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Studying the Effect of Accessibility and Vitality on Urban Space Efficiency in Iran
(Case Study: Hamadan City)

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ABSTRACT: This research seeks the role and effect strength of accessibility and vitality on urban spaces. Urban space is a phenomenon organized by information manifested in various forms, functions and meaning. It is the context of forming and improving social life, representing culture and urbanization of a culture. According to desirable cities, it is deliberated that the cause of this magnificence is their lively and vibrant urban spaces. Regarding this point, weak social interaction of people and lack of optional and social activities in cities of Iran is clearly observed. This issue will remove urbanity attributes of Iranian urban spaces. The research studies two important factors in urban spaces, based on literature review: accessibility and vitality; using library and field study of Hamadan city to find the rate of their effect on urban spaces of Iran. Correlation analysis and questionnaire were used to codify analytic model. The main hypothesis of the research is the weakness of urban spaces in Iranian cities due to poor access and lack of vitality in these spaces, that is acquired by investigating aspects related to access and vitality. The results showed a positive correlation between urban spaces and these two factors, which control 44 percent of urban spaces efficiency as a common courtyard.

Keywords: *Accessibility, Proximity, Social Activities, Urban Spaces, Vitality.*

INTRODUCTION

When it comes to talk about the town, in fact we are speaking on the place that provides economic, cultural, and social interaction for its citizens; this place is generally called urban space. Considering magnificent cities of the world, it is considered that the cause of this glory is their dynamic and vivacious urban spaces that resulted in active cooperation of inhabitants in urban area (Yazdanfar, 2013). Regarding this fact, weak social interaction and absence of people in cities of Iran is clearly observed. This issue will remove urban spaces and replace it with private houses and fields. The second and the third category of urban activities are "selective and social activities" which will be done in good condition and desired status of individuals is necessary to create. Walking in the outdoors, stopping at recreation places, sitting and relax in an attractive and interesting places have created the choice of activities. Physical spaces in the following special conditions, are overshadowed in terms of standing, sitting and playing (Shoaie et al., 2013).

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Lang (1987), in his book "Creation of Architecture Theory", says, "Environment induces some special behavior of citizens". Therefore, it is presumed that one of the factors causing weakness in Iranian city spaces is inappropriate access to these spaces, unattractiveness of these spaces to citizens, or lack of vitality. Public spaces may provide a variety of accessible opportunities for people and become a means of enhancing the quality of living in the urban environment (Goodmann, 1968). Lynch (1984) defines characteristics of an appropriate city, including vitality and accessibility. This research aims to measure quantitative and variables acquired from viewpoints of experts and reviewing literature, to investigate accuracy of the hypothesis on the effect of poor access and lack of vitality on weakening urban spaces in Iran. Hamadan city was selected as a case study, since it is one of the historical cities and a symbol of the innovative thinking city in Iran; spatial system which is disrupted and changed early this century, which influence variables of our research (Lynch, 1984).

First Hypothesis: Accessibility and vitality have significant and meaningful effect on Urban Space efficiency.

Second Hypothesis: Dispersion, Proximity, and Ways and means of accessibility affect Accessibility to various activities in a public space.
Third Hypothesis: Vitality criteria are affected by comfortable space from viewpoint of users, physical diversity, applicability and activity, hosting many people and proximity to retails, and optional and social activities in wide range of time.

MATERIALS AND METHODS

The following steps were followed during research: initial question, exploratory studies, research question, analytic modeling, analyzing data and conclusion (Kiwi & Lokawan, 2007). Correlation analysis and questionnaire were used to codify analytic model. The main hypothesis of the research is that weakness of urban spaces in Iranian cities is due to poor access and lack of vitality in these spaces, that is acquired by investigating aspects related to access and vitality. As, the study is an applied research, it adopted a field investigation (survey), design to collect the data. To this end, a questionnaire was developed and completed in the target population. The survey was conducted in spring 2013. The following formula was used to calculate the sample size: (Formula1)

Formula 1: $\{ n \geq (z^2 \sigma^2)/d^2 \ .\} \quad \rightarrow \quad n \geq 1/d^2$
$z = 1.96$

