The impact of land potential on urban transformations as measured by performed activities in residential neighborhoods of Erbil city

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Abstract

The involvement of the people with different social, economic, and cultural features causes the cities to be complicated and continually self-changing settlement units. The changes happen due to human impact, as they are likely to shape the space where they live in and are lined with their own wishes and needs. However, the most serious problems of the urban space have begun to be taken under the name "urban transformation process". Urban transformation process as a continuous process has had important effects on the cities, one of which is the transformation of urban residential spaces. The purpose of this study is to examine the underlying causes of residential transformation activities which are potential of land. Through discussing the main aspects of residential transformation, the specific research problem has been formulated as "the impact of land potential on performed activities for neighborhood units in Erbil city is still unstudied". Set of indicators are determined to be used in the practical part of this study. The main indicators that contributed in measuring the land potential for neighborhood units are the distance from city center (m), the street width (m), the dwelling unit plot area (m^2) and the area of green open spaces (m^2) .Other indicators have been assumed to measure the performed activities such as construction license, reconstruction license, trading level and land price. Correlation methodology has been adopted to analyze the direction and strength of relation between quantitative variables. The study conducted general survey for (47) neighborhood units for studying impact of land potential on performed activities. The numerical results were calculated through SPSS program. The contribution of this study lies in its role in extending the theoretical debates in the transformation literature to the potential of land.

Keywords: neighborhood unit; urban transformation; land potential; performed activities.

1- Introduction

1-1- Research background

The meaning of urban transformation is changing from a source to another for various reasons and in various ways. Since their establishment day, cities have always been going through continuous change due to their dynamic structures (Karadağ and Mirioğlu, 2012). Urban transformation "the rearrangement of those city centers which become worn-out in time in accordance with the current social structure; it is also aimed to renovate the areas which are under the risk of disasters." (Karakuzulu et al, 2013). Transformation can influence and change the macro form of the cities (Günay, 1999 as cited in Oguz et al, 2010). Transformation projects are needed as a part of an urban transformation not only to make positive and eminent contributions to the urban identity within the context of urban design project, but also to bring the public interest to the front stage (Oguz et al, 2010). In general, format urban transformation can be defined as changing, transforming, improving and reviving the urban atmosphere that got old, dilapidated, lost much of its force or became left out for different reasons within a period of time, according to the socio-economic and physical conditions of today. (Çağla and Inam, 2006).

However, urban spatial structure of cities is not simply random collections of buildings and people, but functional structure. Beside that Duany and Zyberk have stated that "City is made up of multiple neighborhoods and districts,

organized by corridors of transportation or open space" (Duany and Zyberk, 1994). While the neighborhood unit as a major component of physical structure of the city has dynamic mechanisms, the planning unit of the city is a neighborhood unit with a five minute walking range (1/4 mile), and when combined with other neighborhoods it becomes a city (Perry, 1929). All neighborhood units have some physical components that consist of buildings, internal streets and open spaces. However, the land potential varied from one to another depending on its distance from the city center, street width, availability of larger plot area to build on, and sufficient open green space to serve the habitants (Calgary regional planning partnership, 2011). The desire of investors and people for the land is a factor that affects the level of trading, land price and transformation activities such as construction and reconstruction (Alonso, 1964). The transformation process depends on this as well as providing a better economy that results in shifting relationships among capital investments and the production of urban space. The demand side theory is selected for describing the relation between transformation activities and land potential for neighborhood units in Erbil city.

1-2- Previous studies

There are many studies that focused on transformation in general. They attempt to debate urban transformation process, through discussion of different ideas from books and published papers focused on the different viewpoints on the subject. Karakuzulu et al. (2013) focused on a socio-demographic approach to urban transformation. There is a relation between activities of urban transformation as rearrangement of urban space in accordance with current social structure. They found that the successful transformation process will renovate houses and enhance life quality.

Rahman (2010) argued that better economic opportunity and more urban facilities for the dwellers mean better development of the areas as urban transformation. Masoudi (2006) found that the transformation process in a historical city is an interdisciplinary approach to re-identify the modern transformation as a socio-spatial process and consequently social and spatial logic of society will change. Zhou (2015) argued that the transformation process is a spontaneous process of urban renewal responding to the demographic changes.

Mirmoghtadaee (2009) studied the transformation process on an architectural scale. She focused on the compatibility between the transformation of housing form and life style, and found that the harmony between the physical structures of house layout and lifestyles should be; otherwise, residents would react and try to change the environment according to their wishes.

Uzun (2002) found that the structure of transformation process related to the characteristics of the processes and their impacts on the cities are different. These differences are evaluated with respect to their impact on social and spatial structure in neighborhood units. Re´rat and Lees (2010) highlighted the particular importance of 'land potential' in the transformation process. The inhabitant chose to locate a central, dense and multifunctional area that allows them to avoid the times pace constraints of a suburban pattern of mobility.

The aim of discussing these materials is to find out main factors that will help to find the gap in the field and to formulate the research problem, hypothesis, and methodology; as well as to define the variables of the research in order to create a base for the practical part of the study.

1-3- Statement of the problem

Depending on literature review, city is a live dynamic entity, there are a lot of changes occurred in physical, social and economic body of city. In Erbil city there are a lot of activities happened due to different reasons. Despite the extensive literature review an increasing focus on cities in developing countries, very little work has dealt with this issue locally that means, there are many questions being raised related to this issue, such as what kind of transformation activity happened in Erbil city? Where are these transformation activities happening? Why does this transformation activity occur in some neighborhoods and not in others? Why there are variations in neighborhood units in terms of performed activities (construction, reconstruction process, number of trading and variations in land price per m^2? Does the planning of neighborhood unit in term of distance from city center, dwelling unit plot area, street width and percentage of green open area, play significant roles in decreasing the performed activities?

Based on all previous questions, analyses, and discussions, it can be concluded these studies didn't address the urban transformation resulting from the impact of land potentials and how it affects performed activities in Erbil city.

2- Research objectives

The study aims to conceptualize that the differences in value of land potential among neighborhood units will lead to the differences in the values of occurred transformation activities. In other words, the hidden forces behind performed activities for neighborhood units in Erbil city is land potential. The specific objectives of the study are:

a- To detect potential of land for neighborhood units in Erbil city.

b- To detect urban transformation as it is measured by the performed activities within neighborhood units in Erbil city.

c- To discover the impact of land potential on the performed activities in general (all Erbil city neighborhoods).

3- Research variables

The potential of land and performed activities for neighborhood units can be measured and giving it numerical values through indicators. The main indicators for measuring land potential(independent variable) are distance from city center (m), the street width (m), the dwelling unit plot area (m^2) and the area of green open spaces (m^2); also indicators that contributed in measuring the performed activities (dependent variable) are construction license, reconstruction license, trading level and land price. All these indicators are interrelated and work together to ensure a high quality whole; below is a brief description of each independent variable.

3-1- Indicators of measuring the potential of land

3-1-1- Distance from City Center

As (McMillan et al, 2011) pointed out that the neighborhood units close to city center are better in terms of value for land and the location which has economic and social benefits. Also, he mentioned that being close to Central Business District has a great role in time reduction for reaching the shopping center, office buildings, and recreational centers.

3-1-2- Residential Street Width

The sufficient street width will ensure a level of safety by using a planting strip between roadway and sidewalk as a visual and physical barrier between cars and walkers. (ITE ,1984) .Sufficient street width has the capacity to establish the criteria in design in terms of safety for both vehicular and pedestrian traffic, efficiency of service for all users, livability or amenities, economy, minimizing density of building and privacy (Joseph,1995).

3-1-3- Dwelling unit plot area

The neighborhood unit with larger dwelling unit plot area tends to be more attractive than others because it has direct influence on flexibility in the design process, minimizing building density, maximizing green area within plot area and decreasing population density; therefore directly impacting the quality of life (Chakrabarty, 1987).

3-1-4- Green open spaces

Provision of sufficient percentage of green open space which is used for meeting or gathering outside the home and which fosters resident interaction and opportunities for contact and proximity as well as provide environmental health, and social and economic services to communities (Francis et al, 2012). This paper assumes that there is a relation between the potential of land and performed activities for neighborhood units in Erbil city.

