

Operational Performance of Affordable Housing Projects

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Abstract. This work explores the performance of affordable housing (AH) projects in the City of Wuhan in China. The idea behind this research work is on the basis of sustainable development which focuses on the long term benefit rather than short term advantage. An AH project is successful when the need of all stakeholders are determined and addressed simultaneously even if their preferences differ. There are three main stakeholders in AH projects: 1. government and municipalities, 2. Companies which provide AH services and 3. Customers who are using AH services. In order to evaluate each stakeholder different tools are used: Analytical hierarchy process (AHP) is used for evaluating the priorities of government and the municipalities. Sense and respond method is applied to evaluate the performance of the companies engaged in providing AH services. Lastly, statistical approaches are used for evaluating the satisfaction of customer in AH project in the city of Wuhan. An exploration into the government's and municipalities' preferences reveals that building new houses and the renovation of existing ones are the criteria received highest priorities in the city of Wuhan. Evaluation of company performance shows that companies operating in the AH area mainly falls under analyser category- trying to consider cost and quality in their services simultaneously. Finally, customer satisfaction analysis shows that the highest priorities for AH customers in the city of Wuhan is access to private services like shops, banks, restaurants etc. while having a sauna in the apartment & the overall quality of the building (public areas, corridors, lift etc.) receive the lowest interest.

Keywords: affordable housing (AH), sustainable society, sense and respond(S&R), critical factor index (CFI), customer satisfaction, China, city of Wuhan

1. Introduction

With the largest population in the world, China has the most challenging affordable housing concepts. Unlike European countries, where the social and welfare system is very advanced and well structured, the social system in the developing countries, like China, is still in developing stage. Until 1979, the Chinese government was responsible to provide housing to its residents, while the right of ownership belonged to the state. This system faced a number of problems such as the volume of affordable homes and quality of available housing. Since then, the Chinese government have launched numerous housing policies with the goal of privatization of houses and to improve the efficiency of housing system (Deng et al. 2009). Despite the effort of the Chinese government, still the concept of affordable housing (AH) is quite young in China and more research and investigation is needed to improve the

performance of AH in China to make the system efficient. This study attempts to draw a picture of AH concepts in the city of Wuhan to assist decision makers in realizing the objectives of social housing in the locality. Besides, this study gives an overview of AH projects in Finland and in Poland to illustrate how the AH projects are followed differently around the world.

This study starts with the presentation of AH model which is developed to evaluate the performance of AH project. After that, the case and data collection method will be presented. Then in empirical part, the result of the investigation of AH project in the city of Wuhan will be presented. This section also includes a comparison of macro level priorities between China - the city of Wuhan and Finland. Finally, discussion and conclusion will come.

2. Affordable housing: important part of Sustainable society

Sustainable society foundation defines three dimensions of sustainability in any society/country: human wellbeing, 2. Environmental wellbeing and 3. Economic wellbeing. Human wellbeing has three sub categories: basic needs, personal development and well-balanced society. Therefore, having an access to food and shelter are considered basic necessities, thus constitutes an important element of having a sustainable society¹. In most societies, housing is a major component in creating a stable and healthy society. Moreover, housing is often the largest single household expenses (ARA, 2011). The goal of affordable housing is to ensure affordability of rental or owner occupied of houses to everyone in the society, regardless of their level of income (Hoek_smith & Diamond 2003).

Housing has a peculiar position in the welfare state. Affordable housing is subsidized directly and indirectly in all societies. At the macro level housing has been assessed an important driver of the banking crisis in 2008. This sector was much affected by a crisis in Europe which showed the need for implementing the EU policy open to changing social housing systems (Czischke 2014; Scanlon et al. 2015). Social housing providers are under pressure to negotiate their policies and explain their achieved results to local authorities and other stakeholders, in a way to balance the effect of increased market-orientation and decreased central government control (Mullins 2006; Czischke 2009). A number of cultural and societal changes is impacting the nature of demand on social housing providers. These changes relate mainly to the rapidly evolving socio-demographic composition of societies, and the new needs and expectations emerging from those changes (Czischke 2009). In different countries, the social housing providers have been increasingly subject to general market regulations intended to stimulate competition. The need of border comparative studies was implied by Wang and Murie who noticed that housing policy focus mainly on European and North American systems, and are underpinned by theories developed for the welfare state (2011).

