

## **Evaluating Architecture and Urbanism Regulations in Establishing High Buildings (Case study: Hamadan City)**

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### **Abstract**

High buildings in modern cities are always one of effective cases in urban scene. Semiotic, aesthetic, identity and legibility of environment are researchable aspects of high buildings in urban face but despite important effects of these buildings in cities, their absence is always felt in urban macro decisions and their effects on Hamadan urban scene are always felt. Nevertheless, regulations related to these buildings in most cities of world have very widespread dimensions that include primary stage of justifying design, evaluating environmental and visual effects, project design, approval steps and accurate implementation plans but in Iran' cities including Hamadan, these regulations are very primary. Valuable works of city regarding historical, semiotics, architecture and other factors should not be compromised by high buildings. With locating of high buildings in suitable part of the city, we can use them as urban signs. This research tries to improve architecture criteria and urbanism criteria in establishing high buildings. This is an analytical-comparative research and library research and has used pictures and field studies for more examination and SWOT analysis is used. Findings show that current high buildings in Hamadan are located from Bu-Ali Square toward west and south to Eram Boulevard and People Park, sparingly. Therefore, because urban city in this part of the city is more suitable than other parts, tendency to build higher building is higher in this part of city.

**Key words:** Architecture and Urbanism, High Buildings, SWOT, Hamadan City

### **Introduction**

When we speak about tall buildings, it seems that people has same imagination toward it. But this is not the case and not only among people, but also among experts, there are different opinions about tall buildings. Definition of tall building is a relative topic and important factors like time, place and etc. engaged in it. For example, in an area with villa houses, there is a tall building (Rahmani, 2013). We often speak about tall buildings and urban design such that they have no relations to each other, while these two are inseparable (Gordon, 2003). When we talk about one of them, we talk about the other. Lack of recognition between buildings and urban design leads to confusion, even if it did not lead to distortion. However, many construction decisions are daily taken with least attention to their urban consequences. Today, and because out small and large cities have not desired face; it is preferred to preserve integrated, homogeny and optimized paradigms of development which is one of cities' problems (Yang & Lo, 2002: p467). While tall buildings are individually interesting, but their collective picture is disappointing and undesired and set of elements never transforms to a larger continuous totality. Not long ago, it seemed that buildings observed urban planning regulations without the need to reexamining and there was an innate sensitivity which guaranteed order and corresponding homogeneity in artificial environment

(Bemanian, 1998). Current tall buildings in Hamadan are placed in Buali Square toward west and south to Eram Bulverde and People Park. Generally, tall buildings are more in this part of city that has better view. Urban scene in this part is more suitable than other parts.

### **Purpose and Research Methodology**

Valuable historical, semiotic, architecture works of city and other factors should not be affected by tall buildings. By locating tall buildings in suitable parts of city, we can use them as urban signs. This research tries to find suitable solutions for architecture and city building regulations in establishing and locating tall buildings. Research method in analytical-comparative and library method and direct and indirect observations and field studies have been used along with SWOT technique.

### **Theoretical Frameworks**

- **Definition of tall buildings:** in some parts of England it is based on height, influencing surroundings or influence on sky line. If one building has these conditions it is a tall building. With this definition, a building with moderate height can follow tall buildings regulations by influencing sky line or surroundings (Westminster City Hall, 2009; Leicester City Council, 2007). Definition of tower goes farther than this in some cases; for example, based on regulations in some cities of England, one of determining factors of tower is its ability in capturing imagination of observer and forming some part of his mental picture (Liverpool City Council, 2004).

- **History of tall buildings in world:** before 19<sup>th</sup> century, more tall buildings have building structure. In centers of ancient cities like Bible, Athena and byzantine many apartment buildings were built by brick and lumber. Romans even build 10 stories buildings with wood. Traditional method of building tall buildings is yet common in Saudi Arabia and Yemen. It is centuries that Arabs built towers in their cities and built houses with 30m height in 8 stories. The last instance of these buildings generation is a building in north side of Monadnok 16-stories building (Chicago, 1891). Evolution of mechanical and hygiene systems, providing artificial lighting, air-conditioning and heating and cooling systems were occurred in 1920s in some parts of U.S. Elevator invention eliminated buildings height limitation to 5 stories. First safe elevator was presented by Elisha Otis in 1854 in New York exhibition. In 1885, first skyscraper was built (10 floors building for life insurance company, William Lu Baron Jeni). Burnham and Ruth were two architects who designed 20-floors Masonic Temple building in Chicago in 1892 (Westminster City Hall, 2009).