4- Methodology

The correlation methodology will be implemented by interpreting and measuring the relationship between potential of land and number of performed activities for the neighborhood units. In order to conduct these choices and measurements, the study tries to conduct the comprehensive survey on the neighborhood units of Erbil city for providing wide data about the neighborhood units of Erbil city. Land potentials of each neighborhood unit have been measured through measurement indicators.

The process of measuring and ranking for collected data from general survey will be based on the following steps:

1- Categorizing the values for each indicator of land potential and performed activities into five grades from minimum to maximum.

2- The process of coding through giving sign A to minimum value and A++++ to maximum value for potential of land, B to B++++ for performed activities (Appendix A).

3- For increasing clarification, converting values for both potential of land and performed activities into maps from light to dark color.

4- To study the form of relation; summarizing the values of indicators for land potential and performed activities in each neighborhood unit and converting into two-dimensional graphs.
5- To study the direction and association of relation; using a statistic (SPSS) software that measures significance of the relation between quantitative variables (chi square test: is a family of distributions commonly used for significance testing. The most common variants are the Pearson chi-square test, where a research sample has been used, it is important to know whether the findings are valid or came about by chance) (MacDonald and Headlam, 2009).
6- Using Mathematical equation: to measure the strength of relationship between two quantitative variables as well as to describe which neighborhood holds the maximum value of correlation between quantitative variables through using correlation.
7- Correlation measures the strength of relationship only. In general, $r > 0$ indicates positive relationship, $r < 0$ indicates negative relationship while $r = 0$ indicates no relationship. Here $r = +1.0$ describes a perfect positive correlation and $r = -1.0$ describes a perfect negative correlation.

5. Sampling

The main purpose of sampling is to obtain the richest possible source of information to answer the research questions. During the general survey, it has been found that Erbil city consists of many neighborhood units that are different in terms of land division time as some of them are traditional, which had begun before municipality had role in planning neighborhood units, such as *Al- Arab and Khanaqa* neighborhood units. Otherwise, there is a group of neighborhood units that emerged in the form of housing for displaced people that were planned by municipality (displacement). In addition, there are group of neighborhood units that had begun due to a margining phenomenon where people built their dwelling units without planning. These neighborhood units emerged for political and social reasons (marginal). As well as some neighborhood units that emerged recently (investment), have been planned by investment companies under the responsibility of Ministry of Planning and Investment. Finally, the class that has capability to hold the maximum percentage from the overall classes was the municipal class. The research indicated that the marginal, traditional, displacement and municipal class had been under the responsibility of municipality which divided into six directorates. The investment class; however, is under the responsibility of Board of Investment. For selecting neighborhood units to be part in comprehensive survey the study draw the following figures:

1- Illuminate the percentage of each category in terms of number of neighborhood units (Figure 1).
2- Illustrate the area of each category from the whole (Figure 2).
3- Highlight number of houses of each category (Figure 3).

Capability to hold the maximum value in terms of number of neighborhoods units, area of neighborhood unit and number of houses has been adopted in selecting the category. As a result, municipal class has been selected for comprehensive survey (first part) to represent Erbil city because it has been holding the maximum value in terms of percentage of classes, area and number of dwelling units. Selecting sampling process for second part of research has depended on the results of comprehensive survey that selects the neighborhood unit capable to hold the maximum value of correlation.

6. Results and Discussions

The process of analyzing collected data has depended on the mathematical approach through using statistics (SPSS) program. . The results of data collection have been arranged into two sections. The first section presents the results and discussions for comprehensive survey, while the second section will be devoted for interpretation of results and discussions for sample survey. These results will be displayed in form of maps and graphs as well as tabulated in numerical tables.

6-1- Results of comprehensive survey

The results of comprehensive survey have been showed through the collected data for indicators of land potential and performed activities for all neighborhood units in Erbil city. The values for distance from city center indicate a gradual decline in the values for all five groups whenever we move forward from the nearest to the farthest, noting that the first group's grade is (4) pluses (the nearest one) and the last one's grade is (0) pluses (the farthest one) (Appendix A, Figure 1).
The result for the indicator of street width demonstrated that there are different widths available for each neighborhood unit; such as

Parlaman, *Kwestan*, *Mamostayan1*, *Ronaky* and *Zanko1*. These are capable of holding higher pluses (A++++) than the other neighborhood units in terms of street width (Appendix A, Figure 2). Results of survey for dwelling unit plot area as first subdivision by municipality for overall neighborhood units showed that the three neighborhood units (*Parlaman, Mamostayan1* and *Ronaky*) are capable of holding (A++++), reaching to the higher level from the chart which is equal to (600m^2). Some dwelling units in these neighborhood units even mix two or three plot areas to build on, whereas the average housing plot area for *Mustawfi*, *Khanzad*, *Hawleri Nwe* and *Khabat* was (150m^2). Moreover, the dwelling unit area with (250m^2) mostly divided by two such as *Sharawani*, *Hamrin* and *Rasty* as showed in (Appendix A, Figure 3).

Additionally, the percentage of green open spaces in neighborhood units in Erbil city was varied between 1% to 23%. ,as in Kani neighborhood unit is (23%) then followed by *Galawezh* and *Ronaky*. unfortunately the majority of the percentage between 5% - 1% like in *Slahaddin, Khanzad, Mufty*...etc (Appendix A, Figure 3). The summation of land potential's indicators for each neighborhood unit represented in (Figure 4) which can be noticed that the *Ronaky* neighborhood unit holds the maximum value (14) from the whole and this indicates the fact that *Ronaky* is very important, because its nearest from city center, have widest street, availability of large plot area and at same time availably of sufficient green area, all these points gives an impression about the possibility of performing maximum activities, and then followed by *Minara, Parlaman and Mamaostayan 1* which is (11), however the minimum value recorded by *Safin1* & 2 and *Sebardan* is (3).

The result of comprehensive survey illustrates a big variation in the percentage of construction license on city level as shown in (Appendix A, Figure 5). The percentage of construction license in *Sarbasty* neighborhood unit reached to maximum level from the chart which is (65%) however in *Mstawfy*, *Saidawa, Kani, Kwestan, Mufti, Iskan, Andazyaran* and *Mamostayan* the value was under (1%).This indicator is important to be compared with distance from city center; it indicates a relationship, which means that mostly the farthest neighborhood unit from city center has been reached to the maximum level from the chart, otherwise the nearest one hold lower percentage.

The relation between distance from city center and percentage of construction license approves the availability of vacant land for neighborhood units farther from city center rather than nearer one. Whereas the percentage of reconstruction license declined to (0%) in Hamrin and *Chnar* neighborhood unit, it was related to the availability of vacant lands to build on it instead of demolishing deteriorated one, while reconstruction license in *Ronaky* neighborhood unit increased to the maximum level was equal to (8.6%). *Ronaky* is one of the most popular neighborhood units by the citizens of Erbil city at the same time there is no vacant land to build on it, then people tried to buy and demolishing deteriorated dwelling units to construct a new one, that is why the number of reconstruction license reached to the maximum level among them (Appendix A, Figure 6).

The price of land for dwelling units during 2014 in Erbil city has been reached to (850000 ID/m^2) in *Ronaky* and *Parlaman* neighborhood units, otherwise land price for 33% of neighborhood units declined to (150000-250000 ID/m^2). The reasons behind these variations in price may be related to plot area, distance from city center, distance from business center and street width, in other words depended on potentials of land (Appendix A, Figure 7). Percentage of trading for each neighborhood unit in Erbil city, on the one hand increased to 76% as in *Zanayan* neighborhood unit on the other hand decreased nearly to 2% in *Mustawfy*, *Tayrawa*, *Mhabad* and *Roshanbiry* as well as the trend line for trading was between 30% and 45% such as *Shorsh*, *Kani*, *Ronaky*, *Mufti*...etc. This means that the neighborhood units with high potential in term of distance from city center, dwelling unit plot area, percentage of green open space will be more attractive than others (Appendix A, Figure 8).The results for performed activities during 2014 for all neighborhood units have been summarized .It can be noticed that the *Ronaky* neighborhood unit holds the maximum value with (13) among the whole then followed by *Parlaman* is (11). However, the minimum value has been recorded by *Mustawfe* and *Chwarchra* neighborhood unit respectively (Figure 5).