Challenges that development seems to be similar because a political pressure to respond to growing affordable housing shortages across major metropolitan areas. There is a sort of “housing trap” in many EU countries, for people who try to enter the housing market: the rental sector is expensive and home ownership is not an option due to the even higher cost (the state of housing in the EU 2015, Report). For example, in the case of Poland wide range of policy instrument for supporting affordable housing policy, based on new institutional and government support program, was implemented in 2016. The government's housing support program provides for preferential loans and the emissions bond redemption security (Bujny, Maśliński 2016). The affordable housing in Poland includes three subsectors: dwelling owned by municipalities, non-profit housing association mainly provide by public companies and dwelling that were owned by companies – to decrease the cost of construction. The new program calls “apartment plus” (part of the National Housing Program) has a scheme focuses on stable, long-term rental. It assumed building affordable housing on land owned by the state or state firms. The main target of the scheme are people who earn too much to qualify for social housing, but

¹ <http://www.ssfindex.com/>

at the same not enough to be able to take out a mortgage. The National Housing Program also provides other instruments like supporting for the systematic saving for an apartment and increasing the number of constructed housing for low-income households within the municipality. The main aim of the program is to improve the situation of the families for which it is impossible to obtain housing on the commercial market and ensure the satisfaction of housing need. Such initiatives are also undertaken in other countries, regardless of their welfare.

2.1 Affordable housing model

This study applies the AH model developed and implemented in Finland in 2012. In this model three key stakeholders in AH project are determined and the goal is to measure and satisfy the need of these three stakeholders simultaneously. These three main stakeholders are: government and municipalities, customers and companies which provide affordable houses for low income people in society (Forss,2013).

In order to measure/evaluate different stakeholders in AH concepts different tools and/or method are applied:

1. To establish the government and municipalities priorities, analytical hierarchy process (AHP) is used. This helps decision makers to know what their priorities are to develop AH project in coming years.
2. To evaluate companies providing AH services, sense and respond method is applied to evaluate the critical factor indices (CFIs). CFIs also are used for evaluating companies' competitive advantages and SCA (sustainable competitive advantage) level.
3. To evaluate customer satisfaction, different statistical approaches are applied to get an indication on how customer satisfaction can be improved.

3. Method

3.1 Sense and Respond

Sense and respond questionnaire was developed by Ranta and Takala 2007(Ranta & Takala 2007). In order to use sense and respond method, respondents from different managerial level of company are asked to evaluate mentioned attributes in terms of experience (current situation) and expectation (future) and score it from 1 to 10. Later on, these answers are used for calculating critical factor indices- determining which attributes have higher priorities and needs improvement.

Table 1: Format of the sense and respond Questionnaire developed by Ranta and Takala 2007

Performance attribute	Scale: 1=low, 10=high		Compared with competitors			Direction of development		
	Expectation (1-1)	Experience (1-10)	worse	same	better	worse	same	better
attribute 1								
attribute 2								

Adapted from Ranta and Takala 2007

3.2 Manufacturing strategy and RAL model

According to Miles and Snow topology, there are four groups of business strategy types: prospector, analyser, defender and reactor. Prospectors are those companies which have strategic orientation and are leading their market, analyser groups focus on quality and cost at the same time and tries to produce high quality product at low cost. Defenders concentrate on efficiency and process

improvement and prefer not to take risks; they strengthen efficiency and maintain their current customers. Reactors usually have no-strategy and act in absence of defined goals and objectives (Daft 2009).

The way to integrate Miles & Snow Topology (Miles 1978) into Sense and Response methodology is to use RAL Model. RAL is abbreviated from *Responsiveness*, *Agility* and *Leanness*. A firm can optimize the RAL model components (Responsiveness, Agility, Leanness) by prioritizing between cost, quality, time and flexibility (Takala 2012).

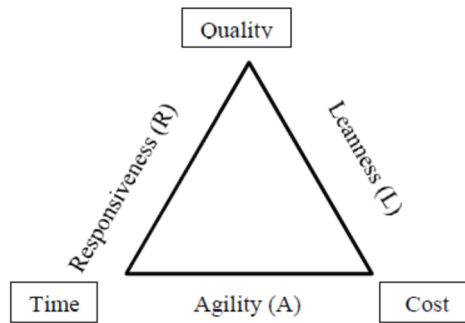


Figure 1. RAL Model (Takala 2012).

3.3 Analytical hierarchy process

The AHP method, which is based on the pairwise comparison between criteria was introduced to apply for mathematics and psychology for the first time, but nowadays this method is used for making decisions in business, industry, health care, education and even government. It is a multi-attribute decision instrument that allows considering quantitative, qualitative measures and making trade-offs (Saaty,1980).In order to determine government and municipalities priorities with AHP method, three main criteria are defined the next stage is to define sub-criteria related to the main criteria.

