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Analysis of Urban Agricultural Effects by Factors According to the Urban Citizens Income Level: Socially Sustainable Effect, Negative Effect, and Economically Sustainable Effect

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ABSTRACT

The role of urban agriculture should not be limited as a small-scale crop cultivation activity as it was, but it has to be considered as an entire process of a agriculture activity for the restoration of the city community. This study is based on the assumption that there has been a significant change in urban lifestyle and urban farming preference, considering the overall improvement in standard of living after implementation of five day work week system. It was conducted for urban citizens who were interested in actual urban agriculture for ages 19 and over who visited the Korea Urban Agriculture Exhibition in 2018. Only 115 valid samples were used for the empirical analysis. To analyze the demographic characteristics and effects of urban agriculture, frequency analysis and descriptive statistics were conducted. In order to analyze the reliability and validity of the measurement variables of the effect, the variables that deteriorate the validity were removed and 15 variables of the urban agricultural effect were selected. According to the result of factor analysis, three factors were extracted as follows: socially sustainable effect, negative effect and economically sustainable effect. In order to examine the effects of urban agriculture depending on income level, the one-way ANOVA, which is a statistical technique for verifying differences in the sample means, was performed. The psychological stability of people, the recovery of humanity through communion with nature, and the vitalization of agriculture linked with local agriculture had significant correlations with income level. The negative effect showed no significant correlation with income level. The improvement of the local environment was found to have an impact in relation with income level. We expect that there will be more studies on policies for the new types and models of urban agriculture in order to make it easier for urban citizens to approach it.

Keywords: classification, factor analysis, lifestyle, preference, urban garden

Introduction

Urban agriculture was initiated as a measure to secure food resources and provide safe food for urban residents, but recently it has been considered as a major component for sustainable cities for the purposes of addressing urban environmental problems and improving the quality of life of urban residents (Park et al., 2012), rapidly expanding its roles around the world such as restoring urban ecology, securing safe food and utilizing as a leisure activity for urban residents.

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As the interest of governments and local governments has increased recently, the role of urban agriculture has been highlighted more and urban residents have participated in urban agriculture more frequently, which requires a new concept of vegetable gardens that are improved more functionally and are added with aesthetic elements. Against this backdrop, this study was initiated to develop a historical and cultural vegetable garden model with a humanistic theme where people can enjoy and share together from the perspective of humanities as new-concept urban agriculture.

Studies on urban agriculture that have been published in Korea since 2000 were reviewed, and most of the earlier studies were conducted to develop measures to institutionally support urban agriculture and suggest the promotion of urban agriculture only through an analysis of foreign and domestic cases. In addition, if it is assumed that governments' policies for urban agriculture are for urban residents, the demand of urban residents who use urban agriculture needs to be evaluated to establish effective policies for urban agriculture. The most important thing in establishing policies and measures to promote urban agriculture is in fact analyzing what kind of activities urban residents who actually select and perform activities of urban agriculture prefer when being involved in urban agriculture, and what kinds of effects can be obtained through the preferred activities of urban agriculture. In this regard, this study assumed that it would be necessary to conduct a study on the types and activities of urban agriculture that are suitable for changes in the environment of new or existing markers for urban agriculture and the demand of urban residents in order to ensure urban agriculture is rapidly settled and secures competitive advantage in this rapidly changing environment. It was also assumed that the income level of urban residents, one of their demographic characteristics among variables that affect their behaviors, would have an important value for the frame of psychological reference that determines the attitudes and behaviors of urban residents, which could be utilized to subdivide the market. This is similar to the results of earlier studies that the higher the academic background and income level of people in both middle and old age, the better their health conditions (Seo, 2011), and that changes in monthly income affect changes in the types of lifestyle (Choi, 1999), which indicates that income has a mediating effect on social influence or the quality of life.

