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Investigating positive and negative effects of high-building in cities Case study: city of Bojnourd

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ABSTRACT

In general, cities in recent years have faced with numerous changes in terms of physical dimensions, space and the environment. In this case, tall-building activity, for example in the city of Bojnourd, can be seen as one the most obvious factors. Although tending to tall-building, and using these buildings can have positive effects and results, but due to lack of sufficient and appropriate attention and regulations in this context, it has had negative and incompatible effects. Therefore, regarding the growth and spread of high-buildings in the city of Bojnourd justifies the importance of this study. This study is a descriptive-analytical one and its information are collected through books, articles, and previous researches as well as through the distributing a questionnaire. Also, comparison and analysis of the strength and weakness points of tall-building in the city of Bojnourd is carried out through the strategic planning method of SWOT. In this study, through investigation of the high-buildings of Bojnourd, we have analyzed the positive and negative effects of them on the city. According to the results achieved in this paper, high-building could result in: reducing horizontal growth of the city, impacting the economy of the city, increasing the traffic volume around the tracks adjacent to the high-buildings, a change in lifestyle and patterns of residents and even citizens of Bojnourd, impacting the climate and the nature of city and dozens of other effects that achieved in this study. Also, a conservative strategy (i.e., WO) as the main priority and the invasive strategy (i.e., SO) in the prioritizing the scheduling strategies of effects of tall-building in Bojnourd were used.

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INTRODUCTION

In recent decades, one recent phenomenon in cities has been tall-building that although is a western model to deal with the demanding demand for housing, but in turn has many advantages. Imposing this type of construction in our cities, in addition to disrupting the natural balance and structure of them has led to the numerous complications for the process of urbanization. For example, the lack of criteria and regulations for the development of these issues would lead to the negative and heterogeneous effects such as traffic disruption in the network of pathways and tracks, disrupting the face of city, creation of sub-cultures, economic problems and etc.

Also, at present in many countries, urban policies have changed from horizontal growth pattern towards tall-building and smart growth patterns. This pattern is also happening in our country so that officials and managers of the middle Cities like Bojnourd have adopted this policy to achieve to their various objectives. So, through analysis done in this study we attempt to identify positive and negative factors of high-building in the cities, especially in Bojnourd, so that through representing appropriate solutions provide the context of improving the city for the planners and administrators.

Background of tall building in the world and Iran:

The first tall-buildings were in ancient Rome in the third century BC so that with increasing population the height of buildings also increased. Beginning of tall-building with non-masonry structures in the early 19th century in the UK is attributed to the mills and warehouses which their skeleton were made of cast iron. Use of high-buildings (in the modern form) in cities of world was become common in the second half of the 19th century (Shokohi, M., 2011, p 4).

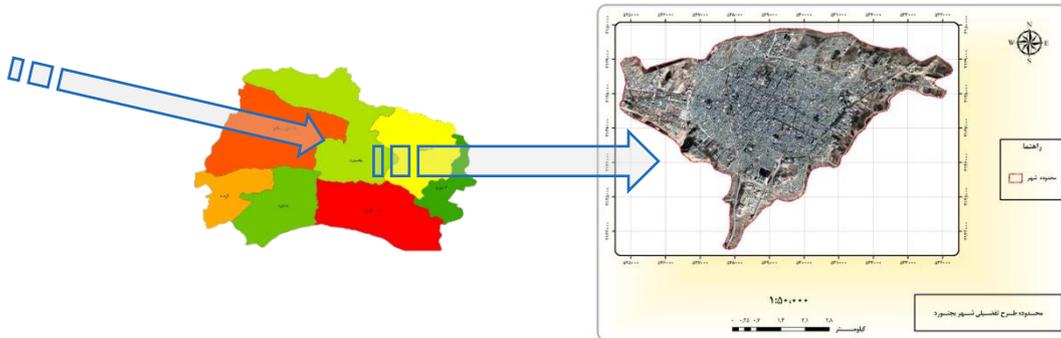
Beginning of tall building in Iran can also be seen in 1949. After happening of Islamic Revolution, tall building almost ceased for more than 10 years. A new wave of tall building in the late ... 60s and after rising

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Bojnourd city as a mediocre city in the urban system (Titkanlo, 2002) is located between $37^{\circ} 27' 27''$ to $37^{\circ} 29' 31''$ northern latitude and $57^{\circ} 17' 4''$ to $57^{\circ} 21' 36''$ east longitude wide and its height from open water surface is 1070 meters (consultant engineers of Pars Nash-Jahan, the comprehensive design of Bojnourd, 2010, p. 1).

Theoretical concepts:

Tall buildings



Being a tall building is a relative matter and from the various aspects various definitions have been proposed for tall buildings. The main problem in the definitions of tall buildings is that its definitions do not have the proper flexibility. For this reason, the definition of tall buildings in terms of urban issues can be a combination of qualitative and quantitative variables (Westminster City Hall, 2009). Thus in general, with respect to the relativity of concept of tall buildings, there are two main approaches to define tall-buildings:

- 1) Based upon determination of a limit for the height of buildings
- 2) Defining buildings based upon their features and location in the city

According to the ratification of Iran urbanization in 1998, tall building refers to the more than 6 floors buildings whereas according to the ratification of comprehensive plan of Tehran in 2007 it refers to buildings with more than 12 floors (Document of the master plan of Tehran, in 2007, p. 24). However, the municipality of Bojnourd considers buildings taller than five floors as tall buildings (consultant engineers of Pars's Nash-Jahan, the comprehensive design of Bojnourd, 2010). This difference is due to the physical and special characteristics of Bojnourd in comparison to other cities. The present study, with respect to the above explanations and physical conditions of Bojnourd considers buildings with more than 5 floors as tall buildings.

