

A Study on the Correlation Analysis between the User's View to the Planning Directions of the Environment-Friendly Apartment Housing and the Income Level

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ABSTRACT: This study aims to examine the differences of user's view, based on his income level, to the environment-friendly apartment housing in Korea. The contents of this research consists of two main parts. The first part is to select the influential planning factors of the environment-friendly apartment housing on the basis of the inquiry of precedent researches. The second part is to analyze the differences of user's consciousness the planning factors of the environment-friendly apartment housing, and study the correlation analysis between the income level and the user's view to the planning directions of the environment-friendly apartment housing. This research will contribute to the establishment of the site planning methods which increase the quality of residential environment in apartment housing.

Keywords: Environment-Friendly Apartment Housing, Planning Factor, User's View, Personal Characteristics, Income Level

1. INTRODUCTION

1.1 Purpose

In recent, the studies on the qualitative improvement of environment of the apartment housing are executed diversely in Korea. Especially, as the concept of 'Environmentally Sound Sustainable development (ESSD)' appears an important paradigm in the field of construction, the necessity and interest of the environment friendly apartment housing are being raised highly. Because the environment friendly apartment housing gives much influence on the improvement of not only the residence environment's ecological function but also the resident's satisfaction, the interest and attempt about the development of planning factors which reflect the importance of

environment are getting increase. I think, however, that the following problem must be solved in advance in order for the currently developed environmental-friendly planning factors and method to be used more realistically and effectively in establishing the environment-friendly apartment housing.

First, if the environment-friendly apartment housing is regarded as the component of physical environment which influences on the quality of human life, the quality of the environment-friendly apartment housing can be evaluated by the degree of satisfaction showing the users' request is satisfied to a certain extent. Therefore, the users' evaluation of the planning directions of the environment-friendly apartment housing which is executed in recent is required. Specially, the necessity of preceding

research in which the difference of users' consciousness about the planning directions of the environment-friendly apartment housing environment can be examined is raised up. It is the serious problem that the personal characteristics of residents, especially, their income levels, are not reflected in the currently progressed studies and tries on the environmental- friendly apartment housing.

Under the such problem consciousness, This study aims to find the differences of user's view, based on their income level, to the environment-friendly apartment housing in Korea. The contents of this research consist of two main parts. The first part is to select the influential planning factors of the environment-friendly apartment housing on the basis of the inquiry of precedent researches. The second part is to analyze the differences of user's consciousness to the planning factors of the environment-friendly apartment housing and study the correlation analysis between the income level and the user's view to the planning directions of the environment-friendly apartment housing. This research will contribute to the establishment of the site planning methods which increase the quality of residential environment in apartment housing.

1.2 Research Scope & Method

This study limites space range into unit plan, apartment building, site plan of environment-friendly apartment housing, and physical environment range that can be considered when the environment-friendly apartment housing is being planned. And the regional range is limited into Chungju City, a local small city area. And the contents of research is limited to the examination of the income level and user's consciousness to the environment friendly apartment housing, and the correlation analysis between the income level and user's consciousness.

In this study, the environment friendly planning factors was deduced from the internal and external case analysis, and the consideration of the previous researches and

documents. And the survey of user's consciousness on the importance of planning factors of the environment friendly apartment housing was executed by the questionnaire to residents in Chungju City. The collected data became database by using Microsoft(R) Excel 97 version, and the statistical analysis (ANOVA) was implemented by using SPSS12version in order to analyze the correlation between user's consciousness and income level

Table I: Questionnaire inspection outline

User's Income Level (unit : won)	Responded No. (total (unit:won) 439 papers)
20 millions and less	90
20-40 millions and less	227
40-60 millions and less	87
60 millions over	35

2. PLANNING FACTORS OF THE ENVIRONMENT-FRIENDLY APARTMENT HOUSING

In order to establish the main planning factors of environment-friendly apartment housing, the preliminary planning factors are derived from the case study of the documental and international environment-friendly apartment housings. The main planning factors are selected from planning factors, with having high selection frequency, by reviewing the previous researches of Yoon, J. H. and Yang, D. Y.(1996), Lee, J. J. and Lee, K. I.(1996), Korea Institute of Construction Technology. (2000), Korea National Housing Coperation. (1996), Park, W. K., Lee, J. J., Oh, S. H., Chang, S. S. and Lee, K. I. (1999), Jun, K. S. (2001). The derived planning factors can be regrouped into the divided 3 planning section(unit plan, building plan, site plan) of environment-friendly apartment housing.¹