6-2- Discussion of Data regarding relation between land potential and performed activities (Comprehensive survey)

The relation between two variables will be highlighted through the graphs, SPSS software and correlation test to highlight form, direction and strength of relation for comprehensive survey. The consequence of matching comprehensive survey results of independent

variables (potential of land) and dependent (performed activities) the form of relation will be clarified (Figure 6). As a result of that, which indicates the provision of direct relationship between land potential and performed activities for (90%) of neighborhood units in Erbil, while the performed activities will increase with any increasing in potential of land as well as the maximum value registered by *Ronaky* in compare with other neighborhood units then followed by *Parlaman* and *Mamostayan1* respectively.

The significance of relation between the land potential and performed activities for all neighborhood units has been tested through the SPSS software (chi-square tests). The result illustrate that the value of Pearson Chi-Square test is (0.009), that highlight highly significant relation between two quantitative variables for all neighborhood units under municipal class in Erbil city (Table 1).

The strength (weak, moderate or strong) of relation between two quantitative variables for each neighborhood unit has been tested through the Correlation test (r) (Appendix B, Table 1). The correlation value for each neighborhood unit as follow:

- The first value of correlation for (4) neighborhood units between (0.1-0.3) that represent weak correlation ($0.1 \leq$ weak correlation < 0.3).
- The second one is (23) neighborhood unit between (0.3-0.5) that represent moderate correlation ($0.3 \leq$ moderate correlation < 0.5).
- The last one is (20) neighborhood units between (0.5-1.00) that represent strong positive correlation ($0.5 \leq$ strong correlation ≤ 1). The maximum value and the strongest correlation have been recorded by *Ronaky* neighborhood unit which is (1.00) then followed by *Parlaman* and *Minara*.

Almost 90% of neighborhood units have strong and moderate correlation between land potential and performed activities. This highlighted that the performed activities will increase with any increasing in potential of land. This will support the validity of study assumption that has relation between land potential and performed activities for neighborhood units in Erbil city (Figure 7).

One of the most important result of this study is it has illustrated that *Ronaky* neighborhood unit has capability to hold the maximum positive correlation between variables (Figure 8).

7. Conclusions

This paper attempts to lay ground work for studying urban transformation generally. It deals with the issue on the whole scale of the city. This would open the way for more comprehensive studies by adopting more aspects of urban transformation process. The numerical results have been obtained from data collection and correlation methodology contributed to conclude that the analysis of performed activities in relation with land potential is an efficient approach, compared to other descriptive analysis approaches adopted by most architectural research studies. Whereas, the numerical results are more credible and accurate in obtaining the information and thereby used as an indicator of measurement can give significant and tangible findings in terms of analysis the 1st, 2nd, and 3rd research objective, To find the land potential and performed activities as well as land potential impact on performed activities generally in Erbil city.

Finally, based on the research objectives, the objectives (a) and (b) have been achieved by the data collection to find the relations shown in objectives (c). As a result of the analysis it is found that:

1- There is a clear variation among the residential neighborhoods of the city regarding their capabilities in contribution in urban transformation; this variety is reflected on the number of activities done by the residents.
2- The potential of land has a strong impact on performed activities, and *Ronaky* neighborhood unit has been capable to draw the maximum correlation value between land potential and performed activities. This conclusion has been found through testing the impact of land potential and the performed activities in general as happened in all Erbil neighborhoods. It means that urban transformation occurs in high scale where the land potential is high.
3- The land potential of the residential neighborhood will be high where it is closer to the city center, dwelling plot area is big, also its streets width is wide and there is high percentage of green area.
4- Assessing the rate and spatial distribution of urban transformation at the city level is important as it helps the planners and the other decision makers to find ways to control the urban transformation. For example, if they need to accelerate urban transformation in a particular neighborhood they can

propose widening some narrow streets within it or maximizing the percentage of green open spaces through changing the land uses. Or even propose merging each two or more dwelling unites plot to have big ones. Municipality can issue such regulations to maximize the land potential wherever it is needed.

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أثر الإمكانات الكامنة للموقع على التحولات الحضرية مقاسة بالأنشطة المنجزة ضمن المحلات السكنية لمدينة أربيل

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المستخلص :
ان انشغال الناس بمختلف الفعاليات الاجتماعية والاقتصادية والثقافية هو ما يجعل المدن كيانات متغيرة ذاتيا بصورة معقدة ومستمرة. ان تلك التغيرات وما ينجم عنها ما هي الا نتيجة لجهود البشر الذين يميلون الى تشكيل الأماكن حيث يعيشون بالشكل الذي يحبون وبما ينسجم مع حاجاتهم. وقد أصطلح على هذه المسألة المهمة ب"عملية التحول الحضري" . ومن أهم تلك التحولات الحضرية تلك التي تحصل في مناطق السكن. الفرض من هذه الدراسة هو قياس مدى تأثير الأمكانيات الكامنة للموقع على أنشطة التحول الحضري ضمن المناطق السكنية. ومن خلال مناقشة الجوانب الرئيسة المتعلقة بالتحولات الحضرية تلك، صيغت مشكلة البحث متمثلة بوجود نقص في معرفة مدى تاثير الامكانيات الكامنة للموقع على الأنشطة التي تحصل فعلا ضمن المحلات السكنية لمدينة أربيل.وقد أعتمدت مجموعة من المؤشرات لقياس الأمكانات الكامنة وهي بعد المحلة السكنية عن مركز المدينة، عرض الشارع ضمن تخطيط المحلة السكنية، مساحة قطعة الأرض السكنية ،فضلا عن مساحة المناطق الخضراء المتوفرة ضمن المحلة السكنية . أما المؤشرات التي أعتمدتها هذه الدراسة لقياس الأنشطة التي تحصل فعلا في المحلة السكنية والتي يمكن اعتبارها مؤشرات للتحولات الحضرية فهي عدد أجازات البناء ، عدد اجازات الترميم، وعدد عمليات البيع والشراء العقارية، فضلا عن مؤشر اسعار الأرض بالمتر المربع الواحد. أعتمدت الدراسة الارتباط لقياس وتحليل قوة واتجاه العلاقة بين المتغيرات . وقد أجري مسح شامل لـ (47) محلة سكنية ضمن مدينة أربيل ،تم من خلال نتائج هذا المسح وباستخدام برنامج SPSS قياس العلاقة بين المتغيرات . تسهم هذه الدراسة بتوسيع النقاش النظري حول موضوع التحولات الحضرية من خلال مجموعة مؤشرات محددة ومن خلال بحث هذه المسألة على المستوى المحلي.

الكلمات المفتاحية : المحلة السكنية، التحول الحضري، الامكانات الكامنة للموقع، الانشطة المنجزة.

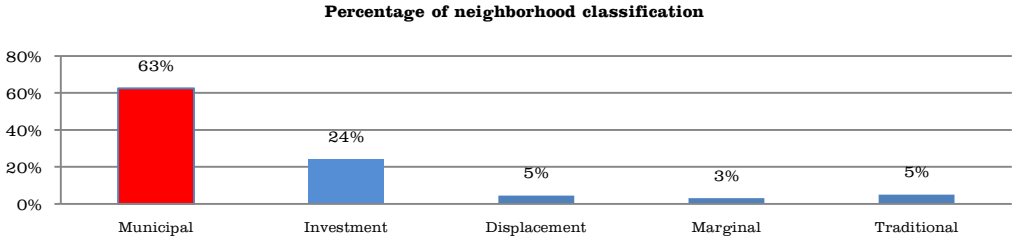


Figure 1: percentage of each category in Erbil city. (by researchers)

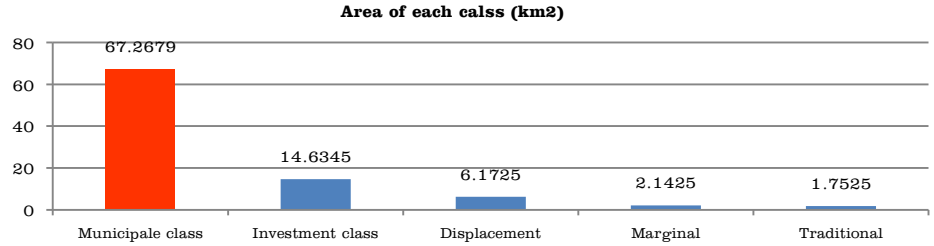


Figure 2: Area of each category. (by researchers)