Tall buildings based on their use are classified as follows: residential, official & commercial, mixed.

The main problems and factors of tall building affecting the city:

In general, effective factors and dimensions of tall building in Bojnourd can be divided in the following categories: A) the role of tall building on economic factors, B) the role of tall building on social and cultural factors C) the role of tall building on the natural and environmental factors, D) the role of tall building on the physical factors of the city.

The introduction of high-level Bojnourd:

To evaluate the effects of tall building, first we should consider their distribution in the city. Most tall buildings of the city are located in the southern region of the city. Among the reasons for the establishment of these buildings in the side areas we can refer to low population density in these areas, good accessibility and appropriate wideness of roads and adequate infrastructure and facilities which have led to the interest of investors for construction in this area. Among the tall buildings of the city, cases which were taller and had more area were selected and elevated.

These buildings include: the buildings of Bank Saderat, the buildings of Bank Melli, Al-Ghadir's housing complexes, Navak, the cement company housing complex, the health center and alumni, the housing complex of educational trainers (Takhti), the housing complex of the agricultural organization, etc. Following conclusions achieved through investigating each of them are presented in detail.

Table 2: Introducing tall building of Bojnourd

| Row | Name | Address | Floors | Kind of use | Density | Occupancy area | Adjacent uses | Width of adjacent roads | Comment |
|-----|--|--|---------|-------------|---------|----------------|---|-------------------------|--|
| 1 | Bank Saderat | Western Taleqani St. | 11 | Official | - | - | Official & Residential | 24n, 16e, 10s | Private parking, ramp parking, installation, elevator and step, in total 85 unit |
| 2 | Hemmat 130 (under construction) | Southern Qiyam St. | 10 | Residential | 100 | 40 | Agriculture | 43n, 38e, 36w, 24s | Structure of concrete, Private parking, elevator and step, green space |
| 3 | City of Navak | Southern Qiyam St. | 8 | Residential | 300 | 60 | Residential & green space | 16e, 24w | warehouse, Private parking, shops, kindergarten |
| 4 | Al-Ghadir complex | 23 m road of University St. | 5 | Residential | 240 | 40 | Residential & educational | 24e, 32w | 60 units, private parking, elevator and step, green space, kindergarten |
| 5 | Bank Mellir | Eastern Imam Khomeini St. | 7 | Official | 240 | 60 | Residential, educational, business, parking | 8e, 30n | private parking, elevator and step, shops, holding salon, installations |
| 6 | Refah Yavar | University St. | 6 | Residential | 240 | 40 | Residential, official, business, | 24e, 32w | Shops, private parking, elevator and step, green space, kindergarten, warehouse |
| 7 | Residential complex before the Azad university | University St. | 4, 6, 9 | Residential | 240 | 40 | Residential, sport, green space | 42e, 20w, 14n | Structure of concrete and steel, |
| 8 | Complex of Agricultural Jihad (under construction) | Boulevard of the Shahrak of Farhangiyana | 6 | Residential | 240 | 40 | Residential | 24n, 16w | Warehouse, private parking, elevator and step, guard |
| 9 | Complex of Regulating Forces (under construction) | End of university St. | 6 | Residential | 240 | 40 | Empty lands | 24w, 32e, 16n, 16s | Private parking, elevator and step, green space, kindergarten |
| 10 | Complex of sport trainers (under construction) | Beltway of Modares | 8 | Residential | 320 | 4 | Residential, workshop, business, | 8e, 12s | shops, private parking, elevator and step, green and play space, kindergarten |



The location of tall buildings in the city of Bojnourd

Findings:

In investigation and the analysis of data using the SWOT matrix, the research is done according to the classification of the impact of these structures (e.g., economic, environmental, natural and cultural, social and physical). In order to complete this part of the research, a goal oriented questionnaire was designed and represented to touch the effects of tall building as much as possible.

Through surveys, the distribution of questionnaires, interviews and observations made in the surrounding of tall buildings of Bojnourd, the SWOT and process of strategic planning resulting on the dimensions of study were appeared as the following.

Strategic planning process (positive and negative effects of tall building in Bojnourd):

The strategic planning process of tall building in Bojnourd using an approach to investigate and identify positive and negative impacts of them on the city through a four-step strategic planning process including: the evaluation of internal and external factors, the matrix of external and internal factors, the final prioritization of internal and external factors and development of the strategic plan was carried out.

First step: evaluation of internal (IFE) and external (EFE) factors:

Internal and external factors which would be affected by tall building in Bojnourd after reviewing related information such as: background, geography, climate, physical, functionality, population, cultural, social and economic infrastructures, upstream projects, previous implemented projects and the opinion of authorities, people and other relevant stakeholders in this regard were identified and included in the evaluation matrix (Golkar, K., 2005).

