STUDY ON THE FACTORS TO MAKE STREETS LIVELY AND BRIMMING WITH PEOPLE BY FIELD SURVEYS ON HISTORIC CITIES AROUND THE GLOBE: KYOTO, FLORENCE AND SEOUL

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ABSTRACT

Due to growing motorization after World War II, streets and their surrounding in Japan have been developed mainly to accommodate automobiles, bringing more vehicles into city centers and causing traffic jams and environmental pollution. This development style has resulted in less vibrancy in a lot of cities, especially historic cities, which have been unable to cope with the ever-increasing automobile traffic. Hence, the charm of cities has decreased significantly. People have recently realized that increasing the charm of streets effectively revitalizes urban cores. The current global trend is that people seek areas with lively streets brimming with people.

Despite this trend, there have not been adequate studies to identify important factors necessary to create attractive urban streets full of pedestrians. To understand the current status of streets, we measured the vibrancy of streets in 1) Kyoto, Japan, 2) Florence, Italy, and 3) Seoul, Rep. of Korea using field surveys to quantitatively clarify factors necessary for vibrant streets in each city. The field surveys examined 1) the vibrancy of streets, 2) parking conditions for vehicles along streets, 3) pedestrian zones, and 4) other surrounding factors such as commodity stores, parking lots, and style of road connections. The results indicate that improving pedestrian-centered space positively impacts streets, making them lively and brimming with people, whereas parked vehicles on the streets negatively contribute to vibrant streets.

Keywords: street, vibrancy, pedestrian, parking condition

1 INTRODUCTION

In Japan, after World War II, with growth of motorization, streets and their environment have been transformed primarily to accommodate automobiles, bringing more vehicles into city centers and causing traffic congestion and environmental destruction. This development style has resulted in less vibrancy in a large number of cities, especially historic cities, which could not be compatible with the increasing automobile traffic.

Kyoto, a famous historic city, has an area of old buildings, which help maintain a traditional environment. However, the impact of the motorization has caused numerous cars to be on the streets; accordingly pedestrian space has been damaged and the charm of the streets has been lost. Meanwhile, several European cities have maintained their narrow streets, and consequently the vibrancy from yesteryears has been maintained on their streets. Recently in Asia, historical streets have been revaluated as viewpoints have changed. Consequently, to improve or preserve pedestrian spaces in several cities, pedestrian-friendly roads are being established or revitalized while simultaneously moving parked cars outside of the central area or at least, reorganizing parking within the area. As mentioned above, people have recently realized that increasing the attractiveness of streets revitalizes urban cores. The global trend is that people seek areas with lively streets brimming with people.

Previous research on street vibrancy has examined pedestrians and traffic. Taniguchi (2009)'s research has demonstrated that cars have a negative psychological influence on pedestrians in shopping centers. Cervero (1999) has shown that access trips by foot and bicycle are affected by factors which New Urbanism calls for like pedestrian-oriented development. Fujisawa (2003) has measured the benefit of improving pedestrian spaces in urban areas. Additionally, Kitamura (2005) used a case study to show that pedestrian-oriented development of a shopping street in an existing urban area can create liveliness on the mall. Moreover, other research has examined environmental factors on streets such as commodity stores and the shape of street. Borgers (1986) has shown that pedestrian's road choice is related to the location patterns of retail stores. Hiller (1993) has demonstrated that the form of the urban grid is important to urban pedestrian movement. Arima (2008) has examined several factors on shopping streets, which arouse pedestrian activities. However, research to quantitatively clarify the relation between vibrancy and various environmental factors about streets, including parking conditions and pedestrian zone, has yet to be conducted.

This study strives to improve the attractiveness of cities by examining what makes areas vibrant. The streets in the surveyed areas, which are in historic cities around the globe, are quantitatively compared to determine which factors make them lively and brimming with people. Kyoto, Florence, and Seoul, which all focus on the coexistence between preservation and the impact of development due to motorization, were selected as targets. In their central areas, numerous narrow streets have been maintained and pedestrian areas have recently been established.

This study is comprised of two components. First, a detailed database from an international field survey is developed to compare various factors such as vibrancy, parking conditions, and pedestrian zone. Second, factors to establish lively streets brimming with people are quantitatively described using the database.

2 RESEARCH AREAS AND ANALYSIS METHODOLOGY

2.1 Research areas

Figure 1 shows the survey areas. The area from Kawaramachi-dori to Karasuma-dori and from Shijo-dori to Sanjo-dori was set for survey in Kyoto. The target area in Florence spanned from Via de Giraldi to Via de Tornabuoni and from Lungarno degli Acciaiuoli to Via de Cenrretani. The survey area in Seoul was defined from Samil-ro to Namdaemun-ro and from Toegye-ro to Eulji-ro. The areas were similar as 0.43, 0.45, 0.36 square kilometers for Kyoto, Florence and Seoul although the size of the cities are different. According to website of each local government in 2009, the area and population of Kyoto, Florence and Seoul are respectively about 828, 102, 605 square kilometers and 1.47, 0.37, 10.46 million people. The size of survey areas was fixed in the analysis.

Figure 1 - Survey areas in Kyoto, Florence and Seoul

2.2 Measurement of the vibrancy

Vibrancy rate on each road is defined as:

Vibrancy rate (: persons/m2∗100) = Number of pedestrian / Area of one road unit ∗ 100.