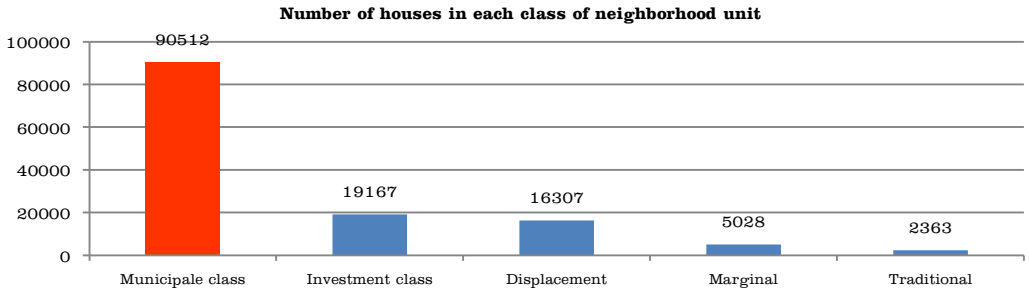


Figure 3: Number of dwelling units for each category. (by researchers)

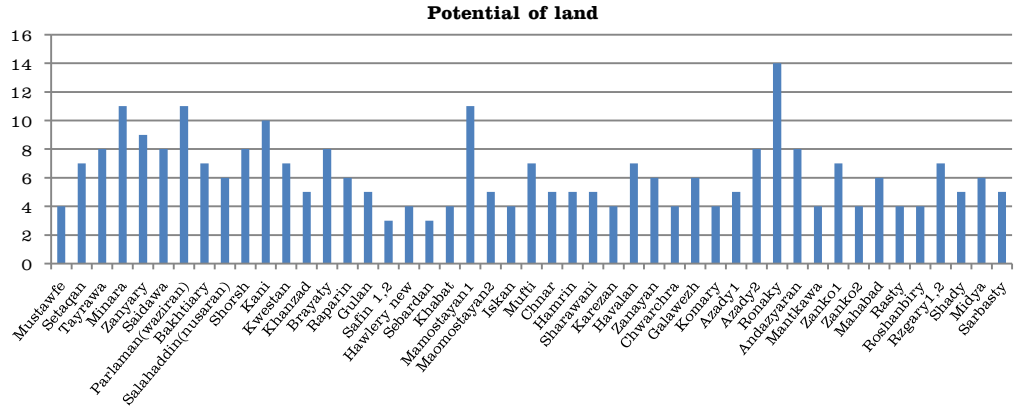


Figure 4: Summation of values for land potential for neighborhood units in Erbil city. (by researchers)

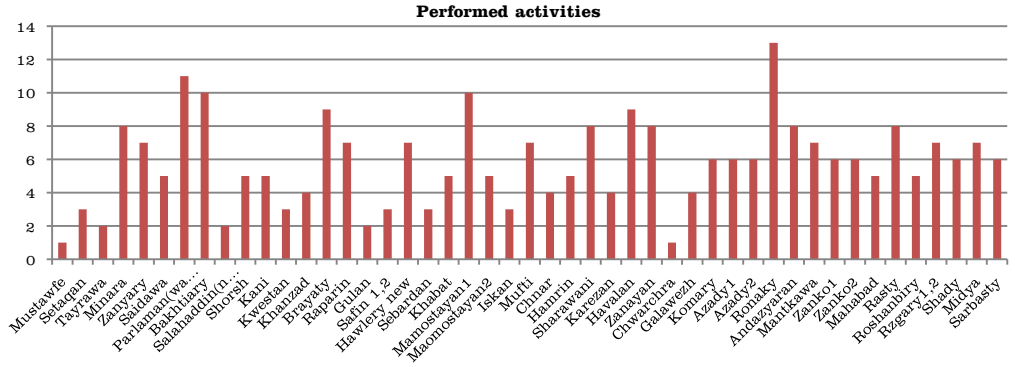


Figure 5: Summation of values for performed activities for neighborhood units in Erbil city. (by researchers)

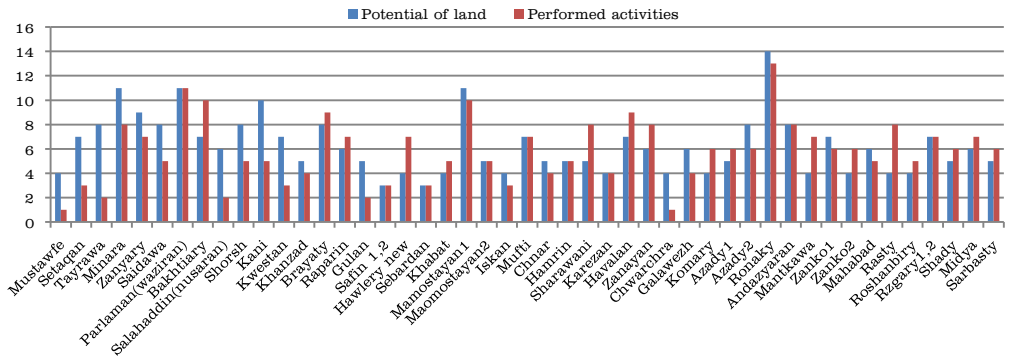


Figure 6: Results of land potential and performed activities for neighborhood units in Erbil city. (by researchers)

Table 1: Chi-square test for testing the significant between variables. (by researchers)

	Value	Df	Asymptotic Significance (2-sided)	Result
Pearson Chi-Square	135.301[a]	99	.009	HS
Likelihood Ratio	81.146	99	.904	S
Linear-by-Linear Association	14.406	1	.000	S
N of Valid Cases	47			

120 cells (100.0%) have expected count less than 5. The minimum expected count is .02.

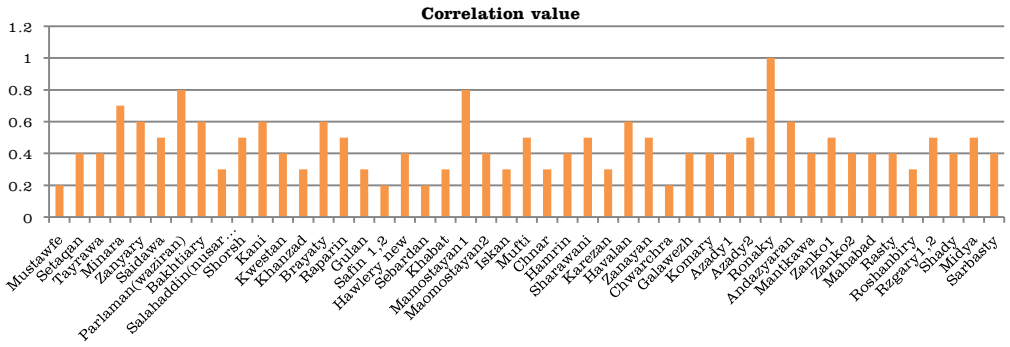


Figure 7: Correlation value between variables for each neighborhood unit in Erbil city. (by researchers)

