

Adjustment of Land Price in Neighborhood Districts with Physical Rupture of Suburban Railway (Case Study: Sari)

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Abstract— Railways which have been formed at the beginning with the purpose of urban growth and development outside the boundaries of cities nowadays are known as the factor of creating a physical and social rupture of cities. In Sari, most of the urban abnormalities are formed on the sidelines of the railway. One the most important of these abnormalities is the physical and social rupture of urban texture and because that, it is investigated in this study. The purpose of this study is to test some assumptions which have obtained based study of theoretical foundation and case studies in Iran and abroad. The other purpose of the study is to obtain the way of the effect of the railway on the urban districts in its neighborhood. This study is based on the use of the special arrangements in order to prevent or minimize physical-social rupture. The period of the research had been started from July of 2015 and was continued until August of 2016. The research has been conducted in four residence districts named Servine Bagh, Lesani, Karmandan, Mirzamani in Sari, Mazandaran, Iran and these districts are located on the sidelines of the Sari-Tehran railway and research community was the people living in mentioned four neighborhood districts. In the current research, by using library study, theories of the theorists and related samples inside and outside the country, are investigated. Then, using field method, case studies (neighborhood districts of the railway) and their characteristics are investigated. In order to identify the sample volume to complete questionnaires in districts, Cochran method is used. The number of completed and questionnaires for Servine Bagh, Mirzamani, Karmandan, and Lesani district are 180, 150, 140 and 90, respectively. According to latest statistics in 1386, the population of these districts has been 4150, 3350, 3170 and 2100, respectively. Findings of the current research show the effects of the railway on the neighborhood residence texture, which can be used as an applied research for the development of the future railway.

Keywords— Railway, Land Price, Physical Rupture, Urban Abnormalities and Residence Districts

I. INTRODUCTION

A physical rupture in cities can be formed under the impact of two factors: urban policies and artificial and natural restricting factors. For example, formation and

creation of independent neighborhood units and zoning laws at the beginning of 20th century was under the influence of cities policies, which led to a physical rupture in cities [1]. Railway lines are one the artificial factors of the physical rupture in cities. Railway lines which at the beginning had been designed as a motivation for urban development, by deployment in the heart of cities, transformed them to a border that was assumed as social borders for citizens. This, brought some problems, including social and environmental instability and especially, drop in land prices particularly in textures around the railway. Lands around these lines, all the time has been considered as an attractive place for low-income and rural population due to its low cost of ownership and cheap operation of infrastructure (Aerial photo of Servine Bagh district in 1956).

In Iran, by the construction of railway of national railway in most of the cities, a kind of construction without a plan and without rules in the passing places of railways has been occurred. By the construction of the railway in the neighborhood of the Sari, railway lines over the time and placement in the urban texture transformed themselves to the borders of the inside the city. So that, residents of the city, called the south of the city as a Barrier. By the transformation of this line to a city border and loss of existed opportunities in the district because of new constructions (low price of land, being the neighborhood with roads and urban Facilities), practically the city transformed to two district parts.

In this research, it is tried to investigate the effects of the railway line on it's around texture in its neighborhood districts and by investigating these effects it is tried to find how the effect railway can create physical rupture in urban texture and finally, to give the warning that, in the future developments of railway lines around the cities, by adopting necessary measures, prevent the physically rupture textures in the neighborhood of railway lines.

II. PROBLEM STATEMENT

A) Theoretical foundations of library

By the construction of the national railway in Iran in 1316, most of the cities began a construction without a plan and without rules in the passing places of railways and deprived the opportunity of creating necessary infrastructures in these districts of the city (Emku comprehensive plan).

Also, in the 70th decade, due to the dominant approach to neighborhood textures, comprehensive plans were not troubleshooting, because they did not have the necessary power to solve the problems in this district. In practice what occurred in such districts, is the formation of a district with residential usage without vital functions and exacerbate of imbalance space (economic, social, physical). This caused the drop in the quality of urban spaces, the increment of informal settlements, an undesirable effect on public welfare services in the neighborhood of railway, transformation of railway line to a pivot of social-physical rupture and finally, lack of growth in land prices in urban [2], [3], [4]. The Economic, social and physical imbalance between urban and suburban caused the urban became richer and the suburban became poorer than the past. So that, residents of the city, called the south of the city as Rahband-city, which in practice, has been transformed the city in two district parts.