Therefore, prior to developing a vegetable garden model with a humanistic theme, the demographic characteristics of male and female adults were examined, and factors were extracted and named based on the commonality of each item of the effects of urban agriculture obtained from earlier studies related to urban agriculture. After that, their relations with income level were identified. The factors of the effects were classified based on the analyzed data, and the names are expected to be used as base data when applying the vegetable garden model to urban agriculture.

Research Methods

Subjects

In this study, data were collected from 120 male and female adults aged 19 or older who visited the 7th Korea Urban Agriculture Exhibition held at Dongtan Cultural Center in 2018, and 5 questionnaires of which some questions were not answered or had many missing values were excluded. Thus, a total of 115 questionnaires were analyzed in this study.

Questionnaire Design

Questionnaire Composition

The questionnaire used in this study was composed of questions on demographic characteristics, urban agriculture-related experiences and satisfaction, the effects of urban agriculture, etc. and the questions were measured using nominal and interval scales.

Selection of Questionnaire Items

Among the effects of urban agriculture suggested by earlier studies (Oh and Choi, 2006; Son, 2011; Ji, 2012; Lee, 2012; Park, 2012; Korea Rural Economic Institute, 2012), a total of 15 effects were selected (Table 1), and each effect was measured using a 5-point Likert scale (1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree).

Analysis Methods

Statistical analysis was conducted using IBM SPSS statistics 25 after coding the collected questionnaires in Excel.

First, the demographic characteristics of the subjects and the effects of urban agriculture were analyzed using frequency analysis and descriptive analysis (based on the average values of the 5-point Likert scale).

Second, exploratory factor analysis and reliability analysis (Cronbach's α) were performed to examine the validity of measured variables and classify factors, and thus to extract the factors of the effects of urban agriculture. In factor analysis, factors were extracted using a varimax rotation among several orthogonal rotation methods through principal component analysis. Factors of which eigen value was 1 or higher were extracted to classify factors. To identify the internal consistency of items by factor, their reliability was analyzed and their Cronbach's alpha was calculated. By doing so, the internal consistency of each factor was tested.

Third, the one-way ANOVA, a statistical analysis technique used to test differences between means of samples, was performed to test the correlation between the recognition of the effects of urban agriculture and income level among demographic variables. Duncan's multiple range test was conducted as a post-hoc test.

Results and Discussion

Demographic Characteristics

The demographic characteristics of questionnaire respondents were as shown in Table 2. The number of questionnaire

Table 1. Items of effects of urban agriculture

Item number	Effects of urban agriculture
x1	Promoting health
x2	Changes in dietary life
x3	Psychological stability through crop cultivation
x4	Restoring humanity through communion with nature
x5	Creating local communities
x6	Children's learning & experience of agriculture
x7	Creating jobs within cities
x8	Supply of safe agricultural products
x9	Vitalizing agriculture connected with local agriculture
x10	Economic profits from secured food
x11	Improved local environment
x12	lack of green space within cities
x13	Damaged landscapes due to mismatched urban landscapes
x14	Environmental pollution in areas near vegetable gardens
x15	Damage by diseases and pests due to crop cultivation

Note. x is an arbitrary variable name indicating the urban agricultural effect.

respondents analyzed in this study was 115 (84 females (73.0%) and 31 males (27.0%)), showing a higher share of females. The number of those aged 60 or older was the highest (55 (47.8%)), followed by those in their 50s (32 (27.8%)), those in their 40s (21 (18.3%)) and those in their 30s (7 (6.1%)), but there was no one in their 20s. The reason why the participation rate of those in their 20s and 30s was low can be attributed to the fact that the survey in the exhibition began on a weekday morning when most college students or workers were unable to participate in the exhibition.