Where "d" is the acceptable error, "n" is the number of subjects for unlimited populations and "σ^2" is the variance of the respective attribute (Dickey & Watts, 1978:67). Considering "d" values and the reliability of the sample, the corresponding values of "n" were calculated. Considering "d" as equal to 0.06, the sample size was calculated to be n=330. The reliability of this sampling was computed to be 94.5%. The participants were selected using random sampling. A desirable sampling technique is one that only affected by unbiased random factors with equal chance for every individual in the population to be included in the sample without considering any advantage in selecting the participants (Mueller et al., 1977,405).
Inferential statistics were used to analyze the data. In this regard, the data was tabulated in frequency tables, figures were drawn and statistical parameters were examined. Factor analysis, Cronbach's alpha formula, Pearson correlation coefficient and multiple regressions were run to analyze the data. The statistical analysis was done using SPSS software.

Statistical Analysis and Demographic Characteristics of Under Study Space

The research method is deductive-inductive and applicable type. From an aim standpoint the method is applied which lead us to knowledge. Standard questioner gathered the information. Reliability and viability was controlled by appropriate test. In total 96 people, of whom 51% were males and 49% were females, were questioned the most frequency related to their age were 20 to 30 years which are 40% (Table 1).

Case Study Characteristics

Karl Frisch, German urban engineer, which lead to destruction of urban fabric, drew the map of Hamadan in 1927. He proposed the idea of building an extended square in downtown, known as Imam Khomeini Square (formerly Pahlavi Square).

Table 1: Demographic characteristics of statistic sample in Hamadan

Characteristics of research sample		percent	Amount
Gender	Female	47	48.9
	Male	49	51.1
Age	18-10	9	9.37
	19-25	32	33.33
	26-40	29	30.20
	41-65	26	27.08
Occupation	Jobless	5	5.20
	Free	28	29.16
	State work	14	14.58
	Housewife	18	18.75
	Retired	3	3.12
	Student	28	29.16
Education	Illiterate	1	1.04
	Primary school	7	7.29
	Guidance school	7	7.29
	Diploma	40	41.66
	University	41	42.70
Owning private car	Yes	49	51.04
	No	47	48.95

Unfortunately, in this idea, destruction of valuable textures and buildings and streets and confliction of organic order of city were not considered. The plan disturbed texture of bazaar and Grand Mosque of the city that were regarded as the social and religious centers, and lead them to margin and cut-off their relation with other fabrics of the city. Some parts of bazaar were destroyed and shopkeepers of these places were transferred to other parts and bazaar lost its former coherence. One of the main disadvantages of these streets was that building Ecbatana Street split Ancient hill of Hegmataneh and caused irreparable losses to this old fabric. In 1952, the first map was prepared after drawing streets. In this plan, it is observed that only the main square and streets are prepared and there is no sign of ring ways. In 1956, square was formed and streets were drawn directly. After these years, by passing of time, streets were extended and city was developed in margins and towns were structured and connected to city (Marjan Consultant Engineers, 1966).

It's worth to note that by development of city, preparing its comprehensive and detailed plan was started in 1966, and performed since 1973. It can be regarded as an activity that has significant effect on city landscape. The effects of these plans were not less than plan of Karl Frisch (Mouzhdar Advisory Engineers, 1984). The plan of Karl Frisch makes centralization of urban space in downtown of Hamadan, which has many effects on using urban space of the city. In this research, selecting 48 central quarters of Hamadan and using questionnaire, the aim is to study effective factors on urban spaces of Iran.

Importance and Role of Public Space

Before defining the concept of urban space, first we shall clarify the meaning of the term "space", since urban space is a space and a part of human peripheral space. The concept of space itself is not obvious. The concept is much more than simple explanation of physical or natural space that is discussed implicitly; it refers to 3-dimensions of the word, i.e., frequencies, separations and distances between people and objects (Fokouhi, 2004). From anthropological point of view, understanding space is conceptualized in different organizations, which differ based on culture and subcultures. From anthropological view, the main question about space is understanding mechanisms used in specified spaces to live and continue living in the environment, human life in space, and continuing relation with interactions (Gratz & Mintz, 1996).