What was said, is a problem which is not only threatening Sari but also it threatens all cities with the railway line. Unfortunately, this issue spreads to Third World countries, due to a slower development. Study of these four districts of the neighborhood with Sari railway gives this opportunity to a reader to investigate the problems in these districts by comparing the statistical studies. Therefore, this study provides a novel pattern for organizing old and emerging districts neighborhood to railway lines in these districts. About half of the population of the city, 1/3 of city district and also, much of urban distressed texture are located in the south part of the railway line and this increases the importance of the study [5].

Therefore, this research started from the beginning of July 2015 with the purpose of study the effect of the railway line on the development four districts in the neighborhood of suburban railway. Different assumptions are extracted, which are based on studied districts of urban pioneers and study of case studies.

B) A review of theoretical foundations and conducted research

Urban space is rarely homogeneous and racial and social divisions in them with varying degrees, is quite striking. For example, these divisions in Seattle in America [6], is due to high difference and abundant inequality in attracting profits, which social classes, institutions, tradespeople, and offices consider for themselves. High inequality in space value, also, brings the separation of activities in proportion to their benefits in the unit of the district [7].

According to the theory of thinkers such as Christaller, mental imagery of central square, is the result of owner use of its position: this means that value of land has an inverse relation with its distance from the city center [7].

Some of the important factors which have been weakened the physical continuity of the urban are 1. existence of urban artificial borders such as railway line, 2. religious property

laws which are non-transferable, which cannot be divided and there is no right of inheritance in them [7], 3. Apartheid city also divides a kind of physical scenery based on spacing, which separates the population (Blacks and whites) from each other [8].

Physical rupture, which has the apparent discrepancy in physical, biological, social, usage and activity quality, is of two kinds:

- i). linear rupture, which is due to factors such as railway, river, highways, ...
- ii). volume rupture, which means large scale usages than its fringe [9].

Lots of theorists in worldwide investigated the issue of the railway line and physical ruptures of it. Summary of these theories is in Table I.

Table I. Related theories about the effect of railway line in creating physical rupture

Theorist	Main points of the theory
Le Corbusier	Railway lines are drawn inside the city and underground in order to reach the central station. The city has two stations, one for commodity and another one for passengers. There is a big park, multi-story office buildings, stores, shops and public buildings around the station. There is another park on the other side of the railway line, which is considered for next developments of the city center [10].
Tony Garnier	District of industrial city Garnier (1904) is associated with the social housing, guest house, and big shops. Open-air markets are deployed in a square in front of the station. The main factory is located in a close distance of station [10].
Raymond Amon	Because of noise and traffic around the railway, railway square is considered separate from city center square, but its emphasis that this square cannot locate in far distance than city center square and it should connect to city center using wide alleys or streets. Station square needs glory which ancient gates had it [11].
Jane Jacobs	Blocks near the borders are short. The potential use of street increasingly attracts urban population. The mix of main usages is high. Mix of age of buildings be high [9]
Kevin Lynch	The entrance of some visual flaws or motion to its inside should be given. To a depth of district on both sides of it should be constructed [12]

Ways of confronting with urban physical ruptures, such as linear rupture of the railway, are as follows:

The first approach in order to confront with physical ruptures is to overcome the urban poverty because physical ruptures occur in districts which can clearly see both poor and rich in them. Confronting with urban poverty should be done in three forms: financial poverty reduction (in order to avoid

the widening of the gap between rich and poor), the increment of the number of literates and extension of e-literacy. Reduction of access poverty (according to experiences, poor people invest a lot of capital for the housing and their habitation infrastructure and pay less attention to invest in access to services, facilities, and other matters. Reduction of the access time to job opportunities encourages a wider range of female headed households to the occupation.) and reduction of power poverty which should be considered in decisions [13].