In terms of academic background, the number of those who graduated from a middle or high school was the highest (48 (41.7%)), followed by those who graduated from a four-year college (41 (35.7%)), those who graduated from a two-year college (16 (13.9%)), those who graduated from a graduate school (9 (7.8%)), and others (1 (0.9%)). In terms of residential types, the number of those who lived in an apartment was the highest (70 (60.9%)), followed by detached house (34 (29.5%)), country house (6 (5.2%)), townhouse or multi-household house (4 (3.5%)), and others (1 (0.9%)). There was no respondent who lived in a studio. In terms of occupation, the number of homemakers was the highest (68 (59.1%)), followed by those who worked in an agricultural (farms') federation and others (11 (9.6%)) respectively, professional jobs (8 (7.0%)), public officials and the self-employed (6 (5.2%)) respectively, and salaried workers (5 (4.3%)). There was no

Table 2. The respondent's demographic characteristics

Item	n(%)	Item	n(%)
Gender		**Occupation**	
Male	31(27.0)	Public official	6(5.2)
Female	84(73.0)	Student	0(0.0)
Total	115(100.0)	Homemaker	68(59.1)
Age		Professional	8(7.0)
20s	0(0.0)	Self-employed	6(5.2)
30s	7(6.1)	Agricultural(a farmers') confederation	11(9.6)
40s	21(18.3)	Businessman	5(4.3)
50s	32(27.8)	Others	11(9.6)
60+	55(47.8)	Total	115(100.0)
Total	115(100.0)	**Marital status**	
Education Level		Married	105(91.3)
Middle/High school	48(41.7)	Single	10(8.7)
Community college	16(13.9)	Total	115(100.0)
University	41(35.7)	**Monthly income**	
Graduate school	9(7.8)	Less than 1 million won	26(22.6)
Others	1(0.9)	1,001,000~2,000,000 won	33(28.7)
Total	115(100.0)	2,001,000~3,000,000 won	22(19.1)
Living		3,001,000~4,000,000 won	15(13.1)
Detached house	34(29.5)	4,001,000~5,000,000 won	6(5.2)
Townhouse/Multiplex housing	4(3.5)	Over 5 million won	13(11.3)
Studio	0(0.0)	Total	115(100.0)
Apartment	70(60.9)	**Urban life Experience**	
Country house	6(5.2)	Have	83(72.2)
Others	1(0.9)	None	32(27.8)
Total	115(100.0)	Total	115(100.0)

student. In terms of marital status, the majority of the respondents were married (105 (91.3%)) and only 10 respondents (8.7%) were single. The number of those whose monthly income was between 1,001,000 and 2,000,000 won was the highest (33 (28.7%)), followed by 1,000,000 won or lower (26 (22.6%)), 2,001,000~3,000,000 won (22 (19.1%)), 3,001,000~4,000,000 won (15 (13.1%)), 5,000,000 won or higher (13 (11.3%)) and 4,001,000~5,000,000 won (6 (5.2%)). To the question about rural life experiences, the majority of respondents (83 (72.2%)) answered that 'I had a rural life experience,' and 32 respondents (27.8%) answered that they did not have any rural life experience but wanted to have, which indicates that urban residents' interest in urban agriculture has continuously increased.

Factor and Reliability Analysis of the Effects of Urban Agriculture

Factor Analysis of the Effects of Urban Agriculture

Based on the classification of earlier studies, the effects of urban agriculture were selected and factor analysis was performed as shown in Table 3. The KMO value that Lee (2003) suggested as a coefficient that determines the validity of samples was .855, and the significance level was .000. The value was close to 1 and higher than .5, indicating the high validity of the factor analysis performed in this study. Based on the commonality of extracted items, the following three factors were selected among the four factors suggested by Lee (2013): socially sustainable effect (Factor 1), negative effect (Factor 2) and economically sustainable effect (Factor 3). Factor 1 was named 'socially sustainable effect' and included the following 9 effects: x2 (changes in dietary life), x6 (children's learning and experience of agriculture), x3