¹) Chung, Y. S. and Yoon, C. S. 2002. A Study on the Characteristics of Planning Factors Applied to the Environment-Friendly Apartment Complex. Vol 13. No 5. Journal of the Korean Housing Association. p25, Table5 Korea. and Kim, H. J. 2002. A Users' Preference Study of Design Elements for Environmentally-Friendly Apartment Housing in Korea. Vol 18. No 6. Journal of the Architectural Institute of Korea. p31, Table4, Table5, Table6. Korea.

3. GENRAL CONSCIOUSNESS TO THE ENVIRONMENT FRIENDLY APARTMENT HOUSING

In order to review the difference of user's general consciousness, based on the income, to the environment friendly apartment housing, 5 questions are asked by means of questionnaire survey, which are '1.usually, you are interested in environment environment problem', '2.you have an action, using the recycled product and separated removing etc. practiced by considering environment problem', '3.you think environment problem should be improved prior to economy development', '4.you know well about the environment friendly', and '5.though price is a little higher, you buy the environment preservation product'.

Table 2: ANOVA's result of general consciousness to the environment friendly apartment housing

Test of Homogeneity of Variances		Levene Statistic	df1	df2	Sig.	
1.interest in environment problem		4.505	3	435	0.004	
2.practicing environment problem		0.424	3	435	0.736	
3.prior environment problem to economy		0.296	3	434	0.829	
4.understanding environment friendly APT		0.440	3	435	0.725	
5.buying the environmental product		4.747	3	435	0.003	
ANOVA		Sum of Squares	df	Mean Square	F	Sig.
1.interest in environment problem	Between Groups	4.015	3	1.338	2.343	0.072
	Within Groups	248.472	435	0.571		
	total	252.487	438			
2.practicing environment problem	Between Groups	2.394	3	0.798	2.138	0.095
	Within Groups	162.389	435	0.373		
	total	164.784	438			
3.prior environment problem to economy	Between Groups	2.547	3	0.849	0.920	0.431
	Within Groups	400.540	434	0.923		
	total	403.087	437			
4.understanding environment friendly APT	Between Groups	5.466	3	1.822	2.618	0.050
	Within Groups	302.748	435	0.696		
	total	308.214	438			
5.buying the environmental product	Between Groups	7.940	3	2.647	4.195	0.006
	Within Groups	274.443	435	0.631		
	total	282.383	438			

And ANOVA(Analysis of Variance) to the result of questionnaire survey(importance of the user's general consciousness) and their income level is implemented, In order to grasp whether the statistical difference exists or not in the user's general consciousness to the environment friendly apartment housing according to the their income. it is showed that there is statistical difference in the question of '4.understanding environment friendly APT' and '5.buying the environmental product'.

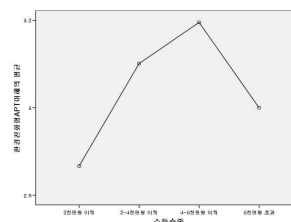


Figure 1: user's view of 'understanding environment friendly APT'

Comparing the average values of the importance with the each income level in the user's general consciousness of '4.understanding environment friendly APT', the importance was showed with the order of '20 millions and less', '60 millions over', '20-40 millions and less' and '40-60 millions and less'. It was known that the importance to understanding environment friendly APT is getting bigger comparing to income level except the highest income level of '60 millions over'.

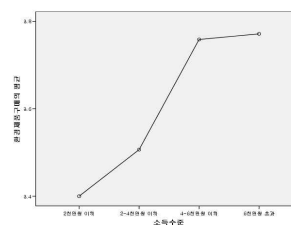


Figure 2: user's view of 'buying the environmental product'

Comparing the average values of the importance with the each income level in

the user's general consciousness of '5.buying the environmental product', the importance was showed with the order of '20 millions and less', '20-40 millions and less', '40-60 millions and less' and '60 millions over'. It was known that the importance to buying the environmental product becomes bigger comparing to income level.