The second approach is confronting with policies which are along with physical rupture in cities. Some examples of these policies include the rule of the land zoning, preparation of comprehensive anti-participatory plans and rules related to the sale of density in space. In contrast, policies which are in favor of mix of sociality, should be supported, some of these policies are: policies which supply a greater variety of urban density and housing types (villas and apartments, rental, one room, two rooms) and policies which pay to combat racism in the acquisition and lease of land and housing [6].




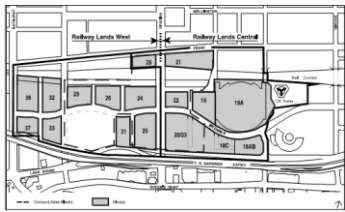
In third degree, what should be considered in neighborhood districts to the physical ruptures (as a border), is land price of these spaces, which has been neglected prior to this time.

Finally, use of artificial and natural factors is considered to join these two environments. Considering the topography of the site, use of the local water flows and attention to natural corridors can help for conjunction of these environments [14], [15], [16].

In the following, case studies and their characteristics and proposed approaches in designing neighborhood districts of the railway, are listed in Table II. At the end, 6 assumptions are evolved from these experiences and reviews of thinkers. Case-by-case review of these assumptions is tested based on their difference in the land price basis.

Table II. Case studies and proposed approaches in designing neighborhood districts to the railway

Case study	Approaches
Utrecht (Netherlands) 	1. repair of two historical stream 2. creation of a boulevard and a street parallel with rail at top and bottom of rail line 3. considering conducting some important urban projects in detailed city plan, including music castle, hotel, cinema, bank 4. deployment of lots of nodes and investments in the vicinity of street or boulevard [14]

Chippendale (one of the districts in Sydney) 	1. promotion of Peace park as a community center 2. creation of a usage cycle of Pubs, barley fields, shops and factories beer [15]
Jura Lille (France) 	1. connection of the old and new city and fixing rupture between them by a design to reshape a square by Jean Noel and Florence Boghnuks, design of a footbridge by Frankos Delagirs 2. deploying a shop center with an important role in economic neighborhood right next to the station [17]
Gosport (Hampshire, Great Britain) 	1. providing a secure access for the crossing of buses and pedestrians to down town 2. considering deli and post box in a radius of 500 meters and deployment of the school, health center, job center, worship place, public park and children playground in the radius of 1000 meters. 3. creation of short-time and long-time stop storages of bicycles according to Regulations for Construction [18]
Bridgeton (Glasgow)	1. separation of large urban blocks in order to facilitate the development and improve the permeability [16]
Toronto (Canada) 	1. creation of public open-air spaces in the fringe of rail line 2. creation of a system to connect parks and open spaces 3. creation of communication paths between new part along with paths of old part located on the other side rail line [19]



<p>Ghaemshahr (Iran)</p> 	<p>1. existence of important city utilities between years 1316-1320, such as City Islamic Council (former municipality), city police posts, railway station, number one and number two textile factory (current Saypa company) and city center square in the fringe of railway 2. center of this linear city is the peak point of the rail line (railway line station) 3. high percent of motion and visual permeability in both sides of the rail line [3]</p>
<p>Behshahr (Iran)</p> 	<p>1. holding of a large weekly Bazaar in the fringe of railway station 2. use of classic building style for industrial buildings and their related housing, which gives a special visual identity to districts in the fringe of rail line 3. Planting tall trees in the lands of these two abandoned textile factories which are in the neighborhood of station 4. re-opening the path of urban water channels 5. lack of formation of east-west paths parallel with rail line in north part of it, which was along with a drop of price in this part. (the interesting point is that poor districts of the city in Behshahr are in the districts towards sea beach, while in Sari, opposite districts to sea are poor districts) [4]</p>

Table III. Price of land and building in neighborhood districts of railway (prices in Rial)

District	Wasteland	New constructed apartment	Commercial
Servine Bagh	8,000,000 to 10,000,000	12,000,000 to 13,500,000	20,000,000 to 30,000,000
Lesani	15,000,000 to 18,000,000	14,000,000 to 15,000,000	25,000,000 to 30,000,000
Karmandan	16,000,000 to 19,000,000	20,000,000 to 22,000,000	35,000,000 to 40,000,000
Mirzamani	20,000,000 to 25,000,000	30,000,000 to 35,000,000	55,000,000 to 75,000,000

True or false test of the proposed assumptions:

Intensity amount of the use of space has a relationship with the land price of the districts adjacent to the railway.

