

AN ANALYSIS FOR TENANTS' CHANGE USING DIGITAL TOWN MAP IN TOKYO ROPPONGI AREA

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ABSTRACT

This study aims to track the newly appearance, the disappearance, and the change of almost all of the tenants in the Tokyo Roppongi area in the period of 1995 to 2005 in about five year blocks. Quantitative methodology for this study is to use digital town map data (ZENRIN Zmap) using GIS or other programs. Those data used in this study include name, location, and floor information etc. for each individual tenant. We are able to know what kinds of businesses appear or disappear concentrically for some area, or whether the floor occupied by those tenants influences the tendency of the movement of them, according to these time series analyses. Features for this study are to provide detailed spatial information and database for three-dimensional based usage for urban area using existing database merchandised for other purposes. In this study, dataset for each change of commercial tenants are analyzed and detected. Commercial buildings that have different pattern of tenants' change are expressed on maps in Tokyo Roppongi area.

1. INTRODUCTION

Urban facilities inclusive of buildings and housings etc. have constructed relatively in a short period in recent years in Japan, therefore it has become to be difficult to keep controlling their change from the viewpoint of city planning or spatial environmental management. Furthermore, the users such as tenants in urban area have changed their location relatively frequently, though the buildings or the apartment houses still exist in the same location without being broken.

Urban decline of the central shopping and business districts became worse, during the depression period in the last decade after the bubble economy of Japan. During the period, buildings with few tenants had increased seriously much more than before even in Urban area like Tokyo in Japan. Therefore, more detailed analyses especially about those users' change must be studied for more efficient city management.

2. METHODOLOGY

ESRI Zmap conversion system was used in this analysis. The conversion system can be downloaded free from the website of ESRI co. The data used in this analysis are ZENRIN digital map (Zmap Town). The digital map has been commercialized for more than a decade. The data in the period of 1995 to 2005 in about five year blocks are used and analyzed in our study. The time series data for commercial based tenants are compared with using computer programs. More than 6,000 commercial based tenants exist in Tokyo Roppongi area. 1) Newly appeared tenants with the change of buildings' name, 2) Disappeared tenants with the change of buildings' name, 3) Change of tenants for the same building, and 4) Continued tenants for the

same building, were mainly distinguished for this methodology.