Table 3: SWOT matrix of significance coefficients (source: author 2013).

| Row | Weight score | Rank | Significance coefficient | SOWT analysis | Strength (S) and weakness (W) points | Internal factors (IFE) |
|-----|--------------|------|--------------------------|--|--------------------------------------|------------------------|
| 1 | 0.296 | 4 | 0.074 | Placing in low risk area in terms of distance to the fault in the north of city | | |
| 2 | 0.248 | 4 | 0.062 | Prevent further destruction of farm lands | | |
| 9 | 0.0945 | 1.5 | 0.063 | The lack of use of the opportunities of tall building for making green and open spaces and internal and external services | | |
| 3 | 0.21 | 3.75 | 0.056 | Improve the efficiency of land | | |
| 11 | 0.088 | 1.6 | 0.055 | Reduced social security in the areas of tall buildings | | |
| 8 | 0.0945 | 1.75 | 0.054 | Tend to move toward the incompatible western cultures in these buildings | | |
| 7 | 0.1148 | 1.98 | 0.053 | Air and noise pollution due to increased traffic in the vicinity of tall buildings | | |
| 10 | 0.09 | 1.8 | 0.050 | Increases in traffic volume across tracks around this buildings | | |
| 16 | 0.047 | 1 | 0.047 | Disturb the privacy of surrounding buildings and the occurrence of the phenomenon of aristocracy | | |
| 4 | 0.148 | 3.3 | 0.045 | Suitable feasibility for constructing high buildings in the city | | |
| 6 | 0.126 | 3 | 0.042 | Reasonable increase of urban density | | |
| 13 | 0.068 | 1.7 | 0.040 | Formation of micro climates (temperature, wind, sunlight, etc.) | | |
| 5 | 0.142 | 3.75 | 0.038 | Increased quality of readability in the city | | |
| 17 | 0.046 | 1.4 | 0.033 | Decreased satisfaction and lack of interest for housing in these buildings | | |
| 18 | 0.044 | 1.42 | 0.031 | The lack of suitable parking space around them which has led to the chaos and disorder in the tracks and streets adjacent to them | | |
| 15 | 0.047 | 1.84 | 0.026 | Rising costs of energy supply in tall buildings | | |
| 22 | 0.031 | 1.25 | 0.025 | Ghosting of such buildings | | |
| 12 | 0.077 | 3.35 | 0.023 | concentration to the target groups in the construction of tall buildings | | |
| 21 | 0.031 | 1.45 | 0.022 | The lack of open and green spaces | | |
| 24 | 0.030 | 1.43 | 0.021 | The loss of identity and sense of belonging in this buildings | | |
| 23 | 0.030 | 1.62 | 0.019 | Interference of children's activities and behaviors with other functions | | |
| 25 | 0.030 | 1.82 | 0.017 | The lack of strict observance of the rules and regulations of tall building in areas such as employment level and deployment of tall buildings | | |
| 26 | 0.028 | 1.79 | 0.016 | Disruption due to height variation | | |
| 27 | 0.028 | 1.9 | 0.015 | Changes in the value of the lands surrounding tall | | |

| | | | | | | |
|----|--------|------|-------|---|--------------------------------|------------------------|
| | | | | buildings | | |
| 19 | 0.0416 | 3.2 | 0.013 | Respect to the improvement of the appearance of urban by volume, convenient viewing of some tall buildings | | |
| 20 | 0.038 | 3.49 | 0.011 | providing services in an easier and cheaper perform for tall buildings | | |
| 29 | 0.015 | 1.51 | 0.01 | Lack or inadequacy of recreation and sport spaces, firefighting systems, emergency exits, waste disposal system and the auditorium in tall buildings | | |
| 30 | 0.014 | 1.66 | 0.009 | Increase in the cost of construction and maintenance with increasing height of tall buildings | | |
| 33 | 0.0088 | 1.1 | 0.008 | The lack of attention to the compatibility of the architecture with the climate in tall buildings | | |
| 31 | 0.012 | 1.8 | 0.007 | Lack of development of service applications servicing to tall buildings | | |
| 34 | 0.002 | 1.2 | 0.006 | Lack of regulations for the color and the material of view of the tall buildings | | |
| 28 | 0.019 | 3.8 | 0.005 | Relatively suitable slope for the disposal of surface waters in the southern of city | | |
| 32 | 0.009 | 3.23 | 0.003 | Existence of a good demand for tall building | | |
| 35 | 0.001 | 1.35 | 0.001 | The need to attract capital to build such a massive projects | | |
| | 2.3492 | - | 1 | Total Weighted Score of Internal factors (IFE) | | |
| 1 | 0.242 | 3.85 | 0.063 | The possibility of increased density and optimal utilization of land | Opportunities (O), threats (T) | External factors (EFE) |
| 2 | 0.208 | 3.65 | 0.057 | Avoiding uneven distribution of urban growth | | |
| 8 | 0.084 | 1.5 | 0.056 | Increased risks and artifact disasters in tall buildings | | |
| 11 | 0.0676 | 1.23 | 0.055 | lack of allowable distance between adjacent tall buildings with each other and with the adjacent buildings due to the their development in the limited space of the city center | | |
| 3 | 0.190 | 3.6 | 0.053 | the possible of creating symbols of the development of city | | |
| 4 | 0.186 | 3.21 | 0.058 | The possibility of using eroded areas for the construction of tall buildings | | |
| 5 | 0.157 | 3.75 | 0.042 | The possibility of enhancement of the sense of place and improvement of navigation in the city and region | | |
| 12 | 0.0672 | 1.64 | 0.041 | The lack of significant social cohesion among residents | | |
| 6 | 0.124 | 3.1 | 0.04 | Development of social cohesion among residents through the creation of common spaces and activities | | |
| 14 | 0.0547 | 1.44 | 0.038 | A context for changes in the abnormal behavior and culture of the people and residents | | |
| 17 | 0.0444 | 1.2 | 0.037 | Increased congestion and traffic problems | | |
| 18 | 0.0432 | 1.2 | 0.036 | High traffic on pedestrians' tracks around tall buildings | | |
| 22 | 0.038 | 1.1 | 0.035 | Lack of appropriate space for children's activities | | |
| 21 | 0.039 | 1.45 | 0.034 | The establishment of some of tall buildings on lands which are not suitable in terms of soil and geomorphological conditions | | |
| 15 | 0.051 | 1.55 | 0.033 | Exacerbate the negative environmental and physical impacts | | |
| 7 | 0.108 | 3.4 | 0.032 | The relative influence in balancing the housing market of city | | |
| 19 | 0.0409 | 1.32 | 0.031 | Gradual loss of things such as the sense of belonging to place due to the trend of increased density in the area | | |
| 24 | 0.033 | 1.1 | 0.030 | Disrupting the privacy and creating aristocracy in tall building | | |
| 8 | 0.102 | 3.54 | 0.029 | The possibility of using the spaces created due to tall buildings and the possibility of improving regulations of tall building | | |
| 16 | 0.047 | 1.65 | 0.027 | Lack of municipal services to areas with tall buildings | | |
| 24 | 0.036 | 1.5 | 0.024 | Providing and emergence of land speculation | | |
| 20 | 0.0400 | 1.74 | 0.023 | Lack of open and green space in such buildings | | |
| 10 | 0.075 | 3.6 | 0.021 | The possibility of promoting diversity in the form and size of buildings | | |
| 27 | 0.024 | 1.52 | 0.016 | Settlement of households in tall buildings that are | | |