Table 3: general consciousness to the environment friendly apartment housing (unit : millions won)

classification		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
4. understanding environment friendly APT	20 millions and less	90	2.87	0.86	0.09	2.69	3.05
	20-40 millions and less	227	3.10	0.84	0.06	2.99	3.21
	40-60 millions and less	87	3.20	0.74	0.08	3.04	3.35
	60 millions over	35	3.00	0.91	0.15	2.69	3.31
	total (unit:won)	439	3.06	0.84	0.04	2.99	3.14
5. buying the environmental product	20 millions and less	90	3.40	0.79	0.08	3.23	3.57
	20-40 millions and less	227	3.51	0.84	0.06	3.40	3.62
	40-60 millions and less	87	3.76	0.75	0.08	3.60	3.92
	60 millions over	35	3.77	0.60	0.10	3.57	3.98
	total (unit:won)	439	3.56	0.80	0.04	3.48	3.63

4. USER'S CONSCIOUSNESS TO THE PLANNING FACTORS OF THE ENVIRONMENT FRIENDLY APARTMENT HOUSING

4.1 unit planning factors of the environment friendly apartment housing

In order to review the difference of user's consciousness, based on the income, to the unit planning factors of the environment friendly apartment housing, 8 questions are asked by means of questionnaire survey, which are '1.field type balcony', '2.inside garden', '3.inside fountain', '4.natural lighting bathroom', '5.using water saving equipment', '6.energy saving type window', '7.green house type balcony' and '8.using solar energy'.

Table 4 : ANOVA's result of user's consciousness to the unit planning factors of the environment friendly apartment housing

Test of Homogeneity of Variances		Levene Statistic	df1	df2	Sig.
1.field type balcony		1.590	3	429	0.191
2.inside garden		1.968	3	431	0.118
3.inside fountain		0.711	3	426	0.546
4.natural lighting bathroom		0.894	3	428	0.444
5.using water saving equipment		4.830	3	432	0.003
6.energy saving type window		2.459	3	430	0.062
7.green house type balcony		1.451	3	431	0.227
8.using solar energy		1.491	3	429	0.216

ANOVA		Sum of Squares	df	Mean Square	F	Sig.
1.field type balcony	Between Groups	4.280	3	1.427	2.085	0.101
	Within Groups	293.480	429	0.684		
	total	297.760	432			
2.inside garden	Between Groups	4.761	3	1.587	2.483	0.060
	Within Groups	275.506	431	0.639		
	total	280.267	434			
3.inside fountain	Between Groups	3.034	3	1.011	1.151	0.328
	Within Groups	374.417	426	0.879		
	total	377.451	429			
4.natural lighting bathroom	Between Groups	2.559	3	0.853	1.463	0.224
	Within Groups	249.515	428	0.583		
	total	252.074	431			
5.using water saving equipment	Between Groups	4.088	3	1.363	2.690	0.046
	Within Groups	218.848	432	0.507		
	total	222.936	435			
6.energy saving type window	Between Groups	4.589	3	1.530	2.505	0.059
	Within Groups	262.620	430	0.611		
	total	267.210	433			
7.green house type balcony	Between Groups	3.723	3	1.241	1.933	0.123
	Within Groups	276.668	431	0.642		
	total	280.391	434			
8.using solar energy	Between Groups	2.930	3	0.977	1.532	0.206
	Within Groups	273.513	429	0.638		
	total	276.443	432			

And ANOVA(Analysis of Variance) to the result of questionnaire survey (importance of the user's consciousness) and their income level was implemented, In order to grasp whether the statistical difference exists or not in the user's consciousness to the unit planning factors of the environment friendly apartment housing according to the their income. It was showed that there is statistical difference in the question of '5. using water saving equipment'.

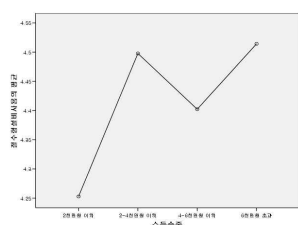


Figure 3: user's view of 'using water saving equipment'

Comparing the average values of the importance with the each income level in the user's consciousness of '5. using water saving equipment', The importance was showed with the order of '20 millions and less', '40-60 millions and less', '20-40 millions and less' and '60 millions over'. It was known that the importance to '5. using water saving equipment' becomes bigger comparing to income level except '40-60 millions and less'.

