantime, land-lot-based addresses persisted for over 100 years. In 1996, the ROK government decided to introduce the Road Name Address Policy, and in 2007, the Road Name Address Act was enacted. Finally in 2014, the full use of road name addresses commenced.

Korea adopted road name addresses not merely because many other countries use them; the primary motivation was the loss of the address's location and identification, which are fundamental functions of an address. ISO defines an address as "structured information that allows the unambiguous determination of an object for purposes of identification and location" (ISO 19160-4:2023). While land-lot-based addresses were systematic at first, the rapid urbanization that caused lots divided and merged damaged their systematic nature.

Despite the introduction of road name addresses in Korea, many people still prefer using facility names like building names and business names when finding a destination or explaining their location, especially in situations such as meeting places or delivery orders. Considering the uncertainty of how much time elapsed since the introduction of the policy and whether the results can be measured as effectiveness (Chung, 2002), it may be that the public simply needs a period of adaptation and maturation to the new policy. However, this article will describe the process of Road Name Address Policy transferred to Korea as an incomplete policy transfer, following the framework proposed by Dolowitz and Marsh (2000), and explain where the roles of the public and the private sectors as the policy subjects remain incomplete.

2. The Role of Public Sectors

2.1. The Establishment of Road Name Address Policy and its Revision

In 1996, the ROK government decided to introduce the Road Name Address Policy for the first time. In 2006, the National Assembly of Korea and the ROK government enacted the laws and regulations. In 2008, they revised the road naming methods to enhance the predictability of road locations by implementing the Road Name Address Improvement Project. With this project, the name of the "-gil" class road[2] was improved from a proper noun method to a numbering method in order to enhance the predictability of these roads' locations. This change draws a lesson from the limitations of the road name systems in other countries, such as Europe and the United States, which rely on proper nouns that are difficult to memorize and unsystematic. However, an overemphasis on the numbering method may risk damaging unique place names and creating excessively hierarchical and lengthy addresses. Therefore, ROK MOIS suggested that local

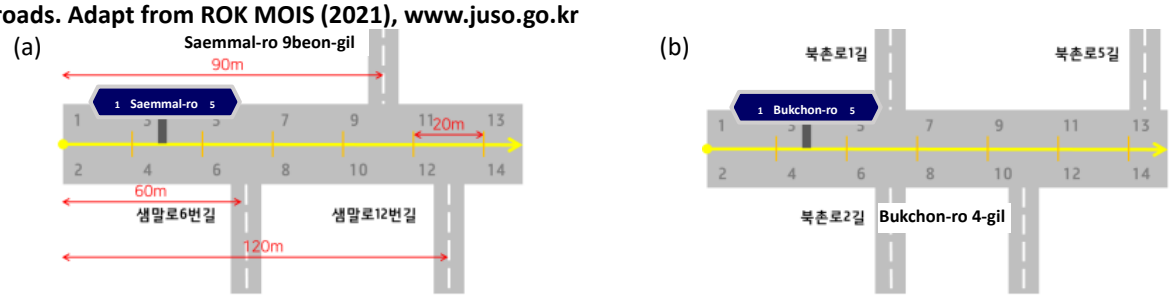
[2] Roads in Korea are divided into three classes: "-daero" (roads with eight lanes and above), "-ro" (roads with two to seven lanes), and "–gil" (roads except "–daero" and "–ro", usually narrow roads)

governments have the flexibility to choose a numbering method based on their needs (ROK MOIS, 2009) so that they adopt a balanced approach. The introduction of a unified two to three methods[3] for assigning road names nationwide, allowing people to navigate using two to three methods anywhere in Korea, could be seen as a measure to enhance the predictability of the location of addresses.

There are 167,525 road names nationwide as of April 2020, of which 33% are proper nouns and 67% are numbers combined to increase location predictability. Figure 3 is the result of a spatial analysis of road names by city, county and district using QGIS, showing that the higher the saturation, the higher the ratio of numeric road names. To produce this thematic map, the ratio of numeric road names among all road names was calculated by city, county, and district. The closer to red, the Basic Numbering Method is adopted, and the closer to green, the Serial Numbering or other numbering method is adopted. For example, it can be seen that regions such as Busan, Incheon, Daejeon, Ulsan, Gwangju, Cheongju in Chungcheongbuk-do etc. have chosen the Basic Numbering Method among the numbering methods, which is due to future housing development. This aims to maintain a stable address system by minimizing changes in road names, considering