| | | | | | | |
|----|--------|------|-------|--|--|--|
| | | | | not culturally prepared for | | |
| 13 | 0.0549 | 3.66 | 0.015 | Opportunity to benefit from the rich historical identity and culture of the city in construction of tall buildings | | |
| 29 | 0.014 | 1.23 | 0.014 | Increasing pressure on urban infrastructure and equipment or increasing the cost of providing them | | |
| 28 | 0.0156 | 1.2 | 0.013 | Creation of sub-climates and the vast shadow | | |
| 16 | 0.0432 | 3.6 | 0.012 | The possibility of mixed functional development in tall buildings | | |
| 23 | 0.037 | 3.4 | 0.011 | Suitable geographical location and climate of the city | | |
| 27 | 0.031 | 3.5 | 0.009 | The use of these buildings for economic investment in the city | | |
| 31 | 0.008 | 1.62 | 0.005 | The high cost of maintaining the facility and equipment in these buildings | | |
| 33 | 0.005 | 1.32 | 0.004 | Losing the natural views and landscapes | | |
| 30 | 0.010 | 3.35 | 0.003 | The possibility of using industrial methods in construction | | |
| 32 | 0.006 | 3.42 | 0.002 | Existence of a beautiful and untouched nature around the city to provide a visual corridor | | |
| 34 | 0.003 | 3.1 | 0.001 | The possible to use tall buildings as residential centers | | |
| - | 2.3258 | - | 1 | Sum of weighted scores of external factors (EFE) | | |

Table 4: The contrast matrix (developing strategies), source: author 2013

| Weak points (W) | Strength points (S) | SWOT matrix |
|--|---|--------------------------|
| <p>Reviewing strategies (WO)</p> <p>WO1- promoting brightness tall buildings at night.</p> <p>WO2- establishment of urban furniture in compliance to the climate as well as providing basic needs of residents such as: security, vitality, comfort, readability and etc.</p> <p>WO3- Providing incentive facilities for residents to participate in tall building projects as good as possible.</p> <p>WO4- strengthening and construction of walkways around tall buildings.</p> <p>WO5- creating security or local police in the area.</p> <p>WO6- supplying service and business units and leisure time in complex through creating proper jobs.</p> <p>WO7- extending public transport fleet in the area.</p> <p>WO8- developing night activities such long-term employment around the area to promote vitality and enhance the security.</p> <p>WO9- developing around of area in comprehensive plan to control adjacent constructions and remove incompatible plaques around tall buildings.</p> <p>WO10- creating urban symbols in routes leading to the tall building in order to create readability.</p> <p>WO11- organization (Forest Park) and enhancement of green spaces around tall buildings.</p> <p>WO12- opening views besides passing walkways and roads of tall buildings towards distinguished indexes of the city and the nature surrounding it.</p> <p>WO13- providing adequate open spaces for children to play and socialize with people and interactions.</p> <p>WO14- organization and observance of the width of roads and walkways around tall buildings.</p> | <p>Competitive strategies - aggressive (SO)</p> <p>SO1- developing regulations for determination of a distance (space) for construction of tall buildings from faults of the city as well as its surface water courses.</p> <p>SO2- identification of unused lands of city in order to prioritize the construction.</p> <p>SO3- provides incentive policies for appropriate constructions.</p> <p>SO4- selecting locations and building spaces and squares around tall buildings.</p> <p>SO5- monitoring and promoting the construction of tall buildings in the feasible area of the feasibility plan of tall buildings.</p> <p>SO6- diverse landscaping by benefiting from ethnic, cultural and climate diversity of the City.</p> <p>SO7- developing comprehensive regulations to prevent conversion of agricultural lands of the city into residential lands.</p> <p>SO8- assigning adequate budget to the organization and control of tall building in Bojnourd.</p> <p>SO9- developing regulations based on integrating the eroded context of the city and construction of tall buildings with respect to all the principles.</p> <p>SO10- developing regulations about the discussion of view of tall buildings and assuring the architecture and viewing compliance to the culture and climate of Bojnourd</p> <p>SO11- holding and offering a comprehensive awareness and training about the culture of housing and the use of tall buildings.</p> <p>SO12- using the staircase design in architecture of some tall buildings with the specific position in the city.</p> <p>SO13- encouraging use of industrial and modern construction methods in the field of tall building in the city of Bojnourd</p> <p>SO14- using tall buildings as residential units for tourists and pilgrims of the holy city of Mashhad.</p> <p>SO15- requiring observing the regulations and adequate per capita for tall construction (e.g., green space, parking, width of roads, services, etc.)</p> <p>SO16- forming an expert group (committee) in the field of tall building in the city of Bojnourd in governmental organizations and comprehensive monitoring of the tall construction.</p> | <p>Opportunities (o)</p> |