Table 5: user's consciousness to the unit planning factors of the environment friendly apartment housing (unit : millions won)

classification	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
5. using water saving equipment	20 millions and less	87	4.25	0.91	0.10	4.06 4.45
	20-40 millions and less	227	4.50	0.65	0.04	4.41 4.58
	40-60 millions and less	87	4.40	0.67	0.07	4.26 4.55
	60 millions over	35	4.51	0.61	0.10	4.30 4.72
	total (unit:won)	436	4.43	0.72	0.03	4.36 4.50

4.2 building planning factors of the environment friendly apartment housing

In order to review the difference of user's consciousness, based on the income, to the building planning factors of the environment friendly apartment housing, 5 questions are asked by means of questionnaire survey, which are '1.garden on the roof', '2.kitchen garden on the roof', '3.greening side wall and balcony', '4.semi-permanent equipment' and '5.nature friendly type entrance hall'.

Table 6: ANOVA's result of user's consciousness to the building planning

factors of the environment friendly apartment housing

Test of Homogeneity of Variances		Levene Statistic	df1	df2	Sig.	
1.garden on the roof		5.206	3	432	0.002	
2.kitchen garden on the roof		1.164	3	431	0.323	
3.greening side wall and balcony		0.720	3	428	0.541	
4.semi-permanent equipment		0.397	3	432	0.755	
5.nature friendly type entrance hall		1.638	3	429	0.180	
ANOVA		Sum of Squares	df	Mean Square	F	Sig.
1.garden on the roof	Between Groups	15.593	3	5.198	6.282	0.000
	Within Groups	357.444	432	0.827		
	total	373.037	435			
2.kitchen garden on the roof	Between Groups	7.038	3	2.346	2.556	0.055
	Within Groups	395.615	431	0.918		
	total	402.653	434			
3.greening side wall and balcony	Between Groups	12.454	3	4.151	4.553	0.004
	Within Groups	390.203	428	0.912		
	total	402.657	431			
4.semi-permanent equipment	Between Groups	1.758	3	0.586	1.153	0.328
	Within Groups	219.682	432	0.509		
	total	221.440	435			
5.nature friendly type entrance hall	Between Groups	3.060	3	1.020	1.433	0.233
	Within Groups	305.439	429	0.712		
	total	308.499	432			

And ANOVA(Analysis of Variance) to the result of questionnaire survey(importance of the user's consciousness) and their income level was implemented, In order to grasp whether the statistical difference exists or not in the user's consciousness to the building planning factors of the environment friendly apartment housing according to the their income. it was showed that there is statistical difference in the question of '1.garden on the roof' and '3.greening side wall and balcony'.

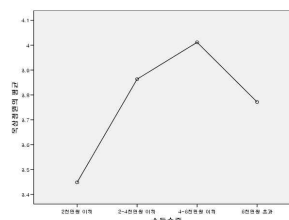


Figure 4: user's view of 'garden on the roof'

Comparing the average values of the importance with the each income level in

the user's consciousness of '1.garden on the roof', The importance was showed with the order of '20 millions and less', '60 millions over', '20-40 millions and less' and '40-60 millions less'. It was known that the importance to '1.garden on the roof' becomes bigger comparing to income level except '60 millions over'.

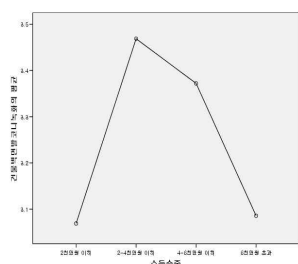


Figure 5: user's view of 'greening side wall and balcony'

Comparing the average values of the importance with the each income level in the user's consciousness of '3.greening side wall and balcony', The importance was showed with the order of '20 millions and less', '60 millions over', '40-60 millions and less' and '20-40 millions and less'. It was known that the importance to '3.greening side wall and balcony' becomes bigger comparing to income level in '20 millions and less' and '20-40 millions and less', and becomes smaller comparing to income level in '40-60 millions and less' and '60 millions over'.