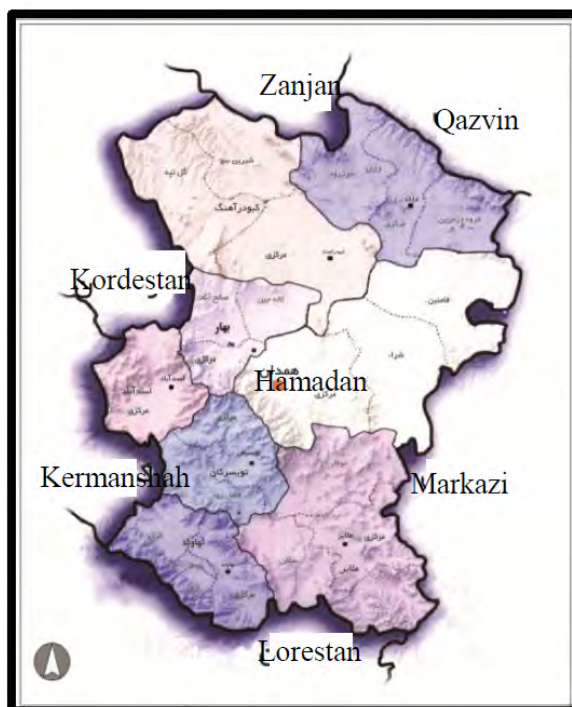
- **Sky scrapers' evolution periods:** history of sky scrapers' evolution in world can be divided in 4 periods. Primary evolution of sky scrapers was from 1880 to 1900 in Chicago. Buildings of this era were block like and had 20 floors. Second era begins with building tall towers in New York. In 1895, a 21 floors building was constructed in New York (El-Shakhs, 1994: p15). After World War I, Singer 47 floors building (1908) with total height 184 meter by Ernest Flag, Metropolitan insurance tower (1909) by Napoleon Lubran and sons with height 203 meter and Woolworth 54 floors building by Gilbert with the height 238 meter were built. This building was the highest world building for 17 years until Chrysler building with 77 floors was built. One year later i.e. in 1931 golden era of American sky scrapers reached to its summit by building Empire State building with 102 floors and 375meter height. Third era of sky scrapers' evolution coincides with modernism. In this era, engineering knowledge of building tall buildings evolves. Efficient structural systems have been developed that the highest world buildings were built with their help in 1970s: first, world trade center towers in New York and then, Sears' tower in Chicago that both of them were taller than Empire State. The fourth and contemporary era of sky scrapers formed in postmodernism era (Leicester City Council, 2007).

### *History of tall buildings in Iran*

- First tall building in Tehran was built in 1949-1951 with 10 floors.
- During 1960-1962, 16 floors building was built in Firdausi and Jomhori streets called Plasco building. Two years later, Aluminum 13 floors building was built.
- One of tall buildings in Tehran during 60s was Kar bank building in Hafiz Street. First tall residential complex in Tehran was Behjatabad which was built between Hafiz and Valiasr Streets during 1964-1970 (Rahmani et al., 2013: p152).
- Saman residential complex with 20 floors was built in north side of Keshavarz Bulverde in 1970.
- By Islamic Revolution, building tall buildings were stopped more than 10 years.
- New wave of building tall buildings began in last years of 80s due to increase in land price in Tehran (Bemanian, 1998).

### **Findings of the Research**

Hamadan city establishment: this city is located in north part of Alvand Mountain and its gradient is from south to north with longitude  $48^{\circ}32'E$  and latitude  $34^{\circ}48'N$  (Rahmani et al., 2014: p70). Hamadan city is neighbor to Razan, Kabudarhahng and Bahar in North and north-west and with Tooyserkan and Malayer in south and west south and Markazi province in East (parsomash consulting engineers, 2007). Its distance from Tehran is 337km, to Kermanshah 190km and to Isfahan 533km. Surface and ground water routes were toward north and north-east of Hamadan city (Marjan consulting engineers, 1973). Two natural canals in city which are considered as natural irrigation for city can be used as suitable methods for gathering surface waters with a restoration plan and guides all surface wastewaters toward outside of city (Iran Statistic Center, 2011).



**Fig. 1 - Position cities in the province**

*Architecture and city building principles, regulations and criteria for establishing and locating tall cities*

- **Preserving valuable works:** historical, semiotic and architecture works of city and other factors should not be influenced by tall buildings. It is not only important to observe scope of these works but we should observe height and locating such that they had no negative effects on these works and they are present significantly in city. It needs special care in Hamadan.