A number of pedestrian people or driving people in the center of the districts have a direct relation with land price. About the number of driving people, because of the blocking of the vehicle traffic communication possibility (possibility of vertical communication of it with rail line is disconnected) of Darab-Sangtarashan and also, one-way Karmandan path, the amount of the crossing driving people in Lesani and Karmandan district, is a bit unusual. About the number of motorcyclists and cyclists it should be stated that during the morning hours, unlike the evening hours, there is not a certain order. Due to the lack of active users and monitoring eyes on the district, in most parts of the district except its main crossing, in the morning also, in the two eastern districts, the proportion of men is dominant and in the two west districts, the proportion of women is dominant. For each of above cases, price indicator has a direct relation with the number of woman users. Therefore, the validity of this hypothesis cannot be confirmed.

The increase of the visual (number of view corridors which extends in depth from both sides) and motion (number of crossing paths between two sides of the railway) permeability in the axis near the railway, increases the land price.

It should be said about the visual corridors to two sides of the rail line that, visual view to other side of the rail line in Karmandan and Servine Bagh districts is restricted by visual physical obstacles

About the motion permeability in the adjacent side to railway, it can be said that there is a direct relation between it and the land price of each districts. About the Servine Bagh district it should be stated that no east-west crossing, after Pezhman street to two KM lower than it (which is ring road), does not cut it. Also, it should be said that north boulevard of the rail line is wider than its south street, which these two streets are conducted parallel to rail line (Fig. 1). (Derived from Utrecht) Therefore the validity of this hypothesis is confirmed.

III. LAND PRICE IN STUDIED DIFFERENT DISTRICTS

In order to test the research assumptions, at first, it is necessary to have a short introduction of land price condition in the studied districts. Therefore, updated prices of Wasteland, apartments and commercial land in the districts are presented in Table III, which are the results of field studies of the authors.

Servine Bagh district has a rural origin and its residents in terms of caste system, are located in the same first order and in the lower class of the urban classes, while Mirzamani district was related to one of the urban feudal landlords.

Two districts, Karmandan and Servine Bagh, predominantly, are separated informally and their formation has much antiquity than two other districts and Lesani and Mirzamani districts are separated formally.

Chart 1. Variety of users of the space in terms of age, between hours 7:30-8:30 (2015-10-12)

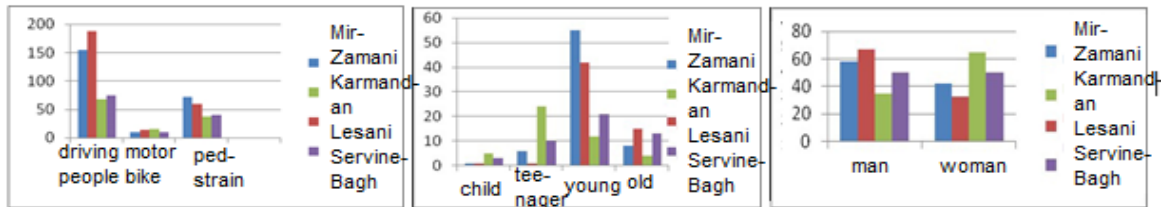


Chart 2. Variety of users of the space in terms of age, between hours 6 to evening (2015-10-12)

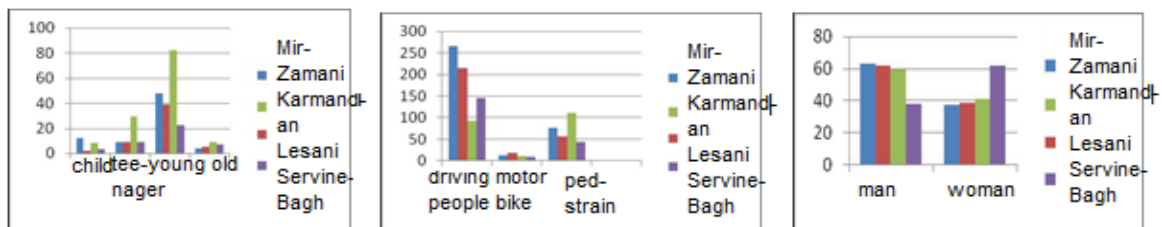


Fig. 1. Map of current situation

The distance of access to urban services and facilities has a direct relation with land price.