Figure 2 shows the method to verify the number of pedestrians. The checked ones act like walking, standing to look around and doing shopping and so on in one road unit. Each block was defined as one road unit if it is connected to two or more roads at opposite ends. The number of pedestrians was determined as follows. First, four pictures were taken on each road; two were from the edges to the middle and two were from the center toward the edges. Second, the average was calculated after determining all the pedestrians walking or standing within the road unit. Vibrancy rate on each road unit was defined as the average density of pedestrians.
To determine vibrancy, 556, 873 and 318 pictures were taken in Kyoto, Florence, and Seoul, respectively, which are almost four times the number of road units in each area (139, 218, and 81, respectively). They were taken from 11 a.m. to 4 p.m. on weekdays, except for outskirts of each area and blocked roads, to avoid the effect of commute. In addition, the number of photos acquired for several other factors was about five times the number for vibrancy.

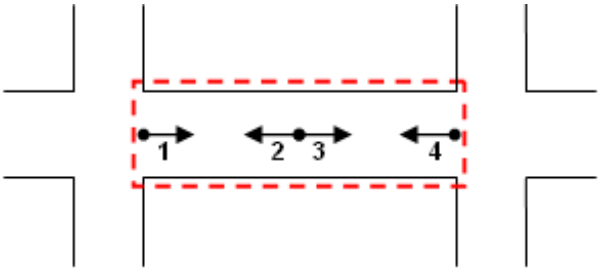


Figure 2 – Method to verify pedestrians and the definition of one road unit

2.3 Factors related to the vibrancy

Various factors were researched in the survey areas. Measuring the vibrancy of road spaces can quantitatively show which factors make lively streets brimming with people. Commonly selected factors on the street include: parking conditions, pedestrian zone, the style of road connection, parking lot, commodity stores, the proximity to subway, etc. As for parking conditions, the number of cars, motorcycles and bicycles on each road was examined. And each city has established pedestrian zone to make walking-life more convenient and safer for citizens, and this information was used in our research. The style of road connection is related to whether the unit of road is straight connected to another as this may influence the flow of a crowd and the sense of openness. Parking lot and commodity store were also considered as factors according to the regional situation. The proximity to subway station was defined as a station within 200m from the center. In addition, there were characteristic factors particular to each city, such as the arcades in Kyoto, piazzas in Florence, and street vendors in Seoul.

3 RELATION OF VIBRANCY AND FACTORS ON STREET

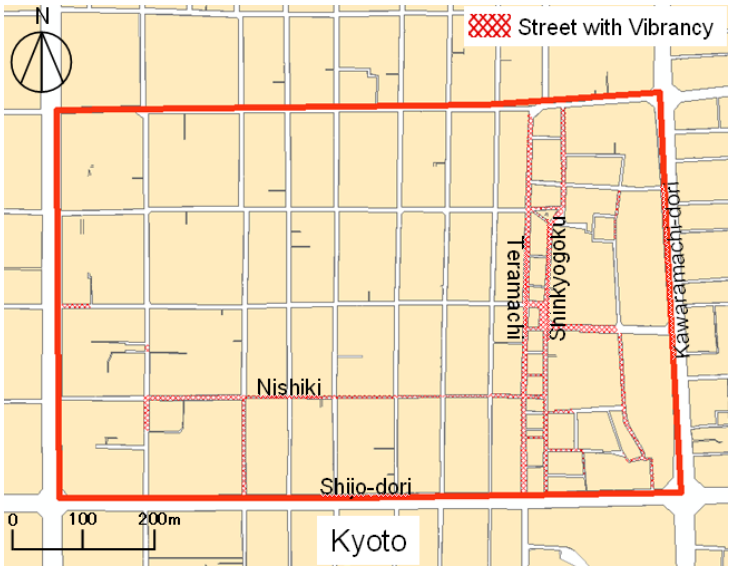
3.1 Vibrancy on streets

As shown in Table 1, Seoul had the highest value of 1.74 (persons/m2*100), followed closely by Kyoto (1.70). Florence had the lowest value (1.52). Consequently, the average of vibrancy rate was 1.65 for the whole survey areas. Figure 3 shows the above average vibrancy in each area.

Table 1 – Vibrancy rate in survey areas of each city

City	Survey area	Pedestrian number	Vibrancy rate
Kyoto	48,034 m2	817 persons	1.70 persons/m2*100
Florence	47,971 m2	731 persons	1.52 persons/m2*100
Seoul	43,935 m2	766 persons	1.74 persons/m2*100

Kyoto had streets that were lively and brimming with people, especially in Teramachi, Shinkyogoku and Nishiki close to Kawaramachi-dori and Shijo-dori, as shown in Fig. 3. There were several bus stops and two subway stations around the edge of the area surrounded by the main road. In Florence, vibrancy existed continuously on the main street Calzaiuoli from Piazza della Duomo to Piazza della Signoria and from Piazza della Repubblica to Piazza S. Firenze. In addition, Florence had lively streets brimming with people connected from the central area to the famous Ponte Vecchio. Famous buildings and piazzas, which attract tourists, are along the streets. In Seoul, the main street, called Myeongdonggil, was lively and brimming with people as well as the long streets from the northern road to the southern road of survey area called Eulji-ro and Toegye-ro. Moreover, the streets were lined with various commercial facilities. Thus, this area attracted both young people and tourists.



