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# Critical Success Factors of the Urban Environmental Quality

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**Abstract**

Application of technologies can improve our urban environmental quality and enhance the quality of our lives. However, the use of technologies and the development of economy can also pollute and damage our urban environmental quality. Living in poor environments mean more expenses of unrenewable resources and more environmental burdens for future generations. It can also cause profound negative influences on individuals, businesses, and the country as a whole. Therefore, when pursuing wealth growth and economic development, both governments and businesses must invest more in improving the urban environmental qualitys in the neighborhoods and in the country as well. In this study, a questionnaire survey was conducted on residents in Fujian Province. Totally 1,000 questionnaires were distributed and 873 valid samples were returned with a return rate of 87.3%. According to the findings of this study, it is found that (1) the most important dimension of urban environmental quality is the "external environment" dimension (with a weight value of 0.378), followed by the "management" dimension (with a weight value of 0.354) and the "internal environment" (with a weight value of 0.268); and (2) among the 13 CSFs of urban environmental quality, the top five with the highest weight values are: health, sustainability, security, awareness, and convenience. Hopefully, this study can provide helpful references for the development planning and improvement of urban environmental quality in the city.

**Keywords:** city environment, urban environmental quality, critical success factor (CSF)

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## INTRODUCTION

Technology development has both positive and negative influences on economic activities. There are mutual interactions among economic development, environment quality, and technology application. Economic development can be fueled by the application of new technologies while technology advancements can bring people more and better products/services. However, technology application and economic development can also pollute and damage people's urban environmental quality. For example, the use of air-conditioning and lighting can enhance the quality of urban environmental quality but the power generation that provides electri City required for air-conditioning and lighting can cause significant impacts on the urban environmental quality, natural environment and ecosystems. Therefore, it is important to incorporate energy-saving residential buildings (Hsueh 2012, Liu K et al. 2018) and green construction materials (Liu K et al. 2017) in the design and implementation of rural development.

Living in poor environments mean more expenses of unrenewable resources and more environmental burdens for future generations. It can also cause profound negative influences on individuals and businesses. It can adversely affect a person both physically and mentally, causing him or her to perform worse at work. Location in a poor urban environmental quality is also detrimental to a company for it may lose business opportunities and fail to recruit good talent. If the urban environmental qualitys in a country are poor, the country will not enjoy healthy competitiveness. Therefore, when pursuing wealth growth and economic development, both governments and businesses must invest more in improving the urban environmental quality in the neighborhoods and in the country as well. Therefore, this study is conducted with a view to providing references for the improvement of urban environmental quality in the city.

## LITERATURE REVIEW

### Urban Environmental Quality

As defined by Shebaro et al. (2015), an urban environmental quality refers to a substantial structure,

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which provides shelter for the physical safety of its residents, along with its surrounding environment. In other words, an urban environmental quality is composed of all the tangible infrastructures and intangible conditions/backgrounds in the living space. Gan et al. (2014) indicate an urban environmental quality is composed of all the tangible and intangible conditions related to human behaviors of living. Therefore, all the internal and external conditions related to people's living behaviors, including tangible infrastructures and intangible social and cultural backgrounds, can influence people's urban environmental qualitys. According to the research by Yoon and Srinivasan (2015), a urban environmental quality can be divided into indoor environment (rooms, structures, decorations, facilities, utilities, elevators, stairways, etc.); residential environment (sunlight, relationships with neighbors, public space, playgrounds, roads, ground treatment, drainage and sewerage, waste water and waste treatment, energy supply, geography, orientation, etc.); neighborhood and community environment (relationships of people in the neighborhood/community, public facilities/services, air quality, noise condition, use of surrounding land, etc.); and city or regional environment (including all the above-mentioned environments and all the major facilities for all kinds of cultural, economic and social activities in a City or region). Cui et al. (2016) also divide a urban environmental quality into environment inside the residence (including compartments, area, internal facilities, ventilation, lighting, sunlight, etc.) and environment outside the residence, which is further divided into substantial environment (facilities for activities of education, culture, business transactions, leisure enjoyment, traffic, etc.) and non-substantial environment (environmental quality, interpersonal relationships in the neighborhood, condition of public security, legal regulations, social customs, etc.). Siraj et al. (2015) divide an urban environmental quality into natural environment (air, water, sunlight, weather, geography, and topography), substantial environment (base, house architecture, structure and indoor facilities, land zoning, public facilities and services, etc.) and non-substantial environment (relationships with neighbors, local social/economic/cultural conditions, legal regulations, social customs, etc.). Li et al. (2016) divide an urban environmental quality into artificial environment (or altered environment) and natural environment. The so-called "natural urban environmental quality" is the natural environment in which the community is based, including the conditions of geography, typography, landscape, air, soil, noise, vegetation, animals, etc. The natural urban environmental quality has an inevitable influence on the life patterns of the residents. If there are some undesirable conditions in the natural urban environmental quality, artificial improvements are needed. Mao et al. (2015) also point out that an "artificial environment" is composed of all the tangible and intangible products and results that are caused from all the activities and processes of man-made design and construction and capable of influencing people's life patterns. The quality of an artificial urban environmental quality is determined by factors such as land acquisition, community position, construction design/implementation, maintenance, management, etc. If any of the factors is missing or inappropriate, the quality of the urban environmental quality will be impaired by problems such as leakage or sewerage blockage. Poor quality of the urban environmental quality will damage the physical and psychological well-being of its residents, which will consequently have a negative influence on those companies they work for and also on the country as a whole. Therefore, urban environmental quality is an important issue for not only individuals but also businesses and governments seeking sustainable development (Hsueh, 2015).