2.1 Flow Chart of Methodology

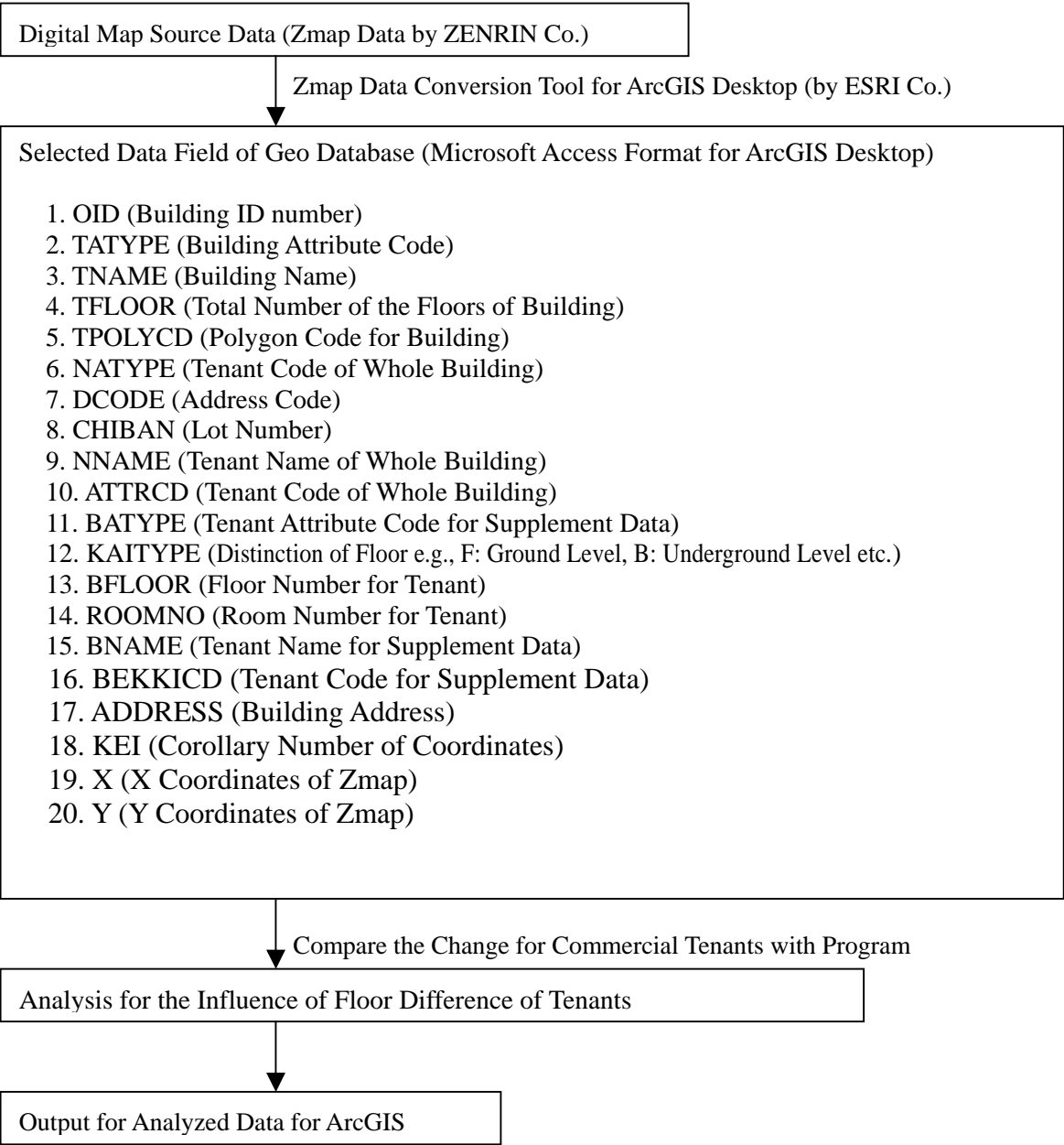


Figure 1: Flow Chart of Methodology

2.2 Dataset Definition

Definition of the dataset used in this analysis is described in the block of “Selected Data Field of Geo Database” in the flowchart of Methodology in the preceding clause. We utilized the characteristics that each data of building polygon, building name, and tenant name for supplement data have their identified code (e.g., “TPOLYCD”, “ATTRCD”, BEKKICD” respectively) in order to be compared as text string data. Buildings occupied by some tenants have supplement data in most cases. By using those data, more detailed tenants’ information not only the name of tenant but also the data including floor of each tenant, room number, and tenant attributes (for commercial use or residential use) can be acquired. However, the data do not include the data of “type of business”. Furthermore, the dataset also has address and coordinates. Therefore, those address and coordinates can be used for visualization on maps, or “address matching system” to plot the point of buildings on exact location on maps for other systems.

2.3 Data Usage

We focus on analyzing not only two dimensional change for tenants with alteration and abolition of buildings but also the three dimensional change for tenants such as which floor of tenants continue occupying or move to other places. Floor data for each tenant have strong attributes for analyzing urban changes. Generally speaking, shopping store is eager to occupy 1st floor to gather customer. In some cases in terms of high-rise building, some business companies are willing to occupy on the higher floor in spite of higher rent. In the future, the data can be applied in a uniform format in order to study the urban characteristics for wider area.

3. TESTING OF THE SYSTEM OF TENANTS’ CHANGE

This tenant change analyzing system is tested for several patterns of changes that have occurred in the real world. The Zmap data used in this analysis is originally investigated and made by site survey. Therefore, several mistakes seem to happen in the manufacturing process. Only a slight difference of the name of buildings or tenants influences the ATTRCD (Tenant Code of Whole Building) or BEKKICD (Tenant Code for Supplement Data), which should not be occurred if the same building or tenant continuously exists in the same place. We have been engaged in reducing those errors of the dataset. Those problems that should be overcome will be described in the each patten shown below.

3.1 Newly Appeared Tenants with The Change of Buildings’ Name

This test results from the change of newly developed ATTRCD (Tenant Code of Whole Building), which means the pattern that new buildings were constructed or the name of buildings change. By using the data, we are not able to distinguish new constructed buildings from other buildings name of them changed. When owners of buildings change, the name of building usually is changed and almost all of tenants occupied in the building change. Therefore, if the same tenant continues to occupy in the same building even the name of the building changes, this test deals it as continued buildings, then those buildings are considered to be subtracted from the original result of newly developed ATTRCD data. 74 buildings were detected for this category in the period from 2000 to 2005. However, 24 buildings out of the 71 buildings have the same tenants before and located in the same address. Therefore, Newly appeared tenants from 2000 to 2005 are detected in the remaining 47 buildings (= 71 –24) that are newly constructed buildings or owner changed building with no same tenants.

