



Analysis of Constrains Facing Urban Agriculture Development in Tehran, Iran

Soraya Pourjavid ¹, Hassan Sadighi ^{2*} and Hossein Shabanali Fami ³

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Abstract

The purpose of the study was to identify the constrains affecting urban agriculture in Tehran, Iran. The statistical population of this study consisted of city dwellers within the 22 municipal districts of Tehran out of which 320 individuals were selected as the sample of the study. Cochran's formula was used to determine the sampling size based on stratified sampling method. A panel of experts confirmed the validity of the questionnaire used in this study. The calculated Cronbach's alpha for the main sections of the questionnaire was 0.95 and 0.93. Results of the ranking of constrains and challenges revealed that "high start-up costs" and "lack of knowledge among managers and authorities" were among the most important constrains. The results of factor analysis revealed that 7 factors including "education-research", "infrastructure", "support", "regulations and policy making", "technical", "financial-economic" and "cultural" explained 67.36 of the variance. Although list of constrains revealed is not perfect, this work paves the way for further research regarding factors influencing urban agriculture. It also provides interesting information for planners about the challenges of urban agriculture development.

Keywords:

Urban agriculture, Constrains, Development, Tehran

¹ M.Sc Graduate, Department of Agricultural Extension and Education, University of Tarbiat Modares, Iran.

² Associate Professor, Department of Agricultural Extension and Education, University of Tarbiat Modares, Iran.

³ Associate Professor, Department of Agricultural Management and Development, University of Tehran, Iran.

* Corresponding author's email: sadigh_h@modares.ac.ir

INTRODUCTION

Based on UN projections, world population is expected to increase 35% to a total of 7.7 billion in 2020 (UN, 1996); whereas 98% of this increase is expected to occur in developing countries, and mainly in the cities (UN, 1995). Although, urbanization is mostly driven by economic growth and migration from rural areas, but its expansion leads to controversial challenges which in turn, may lead to food insecurity, poverty, and exclusion of certain social groups from urban social services (FAO, 2010, 2007). There are various demographic, social, and economic issues that are associated with the contemporary urbanization (Gharekhloo and Abedini, 2009). For example, population growth and over exploitation of resources will exacerbate food insecurity, especially for low-income city residents and the poor (Koc *et al.*, 1999; Garnett, 1996). The rise of population densities not only changes the urban nature and its functions, but makes urban management a complex issue as well. Consequently, urbanization poses various implications for decision makers particularly with regard to the relationship between states and people (James, 1991).

As a response to such concerns, urban agriculture advocates have praised its potential contribution to food security and poverty reduction (FAO, 2010; Dubbeling and Santandreu, 2003). Clarifying the connections among cities, agriculture and food, Armar-Klemesu (2001) asserted that urban agriculture contributes to the food security of many major cities, both as an important component of the urban food system and as a means for vulnerable groups to minimize their food-insecurity problems. Zezza and Tasciotti (2010) have found positive statistical association between engagement in urban agriculture and dietary adequacy indicators. They have concluded that participation in urban agriculture impacts dietary diversity and calorie intake in cities.

The concept of urban agriculture can therefore, be described as 'an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolitan areas which grows and raises, processes and distributes a diversity of food and non-food products (Mougeot, 2001). In accordance with its nature, urban agriculture

takes many forms and can be done at different scales. According to Brown and Carter (2003) urban agriculture can be classified into four categories: (a) public gardens, (b) small scale production activities, (c) large scale production activities such as community supported agriculture, urban farms and urban gardens (d) farming on impervious surfaces and poor soils such as vertical horticulture, mushrooms, aquaculture, etc.

Apart from its contributions to food security and poverty reduction, urban agriculture should be more valued due to its contributions to the vitality of urban communities and their residents. Urban agriculture can become an important income supplement for urban families and can serve as an integral component of urban economic and ecological systems (Dubbeling and Santandreu, 2003). There is a wealth of literature that describes the social roles of urban agriculture, its economic functions and its potentials to sustainable livelihoods in urban areas along with its environmental benefits. According to these studies, urban agriculture has the potential to strengthen local economies (Masi, 2008), boost environmental conditions (Doron, 2005), and promote a sense of community (Flores, 2006; Patel, 1991). Urban agriculture is also praised by scholars and advocates for fostering community building, social cohesion, human well-being, and cultural expression. In his study, Iles (2005) emphasized the contribution of community gardens and city farms to encouragement of social participation. Similarly, Ferris *et al.*, (2001) pointed out that urban agriculture can contribute to the social dimension of sustainability.