The distance of access to taxi station in Mirzamani, Lesani, Servine Bagh and Karmandan districts is 3 minutes, 5 minutes, 6 minutes and 2 minutes, respectively. Therefore, it can be stated that except Karmandan district, in other districts, the land price has an inverse relation with distance to public transportation station.

Also, it can be said that being the neighborhood with green spaces and parks, has a direct relationship with the indicator of space price. Therefore, the validity of this hypothesis is confirmed.

The increase of the environmental quality of the district causes the increase of land price.

At first, it should be said that due to train crossing there is a visual and acoustic pollution in all four districts. About the pollution of water and soil and attention to ecosystem, Servine Bagh district is located at lowest rank due to the blocking of an old water stream. Also, it has lost the gardens and green spaces completely at entry points of its districts. Karmandan

Table IV. Detailed plan of Sari, Department of Housing and Urban Development of Mazandaran Province

Distances to private vehicle minutes	distance to the edge of the city center		Distance to equipped green space		walk distance to city center	walk distance to shop center
	Afoot	Private vehicle	afoot	Private vehicle		
Servine Bagh	14 to 17	4	20 to 23	15	20 to 23	15
Karmandan	10 to 13	2:30	7	8:30	16 to 19	10 to 13
Lesani	9	6	17	12	20	7 to 9
Mirzamani	4	1:30	4	1	12	3 to 5

and Lesani districts by the blocking of the path of water flow fringe and cutting of the trees adjacent to the path of the water stream and lack of foresight common open space are located in next ranks. This is because of the fact that although a part of the path of water flow is blocked, trees in the fringe of water flow are not cut yet and a significant part of the gardens are available. Mirzamani district is placed at third rank. In this district there is no violation of natural corridors, moreover, because of being a neighborhood with two equipped green

spaces, it has a better place than other three districts. Therefore, the validity of this hypothesis is confirmed.

Also, it can be stated that only in Mirzamani district there is a green space in inside parts of the district and this issue is not seen in other districts.

Table V. Parks and green spaces adjacent to quarter of case study

	Mirzamani	Lesani	Karmandan	Servine Bagh
Number of planted trees in public spaces (Another indicator of greenness of district)	Adjacent to Azadegan and Peyvandi parks	Neighborhood with green space adjacent to rail line	Neighborhood with Artesh park which is under constructed	Without green space

The increase of the functional and social diversity causes the increase of the land price in neighborhood spaces with railway

Functional diversity

In order to compare the functional diversity of the districts, by limiting the functional diversity factor, we suffice only to centers of the districts. Used applications in the center of Mirzamani district, in terms of numbers, includes 25 uses and in terms of diversity includes 20 activities. Center of Lesani district includes 15 users with 13 kinds of activities and center of Karmandan district has 20 users with 16 kinds of activities. Except Lesani district, in other centers of the districts, intensity and kind of the used match with the land price indicator. Comparison of capitations of existing uses of districts adjacent to the railway is summarized in Table 5.

Table VI. Capitinations of existing uses of districts adjacent to railway [2]

District \ Usage	Karmandan Square (meters)	Mirzamani Square (meters)	Servine Bagh Square (meter)	Lesani (Square meters)
Residential	54.31	87.12	39.82	41.87
Education-public	1.24	2.22	0.98	1.05
Equipped green space	-	-	-	-
Small	0.84	0.72	0.62	0.9

commercial				
Sporty	-	-	-	-
Sanitary	0.59	0.78	0.19	0.21
Cultural	0.29	-	-	-
Religious	0.41	-	0.17	0.67
Network crossings	12	25.44	9.34	17.62
Sum of uses	63.36	127.43	45.61	74.94
Garden	3.73	5.7	4.96	43.95
Arid	0.28	5.21	0.89	4.44