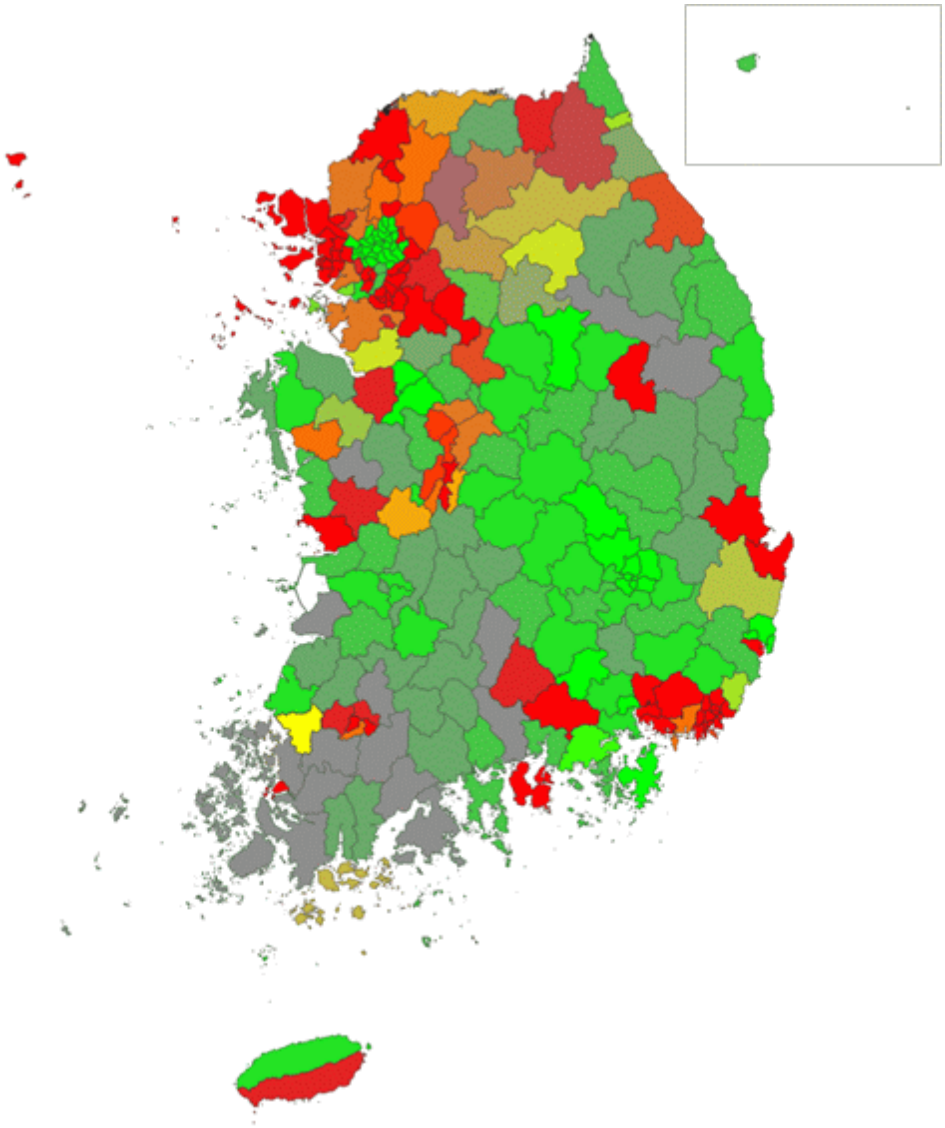
[3] a. Basic Numbering Method: numbering based on basic numbers, which represent the distance from the starting point along the main road to the absolute location of the branch (e.g. "Saemmal-ro 9beon-gil" is the road located about 90 meters to the left from the starting point of Saemmal-ro. Figure 2.(a))
b. Serial Numbering Method: numbering based on the order of the branch along the main road (e.g. "Bukchon-ro 4-gil" is the second branch road to the right from the starting point of Bukchon-ro. Figure 2.(b))
c. Other numbering method: numbering methods vary by structure of road networks

Figure 2. Jun, Y. (2021), (a) Basic Numbering Method and (b) Serial Numbering Method of naming "-gil" class roads. Adapt from ROK MOIS (2021), www.juso.go.kr



the possibility of expansion. On the other hand, in Gangwon, Jeollabuk, and Jeollanam-do, the ratio of road names using numbering methods was found to be less than 50%.