- **Regulations of historical areas regarding building tall buildings:** Historical and cultural works of Hamadan city are mostly located in central part of city. In fact, three limits are determined for historical works including:

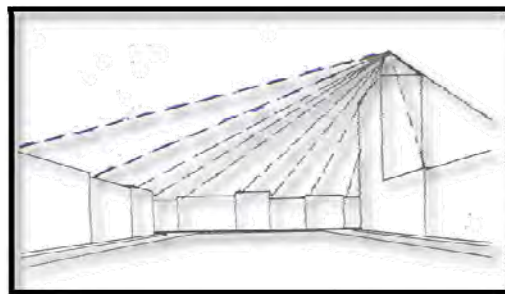
- First grade limit: maximum height 4.5meter
- Second grade limit: maximum height 8.5meter
- Third grade limit-maximum height 10.5meter (center for studies and urban planning, 2010).

- **Harmony and Contrast:** intense harmony is not only impossible but also creates no positive effects in urban face and form. On contrary, city can create positive effects in urban shape and form. Therefore, in locating tall buildings, it is necessary to do make regions and locating is done based on characteristics of each region.

- **City form:** various forms can be imagined in relation to establishing tall buildings.

**A. Gradual Decrease:** height from center to surroundings: the most attention was paid to increasing height regarding nearness to city center. In this type of city forming:

- Those in highest buildings and last edges of tall buildings can see whole city.
- Those in lower parts completely see center of city.
- From outside the city (especially higher areas) city introduces itself with clear form.



**Fig. 2 - Multiple forms the city**

- Residents of middle towers (except last floors) see a tower near them and cannot feel limits of city. They can imagine that hundred towers were built in city or imagine that only this tower and nearby towers built city which can be generalized in all forms of tall buildings.
- Those in lower buildings will not have a picture from other parts of city. They can imagine that the relationship between them and city center is replicated in other points or imagine that city linear shape gradually raises (center for studies and planning in Tehran, 2010).

**B. Gradual Increase in City from Center to Edges:** in those cities with valuable works in city center (which are not tall), gradual increase in density is from middle to edges. In this method: Those in down city completely feel city and its limits.

Some may imagine that after tall buildings there are short buildings and these limits are in limits and boundaries of cities.

Those in edge towers have view to whole city from one side and outside of city from other side (providing that towers built in one or multiple rows with suitable distance).

In the case that many towers were available, middle buildings will only see picture of nearby towers.

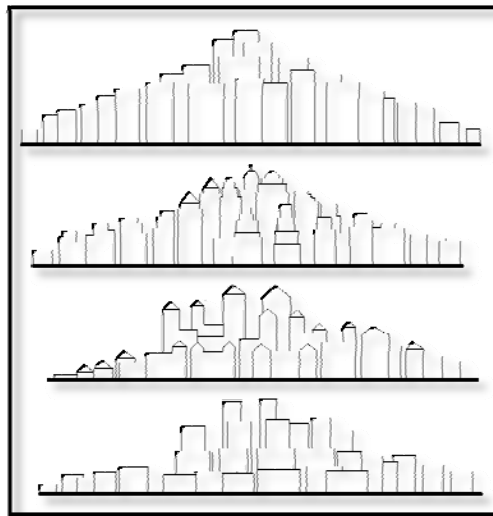
One of this method's characteristics is that if city form preserves in this shape, tall buildings should be built which is in contrast with economic relation of land and building price. Of course, lack of tall buildings in city center has this problem which is compensated somehow because of necessity to preserve valuable works.

**C. Scattered Development of tall Buildings:** in this method, by meeting issues like limits of valuable works, preventing construction and considering problems like natural resources, closing new scenes, lack of harmony with buildings or nearby tissues and etc., pieces of lands were selected for constructing tall buildings in city (Williams Burton, 2000). Therefore, by meeting building regulations regarding distances and harmony of tall buildings, these buildings were built in city. In this method:

Every citizen feels limits of city in everywhere.

Tall buildings did not obscure vision.

Density of tall buildings distributes in city (center for studies and planning, Tehran, 2010).



**Fig. 3 - Effect of High-Rise Buildings in Urban Space**

- **Creating Suitable Urban Spaces:** by locating tall buildings in suitable parts of city, we can use them as urban signs such that all points of city can be distinguishable through these signs.

End of main passages connected to other passage.

In turn of main passages such that building can be seen from street.

In parts of city that paying attention to them is necessary and similar results of constructing tall buildings can have such role.