Urban space, as a subset of the concept of space, is not excluded from category of space. That is, social and physical aspects of city have dynamic relation with each other. In fact, urban space consists of social and physical spaces (Madanipour, 2000). The concept of space and urban space is formed during social thinking history and in the form of classical and modern theoretical schools. For instance, from view point of Aristotle, space is a collection of places and a dynamic context with different qualitative aspects. These aspects and that context, adjusts space with action authenticity and systematize it (Nordberg Shultz, 1975). An urban space can be studied based on different environmental, geographical, and architectural approaches. Urban spaces considered as a scene in which general activities of people occur. Streets, squares and parks of a city form human activities. These dynamic spaces in contrast with static and inactive spaces such as workplace and living places constitute the main and vital elements of a city, and supplies motion networks, contact centers, and public spaces for recreation (Lynch, 2002). The concept of urban spaces is defined in the form of human-social objectives and in compliance with the human objectives and social activities. Urban spaces, including streets, squares, etc. are means to strengthen group work spirit, face-to-face interactions, closed, organism and identified space.

Main function of city is hidden in group activities and frequency of public areas of the city, a context for displaying social life of various people and social groups. Urban space is a common context in which people do functional activities and ceremonies that relates members of the society, a scene in which group life of people is displayed. Urban space is a space, which we share with strangers, the people who are not our relatives, friends and coworkers; a space for politics, religion, business and sport; a space for peaceful coexistence and impersonal encounters, in general urban spaces can be regarded as public realm (Salehi, 2008). Urban space is nothing but daily life of citizens that is understood every day, consciously and unconsciously, during way from home to work (Pakzad, 1997).

Much of the urban design and planning literature stresses on the importance of public space (Glazer & Lilla, 1987; Vernez Moudon, 1992; Sorkin, 1992; Tibbalds, 1992; Worpole, 1992). Additionally, Rogers most recently argues that great cities are known for their great public spaces and one measure of any city's greatness is its ability to provide recreation, natural beauty, and signature open spaces for its citizens (Rogers, 2003).Moreover, open spaces help to build people's confidence or increase cohesion (Braza, 2003). Public spaces in the developing countries turn into left over spaces because of the rapid growth (Harnik, 2003). However, necessity of investigating and studying urban space problems of these countries has attracted researchers more than ever.

Modeling Accessibility

There are several methods developed to measure accessibility. It spans from simple proximity measures to mathematically and theoretically complex ways (Koenig, 1980; Handy & Niemeier, 1997; Talen, 1998).

Simple Proximity Measures

There are several simple and intuitive ways to calculate proximity to target points. These include 'minimizing travel cost method', 'covering objectives method', and 'minimum distance method' (Talen, 1998; 2003). Minimizing travel cost method calculates the average distance from the origin to

desired destinations. Covering objectives method counts the number of desired destinations in a certain limit of distance from the origin. Minimum distance method measures the distance from the origin to the nearest destination. While it seems that all of these measures provide reasonable measures about proximity, they capture different aspects of reality. Talen (1998) compares the maps derived from various measures. The results show that the accessibility pattern changes substantially according to which measure was used.

Utility-Based Model and Activity Based Model

The second group is based on random utility theory (Koenig, 1980; Handy & Niemeier, 1997; Dong et al., 2006). Here the probability of a choice by an individual changes, according to the relative utility of the choice, among all choices. This model can illustrate the changes of accessibility according to different personal and policy choices with monetary values. Handy and Niemeier (1997) use this model to analyze work trips in King County, Washington. They provide, in a summary table, the amounts of money to compensate different elimination scenarios, which vary in destinations, modes of transportation, and target income groups. Activity based model, which is covered in the previous discussion, is an extension of utility-based measure incorporating the impact of trip chaining (Dong et al., 2006).