| | | |
|--|--|--------------------|
| <p>Defensive strategies (WT)</p> <p>WT1- avoiding hasty and rush plans with respect to the importance of the subject of tall building.</p> <p>WT2- avoiding violations and observing the rules and regulations.</p> <p>WT3- avoiding construction incompatible with the climate and geographical conditions of the city of Bojnourd.</p> <p>WT4- disclosing adverse natural factors such as unsuitable soil for the establishment of the heavy structures.</p> <p>WT5- preventing speculation and increase of prices.</p> <p>WT6- avoiding forming of tall buildings cultures which are conflicting with Iranian and Islamic culture in the city.</p> <p>WT7- preventing incompatible cultures in large complexes (residents, behavioral).</p> <p>WT8- awareness of residents of tall buildings from rising of possible risks (risk of falls and etc.)</p> | <p>Diversification of strategies (ST)</p> <p>ST1- management strengthening in the relevant organs total-construction and development of the city.</p> <p>ST2- Continuous monitoring of fulfillment of the codified regulations.</p> <p>ST3-Using the capability of creating step designs in tall buildings and green space in consequence of weather variability of tall buildings set to avoid increasing environmental pollution and retail climates.</p> <p>ST4- organizing and defining movement paths of domain of tall buildings in order to prevent accidents.</p> <p>ST5-using useleslands around tall buildings to build parking.</p> | <p>Threats (t)</p> |
|--|--|--------------------|

Second step: final prioritization of internal and external factors:

According to the results of the analysis matrix SWOT we attempt to prioritize each component with respect to the weight and the final score of each factor so that in this stage through final prioritizing, factors could be used in later steps.

Third stage: the stage of adaptation and determination of strategy 1716683537:

Constituting the contrast matrix (codification of strategies)

In the framework of the codification of strategies, internal and external factors in SWOT matrix are compared to each other to determine the possible strategies, and finally strategies WT-ST-WO-SO are achieved.

Constituting internal and external matrices (selecting acceptable strategy):

Step One: constituting strategies matrix and executive priorities and determining the position tall construction in Bojnourd.

Across point of final scores of evaluation of internal factors of tall building effects and its external factors determines the position of this section in strategic matrices and its executive priorities.

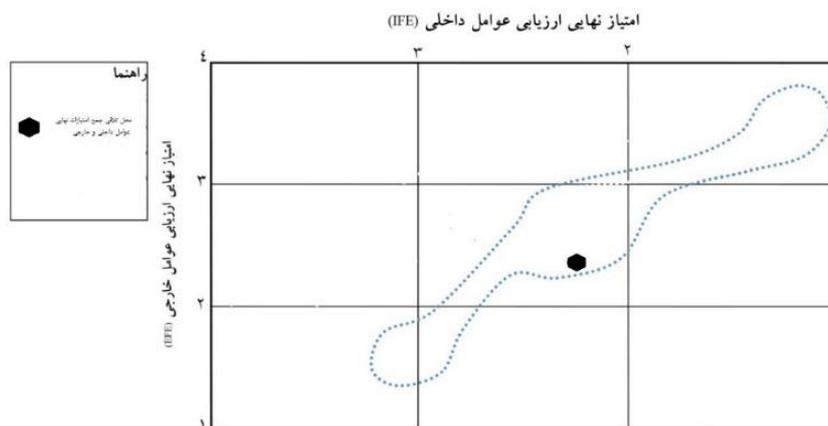


Diagram 1: matrix of strategies and executive priorities (SWOT)

Matrix of strategies and executive priorities (SWOT) (with applying changes in accordance with the present matrix data), David, 2004

Step Two: Selecting acceptable strategies:

Acceptable strategies in planning for investigating and understanding the long term effects of tall building in the city of Bojnourd, with respect to the placement in the fifth home of matrix, is a conservative strategy. With respect to the special position of some impacts of tall buildings between other internal factors we can after conservative strategies also to use offensive strategies. For this reason, first initial strategies in the house of WO and then secondary strategies in the house of SO of matrix is chosen.

Step four: Preparation of qualitative strategic planning table (prioritizing acceptable strategies):

Decision making about acceptable strategies of planning effects and consequences of tall building in Bojnourd is done using scientific analysis and intuitive judgment. The priority of each strategy is distinguished using quantitative matrix of planning and based on the final attractiveness score which is under influence of the amount interaction between strategies and internal and external factors.

