Designing a structural model of participatory management for the development of sustainable urban green spaces

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Abstract

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The expansion of cities, particularly large cities in third world countries, aggravated negative impacts on urban development will exacerbate pollution, including air, water, soil, landscapes, and mental and physical illnesses. The consequences of urban development and the environmental problems in residential areas have made the expansion of green spaces necessary. Since Tehran is considered as the 18th most populous city in the world and the political and economic center of Iran, it has become an important necessity for management in urban planning and management. This study aimed to present a structural model of participation management tailored to the development of sustainable urban green space. For this purpose, a questionnaire was developed and used to collect the data. Population for this study included 157 employees of research centers, training and consulting of urban green space in the municipality city of Tehran, Iran. Dependent variable of this research was sustainable urban green space development which was measured in three dimensions: legal development, environmental development, and physical development. The four independent variables were participatory management (participation in goal setting, participation in decision making, participation in problem-solving, and participation in organizational change).Findings from structural modeling equation (participation in goal setting, decision-making, problem-solving, and organizational changes), the effect of participation in problem-solving on sustainable green space development was more than the other aspects of participation management. Also, the results showed that the impact of each component of participation management dimensions; organizational support on the factors of participation in goal setting, Strategy implementation/evaluation/reformulation, participation in problem-solving and readiness of employees to participate in organizational change and recruitment methods on participation in decision-making.

Keywords: management; green space; sustainable development; organizational; participatory management; urban sustainable; green development

Introduction

Currently, more than 50% of the world's population lives in urban areas (Anguluri & Narayanan, 2017). The proportion of the population residing in urban areas is 54%, which is expected to reach 66% in 2050 (Girma et al., 2019). Today, the spread of large urban areas and the complexity of environmental problems in metropolitan areas have become major challenges in natural resource management and environmental protection issues (McKinley et al., 2017). It would also cause deforestation, the transformation of agricultural land to urban settlements, reducing the capacity of natural systems to survive, extinction of many biological and animal species and destruction of green vegetation (Dirzo et al., 2014; McCauley et al., 2015). Some evidence suggests that the root of many en-

vironmental problems is related to human behaviors (Mohammadi-Mehr et al., 2018).

In recent decades, a review of Iran's natural resource conservation activities reports shows that plans for natural resource management have faced a crisis and targets have been called into question, with most of the natural resource conservation activities being publicly dissatisfied (Karami & Keshavarz, 2016). Despite the recognition of the importance of public green space for urban communities, it has not been uniformly distributed within cities (McConnachie & Shackleton, 2010)2010. This is an important issue in a large and populous city like Tehran, which is considered the political and economic center of Iran and the 18th most populous city in the world (Rezaei et al., 2013).

The metropolis of Tehran, due to its unique characteristics, which today comprises more than 8.2 million or 12% of the population of Iran and more than 25% of economic income as well as natural factors, urban form, existence of more than 2 million active cars and five hundred thousand motorcycles, five thousand industrial units (equivalent to 25 percent of the country's total industry) have made it one of the most polluted cities in the world, consuming about 20 percent of the country's total energy, concentrating 70 percent of services and 80 percent of its specialists (Abbasi et al., 2014).

Due to the air pollution, congestion and migration to the Tehran, the need for green spaces as the city's respiratory lungs is necessary, green spaces play a vital role in the health of individuals whereas, constitutes only 10% of the total area of the city, and the ratio of green space to area 12.2%. It is a percentage that indicates a shortage of these spaces (Zayyari et al., 2012). In appropriate location of urban spaces has also led to anomalies such as low utilization of green space, restriction on proper architectural design, urban landscape disturbance, management and maintenance problems, and so on. As urban planning aims to regulate urban spaces in terms of access to urban facilities and services and the proper distribution of different urban uses, access to urban green spaces tailored to the needs of the people can play a major role in urban sustainability (Alizade-asl et al., 2016).

Therefore, the important issue in all Third World countries and Iran also, is to achieve a framework or management model based on the specific circumstances of that community which can meet the social, economic and social needs of that community. Therefore, having strong management-based management in the private and public sectors is now an ideal goal to achieve, because without effective management in these sectors, the problem of productivity, whether product or service cannot be realized, and it will disrupt the economic growth of society.