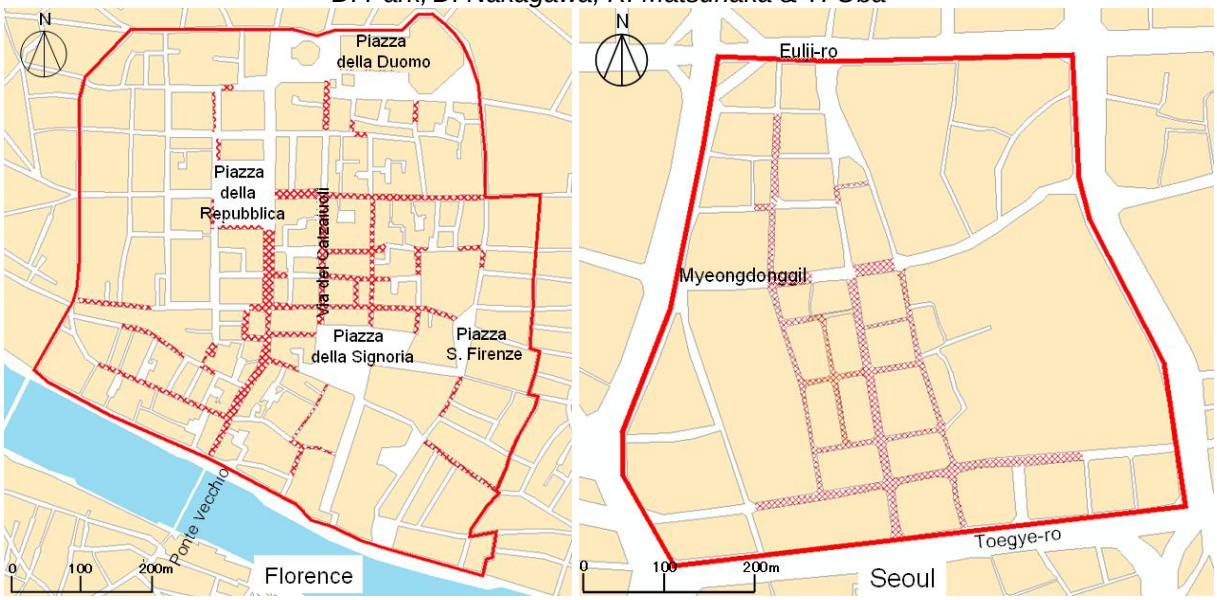


Figure 3 - Above average vibrancy in the survey areas

3.2 Vibrancy and pedestrian zone

Regardless of the survey area, the roads in pedestrian zone had a higher vibrancy rate than general zone, as shown in Fig. 4. In Kyoto, the vibrancy rate on the roads in pedestrian zone was much higher than general zone. This is likely because pedestrian zone are connected to shopping center with arcade. Vibrancy overlapped roads in pedestrian zones in the south and east areas. Additionally, in Florence, there was a relationship between pedestrian zone and vibrancy, but most streets in the survey area of Florence were labelled as pedestrian zone. Similar to Florence, a relationship between vibrancy and pedestrian zone also existed in Seoul.

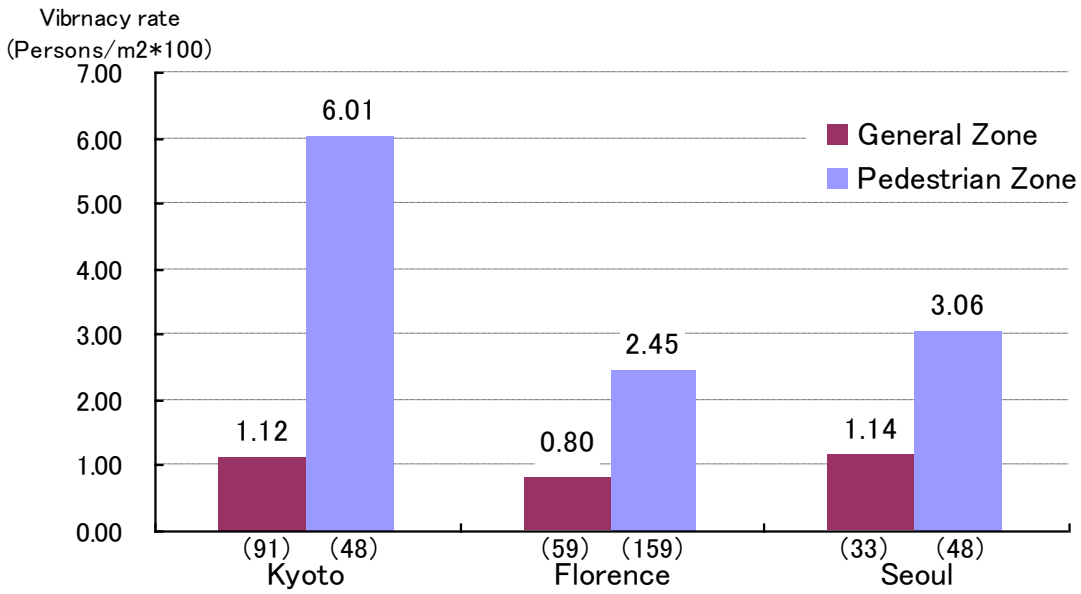


Figure 4 - Relation between vibrancy rate and pedestrian zone in the survey areas

As shown in Fig. 5, Florence has the most roads in pedestrian zone as 159 of the 218 (73%) of the roads belong in pedestrian zone. Seoul also has a high level as 48 of the 81 (59%) roads belong in pedestrian zone. But in Kyoto, only 48 of the 139 roads (35%) accommodate pedestrian zone, which is mainly located on streets with markets and has a similar route as commercial streets. In Florence, pedestrian zone is extensive around tourist attractions and shopping center. In Seoul, the pedestrian zone extends from the central district in Seoul, and future plans call for their expansion.