Table 5: Table of qualitative strategic planning, source: author

| | Internal and external factors (EFE) | Weighted score | Tall building strategies in Bojnourd with the approach of investigation and identification of its positive and negative effects on the city | | | | | | | | | | | |
|------------------------------------|---|----------------|---|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|
| | | | WO3 | | WO6 | | WO8 | | WO9 | | WO13 | | WO14 | |
| | | | Attractiveness score | Sum of Attractiveness score | Attractiveness score | Sum of Attractiveness score | Attractiveness score | Sum of Attractiveness score | Attractiveness score | Sum of Attractiveness score | Attractiveness score | Sum of Attractiveness score | Attractiveness score | Sum of Attractiveness score |
| Strength points (s) | Placement in low risk area... | 0.296 | 2 | 0.592 | 2 | 0.592 | 0 | 0 | 3 | 0.888 | 1 | 0.296 | 2 | 0.592 |
| | Preventing destruction more than... | 0.248 | 4 | 0.99 | 2 | 0.496 | 1 | 0.248 | 3 | 0.774 | 2 | 0.496 | 2 | 0.496 |
| | Improving the effectiveness of land | 0.21 | 2 | 0.42 | 4 | 0.48 | 3 | 0.63 | 3 | 0.63 | 3 | 0.63 | 2 | 0.42 |
| | Appropriate feasibility for the... | 0.148 | 3 | 0.44 | 0 | 0 | 1 | 0.143 | 3 | 0.444 | 1 | 0.148 | 2 | 0.296 |
| | Promoting the quality of readability in the city | 0.142 | 0 | 0 | 2 | 0.284 | 0 | 0 | 1 | 0.142 | 0 | 0 | 1 | 0.142 |
| | Reasonable increase in urban density | 0.126 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.252 | 0 | 0 | 2 | 0.252 |
| | Given attention to the target groups ... | 0.077 | 1 | 0.77 | 0 | 0 | 2 | 0.156 | 1 | 0.077 | 3 | 0.231 | 1 | 0.077 |
| | Giving attention to promotion of view and scene ... | 0.0416 | 3 | 0.12 | 1 | 0.041 | 1 | 0.041 | 1 | 0.071 | 1 | 0.0416 | 3 | 0.124 |
| | Giving services in an easier way ... | 0.038 | 0 | 0 | 3 | 0.114 | 1 | 0.038 | 1 | 0.038 | 3 | 0.114 | 2 | 0.076 |
| | Existence of a relatively appropriate slope ... | 0.019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0.038 |
| Existence of a good demand for ... | 0.009 | 2 | 0.01 | 4 | 0.036 | 2 | 0.018 | 0 | 0 | 2 | 0.018 | 1 | 0.009 | |
| Weakpoints (w) | Air and noise pollution ... | 0.1148 | 2 | 0.22 | 0 | 0 | 1 | 0.114 | 2 | 0.022 | 2 | 0.229 | 4 | 0.459 |
| | Lack of opportunity to use long term ... | 0.0945 | 3 | 0.28 | 1 | 0.094 | 2 | 0.189 | 3 | 0.283 | 2 | 0.189 | 2 | 0.189 |
| | Tendency to move toward the culture ... | 0.0945 | 1 | 0.09 | 0 | 0 | 1 | 0.094 | 2 | 0.189 | 3 | 0.283 | 1 | 0.094 |
| | Increases in traffic volume across tracks ... | 0.09 | 2 | 0.18 | 1 | 0.09 | 2 | 0.18 | 3 | 0.27 | 2 | 0.18 | 4 | 0.36 |
| | Reduced social security ... | 0.088 | 2 | 0.17 | 2 | 0.176 | 3 | 0.26 | 3 | 0.264 | 3 | 0.264 | 2 | 0.176 |
| | Formation of micro climates ... | 0.068 | 2 | 0.13 | 1 | 0.068 | 0 | 0 | 2 | 0.136 | 0 | 0 | 1 | 0.068 |
| | Disrupting the privacy of the building | 0.047 | 1 | 0.04 | 1 | 0.048 | 1 | 0.047 | 4 | 0.188 | 0 | 0 | 1 | 0.047 |
| | Rising costs caused by ... | 0.047 | 2 | 0.09 | 3 | 0.041 | 2 | 0.094 | 1 | 0.047 | 2 | 0.094 | 3 | 0.147 |
| | Decreased satisfaction ... | 0.046 | 3 | 0.13 | 4 | 0.184 | 3 | 0.138 | 3 | 0.138 | 3 | 0.138 | 2 | 0.092 |
| | Lack of parking space ... | 0.044 | 2 | 0.05 | 4 | 0.176 | 2 | 0.088 | 3 | 0.132 | 4 | 0.176 | 3 | 0.132 |