In recent years, participatory management has been iden-
tified as an approach to improve the adoption of sustainable natural resources management and to reduce conflict-related conflicts (Raufirad et al., 2017). As a desirable and efficient system, this management system has passed its successful tests, both theoretically and practically, and is now fully utilized in the developed and developing countries (Mehdi Pour et al., 2009).

Euler and Heldt (2018) suggest that participatory management increasingly leads to the democratization of processes and higher quality of decision-making that goes beyond the engagement and promotion of self - organization strategy. Fors et al. (2015) found out that research on the involvement of green space users has focused mainly on the interests of users and managers instead of physical outputs of partnership. In particular, the results indicated that there was a very slight relationship between the participation and physical quality of the green spaces.

Boiral et al. (2019) also pointed out that the role of organizations and working environments in human interaction with nature have been ignored in the literature. Indeed, participation in urban green space management is the result of a mix of personal characteristics (P) and environmental issues (E), where the environmental issues consist of the characteristics of the physical and social environment, whereas, the personal characteristics have been ignored (Fors et al., 2019).

Therefore, the activities about the partnership should be developed and tested with regard to the improvement of green space related to its physical quality. Urban green spaces are a network of different ecosystems that offer recreational opportunities, conservation of biodiversity and services such as reducing climate change stress, improving welfare, quality of life, health, occupational effectiveness and cultural identity (Boiral et al., 2019; Møller et al., 2018).

Some experts believed that urban green spaces are an integral part of each city (Belmeziti et al., 2018) and it is important to pay attention to the conservation of urban green space by managing the system through participatory management (Peschardt et al., 2012).

The results a study by Colombo et al. (2012) showed the type of management in environmental protection plays an important role in the proper exploitation of natural resources and the participation of citizens in protecting natural resources.

Hedelin et al. (2017) concluded that participative modeling is an interactive and iterative process in which Stakeholder participation is supported by modeling and communication tools. The planning and decision - making for sustainable development (SD) also integrates three basic social, ecological and economic foundations and provides good potential, especially for supporting knowledge integration, learning and transparent monitoring of projects.

León-Fernández et al. (2018) proposed that by establishing a series of meetings to discuss the core issues of the organization and reviewing the strengths and weaknesses in environmental management, the practical measures would be recommended to communicate among key stakeholders throughout the partnership process by increasing the information.

Nazari (2017) in his study reported that Tehran Municipality as one of the largest metropolitan municipalities in the world has been designing participatory management models to increase efficiency and to transform social capital into a strong and developed human force in managing urban green spaces. The existence of specific climatic conditions, tourist attractions, natural, human and political geography has all been instrumental in making this historic city turn into a metropolitan area, which will require integrated and specific decision-making that will not be possible except in the context of smart and efficient management.

Many study examined the different dimensions of participatory management. It should be noted that based on the models and strategies of participatory management in any organization, all decision to use a theory or model is simply ineffective unless using systematic views of urban planners and managers for the sustainable development of urban spaces (Ashkar-Ahangarkolaee et al., 2019). Since the development of green space and its relation with other urban spaces is one of the basic criteria of urban environment planning and one of the most important tasks of the municipality of Iran (Aram et al., 2019). In this study, it has been attempted to conduct a different study on the design of a participatory management model from the perspective of the staffs of Tehran Municipality green space research, education and consulting centers for the development of sustainable urban green space and to identify and identify the needs for providing a suitable structural model and Based on the participation

of staff in the process of targeting, decision making, problem solving and organizational change to develop sustainable green space in green space research, training and consulting centers, including the competent Tehran municipal institutions, the important task of green space research, training and consulting to all Iranian citizens.

Materials and Methodology

This is applied research with a survey method that used to collect, analyze and interpretation of the data. The main instrument to collect the data was a questionnaire and Likert scale used to measure the questions. The independent variables include: employee participation in goal setting in five sections (personnel performance appraisal process, disorderliness of employees, organizational facilities, organizational support and tangible rewards), employee participation in decision making in three sections (employee participation, process of employee participation and staff recruitment), level of employee participation in problem solving (identifying problems; creativity, assessment and selecting strategy and implementing strategy, assessment and improvement) and the degree of employee participation in organizational change in four sections (individual and organizational value about changes, appropriateness of changes, staff readiness and process of change). The dependent variable was the development of sustainable green space which consists of 17 questions (environmental development, physical and legal development).