Table 3. Factor analysis of the effects of urban agriculture

Factor	Item[z]	Division		
		1	2	3
1	x2	.856	.018	.117
	x6	.836	-.012	.012
	x3	.798	.079	.283
	x5	.797	-.064	.187
	x8	.787	-.115	.124
	x1	.747	.037	.177
	x4	.739	-.026	.290
	x7	.666	-.165	.253
	x9	.621	.026	.502
2	x14	.021	.922	.000
	x13	-.012	.912	-.128
	x15	-.158	.877	.181
	x12	.034	.704	-.445
3	x10	.331	-.049	.827
	x11	.464	-.123	.568
Kaiser-Meyer-Olkin measure of sampling adequacy				.855
Bartlett's test of sphericity			χ^2	1180.701
			df	105
			Significant	.000

[z]Items were derived from Table 1.

(psychological stability through crop cultivation), x5 (creating local communities), x8 (supply of safe agricultural products), x1 (promoting health), x4 (restoring humanity through communion with nature), x7 (creating jobs within cities) and x9 (vitalizing agriculture connected with local agriculture). Among the effects classified into Factor 1, x7 (creating jobs within cities) and x9 (vitalizing agriculture connected with local agriculture) were classified by Lee (2013) as 'economically sustainable effects,' but the two items are mentioned as a priority project within social value, one of the three strategies for government innovation that are implemented by the current government. In this study, therefore, they were classified as a factor of 'socially sustainable effect,' and it was confirmed that they could be grouped as one factor. Factor 2 was named 'negative effect' and included the following 4 effects: x14 (environmental pollution in areas near vegetable gardens), x13 (damaged landscapes due to mismatched urban landscapes), x15 (damage by diseases and pests due to crop cultivation) and x12 (lack of green space within cities). Factor 3 was named 'economically sustainable effect' as x10 (economic profits from secured food) and x11 (improved local environment) were grouped as one factor.

Analysis of the Internal Consistency of the Effects of Urban Agriculture by Factor

The results of reliability analysis were listed in Table 4 in order to examine the internal consistency of the effects of urban agriculture by factor after classifying factors. Cronbach's α values were between .659 and .925, showing a high internal consistency between activities of all the factors. In regard of internal consistency, Kang (2016) suggested that a Cronbach's α value of .5 or higher is a reliable level, which indicates that factors were well structured. In the case of Factor 2, the coefficient increased from .882 to .901 when the item of x12 (lack of green space within cities) was removed. Therefore, the item seems to be removed as it decreases the correlation of internal consistency. In addition, the reason why Cronbach's values when each item was deleted in Factor 3 was that there were only two items including x10 (economic profits from secured food) and x11 (improved local environment), and thus that when one of the two items is excluded, it

Table 4. Reliability analysis of the effects of urban agriculture

Factor	Item[z]	Revised Item-General correlation	Cronbach's α if item deleted	Cronbach's α
1	x2	.785	.913	.925
	x6	.736	.916	
	x3	.799	.912	
	x5	.773	.914	
	x8	.718	.917	
	x1	.702	.919	
	x4	.731	.917	
	x7	.657	.922	
	x9	.679	.920	
2	x14	.808	.824	.882
	x13	.846	.811	
	x15	.729	.854	
	x12	.612	.901	
3	x10	.495	-	.659
	x11	.495	-	

[z]Items were derived from Table 1.

is difficult to test internal consistency between items with only one item.

Analysis of Correlation Between Income Level and Effects of Urban Agriculture by Factor

In this study, multiple regression analysis was performed to test the correlation between income level and the effects of urban agriculture. To do so, the effects of urban agriculture were set as a dependent variable by factor, and six income levels were set as an independent variable as follows: less than 1,000,000 won(Group A), 1,001,000~2,000,000 won(Group B), 2,001,000~3,000,000 won(Group C), 3,001,000~4,000,000 won(Group D), 4,001,000~5,000,000 won (Group E), and over 5,000,000 won(Group F).