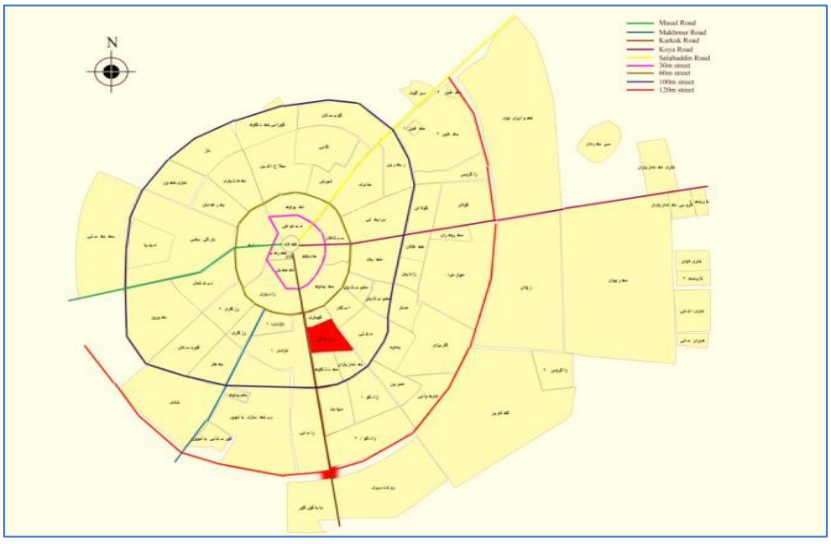
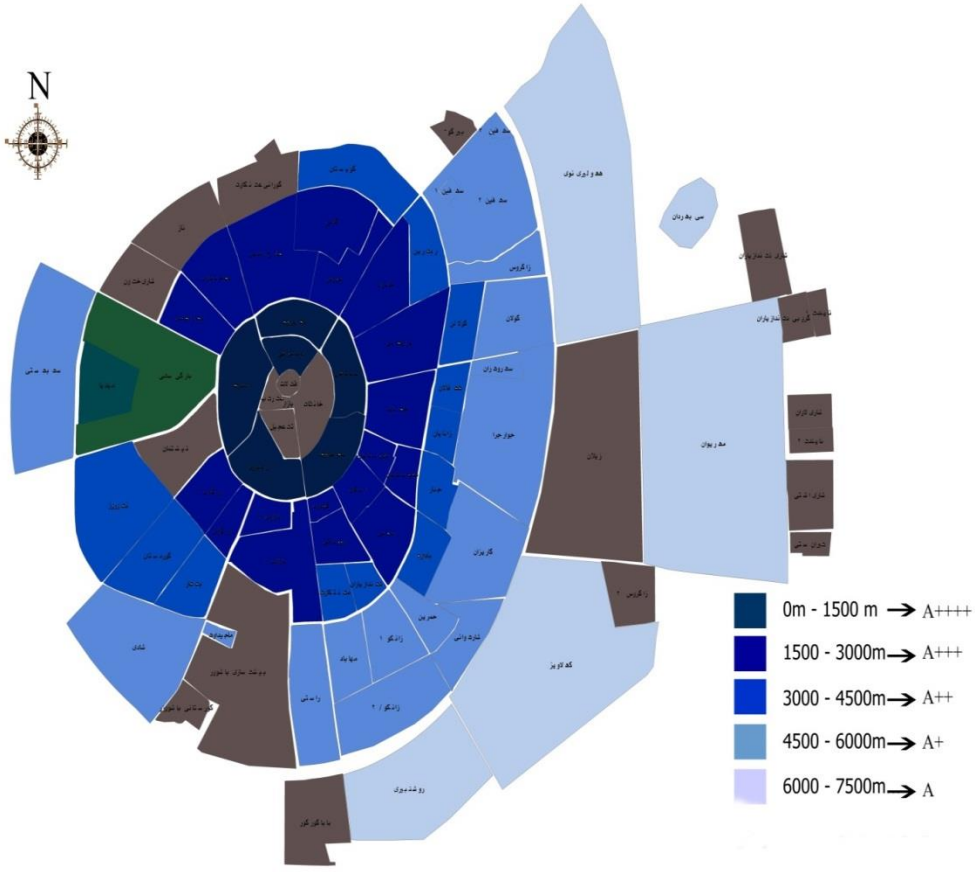


Figure 8: Location of Ronaky neighborhood unit in relation to Erbil city. (by researchers)



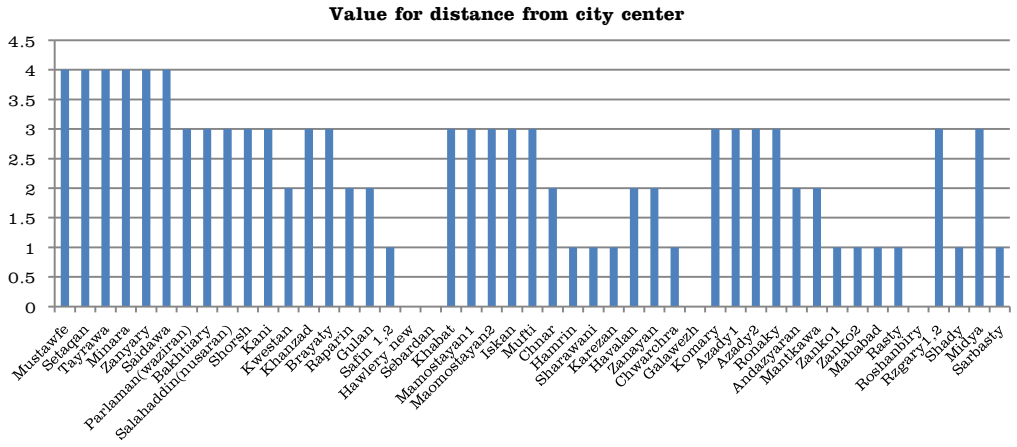


Figure 1: Distance of each neighborhood unit from city center. (by researchers)

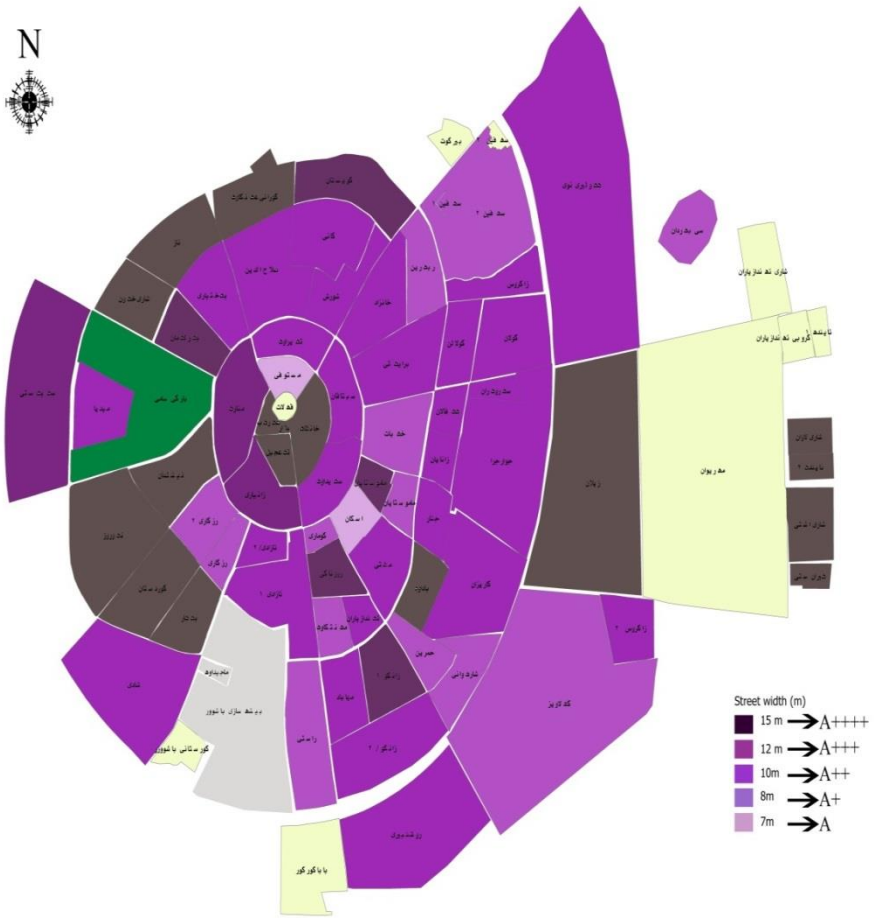
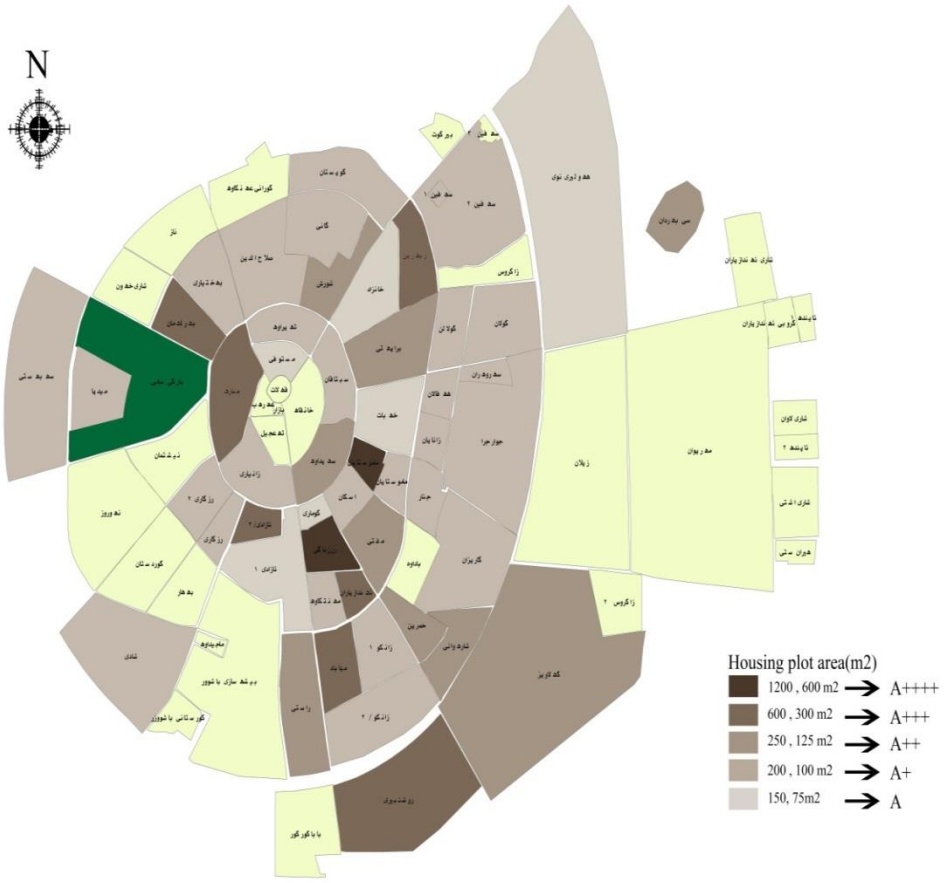