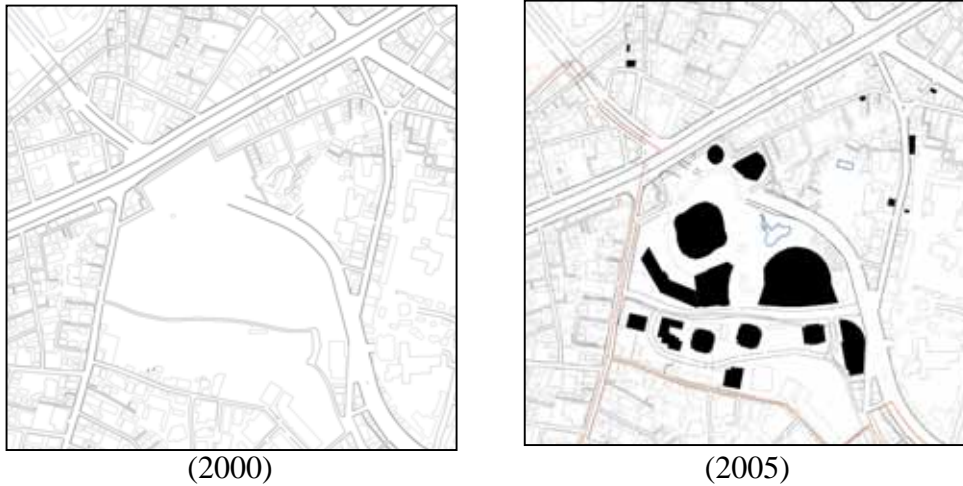


Figure 2: Newly Appeared Tenants with Roppongi Hills Re-Development (2000 – 2005)

3.2 Disappeared Tenants with The Change of Buildings' Name

Detecting the disappeared tenants with the change of buildings' name uses the almost similar algorithm for detecting newly appeared tenants as described preceding clause. ATTRCD (Tenant Code of Whole Building) in the former year disappear in the latter year. Name of 194 buildings out of 1,138 commercial buildings in Roppongi area changed from 1995 to 2000. However tenants in 72 buildings are found to be in the same building. Those buildings are subtracted from the original buildings detected as the change of name in order to find the more accurate disappearance tenants' building.

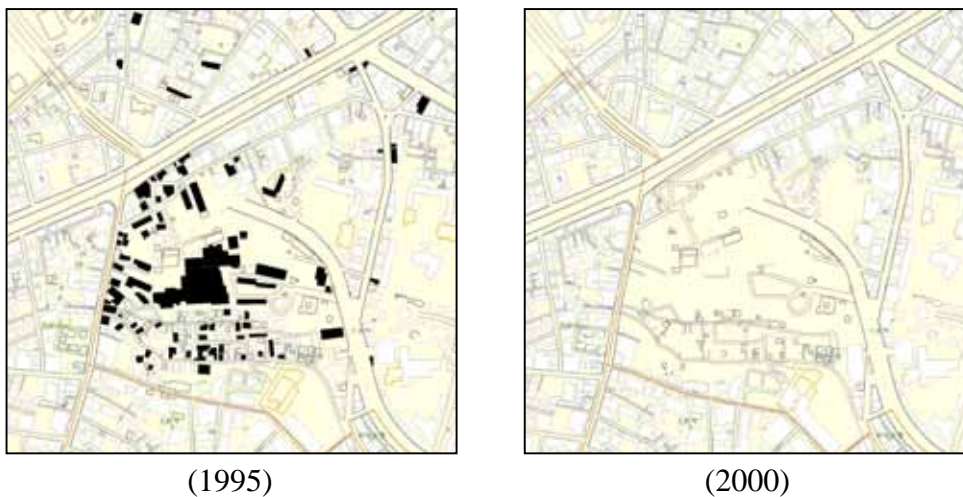


Figure 3: Disappeared Tenants with Roppongi Hills Re-Development (1995 – 2000)

3.3 Change of Tenants for The Same Building

Tenants' change in this test is analyzed within the building. When the supplement data exist, tenant change is tested in the same floor or the same room in the building. When the tenant changes, the BEKKICD (Tenant Code for Supplement Data) should change, and the name of the tenant also changes. The test results in a set of each tenant. Which room of tenant changed or not could be detected. There are some patterns of changing when several tenants occupy in a same room. If there is no room partitioned on the floor of the building, several tenants are dealt as they occupy the same floor together in the building. Including those cases, strictly speaking, we

should deal which tenant appeared and which tenant disappeared. However, in this study by now, we deal those change as the change of whole building especially for visualizing on a two dimensional map.