Comparison of Income Level and Socially Sustainable Effect (Factor 1)

Socially sustainable effect was obtained as one of the effects through factor analysis on the effects of urban agriculture on urban residents. Differences in the recognition of the socially sustainable effect depending on income level were as shown in Table 5. Among the items of the socially sustainable effect, those that showed a statistically significant difference depending on income level include 'changes in dietary life (x2),' 'psychological stability through crop cultivation (x3),' 'restoring humanity through communion with nature (x4)' and 'vitalizing agriculture connected with local agriculture (x9).' The rest items did not show any statistically significant difference depending on income level.

Those items were examined in detail, and most respondents recognized 'changes in dietary life' as 'neutral' or higher. Depending on income level, the correlation value of Group F was 4.31, showing the most positive recognition of 'changes in dietary life.' It was followed by Group D (4.20), Group C (4.05), Group B (4.03), Group E (3.83) and Group A (3.46). Except Group E, the higher the income level of respondents, the more positively they recognized changes in dietary life through urban agriculture. These results were similar to those of Lee (2013) on the effects of urban agriculture, and income level seems to be one of the most important factors of the recognition of changes in dietary life. It was also found that

Table 5. Correlations between income level and effects of urban agriculture in factor 1

Item[y]	Income level[z]						F	Significant
	A	B	C	D	E	F		
x2	3.46(1.14)	4.03(0.85)	4.05(0.99)	4.20(0.56)	3.83(0.75)	4.31(0.63)	2.293	.05*
x6	3.50(1.21)	3.82(0.95)	3.91(0.97)	4.27(0.59)	3.50(0.84)	3.92(0.64)	1.455	.21NS
x3	3.38(1.17)	3.97(0.88)	4.00(0.98)	4.27(0.80)	4.50(0.55)	4.54(0.66)	3.711	.00**
x5	3.42(1.07)	3.88(0.99)	3.77(1.07)	3.93(0.80)	3.83(0.75)	4.38(0.65)	1.863	.11NS
x8	3.46(1.07)	3.64(0.99)	4.14(1.08)	4.00(0.66)	3.50(0.55)	4.00(0.82)	1.726	.14NS
x1	3.42(1.24)	3.88(1.11)	4.23(1.15)	4.20(0.68)	4.33(0.52)	4.23(0.83)	2.134	.07NS
x4	3.50(1.18)	4.00(0.79)	4.09(1.02)	4.20(0.68)	4.00(0.89)	4.54(0.66)	2.618	.03*
x7	2.92(1.23)	3.33(0.99)	3.41(1.14)	3.87(0.83)	3.33(1.21)	3.77(0.93)	1.945	.09NS
x9	3.04(1.00)	3.39(0.93)	3.55(1.10)	4.13(0.64)	4.00(0.63)	4.15(0.56)	4.534	.00***

Note. Values are mean(standard deviation).

[z]A=Less 1 million won; B=1,001,000~2,000,000won; C=2,001,000~3,000,000won; D=3,001,000~4,000,000won; E=4,001,000~5,000,000 won; F=Over 5 million won.

[y]x2=Changes in dietary life; x6=Children's learning & experience of agriculture; x3=Psychological stability through crop cultivation; x5=Creating local communities; x8=Supply of safe agricultural products; x1=Promoting health; x4=Restoring humanity through communion with nature; x7=Creating jobs within cities; x9=Vitalizing agriculture connected with local agriculture.