**Evaluation of Urban Environmental Quality**

The measurement of urban environmental quality is not limited to measuring the quality of construction process or inspecting if the construction follows a specific design or standards. It should focus more on if the final result (residential building) meets the required specifications and standards. If yes, the urban environmental quality is of good quality; if not, the urban environmental quality is of poor quality (Doherty 2015). However, urban environmental quality also involves the promises and services of real estate salespeople and construction companies even before the construction of the residential buildings, which makes the evaluation of urban environmental quality more complicated than merely the evaluation of physical residential buildings (Cui et al. 2016). In addition, residents also develop their expectations of the urban environmental quality before the construction of their residential buildings. They also have different levels of participation in the construction process. All these expectations and experiences will also have an influence on their perceptions of the urban environmental quality after the construction is completed. Huang et al. (2014) point out that residents as customers have different personalities, which also has an influence on their expectations and perceptions of urban environmental

quality. To conclude, the evaluation of urban environmental quality is based on the comparison of the environment quality expected by the residents and the environment quality perceived by the residents (Li et al., 2016). As proposed by Siraj et al. (2015), a customer's evaluation of service quality (Q) is equal to his/her perceived service quality (P) minus his/her expected service quality (E). The formula is "Q=P-E". Mastorakis and Makris (2014) hypothesize that "customers' expectation" represents "the level of customers' attention" and, therefore, propose the formula: "Q=E(P-E)", using "customers' expectation" as a weight index. Yoon and Srinivasan (2015) define "waiting quality" as the result of comparing the quality expected and the quality perceived by the waiting customer. Based on the above-mentioned research, the urban environmental quality in this study is defined as "the environmental quality perceived by community residents (P) minus the urban environmental quality expected by community residents (E)". If the result is equal to or larger than zero, it means the urban environmental quality is of good quality. If the result is smaller than zero, it means the urban environmental quality is of quality poorer than expected.

### Critical Success Factors

Developed by Hosseini and Keshavarz (2017), the "critical success factor" (CSF) approach or "key success factor" (KSF) approach is a method for organizations to define their information demands. Beskese et al. (2015) believe the information system of a company must identify, select, and focus on the CSFs in the industry. There are three to six CSFs in most of the industries. Since 1979, there have been an increasing number of studies on CSFs, which helped to form a gradual consensus on CSFs. Most researchers believe CSFs are a kind of unique assets, techniques, resources, activities and capabilities that a manager should have (Chaudhary and Uprety 2016). If a manager wants to succeed in an industry, he or she must have these CSFs in order to have a long-term competitive edge over his/her competitors. Masudin and Saputro (2016) believe that, in the consideration of CSFs, it is important to pay attention to the characteristics of each CSF. Among the studies on CSFs, there are common findings as follows:

(1) CSFs change with time;

(2) Different industries, products and markets have different CSFs;

(3) CSFs change along with the changes of an industry's life cycle;

(4) CSFs have to factor in the trends of future development;

(5) If a company fails to have prior full understanding of the CSFs in the industry, its investment in CSFs will fail;

(6) A manager must focus on specific issues or key jobs in order to determine the CSFs;

(7) A manager must focus on the CSFs in his or her management work; and

(8) A manager must have deep understanding of and commitments to the CSFs, using them as the foundation for strategy formulation (Boselli et al. 2015).

## RESEARCH DESIGN AND METHODOLOGY

### Delphi Method

In this study, the Delphi method is used to establish the dimensions for the AHP analysis. This method is also called "specialist survey method", collecting opinions from specialists on targeted issues. The opinions are then compiled and sent back to the specialists, who may modify their opinions based on the compiled opinions and then send back their opinions. Through several repetitions of this process, a consensus of opinions on the targeted issues is gradually formed. The Delphi method and the dimensions determined using this method both have high objectivity (Hsueh and Cheng 2017).