Main Variables Affecting the Accessibility of Public Spaces

Spaces accessibility is defined as ‘‘the freedom or ability of people to achieve their basic needs in order to sustain their quality of life (Lau & Chiu, 2003). Bertolini states that an accessible public space is thus one to which many different people can come, but also one where many different people can do many different things: it is an accessible node, but also an accessible place (Bertolini, 1999; Bertolini & Djist, 2003). According to Talen, accessibility to all forms of public space can be measured and used as an indication of the degree of public space dispersion. Dispersed spaces are more preferable than concentrated spaces. Talen (2000) distances between residents and public spaces, when interrelated with the theory of maximizing access to public spaces and minimizing walking distance, is the proposition that public spaces should be well integrated within the residential fabric. In due course, location and design of public space can play a significant role in bringing people together (Calthorpe, 1993). Levinson (1998) suggested that the product of two measures, a temporal element (the travel time between two points) and a spatial element shape accessibility, reflecting the distribution of the activities under question. Gratz and Mintz (1996) argue that a public space will be empty of people most of the time if a user population does not live nearby. In the course of this, access to a public space depends on travel time and/or proximity (Erkip, 1997). According to Whyte (2000), the accessibility of a public space can be judged by its connections to its surroundings, both visual and physical. A successful public space is easy to get to and get through; it is visible both from a distance and from upclose. For instance, local streets are preferable to major arterials, and the presence of sidewalks is seen as a way to encourage links between private and public spaces (Talen, 2000). Apart from these, the availability of public transport or having private cars is also considered as enhancing the accessibility of public spaces (Lau & Chiu, 2003). On the other hand, ‘‘a public space is accessible to everyone regardless of residence, physical abilities or financial resources. It should be sited in such a way that every resident is equitably served. Moreover, accessibility should not be based on an idealized healthy adult but rather on a senior with a cane, a mother pushing a stroller or an eight-year-old riding a bicycle’’ (Harnik, 2003). Based on the above-mentioned discussions, and their relation with objectives of the research, 3 variables of dispersion, proximity, and accessibility ways are determined as means used in this research to study accessibility to urban spaces (Table 2).

Livable Public Spaces

Vitality and viability are considered as characteristic of big and small successful downtowns (Cowan, 2005). Lynch describes

Table 2: Effective factors on accessibility to urban spaces, (Sourc: Pasaogullari & Doratli, 2004)

Variable	Measuring element	Measuring method
Dispersion	Areas allocated to public spaces and space between public spaces and houses	Questionnaire (acquiring travel time)
Proximity	Proximity	Questionnaire (determining whether urban space is observable from living place
Ways and means of accessibility to urban spaces	Types of street sidewalk; Public transportation and private cars	Determining type of street and their way of accessibility; Determining sufficiency of sidewalks and public transportation; Determining value of private car owning and their effect on accessibility

vitality based on human-oriented criteria: "to what extent the form of city supports vital functions, biological needs and human abilities and how it makes survival possible" (Lynch, 1984). In his classification, Lynch considers mainly biological and ecological criteria and considers vitality only with this approach; he ignores social and cultural factors that are as significant as ecological one. Therefore, to achieve a vital and dynamic environment, the issue can be regarded from more extended view to offer more complete classification (Khastou & Rezvani, 2010). Paumier (2007) describes effective factors on vitality of a successful and live public center as follow: "a successful public space should host many people, besides, be near retail centers and attract and activate people" (Paumier, 2007). Jacobs, describes four main conditions in creating diversity in streets and urban spaces and vitality of the city:

The area has more than two main functions;

Blocks usually be small;

The area should be a combination of buildings with various ages and conditions;

•There should be sufficient compact density of people, ignoring the cause of their presence (Jacobs, 1961).

In first condition, he talks about diversity of application, in second and third ones about physical diversity, and in forth condition about diversity in activity; in fact, he believes diversity makes vitality (Khastou & Rezvani, 2010). However, another important factor effecting vitality of city is diversity in application and activity, and physical diversity. Gehl (1996) believes that vital spaces are places in which "optional" and "social" activities occur in extended range of time. Other researches indicate that traffic mitigation (Bonanomi, 1990), and reducing street noise pollution (Amphoux, 1998), are factors that play significant role on vitality of streets and revitalization of urban space. Table3 lists criteria that can be used to measure vitality of used space.

After assessment of urban spaces by approach of accessibility and vitality, we have achieved to a theoretical framework just like Fig. 1.