[NS]Non-significant, [*]p<.05, [**]p<.01, [***]p<.001 by ANOVA test.

respondents recognized 'psychological stability through crop cultivation' as 'neutral' or higher. Depending on income level, the correlation value of Group F was 4.54, showing the most positive recognition of 'psychological stability.' It was followed by Group E (4.50), Group D (4.27), Group C (4.00), Group B (3.97) and Group A (3.38), indicating that the higher the income level of respondents, the more positively they recognized psychological stability through crop cultivation in urban agriculture. These results were similar to those of Lee (2012), which indicates that the factor was valid. Most respondents recognized 'restoring humanity through communion with nature' as 'neutral' or higher. Depending on income level, the correlation value of Group F was 4.54, showing the most positive recognition of 'restoring humanity.' It was followed by Group D (4.20), Group C (4.09), Group B and E (4.00) and Group A (3.50). Except Group E, the higher the income level of respondents, the more positively they recognized 'restoring humanity through communion with nature.' These results were similar to those of Lee (2012) on the effects of urban agriculture, and income level seems to be one of the most important factors of the recognition of restoring humanity through communion with nature. It was also found that most respondents recognized' as 'neutral' or higher. Depending on income level, the correlation value of Group F was 4.15, showing the most positive recognition of 'vitalizing agriculture.' It was followed by Group D (4.13), Group E (4.00), Group C (3.55), Group B (3.39) and Group A (3.04). Except Group E, the higher the income level of respondents, the more positively they recognized 'vitalizing agriculture connected with local agriculture.' These results were similar to those of Park et al. (2012) that urban agriculture is correlated with vitalizing local economy and agriculture, and thus income level seems to be one of the most important factors of the recognition of vitalizing agriculture connected with local agriculture.

Comparison of Income Level and Negative Effect (Factor 2)

Negative effect was obtained as one of the effects through factor analysis on the effects of urban agriculture. Differences in the recognition of all the items of the effect were not statistically significant depending on income level as shown above (Table 6).

Most respondents recognized 'environmental pollution in areas near vegetable gardens' as 'neutral' or higher, but, depending on income level, the correlation value of Group F was 3.85, showing the most positive recognition of 'environmental pollution.' It was followed by Group C (3.64), Group A (3.62), Group D (3.53), Group B (3.52) and Group E (3.33). Most respondents seemed to recognize environmental pollution in areas near vegetable gardens through urban agriculture regardless of their income level. It was also found that most respondents recognized 'damaged landscapes due

Table 6. Correlations between income level and effects of urban agriculture in factor 2

Item[y]	Income level[z]						F	Significant
	A	B	C	D	E	F		
x14	3.62(1.01)	3.52(1.23)	3.64(1.29)	3.53(1.13)	3.33(1.21)	3.85(1.35)	0.210	.96[NS]
x13	3.58(0.86)	3.21(1.19)	3.77(1.31)	3.73(1.10)	3.17(1.47)	4.00(1.29)	1.314	.26[NS]
x15	3.73(1.08)	3.09(1.31)	3.50(1.37)	3.20(1.08)	3.00(1.27)	3.62(1.56)	1.029	.40[NS]

Note. Values are mean(standard deviation).

[z]A=Less 1 million won; B=1,001,000~2,000,000won; C=2,001,000~3,000,000won; D=3,001,000~4,000,000won; E=4,001,000~5,000,000 won; F=Over 5 million won.

[y]x14=Environmental pollution in areas near vegetable gardens; x13=Damaged landscapes due to mismatched urban landscapes; x15=Damage by diseases and pests due to crop cultivation.

[NS]Non-significant.

to mismatched urban landscapes' as 'neutral' or higher. However, depending on income level, the correlation value of Group F was 4.00, showing the most positive recognition of damaged urban landscapes. It was followed by Group C (3.77), Group D (3.73), Group A (3.58), Group B (3.21) and Group E (3.17), indicating that respondents recognized damaged urban landscapes regardless of their income level. Most respondents also recognized 'damage by diseases and pests due to crop cultivation' as 'neutral' or higher, but, depending on income level, the correlation value of Group A was 3.73, showing the most positive recognition of damage by diseases and pests. It was followed by Group F (3.62), Group C (3.50), Group D (3.20), Group B (3.09) and Group E (3.00), indicating that respondents recognized damage by diseases and pests regardless of their income level. There results were similar to those of Lee (2013) and Lee (2012) that there was no significant correlation between the negative effects and monthly income. These results showed that income level is not correlated with the recognition of negative factors among the effects of urban agriculture.