In the application of the Delphi method, the specialists express their opinions anonymously and there is no discussion or communication among them. They only contact the surveyor. After several repetitions of the process of consultations, collection of specialists' opinions, compilation of their opinions, and revisions of their opinions, a consensus of opinions is formed among the specialists on the targeted issues and their consensus is used as the foundation of the research. This method has extensive representativeness and relatively high reliability.

### Establishment of Evaluation Indicators

The original version of the questionnaire to be used in this study was emailed to several specialists. Their opinions on what should be measured in the evaluation of urban environmental quality were collected and compiled. The compiled opinions were emailed to the specialists to ask for their opinions again. After several repetitions of the same process, a consensus was developed on the major categories of measurement units among the specialists. Then a meeting was held

**Table 1.** Weight Values of the Dimensions and CSFs of urban environmental quality

| Dimension | Hierarchy II Weight | Hierarchy II Ranking | CSF | Overall Weight | Overall Ranking |
|---|---|---|---|---|---|
| Internal Environment | 0.268 | 3 | Security | 0.098 | 3 |
| | | | Comfort | 0.080 | 6 |
| | | | Aesthetics | 0.050 | 12 |
| | | | Technology | 0.066 | 9 |
| External Environment | 0.378 | 1 | Convenience | 0.084 | 5 |
| | | | Quietness | 0.062 | 10 |
| | | | Health | 0.119 | 1 |
| | | | Service | 0.071 | 8 |
| Management | 0.354 | 2 | Sustainability | 0.104 | 2 |
| | | | Awareness | 0.092 | 4 |
| | | | Differentiation | 0.046 | 13 |
| | | | Participation | 0.053 | 11 |
| | | | Control | 0.075 | 7 |

with all the specialists discussing and finalizing the three dimensions of CSFs for urban environmental quality: internal environment, external environment, and management. These dimensions and their CSFs were used to develop the AHP questionnaire. The three dimensions and their CSFs established in this study using the Delphi method are as follows:

(1) internal environment dimension: security, comfort, aesthetics, and technology;

(2) external environment dimension: convenience, quietness, health, and service; and

(3) management dimension: sustainability, awareness, differentiation, participation, and control.

### Research Subjects

The AHP questionnaire survey subjects in this study are residents in Fujian Province, mainland China. Totally 1,000 questionnaires were distributed and 873 valid samples were returned with a return rate of 87.3%.

## ANALYSIS RESULTS

Based on the questionnaire results, the weight value of each dimension and each CSF was calculated. The weight value of a dimension or a CSF represents the level of its importance to the subjects in their evaluations of urban environmental quality. The weight value calculation results are shown in **Table 1**.

## CONCLUSION

Based on the analysis results, the following conclusions are reached in this study:

Among the Hierarchy II dimensions, the weight of the "external environment" dimension is 0.378, accounting for 37.8% of the overall weight, followed by the "management" dimension (with a weight of 0.354) and the "internal environment" (with a weight of 0.268). This finding indicates that the "external environment" dimension is the most important dimension in the subjects' evaluation of their urban environmental quality.

The CSFs in each dimension are ranked according to their weight values. The ranking results are listed as follows:

1. Ranking of CSFs in the internal environment dimension: security, comfort, technology, and aesthetics;

2. Ranking of CSFs in the external environment dimension: health, convenience, service, and quietness; and

3. Ranking of CSFs in the management dimension: sustainability, awareness, control, participation, and differentiation.

Based on the ranking of all the CSFs according to their weight values, the top five among the 13 CSFs of urban environmental quality are health, sustainability, security, awareness, and convenience, indicating these five CSFs are considered as the most important factors of urban environmental quality by the subjects.

## SUGGESTIONS

Based on the above-mentioned findings, the following suggestions are made in this study in the hope of providing specific references for the improvement of urban environmental quality in the City:

1. It is suggested that, in the city development planning and design, decisions regarding the green coverage rate should be made by incorporating the opinions of residents. In addition, in the planning and establishment of leisure facilities or activities in the City, it is suggested to focus more on those facilities or activities that are helpful for the health of residents and capable of enhancing the participation and convenience for the residents, such as well-planned cycling routes and walking routes or regular cultural activities such as exhibitions and performances in the community.

2. It is suggested that better planning of city land use and space functionality development should be implemented in order to improve the sustainability of urban environmental quality in the City. Urban environmental qualitys in the City can be improved through better building designs, better traffic connectivity, better green spaces, and better resource availability.

3. It is suggested that governmental authorities should develop a holistic system of urban environmental quality evaluation, through which they can find out the key factors that result in the disparity of urban environmental quality in different city areas so that they can make timely adjustments to correct the disparity by addressing these key factors instead of waiting for the next round of city planning or an overhaul of development policies of the City.