| | | | | | | | | | | | | | | |
|-------------------|---|--------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|
| | The lack of green and open spaces... | 0.031 | 3 | 0.09 | 4 | 0.124 | 1 | 0.031 | 2 | 0.062 | 4 | 0.124 | 2 | 0.062 |
| | Ghosting of such buildings ... | 0.031 | 2 | 0.06 | 1 | 0.031 | 0 | 0 | 2 | 0.062 | 1 | 0.031 | 2 | 0.062 |
| | Interference of children's activities and behaviors ... | 0.03 | 1 | 0.03 | 3 | 0.09 | 3 | 0.09 | 2 | 0.06 | 4 | 0.12 | 0 | 0 |
| | Loss of identity and sense of belonging ... | 0.03 | 2 | 0.06 | 2 | 0.06 | 3 | 0.09 | 0 | 0 | 3 | 0.09 | 2 | 0.06 |
| | The lack of strict observance of the laws | 0.03 | 3 | 0.09 | 3 | 0.09 | 3 | 0.09 | 3 | 0.09 | 2 | 0.06 | 2 | 0.06 |
| | Changes in the value of the land ... | 0.028 | 1 | 0.02 | 1 | 0.028 | 1 | 0.028 | 2 | 0.056 | 1 | 0.028 | 2 | 0.056 |
| | Disruption due to diversity ... | 0.028 | 1 | 0.02 | 1 | 0.028 | 0 | 0 | 1 | 0.028 | 1 | 0.028 | 0 | 0 |
| | Lack or inadequacy of sport spaces ... | 0.015 | 3 | 0.045 | 3 | 0.045 | 3 | 0.045 | 0 | 0 | 4 | 0.06 | 0 | 0 |
| | Increasing construction costs and ... | 0.014 | 0 | 0 | 0 | 0 | 2 | 0.028 | 1 | 0.014 | 2 | 0.028 | 3 | 0.042 |
| | Lack of development of service applications ... | 0.012 | 3 | 0.03 | 3 | 0.036 | 3 | 0.036 | 2 | 0.024 | 3 | 0.036 | 2 | 0.024 |
| | Lack of adequate attention to architecture ... | 0.0088 | 3 | 0.02 | 2 | 0.017 | 1 | 0.008 | 2 | 0.017 | 1 | 0.008 | 2 | 0.017 |
| | Lack of regulations for the paint ... | 0.002 | 2 | 0.004 | 1 | 0.002 | 0 | 0 | 2 | 0.004 | 1 | 0.002 | 0 | 0 |
| | The need to attract great capital ... | 0.001 | 3 | 0.003 | 3 | 0.003 | 0 | 0 | 0 | 0 | 3 | 0.003 | 3 | 0.003 |
| Opportunities (o) | The possibility of increased density and interest ... | 0.242 | 2 | 0.48 | 0 | 0 | 2 | 0.048 | 3 | 0.726 | 1 | 0.242 | 2 | 0.484 |
| | Avoid uneven distribution ... | 0.208 | 4 | 0.83 | 0 | 0 | 0 | 0 | 3 | 0.624 | 0 | 0 | 2 | 0.416 |
| | The possibility of creating development symbols and ... | 0.19 | 2 | 0.38 | 2 | 0.38 | 1 | 0.19 | 1 | 0.19 | 2 | 0.38 | 3 | 0.57 |
| | The possibility of using of tall buildings ... | 0.186 | 3 | 0.55 | 1 | 0.186 | 0 | 0 | 1 | 0.186 | 2 | 0.372 | 2 | 0.72 |
| | The possibility of increase in the sense of place and ... | 0.157 | 1 | 0.15 | 1 | 0.157 | 1 | 0.157 | 2 | 0.314 | 3 | 0.471 | 0 | 0 |
| | Development of social cohesion in ... | 0.124 | 2 | 0.24 | 3 | 0.372 | 2 | 0.248 | 2 | 0.284 | 3 | 0.372 | 0 | 0 |
| | The relative influence on Balance ... | 0.105 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.21 | 0 | 0 | 2 | 0.21 |
| | The possibility of using of landscaping and ... | 0.102 | 2 | 0.2 | 3 | 0.306 | 1 | 0.102 | 3 | 0.306 | 4 | 0.408 | 3 | 0.306 |
| | The possibility of enhancing diversity in form and ... | 0.075 | 3 | 0.22 | 3 | 0.225 | 0 | 0 | 0 | 0 | 1 | 0.075 | 2 | 0.15 |
| | Opportunity to benefit from the Culture ... | 0.0549 | 0 | 0 | 1 | 0.054 | 1 | 0.054 | 2 | 0.109 | 3 | 0.164 | 2 | 0.109 |
| | Allows mixed development.... | 0.0432 | 1 | 0.043 | 1 | 0.043 | 4 | 0.172 | 2 | 0.086 | 2 | 0.086 | 3 | 0.129 |