Figure 2: Street width for each neighborhood unit in Erbil city. (by researchers)



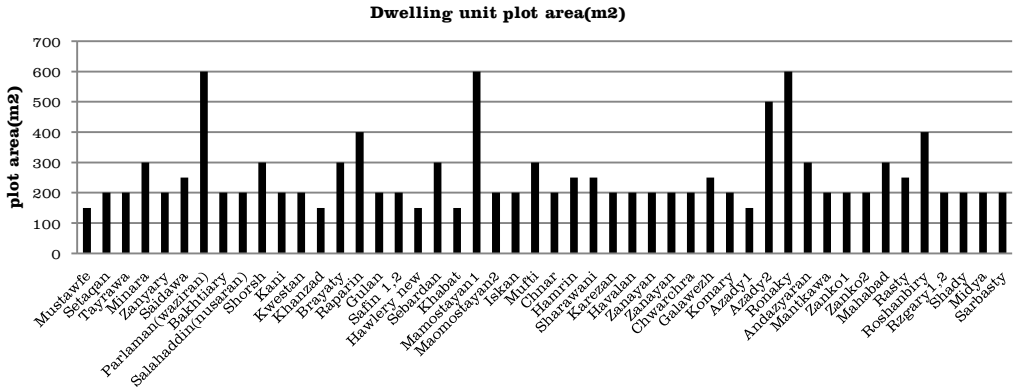


Figure 3: Average dwelling unit plot areas as first subdivision by municipality for each neighborhood unit in Erbil city. (by researchers)

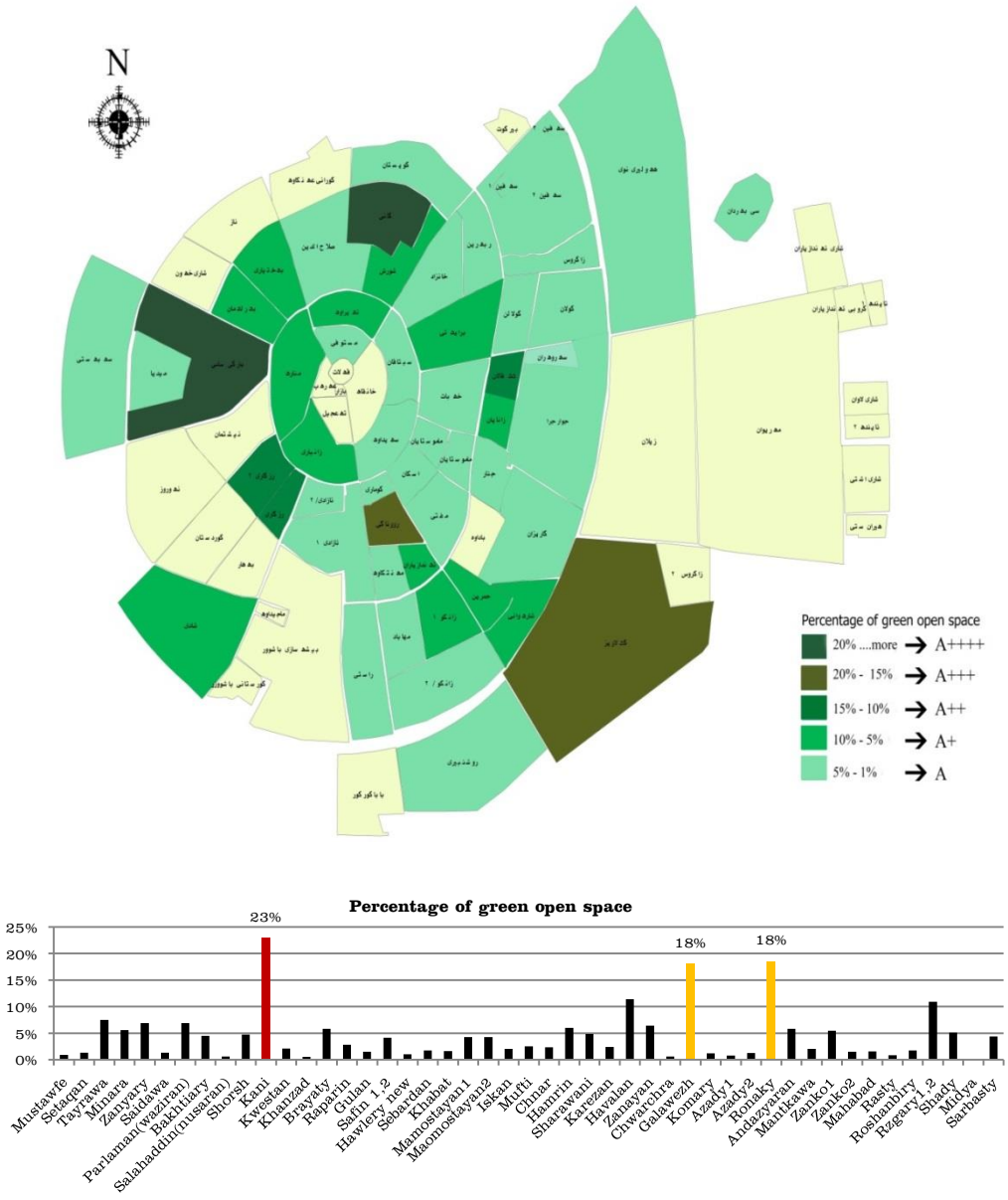
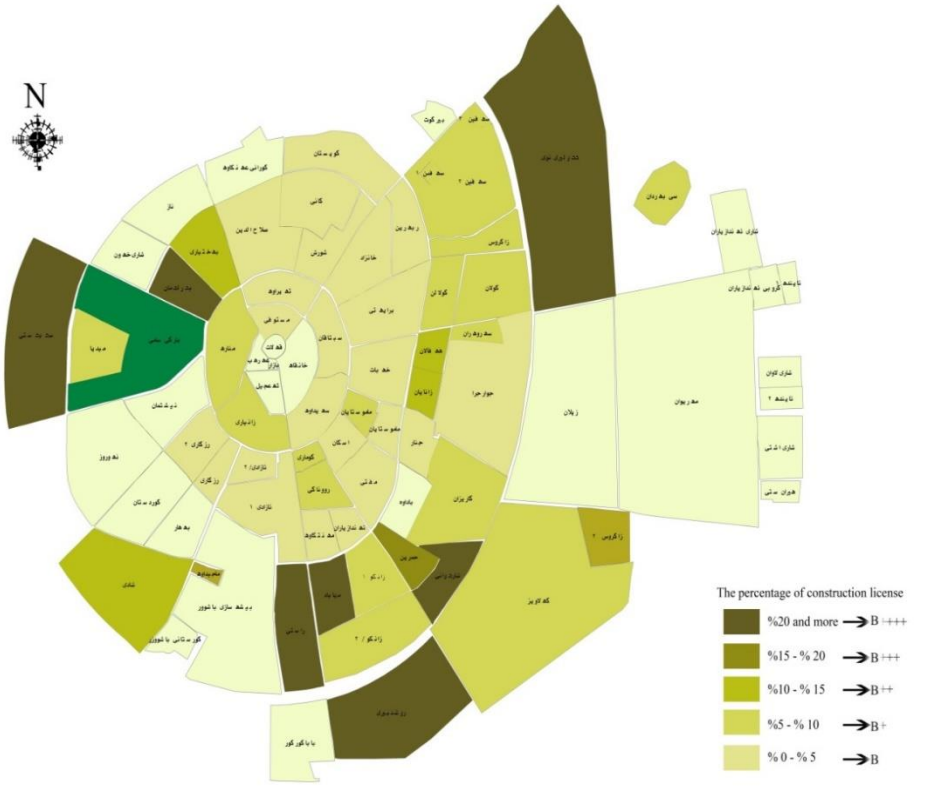