Table 7: user's consciousness to the building planning factors of the environment friendly apartment housing (unit : millions won)

classification		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
1. garden on the roof	20 millions and less	87	3.45	1.04	0.11	3.23	3.67
	20-40 millions and less	227	3.86	0.91	0.06	3.74	3.98
	40-60 millions and less	87	4.01	0.78	0.08	3.84	4.18
	60 millions over	35	3.77	0.84	0.14	3.48	4.06
	total (unit:won)	436	3.80	0.93	0.04	3.72	3.89
3. greening side	20 millions and less	87	3.07	1.08	0.12	2.84	3.30

wall and balcony	20-40 millions and less	224	3.47	0.91	0.06	3.35	3.59
	40-60 millions and less	86	3.37	0.96	0.10	3.17	3.58
	60 millions over	35	3.09	0.89	0.15	2.78	3.39
	total (unit:won)	432	3.34	0.97	0.05	3.25	3.43

4.3 site planning factors of the environment friendly apartment housing

In order to review the difference of user's consciousness, based on the income, to the site planning factors of the environment friendly apartment housing, 14 questions are asked by means of questionnaire survey, which are '1.streamlet', '2.pond (biotope)', '3.waste recycling', '4.kitchen garden', '5.compost lot', '6.learning place for nature and animal', '7.planting fruit trees', '8.parking material having percolation', '9.using natural energy', '10.storage tank for rain water', '11.common cleaning water equipment', '12.natural type children playing equipment', '13.lawn parking pavement', '14.symbol of environment friendliness'.

Table 8: ANOVA's result of user's consciousness to the site planning factors of the environment friendly apartment housing

Test of Homogeneity of Variances		Levene Statistic		df1	df2	Sig.
1.streamlet		0.661		3	417	0.576
2.pond (biotope)		0.084		3	417	0.969
3.waste recycling		0.293		3	421	0.831
4.kitchen garden		0.570		3	418	0.635
5.compost lot		1.160		3	422	0.325
6.learning place for nature and animal		1.916		3	420	0.126
7.planting fruit trees		5.988		3	421	0.001
8.parking material having percolation		1.217		3	420	0.303
9.using natural energy		0.782		3	422	0.505
10.storage tank for rain water		0.717		3	420	0.542
11.common cleaning water equipment		2.866		3	420	0.036
12.natural type children playing equipment		1.033		3	422	0.378
13.lawn parking pavement		2.818		3	422	0.039
14.symbol of environment friendliness		0.642		3	422	0.588
ANOVA		Sum of Squares	df	Mean Square	F	Sig.
1.streamlet	Between Groups	3.841	3	1.280	1.591	0.191
	Within Groups	335.632	417	0.805		
	total	339.473	420			
2.pond (biotope)	Between Groups	4.044	3	1.348	1.895	0.130
	Within Groups	296.702	417	0.712		

	total	300.746	420			
3.waste recycling	Between Groups	0.339	3	0.113	0.259	0.855
	Within Groups	183.698	421	0.436		
	total	184.038	424			
4.kitchen garden	Between Groups	3.119	3	1.040	1.287	0.278
	Within Groups	337.793	418	0.808		
	total	340.912	421			
5.compost lot	Between Groups	2.827	3	0.942	0.959	0.412
	Within Groups	414.856	422	0.983		
	total	417.683	425			
6.learning place for nature and animal	Between Groups	5.044	3	1.681	1.867	0.134
	Within Groups	378.192	420	0.900		
	total	383.236	423			
7.planting fruit trees	Between Groups	4.808	3	1.603	2.379	0.069
	Within Groups	283.555	421	0.674		
	total	288.362	424			
8.parking material having percolation	Between Groups	1.739	3	0.580	1.006	0.390
	Within Groups	242.034	420	0.576		
	total	243.774	423			
9.using natural energy	Between Groups	0.663	3	0.221	0.487	0.691
	Within Groups	191.433	422	0.454		
	total	192.096	425			
10.storage tank for rain water	Between Groups	1.702	3	0.567	0.914	0.434
	Within Groups	260.713	420	0.621		
	total	262.415	423			
11.common cleaning water equipment	Between Groups	4.721	3	1.574	2.359	0.071
	Within Groups	280.220	420	0.667		
	total	284.941	423			
12.natural type children playing equipment	Between Groups	3.870	3	1.290	2.035	0.108
	Within Groups	267.566	422	0.634		
	total	271.437	425			
13.lawn parking pavement	Between Groups	10.607	3	3.536	3.711	0.012
	Within Groups	402.109	422	0.953		
	total	412.716	425			
14.symbol of environment friendliness	Between Groups	11.523	3	3.841	4.087	0.007
	Within Groups	396.573	422	0.940		
	total	408.096	425			