With respect to developing countries, Smit *et al.*, (1996) observed that urban agriculture improves social equity by boosting the health, productivity, and income of poorer populations. Other studies have highlighted the positive influence of urban farming on city residents' health as another way cities may profit financially from the activity (Dixon *et al.*, 2007; Brown and Jameton, 2000). By reconciling people and sustainability, community gardens have the potential to promote environmental justice especially in marginalized and poor areas. Holland (2004) maintained that such gardens serve as a dynamic participative model of practical sustainability

which improves social interactions, environmental conservation and organic food production. With the few environmental risks posed by urban agriculture, farming in cities provides a unique opportunity to reintegrate nature into the urban environment. Among the benefits attributed to urban agriculture, however, economic values such as income supplementation, skill transference, and job creation are further emphasized (Dixon *et al.*, 2007; Petts, 2005). Mougeot (2005) has highlighted the contribution that urban agriculture makes to urban employment, income, and food expense savings. Beside job creation, production and delivery of services will bridge the gap between marketing and selling food products and thereby may lead to urban sustainability (Howe and Wheeler, 1999).

While urban agriculture might create possibilities to foster urban development, concern over negative impacts associated with the introduction of agriculture to urban settings are increasing. Soil and water contamination, air pollution, and the resulting health risks can be major obstacles to urban agriculture (Brown and Jameton, 2000; Koc *et al.*, 1999; Garnett, 1996). Kutiwa *et al.*, (2010) maintained that urban agriculture can serve as a significant source of fresh produce particularly in low income households but shortage of agricultural resources, serious environmental health risks and policy gaps remain paramount obstacles to realizing the full potential of urban agricultural development. However, there are several methods to overcome these challenges (Brown and Jameton, 2000; Smit *et al.*, 1996). Developing and promoting a more reasonable application of chemicals and the adoption of environmentally friendly farming techniques are paths that should be explored to help urban agriculture become more sustainable (Vagneron, 2007).

Additionally, Brown and Carter (2003) have enumerated the economic challenges of urban agriculture, including the start-up costs and the difficulty farmers in cities may face in marketing their produce due to the monopolies held by wholesale distributors. Brown and Jameton (2000) explained that urban growers require assistance such as subsidies, grants, loans, and crop insurance so their businesses can survive agri-

culture's hazards of market slumps and climate disasters. In addition to marketing challenges, land use issues can limit the development of urban agriculture. Lynch *et al.*, (2001) have analyzed the constrains facing urban agriculture in Kanu, Nigeria. They have pointed out that urban agriculture is threatened by tenure insecurity and encroaching land development, development of constructions, and illegal use of land. As Maxwell (1995) pointed out access to land remains the most important constraint facing poor woman who take advantage of farming activities as a long-run strategy to produce food and generate income. In a study carried out in Zambia, Hampwaye *et al.*, (2007) found that in spite of the growing significance of urban agriculture, official policy remains vague and it has not been adequately supported or catered for in urban planning. Local government bodies, however, can play a key role to create an "enabling environment" in which urban agriculture is encouraged and supported (Lynch *et al.*, 2001). Efficient use of resources, application of domestic materials, integration of nature i.e. water and fauna to refresh air and create brilliant landscapes which influences on cities' sustainability. However, today, with the dominance of the classic model of development, the situation in cities is far away from the desirable sustainability.