Table 3: Investigating characteristics of vitality and their measurement from view point of theorists

Theorist	Criteria of vitality	Measuring method
Kevin lynch	Ecological and biological characteristics of urban spaces	Questionnaire (measuring comfortable space from viewpoint of users)
Jacobs	Diversity in application, physical and activity in urban space	Questionnaire (measuring types of activities)
Paumier	Hosting many people; proximity to retail centers in a way to attract and activate people	Questionnaire (studying various members using these spaces)
Gehl	Optional and social activities in extended range of time	Studying diversity and nature of behavior of users (questionnaire) Recording time table of users from the space (questionnaire)

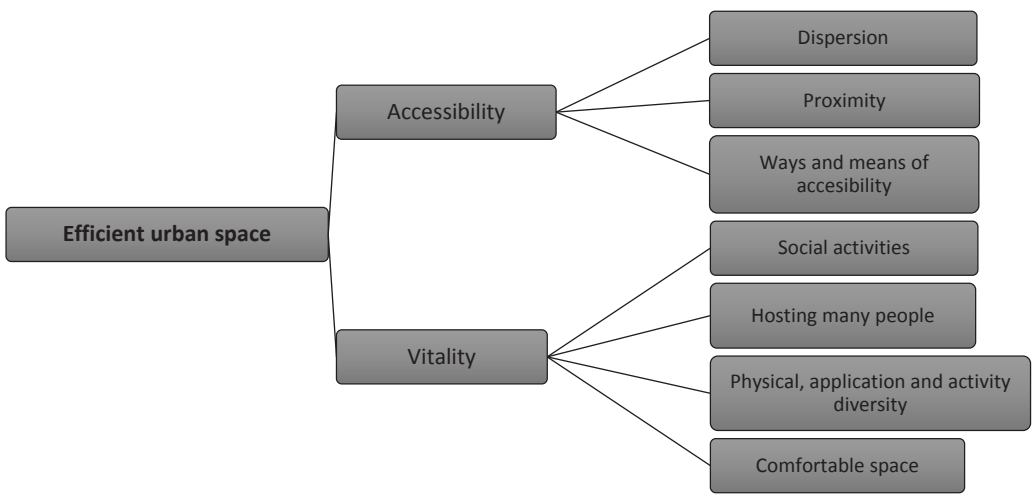

Fig. 1: Effective factors on urban spaces based on accessibility and vitality approaches

RESULTS AND DISCUSSION

The correlation test used for testing this assumption and rate of correlate for every component with depend variable compute, at the follow the results of correlations are represent. The findings show that the rate of correlation between accessibility and disperse is equal to 0.442.The findings show that the rate of correlation between accessibility and proximity is equal to 0.568.The findings show that the rate of correlation between accessibility and ways and means of access to urban spaces is equal to 0.736. Based on Friedman test, ranking the variable related to accessibility are represented in the Fig. 2 (Table 4). There is a direct significant relationship between accessibility and dispersion, proximity and ways and means of accessibility ($p<0.01$).

The correlation test used for testing secondary hypothesis assumption and rate of correlate for every component with depend variable compute, at the follow the results of correlations are represent. The findings show that the rate of correlation between Vitality and comfortable space is equal to 0.442. Based on correlation coefficient, the relation between physical diversity, application, activity and vitality is approved. The rate of correlation between hosting many people and proximity to retails and vitality is 0.39 and in meaningful level of 0.99 ($p<0.01$). The rate of correlation between optional and social activities in wide range of time and vitality is 0.69 and in meaningful level of 0.99 ($p<0.01$). Based on Friedman test, ranking the variable related to measuring vitality are represented in the Fig. 3 (Table 5).There is a direct significant relationship between vitality and comfortable space, hosting many people, optional and social activities in wide range of time.

Based on analysis, it was considered that in part of access to urban spaces, all variables of the study have meaningful relation with accessibility. It was also considered that proximity to urban spaces is weak in Iranian cities. After the factor of proximity, the main weakness in accessibility was about ways and means of accessibility; dispersion has better condition

Table 4: Analysis of statistic tests of accessibility

	Factors	disperse	proximity	ways and means of access to urban spaces
Accessibility	Pierson correlation coefficient	.442**	.568**	.736**
	Sig.	.000	.000	.000
	research sample	100	100	100
**. Correlation is significant at the 0.01 level				

Table 5: Analysis of statistic tests about vitality

	Factors	Comfort space from viewpoint of users	Physical diversity	Hosting many people	Social activities
Vitality	Pierson correlation coefficient	0.442**	0.568**	0.336**	0.698**
	Sig.	.000	.000	.000	.000
	research sample	100	100	100	100
**. Correlation is significant at the 0.01 level					

Table 6: Results of multivariate regression between the measured factors of efficient urban space