Figure 3. Jun, Y. (2021), Thematic map of nationwide road names statistics by cities, counties, and districts. Data Source: Road name database as of April 30, 2020 from ROK MOIS (2021), www.juso.go.kr



2.2. Installation and Management of Road Name Information Facilities

Both the central and the local governments in Korea have been installing and managing road name information facilities, including road name plates, building number plates, and other road signs that represents road name addresses (Figure 4). “The fundamental concept guiding the

Figure 4. Jun, Y. (2021), (a) Road Name Plate (b) Building Number Plate and (c) Road Sign with Road Name

(a) (b) (c)

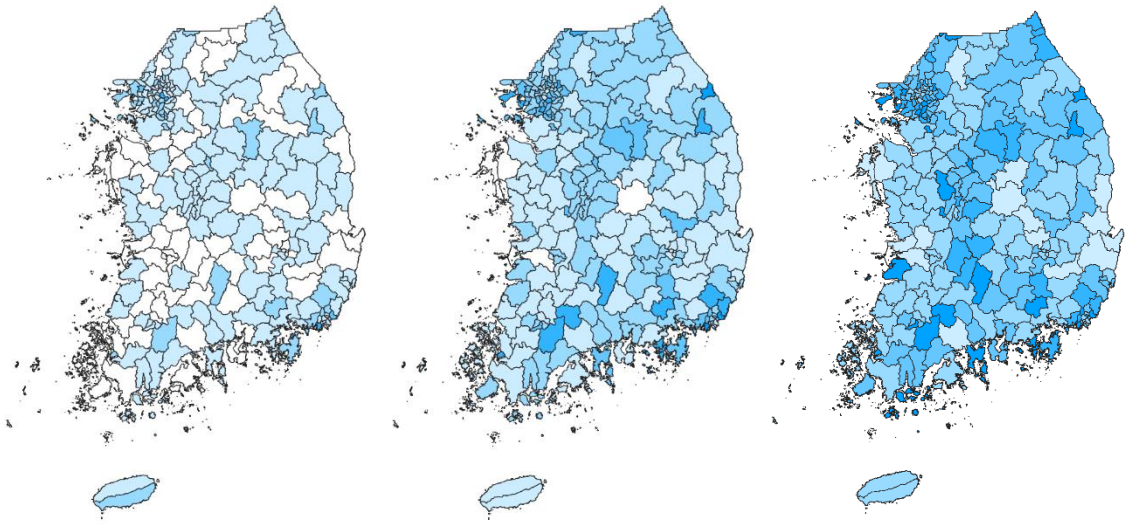
installation of road name plates is that they should be located in locations that can help with wayfinding."[4] To quantitatively verify this, this article calculated the number of intersections by local governments nationwide, determined the minimum required number of road name plates for each intersection, and computed C-value, the ratio between the actual number of installed road name plates and the minimum required number of road name plates, both by year and each period. If the C-value is 100% or higher, address users will face little difficulty finding the location using the road name address by using only the installed road name plates, and if it is less than 100%, the smaller the number, the more challenging it will be to locate the destination on-site, as the road name cannot be identified easily. Figure 5 shows the results of expressing C-value by city, county, and district in 2013, 2016, and 2019 as spatial information using the QGIS package. Given that most districts had less than 50% coverage in 2019, it suggests that Korea lacks sufficient road name information facilities to locate addresses using only the road name address.

2.3. Support keeping online maps up-to-date

One of the most important roles of the government is to support the maintenance of up-to-date of online maps. In Korea, it can be said the latest information is maintained well enough to

[4] Result of interview with Professor T, on November 9, 2020

Figure 5. Jun, Y. (2021), Thematic map of C-value by cities, counties, and districts. Data Source: Database for Road Name Address Facilities provided by ROK MOIS (2021) (a) 2013, (b) 2016, (c) 2019



(a) (b) (c)

find a location using only the road name address. ROK MOIS has established the Korean Address Information System (KAIS) through which information on changes such as new construction of buildings, changes in addresses, or closures are shared nationwide in almost real-time. The fact that this information system was able to be established almost simultaneously with the enactment of the Road Name Address Act (2007) can be attributed to the fact that Korea has been constructing digital maps by vectorizing paper maps through the National GIS Plan since 1996. From 2012, KAIS allowed the ROK government to provide daily fluctuation data from the address database to the major online map providers and to distribute them to the general public. In sum, the public and the private sectors in Korea have a very cooperative relationship in terms of notifying and providing daily change data.

3. The Role of Private Sectors

Private companies also play a crucial role in shaping address policy, educating, and fostering public acceptance, particularly in areas closely tied to people's lives. Notably, the recent monopolization of location-based services, including mobile maps, by a few companies such as

Naver, Kakao, and SK Telecom in Korea has heightened the influence of the private sector compared to the past.

The ROK government explains that the biggest advantage of the road name address is the scientific granting principle that allows you to find your destination just by knowing the address. However, these advantages are not revealed at all in various online addresses usage environments such as mobile maps and navigation in Korea. As seen in 2.3., despite close cooperation between the government and the private sector to establish road name addresses, there is an experience lag in the use of addresses, which can be easily confirmed by comparing the functions of the Google Maps app in other countries.