Despite progress in cities, the extent of the role of urban agriculture in urban sustainability is not fully understood or defined. Without a careful analysis of existing opportunities and risks, policy makers will miss an important opportunity to better integrate agricultural activities into local municipal development, and ensure that it helps to achieve social, economic and environmental sustainability (FAO, 2010). Therefore, a more explicit understanding of advantages, constrains and challenges facing urban agriculture is needed. This would help policymakers promote and manage urban agriculture through policies and incentives that meet public needs. Non-governmental organizations (NGOs), research centers, and private corporations should also support initiatives in these areas (Dubbeling and Santandreu, 2003). Therefore, to provide planners with a sound basis for decision making, this study was conducted to address constrains facing

agricultural activities in urban areas. The main purpose of this study was to identify constrains that might influence the fate of the urban agriculture in Tehran, Iran. The secondary purpose of the study was to profile the socio-economic status of the city dwellers, and determine their level of agricultural know-how.

MATERIALS AND METHODS

This was a survey research that was carried out via a field study. An extensive literature review was done prior to the study and a list of important constrains was identified (37 constrains). These constrains were used in preparing the questionnaire for the target respondents of this study. A panel of experts in the field of agricultural extension and education was formed to evaluate the content validity of the questionnaire. The constrains were rated by the respondents on a five point Likert scale from 1 to 5, with one representing very low and five representing very high. A pilot study was conducted to check the relevance of questions in the context of local conditions and their level of understanding. The pilot-test results were considered and necessary revision was made on the questionnaire. To assess the reliability of the questionnaire, a Cronbach's alpha coefficient was calculated for the questionnaire. This coefficient for the main sections of the questionnaire was acceptable (0.95 and 0.93). A stratified sampling technique was used to draw a sample of 320 city dwellers from 22 municipal districts of Tehran, the capital city of Iran (N=6758845). Respondents from different groups (18 years old and above) were informed about study's objective and answering procedure. The SPSS (Version 16) was used to

code and analyze the survey data. The respondents' opinion generated a clear criterion for prioritizing constrains that were judged to be important in the future development of urban agriculture.

Characteristics of respondents

The mean age of the respondents was about 37 years and their age classes ranged from 19 to 75. Respondents were nearly evenly distributed between males and females (52.2% male and 47.7% female). Most of the respondents were married (73.1%). Generally, a large proportion of them had finished high school (33.8%) and only 2.2% of the respondents were considered illiterate. The majority of the respondents (50.6%) worked for a private sector while 1.2% of the respondents were doctors or faculty members. Over 40% of the residents of Tehran have moderate interest in agriculture. More than 25% of the respondents have had experience in agriculture.

Agricultural know-how

The results of the study (Table 1) revealed that city dwellers of Tehran were more familiar with agricultural practices such as "irrigation", "tree plantation", and "growing indoor flowers and plants". Meanwhile, respondents expressed poor knowledge about "accounting and managing financial records".

Prioritizing constrains facing urban agriculture development

Constrains listed in Table 2 have been prioritized by the respondents. Overall, "high start-up costs" and "lack of knowledge among urban managers and authorities" were given the highest rankings by the respondents. "Water-related is-

Table 1: Agricultural know-how

Agricultural practice	Mean	SD	Priority
Irrigation practices	2.39	1.40	1
Tree plantation	2.24	1.44	2
Growing indoor flowers and plants	2.16	1.27	3
Adding fertilizers to plants	2.10	1.43	4
Pruning trees	2.00	1.45	5
Processing agricultural products	1.98	1.44	6
Vegetable gardening	1.97	1.32	7
Management of pests, diseases and weeds in garden	1.84	1.45	8
Packaging of agricultural and food products	1.71	1.34	9
Marketing and selling agricultural products	1.41	1.44	10
Accounting and examining financial records	1.34	1.39	11

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sues” ranked as the most important constraint after “lack of financial support”. Constrains like “Devastation and insecure yield due to theft” and “weak effects of mass media to raise public awareness of urban agriculture” were among the lowest priorities facing urban agriculture development (Table 2).

Factor analysis of constrains facing urban agriculture development as perceived by the respondents.

Factor analysis summarized the original 37 constrains in seven factors which accounted for 67.36% of total variance. Only factors with eigenvalues greater than 1 were considered. KMO (0.897) and Bartlett’s (4145.8184) measures revealed that the data were appropriate for statistical factor analysis. Factors were rotated

using VARIMAX rotation. Factor loading of 0.50 was used to determine which statements should be included in a given factor. Consequently, 7 seven constrains were excluded at this stage.