In addition, by constructing a tall building in a set of buildings with 1/4 height, we can use it as a symbol of main beam that encompasses space. High tower height is equal with plaza and provides encompassing space with 1: 4 ratio of body height to width. Tower acts as beam and increases mean ratio of body height to width.



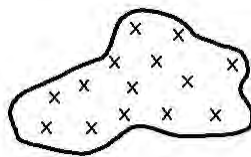
- **Urban access:** one of influential factors on locating tall buildings is access. Establishment in areas with unsuitable access has adverse effect on settlement and tall buildings. In contrast, suitable access for establishing high buildings is suitable; therefore, it is necessary to classify passages of city (Shahabzade, 2011: pp. 5-6).

- **Exploiting Scenes:** urban scenes are elements which should be subjected to view of more citizens because of their scarcity and exceptional value. For example, unique view of land or green valley or river cannot belong only to habitants of one villa. Therefore, by constructing high buildings in such situations, we provide chance of exploiting these scenes for more groups. Searching these regions and determining them for constructing tall buildings (with general land uses) is important part of locating tall buildings. But it should be considered that this should not obscure vision of others.

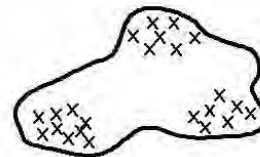
- **Weather:** weather may be suitable in some points because of gardens or suitable air flow or it may be ore polluted because of air statistics or polluting land uses. This should be influential in locating tall buildings and if it is necessary, open and green area should be added to it. City is what is seen; therefore, we should understand characteristic of each place and planned it (ibid: p.6).

- **Current Patterns for constructing tall Buildings in Cities:**

- Scattered in urban tissue level (fig.4);
- Concentrated (spot) in corners of city (fig.5);

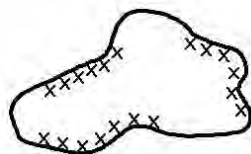


(fig.4)

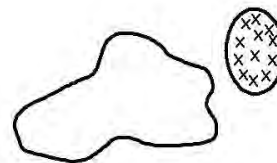


(fig.5)

- Continuous (chain) in some parts of city (linear) (fig. 6);
- Forming zones to establish tall buildings in suburbs; forming small cities around cities (fig.7);

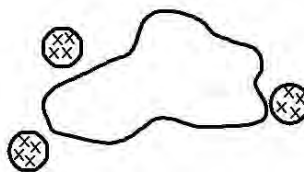


(fig.6)



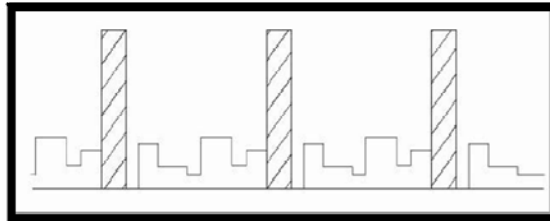
(fig.7)

- Forming tall buildings in urban tissue level (fig. 8).



(fig.8)

- **Model Number (1):** is one of events that have occurred as single buildings during time because of the need to administrative, commercial and residential spaces in large cities (Maclaren Virginia, 1996, p187). In early forming these buildings, there was no retrospection about this type of vertical development in urban tissue, but after sometimes problems caused by this tall buildings in urban space, traffic and other issues caused that urban planners understand that establishing tall buildings singly needs very careful planning (Sawicki & Flynn, 1996: p169).

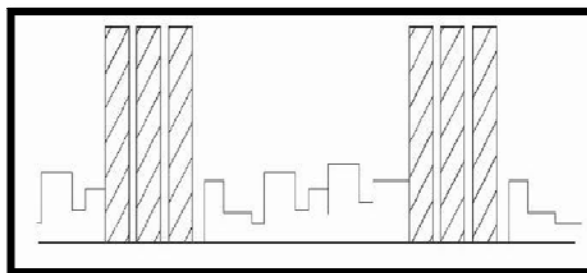


**Fig. 9- dispersed pattern in the urban development**

**Table 1: analyzing scattered pattern of development in urban tissue level**

<b>Weakness</b>	<b>Strengths</b>	<b>Opportunity</b>	<b>Threats</b>
Distorting urban order visually.	Reducing costs related to urban infrastructures and facilities and energy saving.	Using land to meet residential, administrative and commercial needs.	Dispersion and lack of link with traditional parts.