The target population of the study was 266 employees of research centers, training and counseling centers in Tehran municipality. To determine the sample size, Cochran's formula was used, based on which the sample size was estimated with a level of error of 5 % and 157 respondents were selected based on stratified random sampling random (Table 1).

Table 1. Total population and samples

Region	Total number of employees	Samples	Region	Total number of employees	Samples
1	4	2	13	11	6
2	10	6	14	4	2
3	16	3	15	12	8
4	26	15	16	13	9
5	15	9	17	10	11
6	10	6	18	16	9
7	11	6	19	12	8
8	12	8	20	4	2
9	18	11	21	9	5
10	12	7	22	19	11
11	9	5	Total	266	157

To assess the reliability of the research instrument, the questionnaire was completed by 25 respondents that were not included in the final sample of the study. The Ordinal Coefficients Theta was calculated and the value for each section was between 0.62% and 0.88%. To analyze the data, descriptive statistics and structural equation modeling (SEM) have been used to estimate the relationship between variables in a conceptual model (Raza et al., 2019). The main purpose of the SEM is to estimate which structures significantly affect participatory management in developing a sustainable green space.

Research hypotheses measured by studying the relationship between variables and the direct and indirect effects of them from SEM analysis. After the extraction of data, descriptive statistics and structural equations performed using SPSSV19 and AMOSv23 software, respectively.

Results

The results of the descriptive statistics showed that the average age of the respondents was 31 years. According to the results, 90.4% of the respondents were women and the majority had at least a graduate-level degree (49.4%). The average work experience of respondents was 6 years old (Table 2).

Table 2. Demographic characteristics

Age (year)	Mean = 31	S.D = 6.07
Gender (percent)	Female = 90.4%	Male = 6.1%
Work experience (year)	Mean = 6.6	S.D = 4.72

In this research, to identify and categorize the factors influencing the development of sustainable urban green space, as well as to reduce the number of variables of research to less factors by removing variables with factor load less than 0.50 after factor turning by Varimax, exploratory factor analysis used. It should note that, according to Kisser's criterion, agents with a specific amount of extraction extracted. About the factors influencing the development of sustainable urban green space in this study, the significance of the Bartlett test with a confidence of 99% and the proper value of the KMO index of 90% indicates the suitability of the items for extracting the factors. After factor rotation in the Varimax method, the variables of the research were classified into three factors and the only factor loads greater than 0.50 appeared in the results. As shown in Table 3, the first factor has the highest share of 34.59%, the third factor has the lowest contribution of 16.82% in explaining the variance of all variables, and these factors had shown 68.29% of the total variance of the

factors affecting the development of sustainable urban green spaces (Table 3).

Table 3. Extracted factors, Eigen Value, Variance

Factor	Eigen value	Percentage of variance	Cumulative variance
1	88.5	597.34	597.34
2	85.2	878.16	47.51
3	86.2	819.16	293.68

According to Table 4, about environmental development, the impact of respondents' understanding of current situation, capabilities, and limitation of water and soil on development of green spaces in Tehran with a factor loading of 0.84 considered the most important factor. Based on the perception of respondents, the modeling for development of Tehran in the 20 years horizon with the factor loading of 0.87 was the most important factor in legal issues and also, it was reported that examining the condition of old trees in Tehran was the most important factor in the physical aspects of green space development in Tehran (Factor loading: 0.80).

To identify the important dimensions of participative management to develop sustainable green space, SEM analysis was used (Figure 1).

According to SEM results, organizational support (18.1%) was the most important component of participation in goal setting. Also, a recruitment method (0.75%) was the most important component of participation in decision making. Also, the implementation of strategy/ assessment /modification (0.84%) and employee readiness (0.87%) had the most important role in affecting the participation in solving problems and organizational changes, respectively (Table 5).

Based on the value of the regression coefficients of the paths, participation in decision making as one of the dimensions of participatory management had the greatest impact on the development of sustainable green space in Tehran (Estimate: 0.065%) (Table 6).