According to above Table VI, it can be said that land price in districts adjacent to suburban railway, has a direct relationship with the capitation of residential land, capitation of network crossings and the sum of uses. About the commercial usage, capitation of Gardan Bridge district is more than Mirzamani district. Reopening of three new crossings in the district has been caused a dramatic increase of commercial uses in this field. About education use, it should be stated that capitation level of Servine Bagh district is abnormally higher than Karmandan district. This is because of the fact that education usage of the Servine Bagh is just limited to Shotordaran elementary school with a large yard, which is constructed on the remains of the cemetery of the Servine Bagh. While in the contemporary era, education uses of Karmandan district have been increased in different education levels, especially in the east part of the district. Capitacion of religious usage, except in Mirzamani district which does not follow a certain order, in other districts it follows the intensity of land price. Therefore, the validity of this hypothesis is almost confirmed in the part of the intensity of land and diversity of activities.

Social diversity

It can be stated that land price indicator has an inverse relation with the intensity of ethnic and cultural diversity and a number of non-native people to the city. This issue can state the number of native people to the province. Price indicator has a direct relation with the amount of acquisition. In the investigation of the job of the people, it is concluded that people in better districts in terms of price indicator, has more diversity in terms of job and also the amount of unemployment is low there. Therefore, the validity of this hypothesis is confirmed for job diversity, however, for ethnic diversity not only it is not confirmed but also it is canceled completely.

Chart 3. Variety of users of the space in terms of age, between hours (2015-10-17 until 2015-11-17)

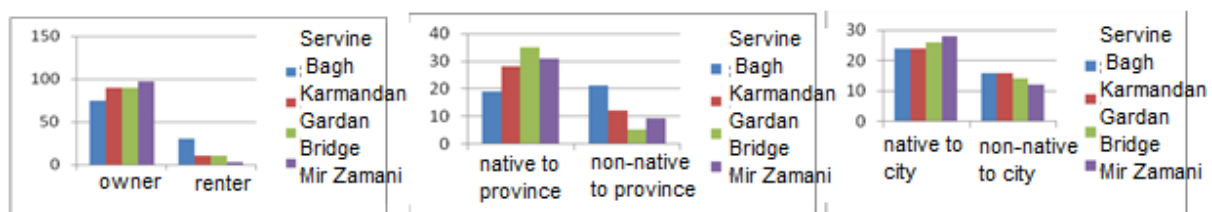
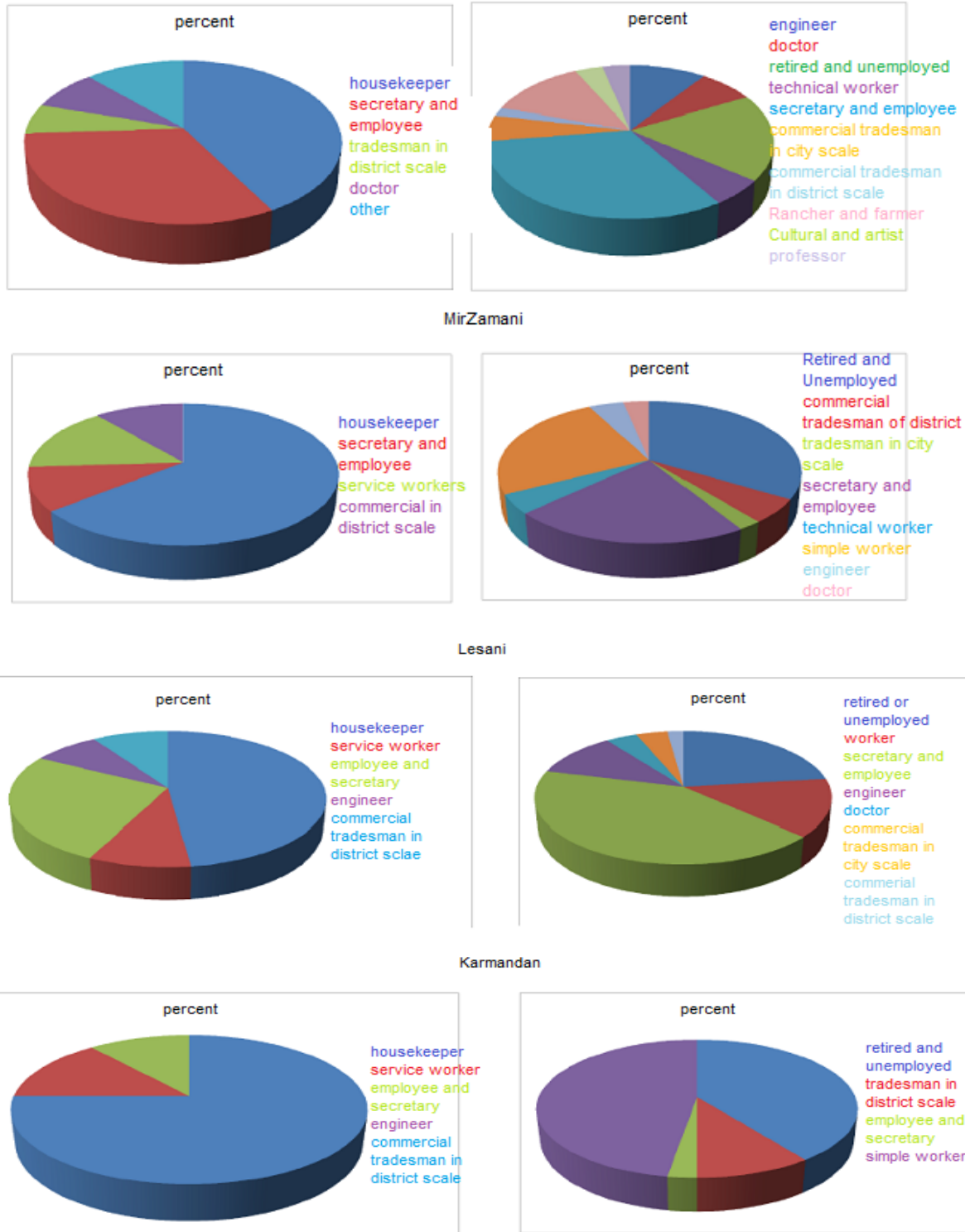