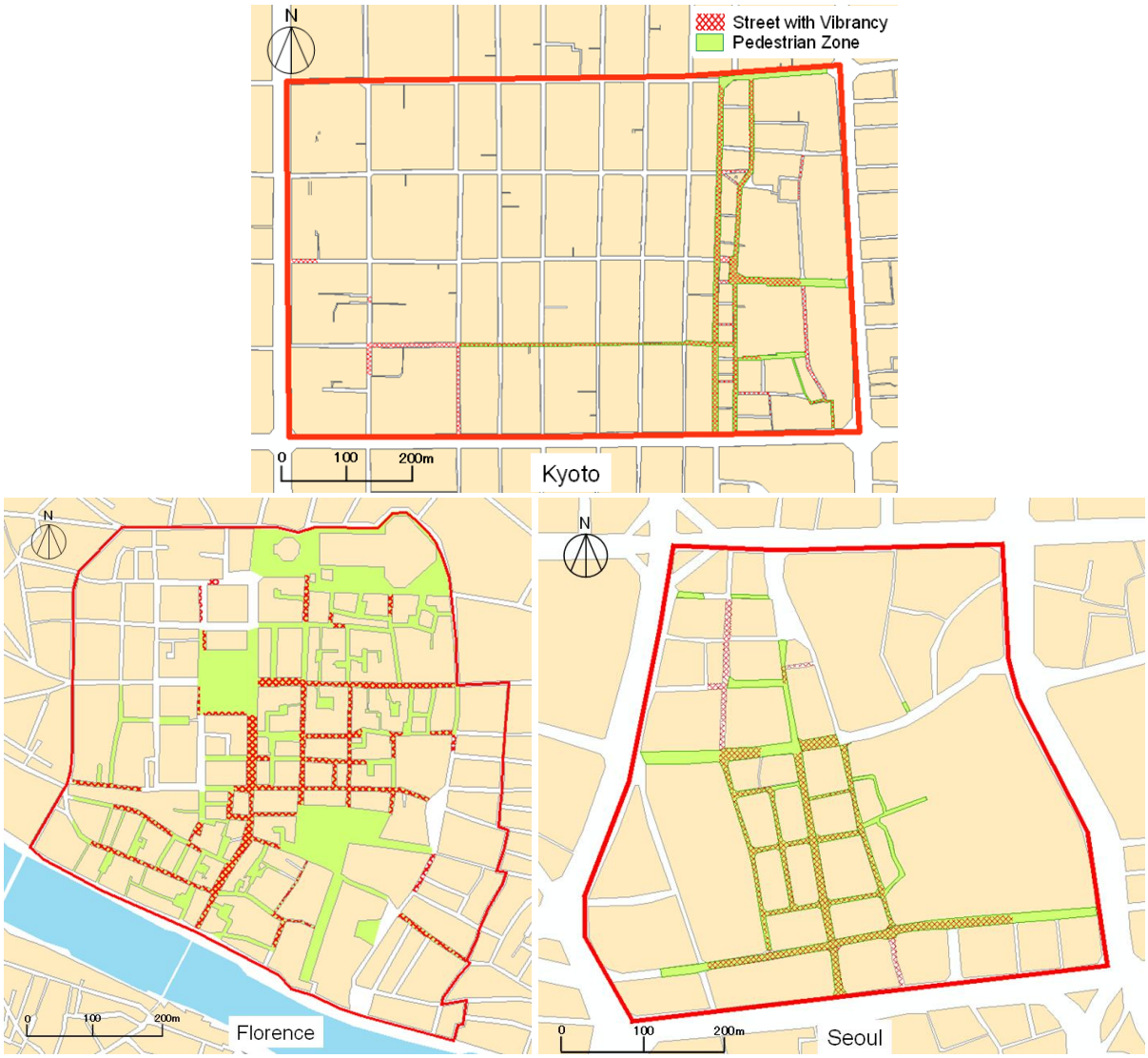


Figure 5 - Vibrancy and pedestrian zone

3.3 Vibrancy and parking conditions

To analyze the relation between vibrancy and parking conditions, the parking conditions were divided into three parts: cars, motorcycles, and bicycles (Fig. 6). Consequently, vibrancy was inversely related to parking conditions throughout the survey areas. Vibrancy was concentrated in the eastern and southern areas, while parking was scattered throughout the survey area of Kyoto. Parking, specially bicycle parking, may be due to the high rate of residences as well as high-accessibility from outside. Florence had a lot of vehicles

concentrated in the Northwest, but highly vibrant streets were located in the central area. Seoul also showed that lively streets brimming with people were concentrated in the central and southern areas, while parking was dispersed throughout the survey area.