3.1. Lower Priority of Road Name Labels on Mobile Maps

Private sectors prefer that business names are displayed with higher priority than road names, and there is no incentive to display road names prior to other information. Table 1 shows that the minimum scale that the names of "-gil" class roads first display on the mobile maps. The expert in the conducted interview says "Private map providers incorporate the daily change data of road name addresses provided by the ROK government into their maps. However, they have to update the business names by themselves as the government does not provide this information. Accordingly, the private map providers build and utilize business name data by adding its own know-how to the latest road name address data from the government.[5]" Additionally, one of the main map suppliers in the conducted interview says "It is challenging to adjust the priority of label information displayed on the map to increase the use of road name addresses due to the internal

[5] Result of interview with Researcher S, Korea Local Information Research and Development Institute (KLID), on April 28, 2020

logic of the T Map platform. This article sees that measures to more actively expose or utilize road names must be designed based on changes in user behavior. However, more than 90% of the search terms entered by users are facility names, and there is no difference before or after the introduction of road name addresses.[6]"

3.2. Road Name Display Systematically on Mobile Maps

The basic numbers and numeric road names are not systematically displayed, and there is no legal basis for doing so. "Unlike Europe, where building numbers are assigned sequentially, Korea's road name address system utilizes basic numbers spaced at regular 20-meter intervals. This design offers the advantage of accurately expressing the addresses of street stores, food trucks, and moving objects in real-time as well as buildings. Therefore, if private sectors offered a feature that displays basic numbers along roads by level, it would significantly help people in understanding the principles of the road name addresses. However, despite ROK government collaboration with private sectors, there are realistic limitations when it comes to requesting the implementation of the road name address function."[7] Figure 6 shows that the screenshots of four major mobile amps in Korea and their degree of friendliness to road name addresses.

Table 1 Jun, Y. (2021), The minimum scale at which the names of "-gil" class roads first display on the map

Mobile Map	Consistency and Systematicity of the Road Name Labels	The Minimum Scale at which the Names of "-gil" Class Roads First Display on the Map
Kakaomap	NO	1:4,000
Naver Map	NO	1:2,222
T map for public transportation	NO	1:3,172
Google Maps (Korean domestic)	NO	1:5,000
Google Maps (international)	YES	1:8,695

[6] Result of interview with Employer X, SK Telecom, on May 28, 2020

[7] Result of interview with Deputy Director D, ROK MOIS, on May 26, 2020

Figure 6. Jun, Y. (2021), The screenshots of four major mobile maps in Korea and their user environments to use road name addresses

3.3. Diverse of Location and Identification Ways

With the advancement of technology, location indication and communication methods have become more diverse in addition to addresses. As a result, the chance that people attempt to experience to determine location or identification solely through road name addresses has decreased. As mentioned in 1., the primary reason the ROK government decided to reform the address system in 1996 was the loss of the location and identification function of land-lot numbers, which is essential, owing to the frequent divisions and mergers of lots resulting from rapid urbanization. However, with the widespread adoption of mobile maps and navigation over the past 10 years, there is less incentive for the address itself to follow a systematic structure. Notably, a service called "what3words" has emerged, offering a one-to-one correspondence between grids divided by longitude and latitude coordinates around the world through addresses composed of three random words. In other words, the road name address is just one of various location identification methods, like point of interest (POI), including street numbers, apartment names,

facility names, and even personal experience, and it is now possible for people to select and use one of these methods that is convenient in each situation.

4. Conclusion: The Necessity of Collaboration between Public and Private Sectors

This article has explored the process of transfer of address policy to Korea, and has verified its incompleteness by assessing the roles of the public and private sectors—key players in this policy. While address policy significantly influences various aspects of people's lives, the implementation of coercive measures, such as punishment for not using road name addresses, is limited. For this reason, Kim and Kwon (2015) recommend that a mid- to long-term approach, emphasizing the importance of "experiencing the convenience and excellence of the road name address system." They argue that "Achieve this goal requires a learning effect at the educational level rather than a simple experiential learning effect." Similarly, Bang and Yu (2016) described the wayfinding process as "the most active activity of exploring space," while Kim (2015) emphasizes the significance of journey planning before pedestrians commence walking. Consequently, public sectors are seen as having a role in managing and supervising the proper distribution of information required at all wayfinding stages, and if required, they need to develop strategies to incentivize private sectors to create online use environments conducive to using road name addresses. To accomplish this, it is suggested that both the public and private sectors should collaborate to establish an address use environment that seamlessly integrates road name addresses into people's lives on a voluntary basis.

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