Chart 4. Job Chart residents (2015-10-17 until 2015-11-17)



IV.

CONCLUSION

Based on above studies, it can be stated that except the social diversity indicator, indicators of functional diversity and quality of public spaces especially in two parts of the

urban furniture and wall appearance, has a direct effect on the quality of texture (Servine Bagh district in fully located in the urban distressed texture and Lesani and Karmandan districts extendedly are located inside the urban distressed texture.). The indicator of access distance to urban facilities and district

services and the indicator of a number of urban capitations of districts, especially in the roads issue, green space is effective, however, in the discussion of some capitations such as religious capitation, it is un-effective. Therefore, it can be said that increment of the social-functional and space diversity can promote the increase of the land price in the area. Through the increment of visual-motion permeability's or improvement of the environmental conditions, which leads to the variety of social classes living in the area, the ruptures will be faded. The existence of the physical ruptures is the aggravating factor of the aging of the texture.

About this hypothesis that is it possible to transform physical ruptures to a social physical integration by the promotion of public spaces? it can be said that although increment of the quality of public spaces is a suitable indicator to determine the land price, it can be stated that it can improve the quality of area.

V. SUGGESTIONS

Three approaches are proposing to increase the life quality level in neighborhood districts with railway stations:

- i). Promotion of environmental quality such as the development of urban agriculture, preserving natural heritage, use of natural elements in district and avoidance of visual and acoustic pollutions.
- ii). Promotion of quality of public spaces such as increment of presence in space, promotion of facilities and services, the increment of security and safety of public space, promotion of visual quality of buildings, promotion of economic situation of district and increment of education.
- iii). Integrating social-usage, in which public participation, a mix of social-functionality, promotion of culture and education of residents and continuity of physical space are its kinds.

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