Goal	Housing Model												
Main criteria	Housing Diversification				Government Interventions				Property development				
Sub-Criteria	Market Finance rental Housing	States subsidized rental housing	Right of occupancy	Special group housing	Social housing demand support	Social housing supply support	Location region development	Social infrastructure	Regulation of rent and entitlement	Maintenance and management	Renovation of existing houses	Production of new homes	Demolition of houses

Figure 2. Macro-level priorities for AHP method in AH project

In order to implement the AHP method, two main steps are conducted: firstly, participants are given two different sub-criteria from above charts then they choose which of them is more important. The next step is to give a weight from 1-9, to the chosen factor, in order to indicate, to what extent selected factor is more important than the other one. Selection of 1 implies that both factors are equal in terms of significance. These two main steps are conducted for the whole pair of sub-criteria from above table.

4. Case introduction

With the largest population in the world, China has one of the most challenging affordable housing conditions. The Chinese government has been actively developing affordable housing system and the supply of the rental homes with control over land, regulations and capital. Over the years, Chinese housing system has moved from centrally planned public housing system to a market-oriented housing production industry (Deng et al.2009). Unlike most European countries which have very developed social welfare system, in most of the Asian countries the social welfare systems are still developing and are seen as inadequate compared to their large amount of low-income population.

Until 1979 and under the old system, Chinese government was responsible for providing housing for residents as part of social welfare system. However, this system caused housing shortage and the Chinese government launched the first economic reform in 1979. The Chinese affordable system has faced four waves of development from 1979 till now (Forss et al.2016):

- 1979: to adjust rents and try to privatize the existing housing stock
- 1994: Economical and Comfortable Housing (ECH) and Housing Provident Fund (HPF) with the goal of reducing the gap between supply and demand side of the housing system.
- 1998: with the goal of guiding private sector to follow strangely government's institution's criteria
- 2004: Cheap Rental Housing Program (CRH) with the aim to support extremely low-income households to rent house. The previous programs were based on ownership but in this CRH program, rental solution is provided to the people who were not able to buy house in previous program or are not able to rent house from free market.

Both private and public capital is financing housing in China. China's housing supply system is comprised into two parts, commercial housing supply system and security housing system. Commercial housing supply targets medium income group and security housing system focus on the low income groups (Forss et al.2016).

Cooperating Finland and University of Vaasa affordable housing research group with the Wuhan university of Technology, affordable housing studies have been executed in the city of Wuhan. The study is conducted by the affordable housing model which was proposed by university of Vaasa researchers and had been launched in 2012 in Finland, the city of Turku. The model has been applied once again in 2016 in Finland, China, Poland and some other part of the world.

5. Data collection

In order to investigate AH concept in the city of Wuhan, three different questionnaires have been distributed among respondents. For customer satisfaction investigation, totally 49 respondents have answered the questionnaire. In order to evaluate macro level strategy, AHP priorities have been distributed among the managers of two different organizations that are able to influence on AH strategies in the city of Wuhan. Here they are briefly named as group A and B. However, their performance and the way they influence on AH strategies are completely different. While the Company A is responsible to provide its employee with support to buy AH, company B provides financial help to citizen to buy / renovate houses. Company B is not a bank, but a part of its responsibility is to provide loans with low interest rate for people who plan to buy houses. Three respondents from A and 10 respondents from B have answered the questionnaire. Finally, in order to investigate the performance of companies which provides AH services, company C is selected which

is preparing different equipment like TV and fridge and etc. for affordable houses. Totally 13 respondents from company C has answered to sense and respond questionnaire.

6. Empirical results

6.1 Regional policies

The AHP priorities for regional policies (the city of Wuhan) for company A is shown in the following figure:

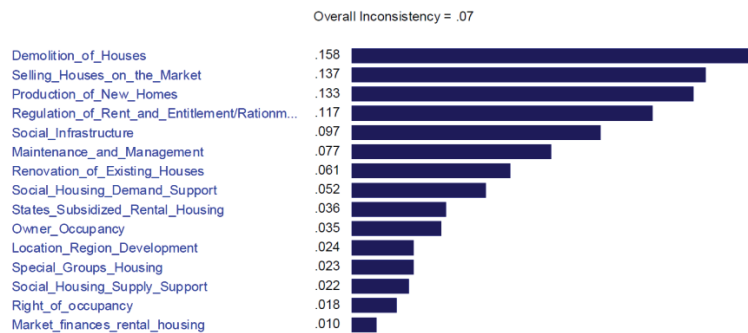


Figure 3. Macro level priorities, company A

Three respondents have answered the questionnaire and the inconsistency rate is 0.07 which indicates the reliability of the answers.