Interpretation of the results in table 3 suggests that the most important constrain facing urban agriculture in Tehran is related to education-research constrains explaining 11.67% of the variability. The second factor is almost as important as the first factor explaining 11.14% of the variance representing constrains involving infrastructure constrain. ‘Support’ characterizes the third factor explaining 9.88% of the variances. The fourth factor, however, involves regulations and policy making issues explaining 9.67% of the variance. Technical issues form the fifth factor explaining 9.40% of the variance. The sixth

Table 2: Prioritizing constrains facing urban agriculture

Statement/Constraint	Mean	SD	Priority
High start-up costs	3.479	1.19	1
Lack of knowledge among urban managers and authorities	3.433	1.26	2
Lack of government-funded financial support and credits	3.423	1.24	3
Weakness in the management of free of charge water resources	3.420	1.25	4
Lack of laws and regulations in municipality in the area of issuing urbanization certificates	3.408	1.10	5
Water scarcity	3.377	1.25	6
Lack of public awareness	3.339	1.21	7
Not considering urban agriculture as a production-economic system	3.328	1.24	8
Lack of adequate knowledge and skills among city dwellers	3.289	1.17	9
Economic problems due to lack of capital	3.269	1.25	10
Having no time to spend on urban agriculture	3.258	1.21	11
No access to equipments and tools necessary for agriculture	3.219	1.15	12
Weakness of planning prior to construction of buildings harmonized with urban agriculture	3.215	1.26	13
Vagueness of objectives and strategies in organizations to develop urban agriculture	3.221	1.23	14
No guarantee for the sale of produce grown in urban agriculture	3.208	1.19	15
Lack of a sector responsible for urban agriculture in the municipality	3.202	1.26	16
Lack of standard structures in buildings to implement urban agriculture projects	3.198	1.21	17
Contaminated city soils	3.187	1.22	18
No separation between drink water and untreated water	3.182	1.29	19
Scarcity of arable land in and around cities	3.175	1.30	20
Considering urban agriculture as a cheap activity	3.167	1.20	21
Inadequate research efforts to identify appropriate plant species for cities	3.154	1.22	22
Weakness in designing proper irrigation systems	3.139	1.25	23
Lack of motivation among city dwellers	3.139	1.20	24
Inadequate research efforts to recognize proper places for urban agriculture	3.135	1.24	25
Lack of community-based organizations and bodies interested in urban agriculture	3.133	1.22	26
Inadequate attention to produce and consume safe food products on city dwellers' side	3.121	1.22	27
Inappropriate weather conditions in cities for agricultural practices	3.116	1.24	28
High risk of agricultural activities in cities	3.110	1.20	29
Lack of training courses to improve city dwellers' information	3.086	1.27	30
Low number of qualified companies implementing agricultural projects in cities	3.045	1.26	31
Neighbors opposing agricultural practices	3.031	1.23	32
Lack of markets for urban produce	3.000	1.24	33
A limited number of plant species available for cultivation in cities	3.000	1.14	34
Lack of technical-consulting companies to serve urban agriculture	2.982	1.18	35
Weak effects of mass media to raise public awareness of urban agriculture	2.969	1.41	36
Devastation and insecure yield due to theft	2.829	1.38	37

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Table 3: Extracted factors, variables loaded in factors, eigenvalues and variance explained by each factor.