Figure 4: Percentage of green open spaces for neighborhood units in Erbil city. (by researchers)



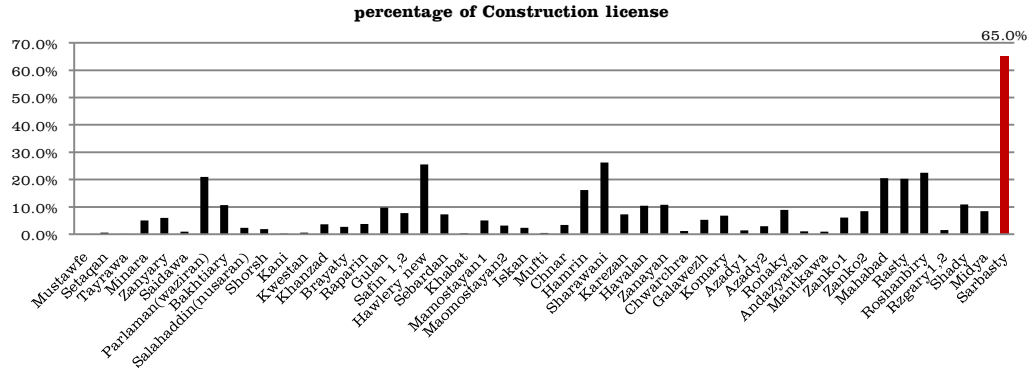


Figure 5: Percentage of construction licenses for neighborhood units in Erbil city in 2014. (by researchers)

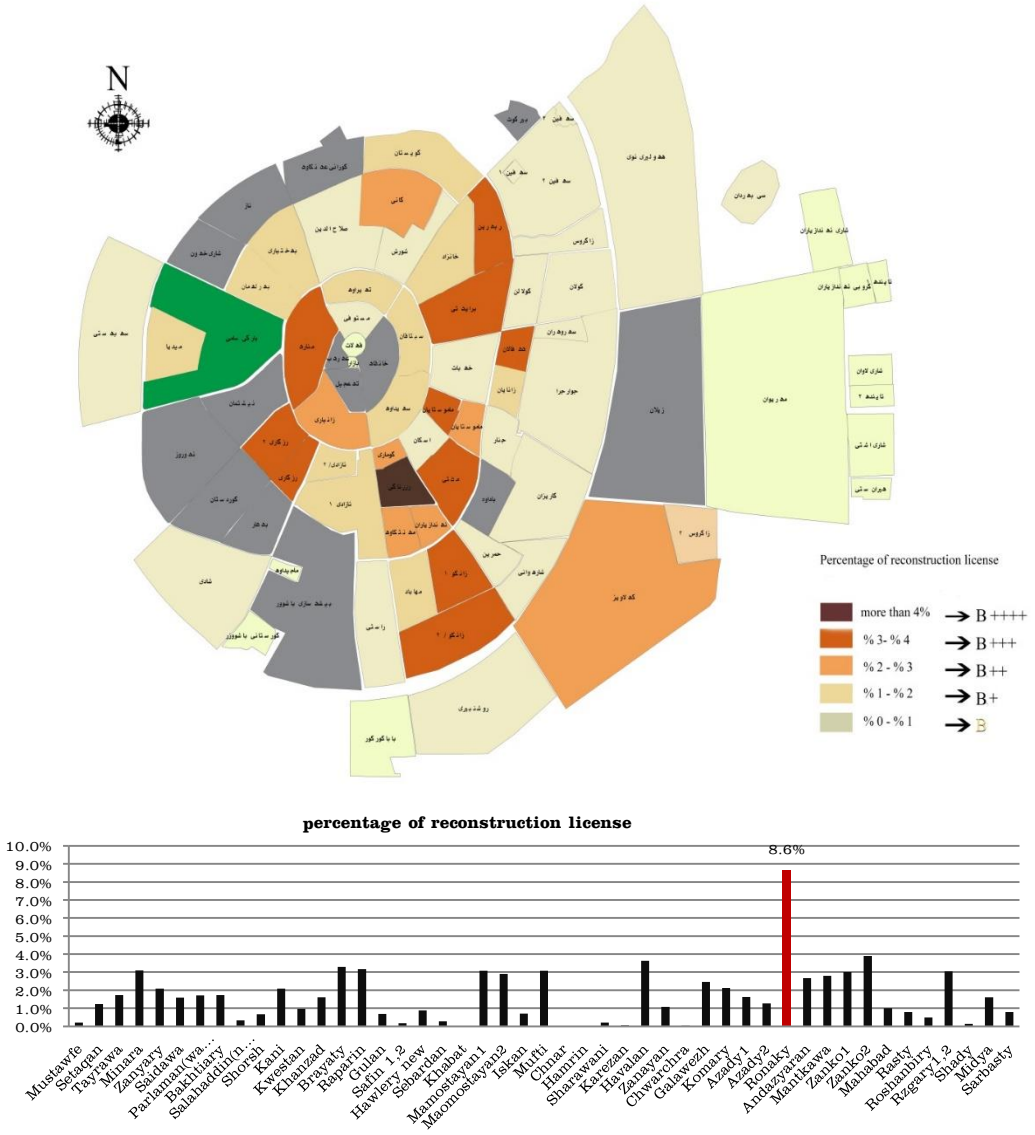


Figure 6: Percentage of reconstruction licenses for neighborhood units in Erbil city during 2014. (by researchers)