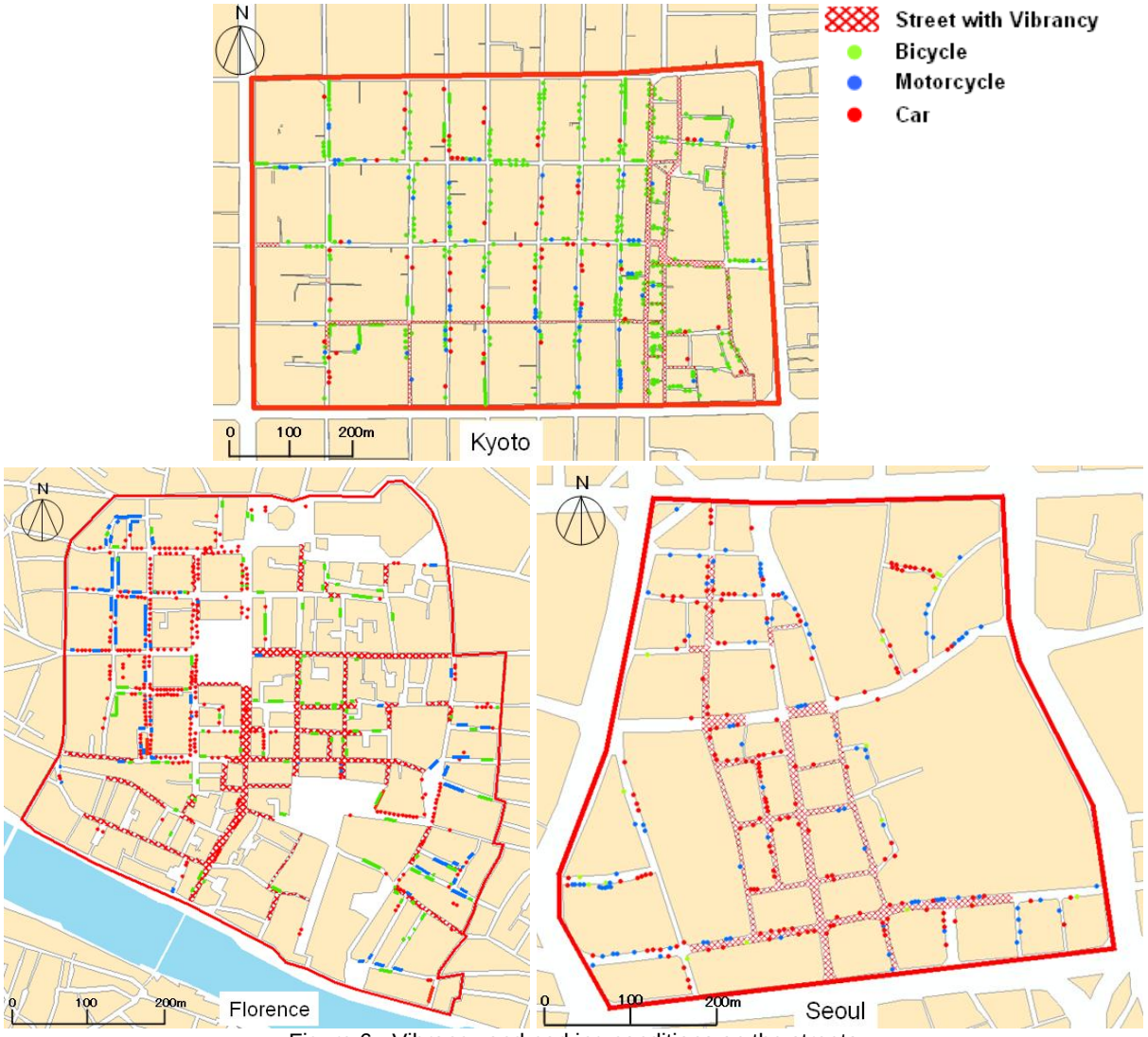


Figure 6 - Vibrancy and parking conditions on the streets

As shown in Fig. 7 and 8, parking conditions are classified to binary questions; street with parked one means street where more than one is parked. The percentage of street with parked cars is low as 27% of all the roads in Kyoto. In addition, there is the obvious difference of vibrancy rate between streets without parked car and with parked car. There are parking lots within buildings in Kyoto and Seoul, but in Florence the parking spaces are beside the streets on specific area. Each road was designated as one-way because the narrow roads have been preserved. Nevertheless, Florence also had a relatively low rate of road units with parked cars (39%). However, a lot of road-units (69%) had one or more parked cars in Seoul. Although this value is very high, it is partly due to numerous stores and streets being reconstructed during the survey.