Table 7 shows the value of the index of Chi-Square is 1.129. Since the amount is smaller than 3, it can be said that the model is a desirable fit. On the other hand, the significance level is 0.253 and has a favorable fit for the model. The RMSEA (mean square error estimate) for optimal models should be 0.05 or less and in this model, the index is equal to 0.02, so its fit well estimated. Another criterion for fitting this model is the GFI index (goodness fit), which evaluates the relative value of variances and covariance in a commonly the model. The range of GIF variations should be between zero and one. The GIF value is close to 0.90 and reflects a good fit. In this model, the goodness of fit is equal to 0.95, which is good. The AGFI index (the GIF index for the degree

Table 4. Variable, variables on each factor as factors affecting sustainable urban green space development

| Factors	Variables	Factor loads
Environmental development	Understanding the status quo, capabilities and climate constraints of the development of green spaces in Tehran.	0.63
	Understanding the status quo, capabilities and limitations of the water and soil of the development of green spaces in Tehran.	0.84
	Recognition of the current status of different types of green spaces, its ownership, and location in different regions of Tehran	0.83
Legal development	Understanding the urban pollutants and environmental constraints of the development of green spaces in Tehran.	0.69
	Determining priorities of urban Green Spaces Development in Addressing the Major Problems of Environmental Pollutant in Tehran.	0.62
	Preparing the space development program for urban green space about per capita and vacant spaces of the city.	0.67
	Developing guidelines for the development of urban green spaces in Tehran.	0.76
	Developing an Action Plan for the Development of Urban Green Spaces in Tehran with a 10-year horizon.	0.82
	Modeling the Development of Tehran in the 20 Years Horizon.	0.87
	Investigating the status of the surface heat islands in Tehran and developing solutions to this problem is through the development of urban green spaces.	0.84
	Planning participatory program, public education, and monitoring of green spaces in Tehran.	0.70
	Developing the structure and executive body of the comprehensive design of green spaces in Tehran.	0.78
	Developing a practical plan for the development of urban green spaces.	0.82
Physical development	Understanding the current status of per capita urban green space based on the performance and occupancy level and measuring the required green spaces according to type, ownership, and location.	0.76
	Understanding the status quo, capabilities, social and economic constraints of the development of green spaces in Tehran	0.52
	Examining the condition of the old trees in different regions of Tehran	0.80
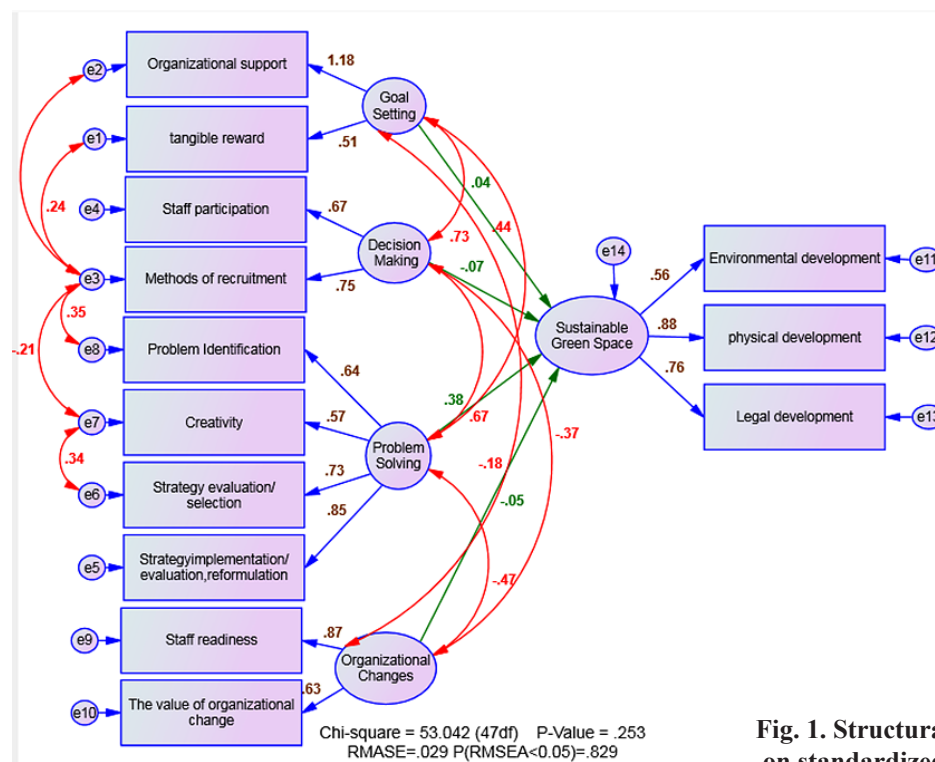
Fig. 1. Structural equation model based on standardized regression coefficients