| | | | | | | | | | | | | | | |
|--------------------------------------|---|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| | Geographical location and climate ... | 0.037 | 0 | 0 | 1 | 0.037 | 0 | 0 | 1 | 0.037 | 2 | 0.074 | 2 | 0.074 |
| | The use of these buildings ... | 0.031 | 3 | 0.093 | 0 | 0 | 1 | 0.031 | 0 | 0 | 1 | 0.031 | 2 | 0.064 |
| | The possibility of using methods ... | 0.01 | 3 | 0.03 | 2 | 0.02 | 0 | 0 | 2 | 0.02 | 2 | 0.02 | 0 | 0 |
| | Existence of pristine and beautiful nature ... | 0.006 | 0 | 0 | 1 | 0.006 | 0 | 0 | 0 | 0 | 1 | 0.006 | 1 | 0.006 |
| | The possibility of using tall buildings.... | 0.003 | 3 | 0.009 | 3 | 0.009 | 1 | 0.003 | 1 | 0.003 | 1 | 0.003 | 0 | 0 |
| Threats (I) | Increased risks and disasters ... | 0.084 | 0 | 0 | 1 | 0.084 | 0 | 0 | 3 | 0.252 | 1 | 0.084 | 2 | 0.168 |
| | Failure to comply with the allowable distance between ... Lack of social cohesion ... | 0.0676 | 4 | 0.27 | 2 | 0.135 | 2 | 0.135 | 4 | 0.27 | 2 | 0.135 | 3 | 0.202 |
| | Potential change in behavior and ... | 0.0672 | 2 | 0.13 | 1 | 0.067 | 2 | 0.134 | 2 | 0.134 | 3 | 0.201 | 2 | 0.134 |
| | Exacerbate the negative effects of environmental ... | 0.0547 | 1 | 0.05 | 2 | 0.109 | 2 | 0.109 | 0 | 0 | 3 | 0.164 | 3 | 0.164 |
| | Exacerbate the negative environmentaleffects... | 0.051 | 2 | 0.1 | 1 | 0.051 | 1 | 0.051 | 0 | 0 | 3 | 0.153 | 2 | 0.102 |
| | Failure of utilities to ... | 0.047 | 3 | 0.14 | 3 | 0.141 | 2 | 0.094 | 1 | 0.047 | 3 | 0.141 | 0 | 0 |
| | Increased density and the incidence of ... | 0.0444 | 1 | 0.04 | 0 | 0 | 0 | 0 | 2 | 0.088 | 1 | 0.044 | 3 | 0.133 |
| | High traffic for walkways and.... | 0.043 | 0 | 0 | 1 | 0.043 | 1 | 0.043 | 0 | 0 | 1 | 0.043 | 3 | 0.129 |
| | The gradual loss of the issues ... | 0.0409 | 2 | 0.08 | 1 | 0.04 | 0 | 0 | 2 | 0.081 | 1 | 0.0409 | 2 | 0.031 |
| | Lack of open and green space.... | 0.04 | 3 | 0.12 | 3 | 0.12 | 3 | 0.12 | 2 | 0.08 | 3 | 0.12 | 2 | 0.08 |
| | Establishment of some tall buildings ... | 0.039 | 2 | 0.07 | 0 | 0 | 0 | 0 | 1 | 0.039 | 2 | 0.078 | 1 | 0.039 |
| | Lack of suitable spaces for ... | 0.038 | 3 | 0.14 | 3 | 0.114 | 3 | 0.114 | 2 | 0.076 | 4 | 0.152 | 2 | 0.076 |
| | Speculation ... | 0.036 | 3 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.036 | 2 | 0.072 |
| | Disturbing the privacy and creating ... | 0.033 | 2 | 0.06 | 0 | 0 | 0 | 0 | 3 | 0.099 | 2 | 0.066 | 0 | 0 |
| | settlement of families in high ... | 0.024 | 2 | 0.04 | 2 | 0.048 | 2 | 0.048 | 1 | 0.024 | 1 | 0.024 | 0 | 0 |
| | Increasing the pressure on the equipment ... | 0.014 | 3 | 0.042 | 1 | 0.014 | 0 | 0 | 2 | 0.028 | 0 | 0 | 0 | 0 |
| | Creating sub-climates and shadows ... | 0.0156 | 3 | 0.046 | 1 | 0.015 | 0 | 0 | 1 | 0.015 | 0 | 0 | 0 | 0 |
| Increased maintenance costs ... | 0.008 | 3 | 0.024 | 2 | 0.016 | 1 | 0.008 | 1 | 0.008 | 3 | 0.024 | 2 | 0.016 | |
| loss of the views and landscapes ... | 0.005 | 0 | 0 | 2 | 0.01 | 0 | 0 | 0 | 0 | 1 | 0.005 | 0 | 0 | |
| Sum | | - | - | 9.378 | - | 6.74 | - | 5.233 | - | 9.855 | - | 8.364 | - | 8.955 |

Conclusion and Summary:

Prioritizing strategies of the planning of high building effects in Bojnourd through the analysis of effective external and internal factors on tall buildings in the Bojnourd using the SWOT matrix and quantitative strategic planning model were specified. With respect to the location, the status of resulting works from tall buildings in

Bojnourd, according to house number five of internal and external matrix (Figure 1) is using a conservative strategy (WO) as the main priority and an invasive strategy (SO) in the next priority.

In conservative strategies (WO), development strategies for and observing the privacy of tall buildings in the comprehensive plan to control adjacent constructions and remove incompatible plaques surrounding tall buildings and the strategy of giving encouraging facilities to residents to participate in the plans relevant to desirable tall building with scores of 9.855 and 9.378, respectively, are the best strategies to improve the effects caused due to high building in Bojnourd. Also, the other suggested strategies with a high priority include:

Organization and observing the width of walkways surrounding the area, providing adequate open spaces for children to play and socialize with people and interactions, providing business units, services and leisure in the complex, appropriate control of generated jobs in consequence of this action, extension of the nightly activities such as long-term employment in the direction to provide vitality and enhance security.

Although these days, tall building phenomenon seems to be a good idea in terms of a response to the demands of society and Bojnourd's citizens to the housing, but in terms of quality it has led to reduced quality in different dimensions of the live so that people dream to live in a villa home.

Regarding tall building phenomenon alone does not cause instability and civil problems, we must in expressing the reasons of impacts also refer to more close factors including lack of consistent standards in this area and even non performing the existing rules and regulations in the field of high building. That is, if the principles and criteria considered in the design of tall buildings were properly implemented, maybe there are not this severe issues and challenges at the present.

The consequences of high building in these days of Bojnourd completely honest the following claim that: "in the construction of tall buildings in the city of Bojnourd negative effects of high building have not been considered."

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