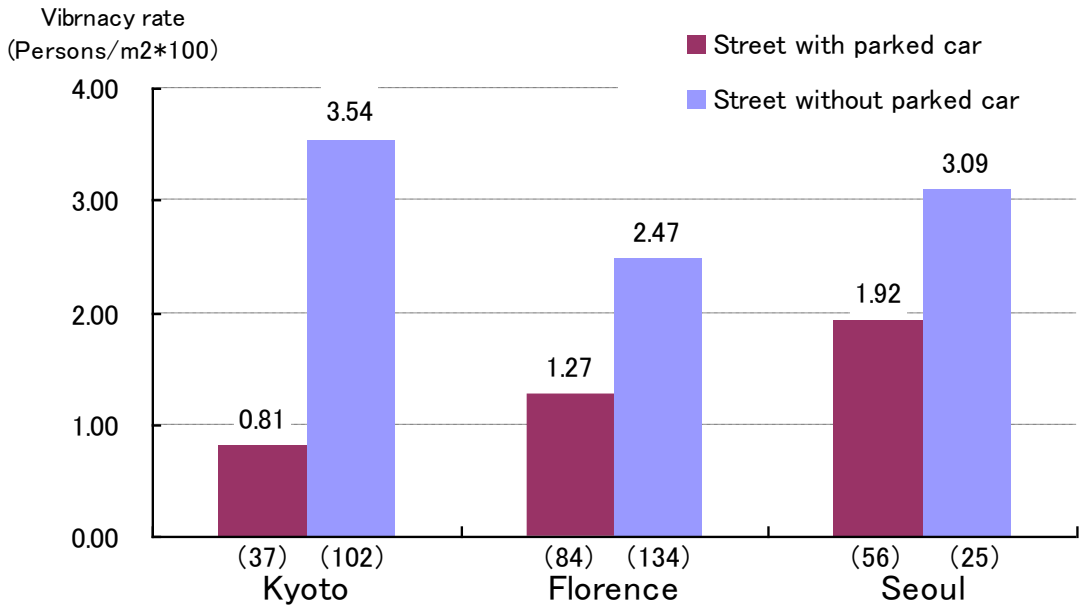


Figure 7 - Relation between vibrancy rate and street with parked car in the survey areas

As for motorcycles and bicycles, they were combined to determine the relation between vibrancy and parking conditions. Figure 8 shows there is an obvious contrast between the vibrancy and the existence of their parking in Kyoto, whereas Florence has a relatively low relevancy of vibrancy and their parking. This difference is likely because motorcycles and bicycles are scattered in all areas, including the central area, in Florence. Seoul had the opposite trend for vibrancy and motorcycle parking, but Seoul has fewer bicycles in Fig. 6. Thus, this difference may be due to fewer residents in commercial districts as well as the low accessibility of pedestrians into the area surrounded by wide roads designed for vehicles in Seoul.

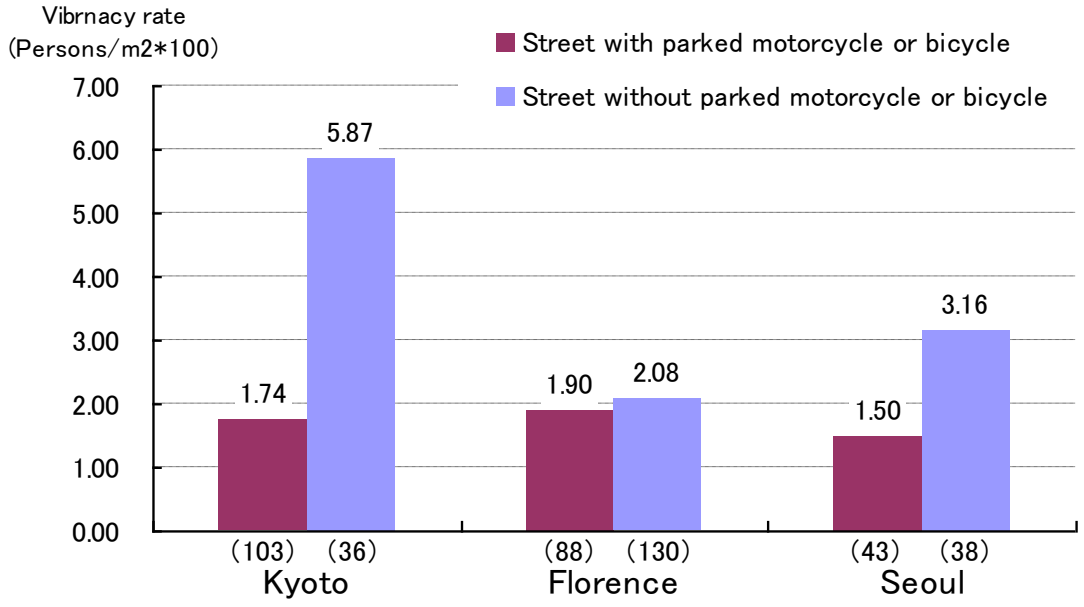


Figure 8 - Relation between vibrancy rate and street with parked motorcycle or bicycle in the survey areas

4 ANALYSIS OF VIBRANCY IN EACH CITY

4.1 Kyoto

Figure 9 shows the analysis result of the quantification method (type 1), which was used as a form of quantitative analysis, for various factors related to vibrancy. Explanatory variables for Kyoto include parking conditions, pedestrian zone, parking lots, commodity stores, proximity to subway stations, the style of road connections, and arcades. The existence of parking was negatively correlated with vibrancy. And there is noticeable distinction between pedestrian zone and general zone. Especially, Arcades were the most characteristic factor relevant to lively streets brimming with people in Kyoto. The high relationship concerning arcades may be due to the fact they are located in the central commerce area. And the style of road connection had a high relationship, too.