## REFERENCES


Beskese A, Demir HH, Ozcan HK, Okten HE (2015) Landfill site selection using fuzzy AHP and fuzzy TOPSIS: a case study for Istanbul. Environmental Earth Sciences, 73(7): 3513-3521. https://doi.org/10.1007/s12665-014-3635-5

Boselli R, Cesarini M, Mercorio F, Mezzanzanica M (2015) Applying the AHP to Smart Mobility Services: A Case Study. Paper presented at the DATA. https://doi.org/10.5220/0005580003540361

Chaudhary A, Uprety I (2016) Analysis of telecom service quality factors with analytic hierarchy process and fuzzy extent analysis: a case of public sector unit. International Journal of Business and Systems Research, 10(2-4): 162-185. https://doi.org/10.1504/IJBSR.2016.075750

Cui C, Geerman S, Hooimeijer P (2016) Access to homeownership in city China: A comparison between skilled migrants and skilled locals in Nanjing. City, 50: 188-196.

Doherty G (2015) Quality in family child care: A focus group study with Canadian providers. Early Childhood Education Journal, 43: 157-167. https://doi.org/10.1007/s10643-014-0645-6

Gan C, Hu B, Gao C, Kao B, Cohen DA (2014) An empirical analysis of homeownership in city China. Journal of Asia Business Studies, 8(1): 1–17. https://doi.org/10.1108/JABS-01-2012-0005

Hosseini MH, Keshavarz E (2017) Using fuzzy AHP and fuzzy TOPSIS for strategic analysis measurement of service quality in banking industry. International Journal of Applied Management Science, 9(1): 55-80. https://doi.org/10.1504/IJAMS.2017.082414

Hsueh SL (2012) A fuzzy utility-based multi-criteria model for evaluating households' energy conservation performance: A taiwanese case study, Energies, 5(8): 2818-2834. https://doi.org/10.3390/en5082818

Hsueh SL (2015) Assessing the effectiveness of community-promoted environmental protection policy by using a Delphi-fuzzy method: A case study on solar power and plain afforestation in Taiwan. Renewable and Sustainable Energy Reviews, 49: 1286-1295. https://doi.org/10.1016/j.rser.2015.05.008

Hsueh SL, Cheng AC (2017) Improving air quality in communities by using a multicriteria decision-making model based on big data: A critical review. Applied Ecology and Environmental Research, 15(2): 15-31. https://doi.org/10.15666/aeer/1502_015031

Huang X, Dijst M, Weesep JV, Zou N (2014) Residential mobility in China: Home ownership among ruralecity migrants after reform of the hukou registration system. Journal of Housing and the Built Environment, 29: 615-636. https://doi.org/10.1007/s10901-013-9370-5

Li D, Chen Y, Chen H, Kai G, Hui CM, Yang J (2016) Assessing the integrated sustainability of a public rental housing project from the perspective of complex eco-system. Habitat International, 53: 546-555. https://doi.org/10.1016/j.habitatint.2016.01.001

Liu KS, Hsueh SL, Chen HY (2018) Relationships between Environmental Education, Environmental Attitudes, and Behavioral Intentions toward Ecolodging, Open House International, 43(2): 5-12.

Liu KS, Liao YT, Hsueh SL (2017) Implementing smart green building architecture to residential project based on Kaohsiung, Taiwan. Applied Ecology and Environmental Research, 15(2): 159-171. https://doi.org/10.15666/aeer/1502_159171

Mao Y, Fornara F, Manca S, Bonnes M (2015) Perceived Residential Environment Quality Indicators and neighborhood attachment: A confirmation study on a Chinese sample in Chongqing. PsyCh Journal, 4(3): 123-137. https://doi.org/10.1002/pchj.90

Mastorakis G, Makris D (2014) Fall detection system using Kinect's infrared sensor. Journal of Real-Time Image Processing, 9(4): 635-646. https://doi.org/10.1007/s11554-012-0246-9

Masudin I, Saputro T (2016) Evaluation of B2C website based on the usability factors by using fuzzy AHP & hierarchical fuzzy TOPSIS. Paper presented at the IOP Conference Series: Materials Science and Engineering. https://doi.org/10.1088/1757-899X/114/1/012091

Shebaro B, Oluwatimi O, Bertino E (2015) Context-based access control systems for mobile devices. Dependable and Secure Computing, IEEE Transactions on, 12(2): 150-163. https://doi.org/10.1109/TDSC.2014.2320731

Siraj I, Kingston D, Melhuish E (2015) Assessing quality in early childhood education and care: Sustained shared thinking and emotional well-being (SSTEW) scale for 2–5- year-olds provision. London, England: Trentham Books.

Yoon H, Srinivasan S (2015) Are They Well Situated? Spatial Analysis of Privately Owned Public Space, Manhattan, New York City. City Affairs Review, 51(3): 358–380. https://doi.org/10.1177/1078087414552457