Statement	Factor						
	1 Education- research	2 Infrastructure	3 Support	4 Regulation- policymaking	5 Technical	6 Financial- economic	7 Cultural
Weak effects of mass media to raise public awareness of urban agriculture	0.816						
Lack of training courses to improve city dwellers' information	0.841						
Inadequate research efforts to recognize proper places for urban agriculture	0.839						
Inadequate research efforts to identify appropriate plant species for cities	0.794						
Lack of standard structures in buildings to implement urban agriculture projects		0.657					
Lack of a sector responsible for urban agriculture in the municipality		0.511					
High risk of agricultural activities in cities		0.726					
Lack of community-based organizations and bodies interested in urban agriculture		0.661					
No separation between drink water and untreated water			0.633				
Lack of markets to sell agricultural products			0.705				
No guarantee for the sale of produce grown in urban agriculture			0.671				
Weak management of free of charge water resources			0.694				
Considering urban agriculture as a cheap activity				0.719			
Inadequate attention to produce and consume safe food products on city dwellers' side				0.536			
Not considering urban agriculture as a production-economic system				0.712			
Lack of knowledge among urban managers and authorities				0.634			
Vagueness of objectives and strategies in organizations to develop urban agriculture				0.517			
Lack of laws and regulations in municipality in the area of issuing urbanization certificates				0.575			
Contaminated city soils					0.645		
A limited number of plant species available for cultivation in cities					0.787		
Having no time to spend on urban agriculture					0.637		
Inappropriate weather conditions in cities for agricultural practices					0.749		
No access to equipments and tools necessary for agriculture					0.502		
Economic problems due to lack of capital						0.515	
Lack of adequate knowledge and skills among city dwellers						0.662	
Weakness in designing proper irrigation systems						0.608	
Lack of government-funded financial support and credits						0.722	
High startup costs						0.572	
Devastation and insecure yield due to theft							0.649
Neighbors opposing agricultural practices							0.612
Eigenvalue	4.08	3.89	3.46	3.38	3.29	3.24	2.20
Variance explained	11.67	11.14	9.88	9.67	9.40	9.28	6.30

factor is composed of financial-economic constrains explaining 9.28% of the variance. Finally, the seventh factor involves cultural constrains accounting for 6.3% of the variance (Table 3).

DISCUSSION AND CONCLUSION

Urban agriculture is crucial for the vitality of the urban communities particularly in most developing countries. It is considered as a response to the increasing urbanization and economic worsening of the situation of the poor. It is generally believed that urban agriculture has the potential to contribute to the urban sustainability. As results of this study revealed 25% of the respondents have had experience with agriculture and more than 40% of them were moderately interested in agricultural activities. Unfortunately, people with different levels of education are not aware of urban agriculture. Perhaps, low awareness of the advantages of urban agriculture affected respondents' level of interest. Hence, efforts must be made in raising awareness, such as broadcasting documentaries, movies and other training programs through mass media. Furthermore, urban agriculture should be introduced in schools. This will help children to become more acquainted with possibilities of urban agriculture. In this regard, beside integration of urban agriculture to the comprehensive plan of educational system, providing short-term training courses would be of great help.

Ranking the constrains facing urban agriculture in Tehran revealed that "high start-up costs" and "lack of knowledge among urban managers and authorities" are at the top of the list. In fact, in urban contexts some costly infrastructures such as irrigation systems are necessary to initiate agricultural activities. Therefore, credits with low interest rate will be of paramount importance to those who wish to involve in urban agricultural activities. Also, formation of agricultural cooperatives will help producers take advantage of facilities and instruments collectively and thereby reduce costs. Regarding raising awareness among urban managers and authorities, workshops and forums must be initiated in municipality in collaboration with the ministry of agriculture which helps create positive viewpoints. Another constraint which remains as an important obstacle facing urban agriculture is

"water-related issues". In fact, without access to adequate water sources, urban agriculture will not be possible. Therefore, efforts should be made regarding management and optimal use of surface water resources, treatment and reuse of urban wastewater. Additionally, research efforts in municipality, ministry of agriculture and research centers must focus on plant species with short growth period to be planted in cities. These species are more compatible with water scarcity and urban conditions. In this regard, identification of suitable places to cultivate these species is a key point.

Results of factor analysis revealed that seven factors including "education-research", "infrastructure", "support", "regulation-policy making", "technical", "financial-economic", and "cultural" accounted for 67.36% of total variance. Among factors extracted from factor analysis "education-research" factor accounted for the highest proportion of the variance. This finding suggests that efforts must be made to produce training programs and to organize other mass media public relation programs (e.g. TV or billboards). In developing programs websites and internet must be used to reach wider audience. Also, visiting other training and consulting institutes and becoming aware of their research and practical work directed toward urban agriculture should be recommended. Considering "infrastructure" and "support" factors which explain a great amount of the variance in this study, it is recommended to create a separate sector in the municipality to take the responsibility of both implementation of urban agriculture and support for urban producers.

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