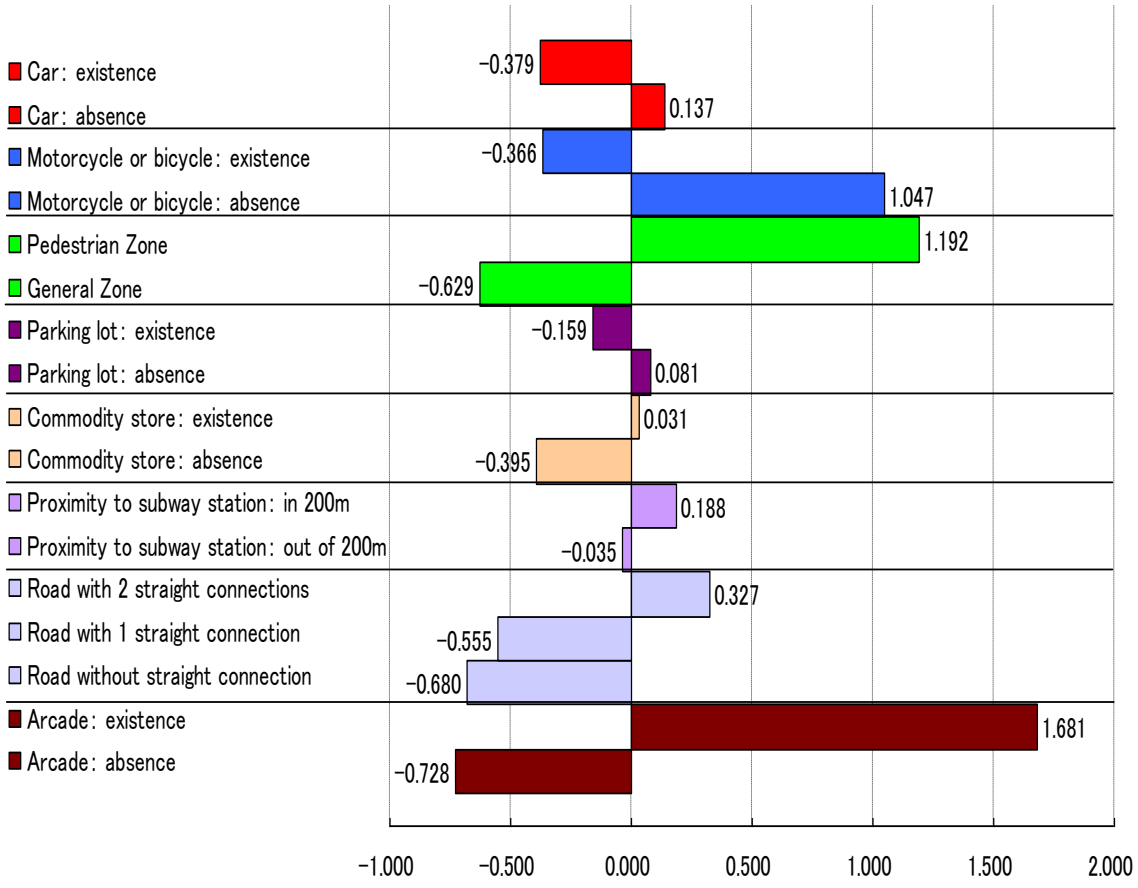


Figure 9 - Several factors related to vibrancy in Kyoto (R=0.788)

4.2 Florence

In Florence, factors such as parking conditions, pedestrian zone, commodity stores, road connection, and piazzas were used as explanatory variables, as shown in Fig. 10. Large

scale parking lot and subway station are apart from the survey area. The pedestrian zone and the density of cars parked on the street were highly related with vibrancy. However, parking for motorcycles and bicycles had little relevance. It may be due to a kind of public promotion to ride bicycles. One factor related to lively streets brimming with people was the road connection. However, piazzas, a character in Florence, had a low correlation during the survey period.