Factors	Non-standard coefficients		Standardized coefficients	Significant level
	B	Std. Error	Beta	
Accessibility	.000	0.027	0.187	0.194
Vitality	.000	0.028	0.247	0.219
r = 0/931 , r^2=0/866 , sing = 0/000 Dependent variable: Efficient urban space				

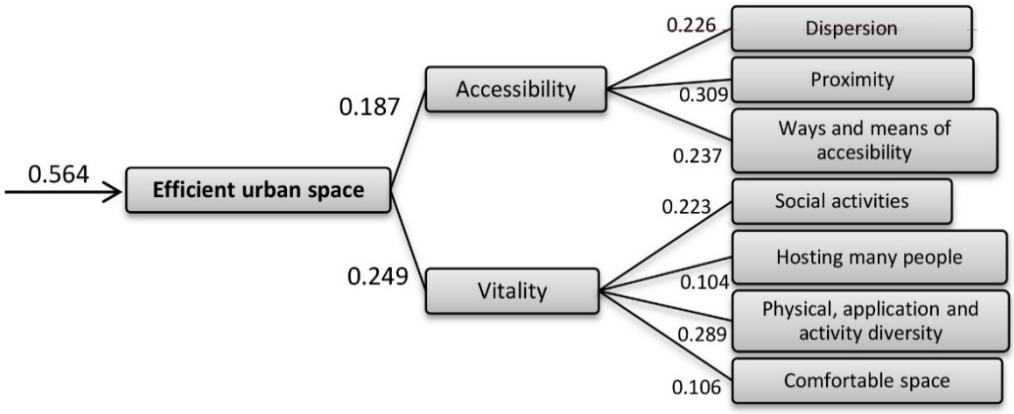

Fig. 2: Beta coefficients obtained from the multiple regression variables

compared to two other factors.

After studying variable of vitality collected based on the ideas of experts, it was considered that the weakest criterion of vitality is weak hosting of many people and lack of proximity to retails based on Paumier's model. Then, uncomfortable space from viewpoint of users based on Lynch model is determined as vitality reduction factor with average score of 1.95. The other variable influencing weakening urban space is weak social activities with average score of 2.41. The variable of physical diversity, diversity of application and vitality based on Jean Jacob's model was in better condition than the other variables in Iran urban space. Results have proved important role of vitality and accessibility on urban spaces efficiency. Based on regression analysis, they have significant effect on urban spaces efficiency with about 44% of share amount.

CONCLUSION

The social value of urban public spaces makes them significant within the cities, since they are involved with people needs, from the very basic to the complex. As such, public spaces affect people's quality of life. They have to afford people various activities; otherwise, parts of the society will be pushed out of the public realm, which results in serious limitations for the daily lives of people. Attention to social value has been increased in the recent urban design theories owing to the negative effects of the visual-artistic trends in the urban design and due to focus on the requirements of cars rather than pedestrian needs. In this context, reviewing various approaches and aspects in urban public space was found important to reveal the interrelationship between the physical environment and the social environment. The key issues concerning vitality in a place are the presence of people at different times and the compatibility of diverse activities. Vitality relates to various dimensions of a public space including both physical and social aspects. Streets, which are reduced to "traffic channels" in modernist city planning, have the potential to be transformed into vibrant and vital public spaces by hosting various activities and events.

As it was mentioned, this article has studied cause of weakness about accessibility and vitality in urban spaces and their failure in Iranian cities relying on reviewing and measuring two qualitative elements affecting these spaces. Based on literature and studying thoughts of experts in this area, sub-variables of these factors were acquired. Results of the analysis show that non-proximity of urban spaces to residential environment cause unwillingness of citizens to these spaces, and inappropriate infrastructure in ways and means of accessibility intensifies these problems. Therefore, inappropriate positioning of urban spaces in city plans of Iran weakens accessibility to them and results in non-functionality of these spaces. The main factor of weakening vitality of urban spaces is lack of hosting all social members by urban spaces, the cause of which is rooted in cultural and social structures of cities in Iran. The other factor of reducing vitality of these spaces is uncomfortable spaces, which are resulted from weakness in designing and saving these places by responsible organizations. This report can be considered as an important approach in management of urban spaces positioning in city plans of Iran and other similar Middle East countries.

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