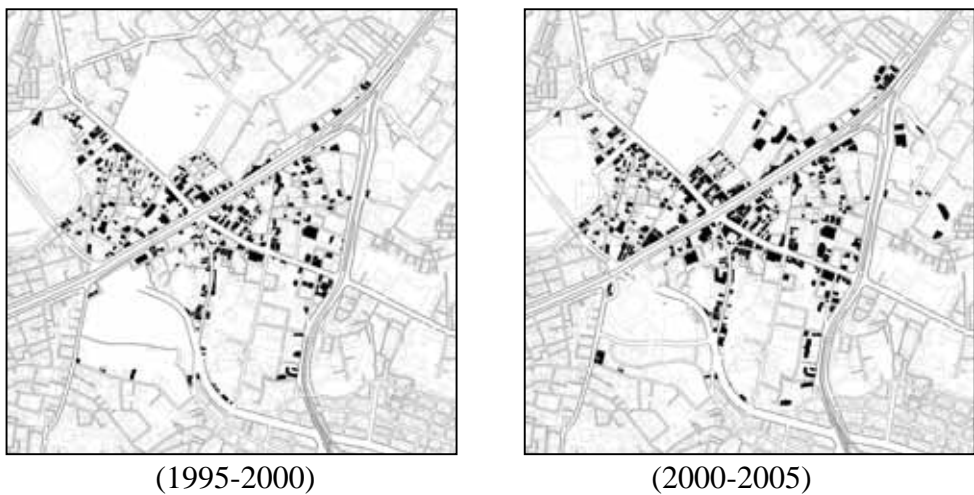


Figure 4: Buildings Tenants' Change Occurred

3.4 Continued Tenants for The Same Building

Continued tenants in the same building are detected with using ATTRCD (Tenant Code of Whole Building) or BEKKICD (Tenant Code for Supplement Code). When supplement data exist, BEKKICD compared by the new data should be the same as the old one. If supplement data do not exist, the ATTRCD compared by the new data should be the same as old one. Algorithm for this test also uses the coincidence of both NNAME (Tenant Name of Whole Building) and BNAME (Tenant Name for Supplement Data) in case a tenant has different ATTRCD changed by the slight change of building's name that seems to be happened by survey mistake. The dataset during from 1995 to 2000 and the dataset during from 2000 to 2005 were tested There are several patterns for continued tenants depending on the duration of the period we test. Even a tenant is detected as continued tenants by the test for five years, the tenant might move in the next five years. The definition for continued tenants for this test is basically by the period of five years. However, continued tenants in the period of 1995 to 2005 can also be analyzed if the dataset of 2005 and the one of 1995 are directly compared.

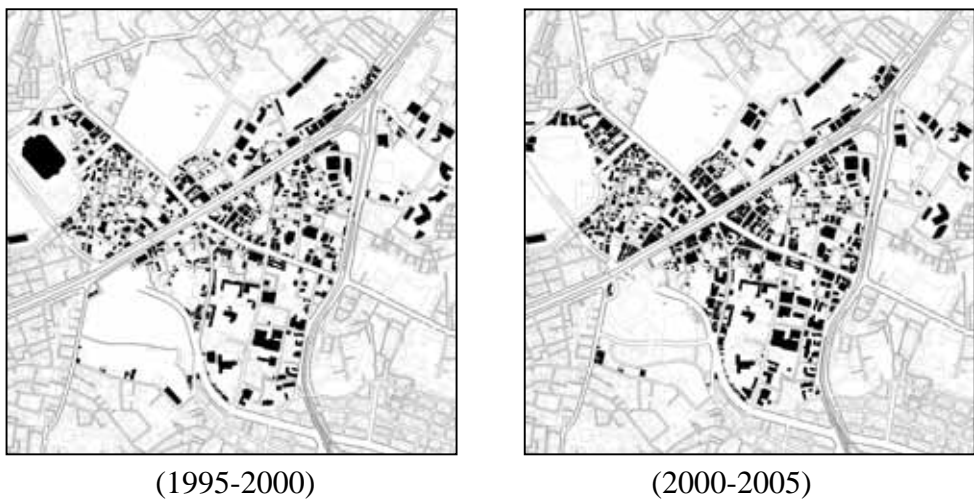


Figure 5: Buildings Continued Tenants Occupied

4. CONSIDERATION

Tenant based condition such as movement or continuation of occupation was detected by our system. Although the resulting dataset has floor and room information, more sophisticated application is necessary to obtain the result that express the more realistic change of urban commercial area. Like this Roppongi area where large-scale re-development project was accomplished, there should be the same tenants in the buildings before development and the ones after development. In this consideration, a problem using Zmap dataset was found. Identification code for tenants is influenced with the change of building code (building name). Therefore, even the same tenant continuously occupies in the same building, it was detected as different tenant by the name change of building. Problem is that only a slight change of name makes the code (e.g., ATTRCD, BEKKICD etc.) different from the one before. Not only the analysis by code but the name of tenants should be applied more accurately in order to overcome those kinds of problems found in these tests.

5. CONCLUSIONS AND RECOMMENDATIONS

Testing results show the capabilities of detecting time series change of tenants. However there still have several problems to be overcome. As Zmap dataset does not have type of business information for tenants, digital telephone directory data (NTT Town-Page) should be jointly used in this study for the next step. Then, the difference for the change by floor occupied by certain types of tenants can be analyzed. The relationship by prices by floor or other characteristics of buildings cannot be ignored for future consideration. In case a building itself disappear or newly built, where will those tenants' move should be detected for the next version of our system.

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