Comparison of Income Level and Economically Sustainable Effect (Factor 3)

Economically sustainable effect was obtained as one of the effects through factor analysis on the effects of urban agriculture. Differences in the recognition of the effect depending on income level were as shown in Table 7. Among the items related to the economically sustainable effect, only one item (improved local environment, x11) showed a statistically significant difference depending on income level, and the other item (economic profits from secured food, x10) did not show any statistically significant difference depending on income level. Most respondents recognized 'improved local environment' as 'neutral' or higher. Depending on income level, the correlation value of Group F was 4.15, showing the most positive recognition of 'improved local environment.' It was followed by Group C (4.00), Group D (3.93), Group B (3.55), Group E (3.50) and Group A (3.27). Except Group D and E, the higher the income level of respondents, the more positively the respondents recognized 'improved local environment through urban agriculture.' These results were similar to those of Lee (2013) on the effects of urban agriculture, and thus income level seems to be one of the most important factors of the recognition of improved local environment. However, most respondents recognized 'economic profits from secured food' as 'neutral' or higher, but, depending on income level, the correlation value of Group F was 4.08, showing the most positive recognition of economic profits. It was followed by Group D (3.80), Group B (3.73), Group A and C (3.50) and Group E (3.33), indicating that income level was mostly not correlated with the recognition of 'economic profits from secured food.' These results were different from those of Lee (2013) that income level is correlated with economic profits from secured food in urban agriculture, which indicates that urban agriculture is effective to some extent, but that it is difficult to expect enough harvest to obtain 'economic profits' through small-scale cultivation.

Table 7. Correlations between income level and effects of urban agriculture in factor 3

Item[y]	Income level[z]						F	Significant
	A	B	C	D	E	F		
x10	3.50(0.91)	3.73(0.80)	3.50(1.06)	3.80(0.68)	3.33(1.03)	4.08(0.76)	1.198	.32[NS]
x11	3.27(1.08)	3.55(0.91)	4.00(1.11)	3.93(0.88)	3.50(0.55)	4.15(0.69)	2.479	.04[*]

Note. Values are mean(standard deviation).

[z]A=Less 1 million won; B=1,001,000~2,000,000won; C=2,001,000~3,000,000won; D=3,001,000~4,000,000won; E=4,001,000~5,000,000 won; F=Over 5 million won.

[y]x10=Economic profits from secured food; x11=Improved local environment.

[NS]Non-significant, [*]p<.05 by ANOVA test.

Conclusion

For the rapid settlement of urban agriculture and the maintenance of its competitive advantage, it is necessary to study the rapidly changing environment of the new urban agriculture market and the types and consequent effects of urban agriculture that meets the demand of urban residents. Beyond its role as the primary industry, and its spatial limitation as small-scale crop cultivation in cities, the importance of urban agriculture has been increasingly highlighted as a healthy leisure activity for urban residents and as an agricultural activity for the recovery of communities in cities. The implementation of the five-day workweek system has resulted in the extension of leisure hours and the increasing real income of urban residents, which is expected to cause changes in lifestyle and the preferred types and effects of urban agriculture. Under the assumption, this study extracted the types and activities of urban agriculture and set measurement items through theoretical review of urban agriculture, and developed measurement scales and items used as a variable for each construct in order to achieve the goals of this study. The developed questionnaire survey was performed on male and female adults aged 19 or older who visited the 7th Korea Urban Agriculture Exhibition held at Dongtan Cultural Center. Among 120 questionnaires collected from the exhibition, only 115 valid samples were used for empirical analysis. The demographic characteristics of the subjects and the effects of urban agriculture were analyzed using frequency analysis and descriptive analysis (based on the average values of the Likert 5-point scale). In addition, the one-way ANOVA was performed to verify the correlation between their income level and their recognition of the effects of urban agriculture.