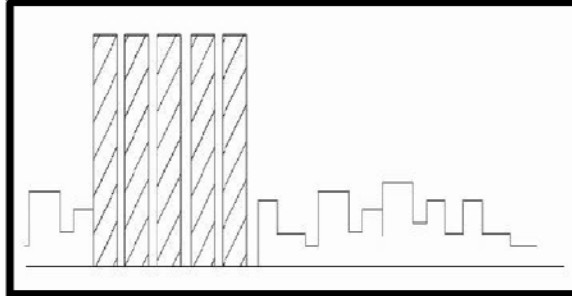
- **Model Number 2:** constructing tall buildings especially in relation with residential use in most large cities of world formed during 50s with high speed. From builders' view this movement can respond many residential, commercial and administrative shortages in these cities and this is the only thing that can satisfy them. On the other hand, it was city that was fragmented and without harmony in this way and old parts was built in inappropriate scales regarding new constructions and entered many issues in urban spaces. Dominance, lack of privacy, wind shadows, closing open horizons in city, traffic and other issues impose themselves to city citizens. This model can be a useful option if it is imposed with suitable solution in building architecture.



**Fig. 10 - Compact Pattern of Development in Around the City**

- **Model Number (3):** this model leads to tall constructions in large cities and forming complexes with mixed land uses in some parts of city. Applied architecture in these buildings created monotony in form and shape of urban spaces and this has distorted face of cities. On the other hand, chained tall buildings obstructed wind canals in cities that this leads to lack of suitable

air conditioning in cities and air pollution. As model number 2 showed this model in combination with architecture solutions is a suitable solution.



**Fig. 11 - Pattern Continuous (linear) Development**

**Table 2 - Analysis Compact Patterns and a Continuous (linear) City Development**

Weakness	Strength	Opportunity	Threats
Change is shape of city and without correct locating it can influence blowing suitable winds.	Accumulating tall buildings in parts of city which creates harmony in a zone.	Establishing tall buildings in bulk form in parts of city which preserves traditional part.	This zone with tall buildings inside city creates non-harmony in urban space and distorts city visually.

- **Model Number (4):** in urban development programs, creating zones for establishing high buildings in suburbs formed zones that have the highest are for tall buildings. These areas were mostly residential with little commercial and administrative facilities. These spaces lack suitable spirit for continued living because they are separated from city body and therefore those who live in these areas left it and these zones were emptied and these programs failed. Using these constructions' experiences, we can use this solution without reducing motivation for living in these areas.

- **Model Number (5):** forming small cities around large cities is one of programs that governments designed to organize unregulated expansion of cities. Tall buildings will impose many problems to surrounding environment and people because of tall height, common spaces and other problems without correct thinking and planning.

**Table 3: Development Model Analysis in Suburbs and City Structure**

Weakness	Strength	Opportunities	Threats
Regarding urbanization, zones around cities expand and city lacks a live spirit and silenced because of historical works.	There is no distortion in city space and city has full harmony.	Constructing tall buildings outside city gives this opportunity to people to have new space with more facilities.	Establishing tall buildings in zones around city extends city to superb and it is a risk for environment and natural environment.



### Conclusion and Suggestions

Historical, semiotics, architecture works and other factors should not be influenced by tall buildings. By locating tall buildings in suitable part of city, it can be used as a symbol of urban spaces. Research findings indicate that constructing tall buildings is one of suitable solutions in creating harmonic structure and optimal spatial organization. Using tall buildings in creating mixed limits is one of suitable solutions in creating protective scopes or limit between practical and residential parts. Besides, spatial diversity will increase. Current trend toward constructing tall buildings is seen in west and south parts of cities. In this case, dispersion of tall buildings is not homogenous and there are distortions in scattering services; therefore, mixed problems and performance intervention increases and the environment become dissatisfactory. Because Hamadan is located in steep foot in East-north-east direction, with mountainous weather and condition of faults it is recommended that future development takes place in north and north-east of country.

Presence of major and documented faults in city warns against ruin caused by reactivity of faults; therefore, using solid and resistant structures against quake is very important in tall buildings. Regarding statistics and studies that have used information like comprehensive plan, geology organization, meteorology and etc. Hamadan has no problem in this regard. Regarding other natural accidents, we should say that Hamadan is in sustained state. Statistics show that number of family members is decreasing and by increasing population, we need more residential units. Dominant activity of city in service sector especially construction, retailing and wholesale and industry. Considering increase in constructing tall buildings in recent years shows tendency toward constructing tall buildings in Hamadan. Therefore, regarding development limitations in Hamadan and increase in constructing tall buildings in this city, suitable solution is creating optimal spatial structure in city and guiding construction of tall buildings toward a rational order with planning.



**Fig. 12 - Prioritize the Different Urban Areas in Terms of tall Building**

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