Table 5. Regression weight and significance test of paths

Path		Estimate	SE	CR	P value
Participation goal setting	Sustainable green space development	0.48	0.16	-0.29	0.76
Participation decision making	Sustainable green space development	-0.06	0.24	0.27	0.78
participation problem solving	Sustainable green space development	0.26	0.11	-2.29	0.02*
Participation organizational change	Sustainable green space development	-0.05	0.12	0.40	0.68

* P< 0.05

Table 6. Standardized regression weights of significant paths

Path		Estimate
Participation goal setting	Sustainable green space development	0.042
Participation decision making	Sustainable green space development	0.065-
participation problem solving	Sustainable green space development	0.382
Participation organizational change	Sustainable green space development	0.046-

Table 7. The Goodness of fit

Criteria	RMSEA	NFI	TLI	CFI	GFI	AGFI	χ^2	Pcmin	χ^2/DF
Amount	0.02	0.93	0.98	0.99	0.95	0.90	53.042	0.25	1.129
Desired limit	≤ 0.05	0.90>	0.90>	0.90>	0.90>	0.90>	–	≥0.05	≤ 3

of freedom), the value of this index is also between zero and one. In this model, it is equal to 0.90, after fitting it is relatively good. The NFI (Normal Fit Index) for values between 0.90 and 0.95 is acceptable and reflects the model's fitness. In this model, the NFI is equal to 0.93 and shows its appropriateness. The NNFI index, or the TLI Tucker-Lewis TLI, which is independent of the sample size of the research, has a value of close to 0.90 and it reflects a good fit. In this model, the TLI is equal to 0.98, which fit appropriately good. The CFI index (obtained by comparing an independent model in which there is no relationship between the variables with the proposed model) values greater than 0.90 and close to 0.95 acceptable and reflects the model's fitness. The CFI value in the model is equal to 0.99, which represents the desired fit. Therefore, it can be concluded that the model of final factor analysis of the affective dimensions on participatory management is acceptable.

Discussion

The results of this study showed that participation in goal setting does not have a significant effect on the development of sustainable green spaces; therefore, in spite of its importance in participatory management, the impact on the participation of respondents on the development of green spaces in Tehran was minimal. This result was unlike the findings of Mazaher et al. (2017) and Tao et al. (2018).

Participation in decision-making has no significant effect on the development of sustainable green spaces. Although employee participation in decision-making and recruitment

methods is considered as the important dimension of participatory management respondents, did not either participate in this process or believe in the importance of the participation in the development of sustainable green space. These findings are in contrast with the findings of Mullaby and Daryabari (2018), Sharma (2006), Kazimpour et al. (2018), Ghorbani & Amirzadeh Heravi (2011).

Participation in solving problems as one of the important dimensions of participatory management has a significant effect on the development of sustainable green space. It was reported that employee participation to identify problems, in terms of creativity, sharing solutions, questioning about the positive and negative outcomes of each solution and interacting with the manager and co-workers as well as implementing/evaluating/choosing a strategy were considered as important in the development of programs and strategies in development of urban green spaces in Tehran. These findings are consistent with the results of studies by Kazimpour et al. (2018), Mazaher et al. (2017), Akbari & Amir Mahmudi (2017).

It was found that participation in organizational changes had a significant impact on the development of sustainable green spaces. These findings are not consistent with studies by Tao et al. (2018), Kazimpour et al. (2018), Rajabi et al. (2018)

Conclusions

According to the findings of this study, it is concluded that the application of the important participatory manage-

ment and its components provide suitable mechanisms for the development of sustainable urban green space policies and strategies in the Tehran municipality. The study showed a positive relationship between the participation of employees in solving problems regarding sustainable green space. Also, the results of the study show that the important elements of employee participation in goal setting, decision-making, problem-solving and organizational change, respectively, have the greatest impact on participatory management in the development of sustainable urban green space.

Acknowledgments

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