And ANOVA(Analysis of Variance) to the result of questionnaire survey(importance of the user's consciousness) and their income level was implemented, In order to grasp whether the statistical difference exists or not in the user's consciousness to the site planning factors of the environment friendly apartment housing according to the their income. it was showed that there is statistical difference in the question of '13.lawn parking pavement' and '14.symbol of environment friendliness'.

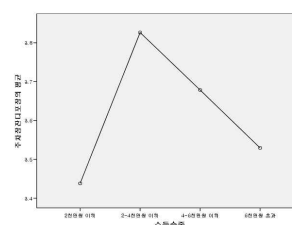


Figure 6: user's view of 'lawn parking pavement'

Comparing the average values of the importance with the each income level in the user's consciousness of '13.lawn parking pavement', The importance was showed with the order of '20 millions and less', '60 millions over', '40-60 millions and less' and '20-40 millions and less'. It was known that the importance to '13.lawn parking pavement' becomes bigger comparing to income level in '20 millions and less' and '20-40 millions and less', and becomes smaller comparing to income level in '40-60 millions and less' and '60 millions over'.

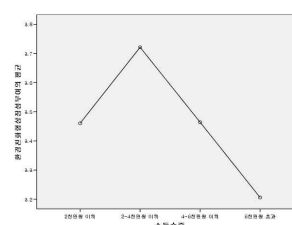


Figure 7: user's view of 'symbol of environment friendliness'

Comparing the average values of the importance with the each income level in the user's consciousness of '14.symbol of environment friendliness', The importance was showed with the order of '60 millions over', '20 millions and less', '40-60 millions and less' and '20-40 millions and less'. It was known that the importance to '14.symbol of environment friendliness' becomes bigger comparing to income level in '20 millions and less' and '20-40 millions and less', and becomes smaller comparing to income level in '40-60 millions and less' and '60 millions over'.

Table 9: user's consciousness to the site planning factors of the environment friendly apartment housing (unit : millions won)

classification		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
13.lawn parking pavement	20 millions and less	89	3.44	1.12	0.12	3.20	3.67
	20-40 millions and less	219	3.83	0.93	0.06	3.70	3.95
	40-60 millions and less	84	3.68	0.96	0.10	3.47	3.89
	60 millions over	34	3.53	0.93	0.16	3.21	3.85
	total)	426	3.69	0.99	0.05	3.60	3.79
14.symbol of environment friendliness	20 millions and less	89	3.46	1.00	0.11	3.25	3.67
	20-40 millions and less	219	3.72	0.96	0.06	3.59	3.85
	40-60 millions and less	84	3.46	0.96	0.11	3.26	3.67
	60 millions over	34	3.21	0.98	0.17	2.86	3.55
	total (unit:won)	426	3.58	0.98	0.05	3.48	3.67

5. CONCLUSION

This study started from the need that the differences of user's view to the environment-friendly apartment housing must be examined based on his personal characteristics, especially income level. The main contents of this research is to analyze the correlation between the user's view to the planning directions of the environment-friendly apartment housing and the income level of residents.

the result of ANOVA(Analysis of Variance) between the user's important consciousness and their income level showed that there is statistical difference in '5. using water saving equipment' of the unit planning factors, '1.garden on the roof' and '3.greening side wall and balcony' of the building planning factors and '13.lawn parking pavement' and '14.symbol of environment friendliness' of the site planning factors. It was known that the importance to '5. using water saving equipment' becomes bigger comparing to income level except '40-60 millions and less'. the importance to '1.garden on the roof' becomes bigger comparing to income level except '60 millions over'. It was known that

the importance to '3.greening side wall and balcony', '13.lawn parking pavement' and '14.symbol of environment friendliness' becomes bigger comparing to income level in '20 millions and less' and '20-40 millions and less', and becomes smaller comparing to income level in '40-60 millions and less' and '60 millions over'.

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