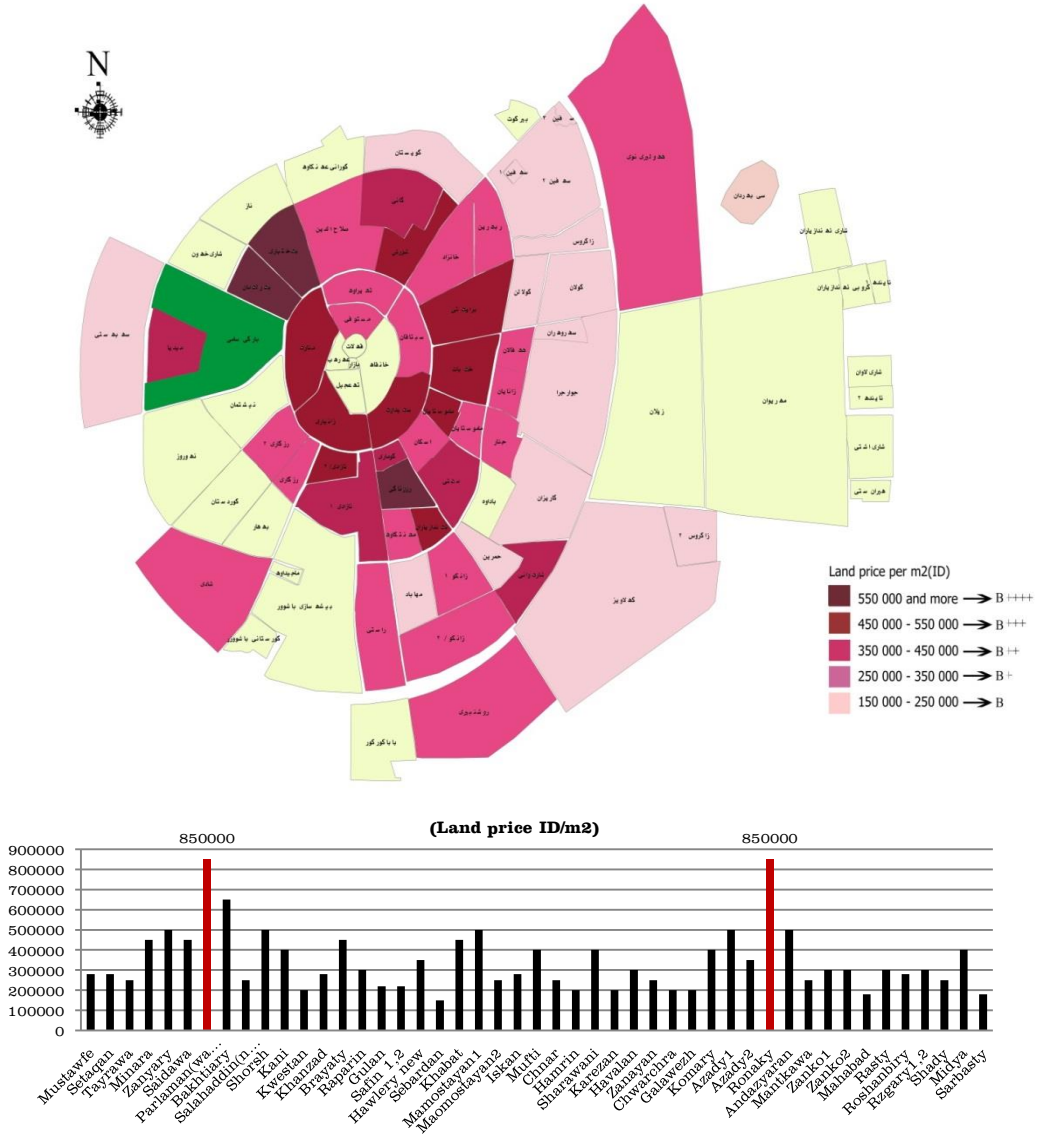
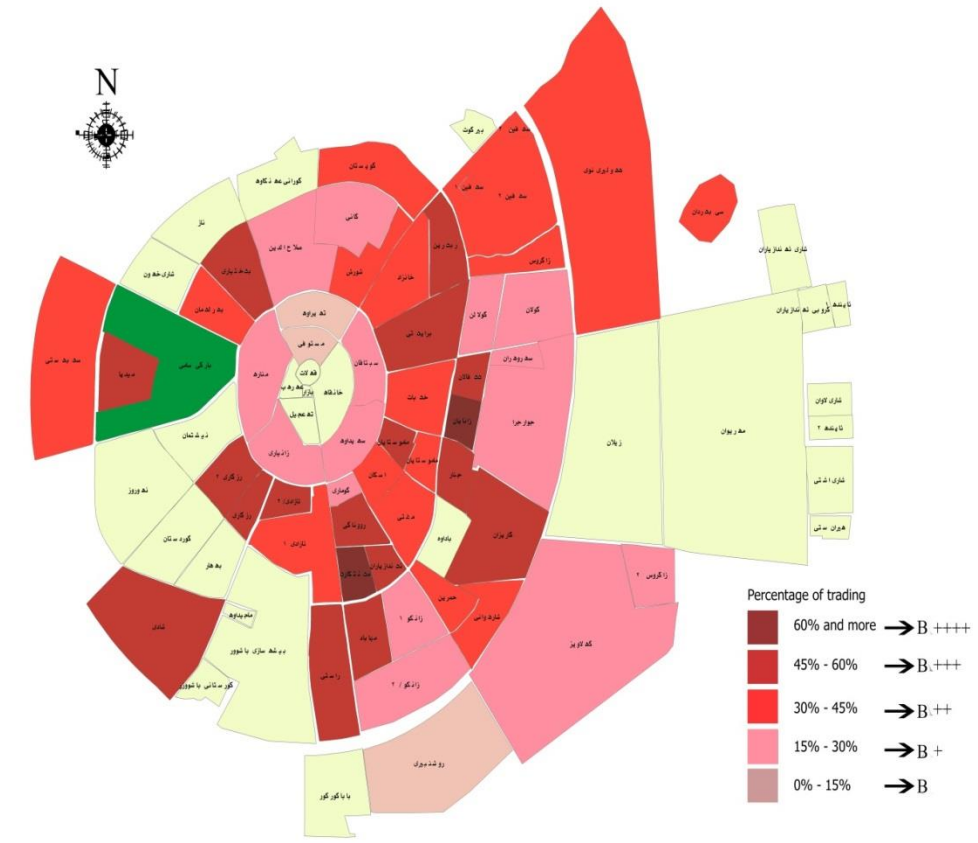


Figure 7: Price of land for neighborhood units in Erbil city in 2014. (by researchers)



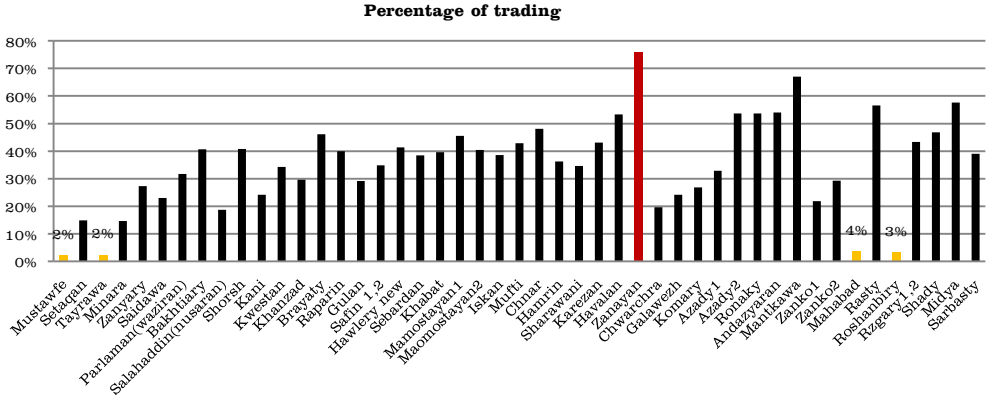


Figure 8: Percentage of trading for each neighborhood unit in Erbil city during 2014. (by researchers)

Table 1: Correlation values between two quantitate variables for each neighborhood unit in Erbil city.(by researchers)

Neighborhood	Correlati	Neighborhoo	Correlation	Neighborhood	Correlation	Neighborhood	Correlation
Mustawfe	0.2	Khanzad	0.3	Chnar	0.3	Andazyaran	0.6
Setaqan	0.4	Brayaty	0.6	Hamrin	0.4	Mantkawa	0.4
Tayrawa	0.4	Raparin	0.5	Sharawani	0.5	Zano1	0.5
Minara	0.7	Gulan	0.3	Karezan	0.3	Zanko2	0.4
Zanyary	0.6	Safin 1,2	0.2	Havalan	0.6	Mahabad	0.4
Saidaa	0.5	Hawlery new			0.5	Rasty	0.4
Parlaman	0.8	Sebardan	0.2	Chwarchra	0.2	Roshanbiry	0.3
Bakhtiary	0.6	Khabat	0.3	Galawezh	0.4	Rzgary1,2	0.5
Salahaddin	0.3	Mamostayan	0.8	Komary	0.4	Shady	0.4
Shorsh	0.5	Maomostaya	0.4	Azady1	0.4	Midya	0.5
Kani	0.6	Iskan	0.3	Azady2	0.5	Sarbasty	0.4
Kwestan	0.4	Mufti	0.5	Ronay	1		