The demographic characteristics of respondents were obtained through empirical analysis, and it was found that the number of female respondents (84 (73.0%)) was far higher than that of male respondents. The number of those aged 60 or older was the highest (55 (47.8%)), and the number of those who graduated from a middle or high school was the highest (48 (41.7%)). The number of those who lived in an apartment was the highest (70 (60.9%)), and the number of homemakers was the highest (68 (59.1%)). The number of those whose monthly income was between 1,010,000 and 2,000,000 won was the highest (33 (28.7%)). To the question about rural life experiences, the majority of respondents (83 (72.2%) answered that 'they had a rural life experience,' and 32 respondents (27.8%) answered that they did not have any rural life experience but wanted to have, indicating that urban residents' interest in urban agriculture has continuously increased.

Exploratory factor analysis and reliability analysis were performed to examine the reliability and validity of the measurement variables of the effects of urban agriculture. A total of 15 variables of the effects were determined, and based on the results of factor analysis, the following three factors were selected: socially sustainable effect (Factor 1), negative effect (Factor 2) and economically sustainable effect (Factor 3). Their correlation with income level was tested, and those that showed a statistically significant difference depending on income level in Factor 1 include 'changes in dietary life,' 'psychological stability through crop cultivation,' 'restoring humanity through communion with nature' and 'vitalizing agriculture connected with local agriculture.' The rest items did not show any statistically significant difference depending on income level. Income level was not found to have a clear impact on Factor 2, 'negative effect.' One of the items in Factor 3, 'improved local environment,' was found to have an impact in relation with income level. These results are expected to be used as sufficiently meaningful data, once the curiosity of urban residents raised by their intellectual level is satisfied, and the demand base of urban agriculture is expanded according to the characteristics of urban residents.

Based on the results of this study, more studies need to be conducted on strategies and policies for the vitalization of urban agriculture to ensure people can access urban agriculture more easily by developing new types and models of urban agriculture that urban residents can enjoy.

References

Choi, S.A. 1999. An empirical study on lifestyle of adults living in urban area based on longitudinal analysing. Master's thesis, Ewha Womans University, Seoul, Korea.

Ji, T.G. 2012. A study on exploring an order of priority in urban agricultural policies: Using AHP analysis method. Doctoral dissetation, Paichai Universty, Deajeon, Korea.

Kang, J.H. 2016. Using statistical analysis according to the new spss program. Seoul, Korea: Crownbook Press.

Korea Rural Economic Institute. 2012. Weekly agriculture·rural trends report 26. Naju, Korea: Author.

Lee, D.G. 2013. A study of the preference on the type of urban agriculture and activity preferences by lifestyle. Master's thesis, Hanyang University, Seoul, Korea.

Lee, I.H. 2012. A study on the level of satisfaction of citizens participating into the urban farming and recognition on the farming village experience tourism. Master's thesis, University of Seoul, Seoul, Korea.

Lee, P.Y. 2003. Understanding of research and analysis theory. Paju-si, Korea: Free academy.

Oh, D.M. and Y.A. Choi. 2006. Urban agriculture that heal the world by meeting with nature. Seoul, Korea: Hakjisa.

Park, H.S. 2012. A study on collaborative governance for revitalization of the urban agriculture. Master's thesis, University of Seoul, Seoul, Korea.

Park, W.Z., B.H. Koo, M.O. Park, and H.J. Kwon. 2012. A comparative study on the recognition of urban agriculture between urban farmers and public officials. J. Korean Inst. Landsc. Archite. 40(4):90-103.

Seo, Y.S. 2011. A study on health status by social-economic status of middle-aged and elderly. J. Korean Gerontol. Soc. 31(4):1135-1153.

Son, B.W. 2011. Model development and vitalization scheme of urban agriculture in Pohang based on organic farming. Doctoral dissertation, Dankook University, Seoul, Korea.