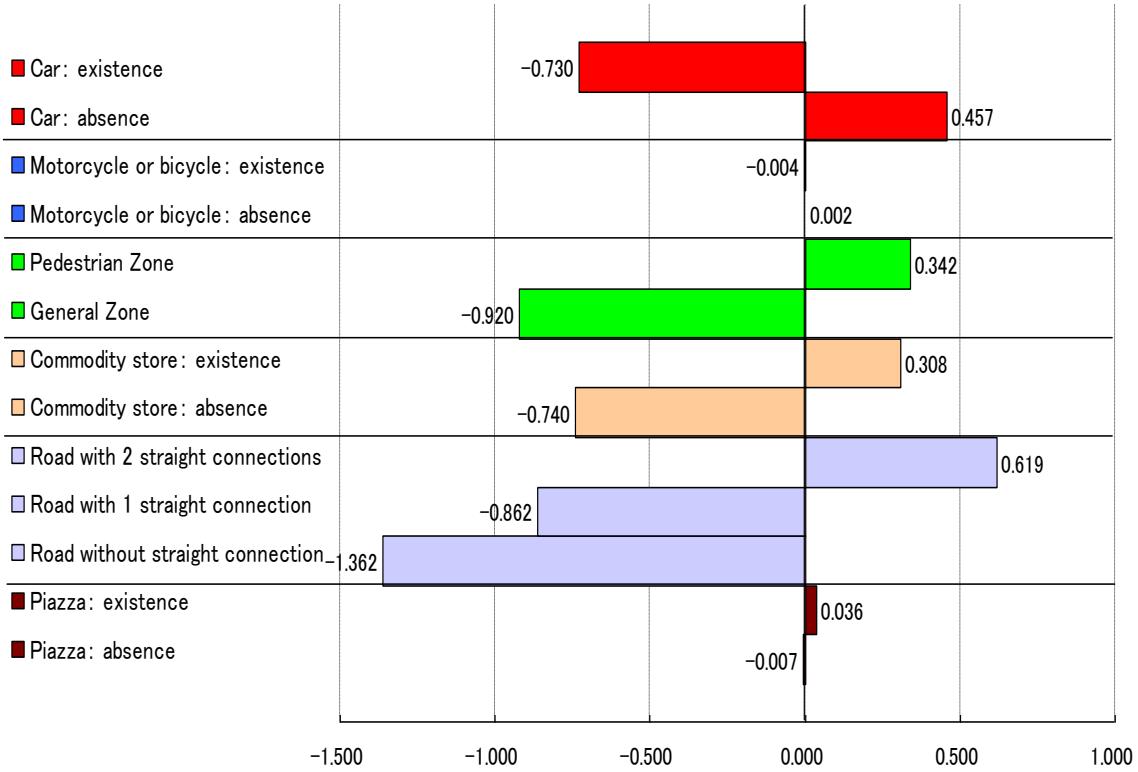


Figure 10 - Several factors related to vibrancy in Florence (R=0.490)

4.3 Seoul

In Seoul, parking conditions, pedestrian zone, parking lots, commodity stores, proximity to subway station, road connection, and street vendors were used as explanatory variables in Fig. 11. The parking conditions were negatively correlated with vibrancy. However the pedestrian zone had high levels of relevance to lively streets brimming with people. Factors such as commodity store and the style of the road connection were related to vibrancy, whereas parking lot and street vendor were less correlated. The result concerning proximity to subway station could differ from the expected because there were several connections and bus stops around the area.

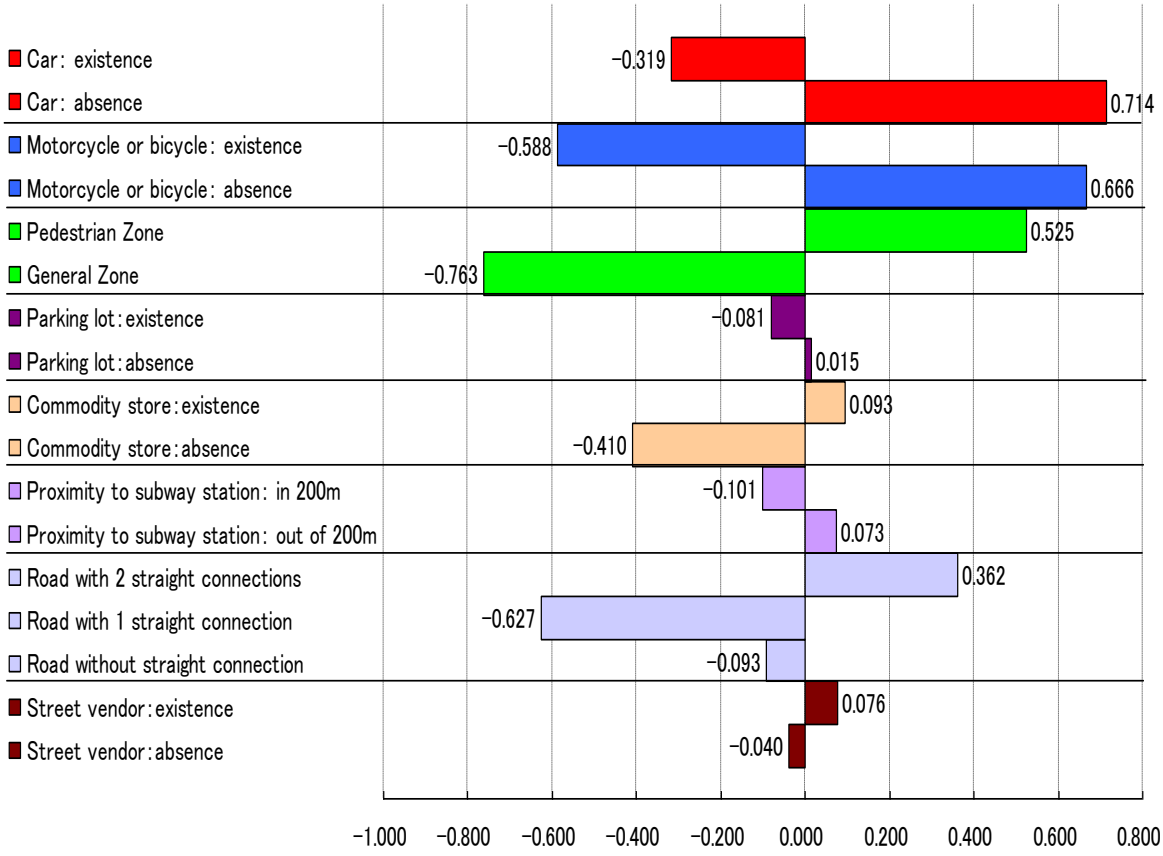


Figure 11 - Several factors related to vibrancy in Seoul (R=0.608)

5 CONCLUSION

This research examined factors to make streets lively and brimming with people and not vehicles. Therefore, central areas in Kyoto, Florence, and Seoul were surveyed using a common methodology to create a database. Then the database was quantitatively analyzed. Consequently, vibrancy is concentrated in select parts of the city. In the central areas of three cities, several factors were shown to make lively streets brimming with people. The pedestrian zone had a very positive relationship with vibrancy in streets. In contrast, the presence of any type of parking, whether for cars, motorcycles, or bicycles, were negatively related to vibrancy. This study clearly shows that creating pedestrian-friendly streets and moving away from a vehicle-centered environment are essential to vitalize areas in a city.

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