As it is explained previously, company A does not work directly in housing scope but since it is a big employer in the city of Wuhan, it is responsible to prepare affordable houses. Therefore, it influences on AH strategies in the city of Wuhan. Company A is providing cheap housing units to its employees. The length of occupancy is not regulated. The housing unit is not permitted to be sold to the third party, but company redeems the housing unit when necessary.

Demolishing the homes and selling houses in market are the two criteria with the highest priorities. Demolishing the homes has gain the highest priority as company's houses are (very) old and the company's goal is to reform the housing capacity (when one owner moves out the company generally destroys it and built a new one for next owner instead). Selling the house was considered second most important as company A plan is to sell its houses to its employee and also to free market to have the money to follow its goal in AH area.

The AHP priorities for regional policies for company B is shown in the following:

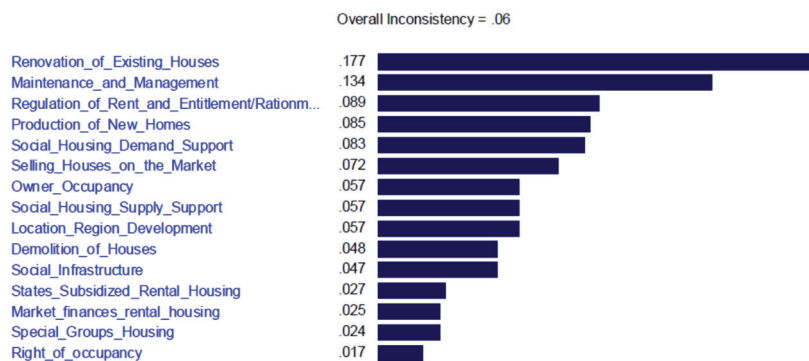


Figure 4. Macro level priorities, Company B

Ten respondents from company B have answered to this questionnaire and the inconsistency ratio is 0.6 which reflects the reliability of answers. The company B provides financial support for a different

issue related to accommodation with a very low interest rate. Their main priorities for this company are renovation of existing houses and maintenance and management because they do not require a huge amount of money and in this case, company B can support more customers with their available financial support.

6.2 Policy comparison: Finland _ China

Affordable housing projects were investigated in China in 2012 for the first time. Comparing the results between the year 2012 and 2016 (in the city of Wuhan) shows that in 2012 the main priorities for decision makers in the area of AH was “Government intervention”(Forss,2013) while the main priority in 2016 in Wuhan is “Property development”. The following charts represent these results.

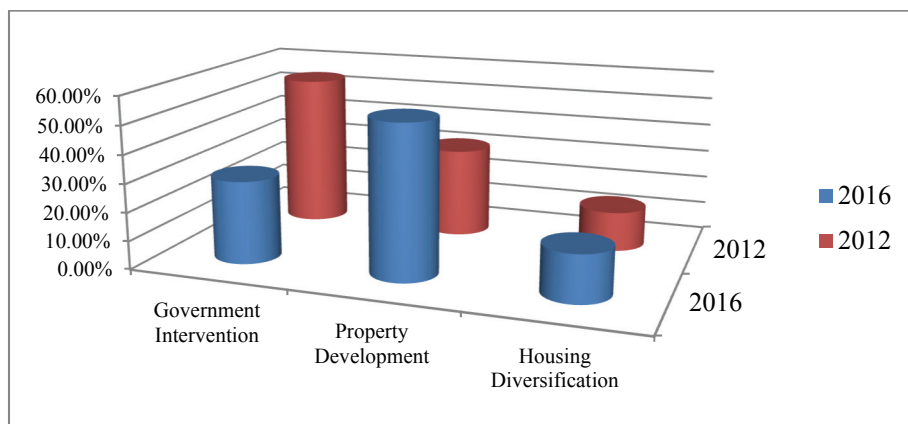


Figure 5: Macro-level priorities for housing policy in China: 2012 Vs. 2016

Another valuable comparison is to consider the results of policy priorities in Finland and in China in 2016. This comparison is presented in the next figure:

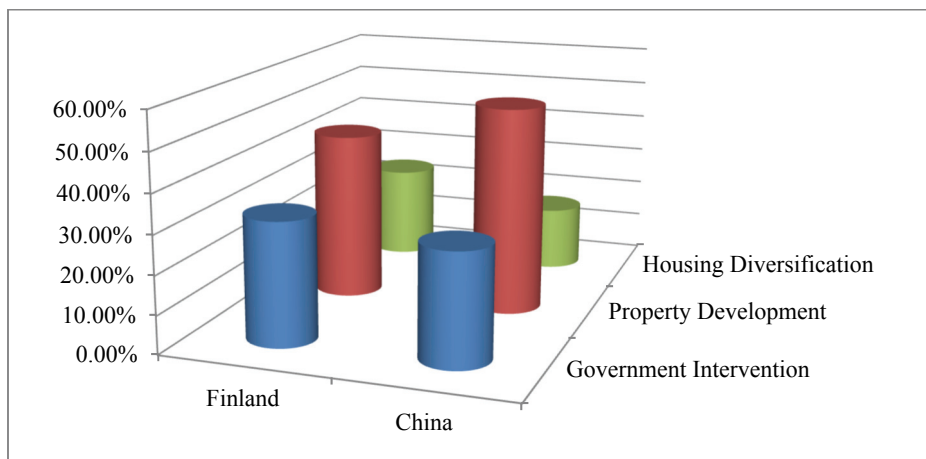


Figure 6: Macro-level priorities for housing policy in 2016: Finland vs. China

As the chart shows, for decision makers in both countries “property development” has the highest priorities. However, the share of this attribute is higher in China compared to Finland—which comes as the house in Wuhan are quite old and the government has high tendency to increase the quality of those by making new houses or renovate them.

Table2. Main factors importance present values

	Finland	China
Government Intervention	32.10%	29.30%
Property Development	43.60%	54.00%
Housing Diversification	24.30%	16.70%

When head to head comparison between main factors are made housing diversification and property development has the result with highest variance 0.283 which indicate greater disagreement between respondents

6.3 Companies' analysis

Company C works in different housing business of manufacturing appliances such as (TV, refrigerator and etc.) for houses (affordable houses). 13 respondents have answered to the sense and respond questionnaire. The results of the analysis of company performance are shown in the following:

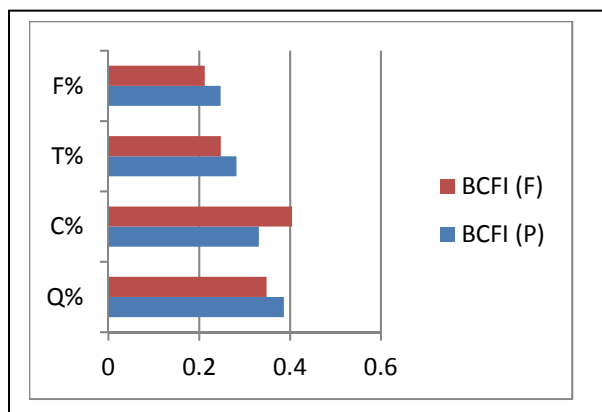


Figure 7: company competitive prioritize

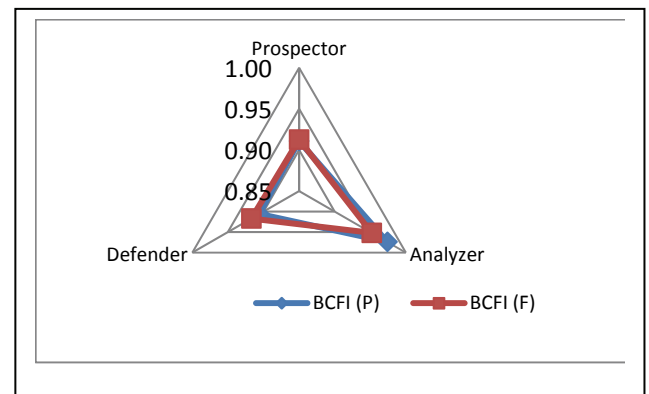


Figure 8: company business strategy

As it is presented in figure 7 and 8 company business strategy is mainly analyser which tries to keep balance between cost and quality. It can be interpreted in such a way that, as the company is quite new, it focuses on cost and quality at the same time in order to gain competitive advantage compare to others.

6.4 Customer satisfaction analysis

49 respondents answered to customer satisfaction questionnaire. As the next diagram shows Chinese customer of AH in the city of Wuhan are mainly:

1. Customers who live in 3 rooms or more,
2. They are living in their house more than three years,
3. They are mainly parents with their children and
4. They plan to buy their house.

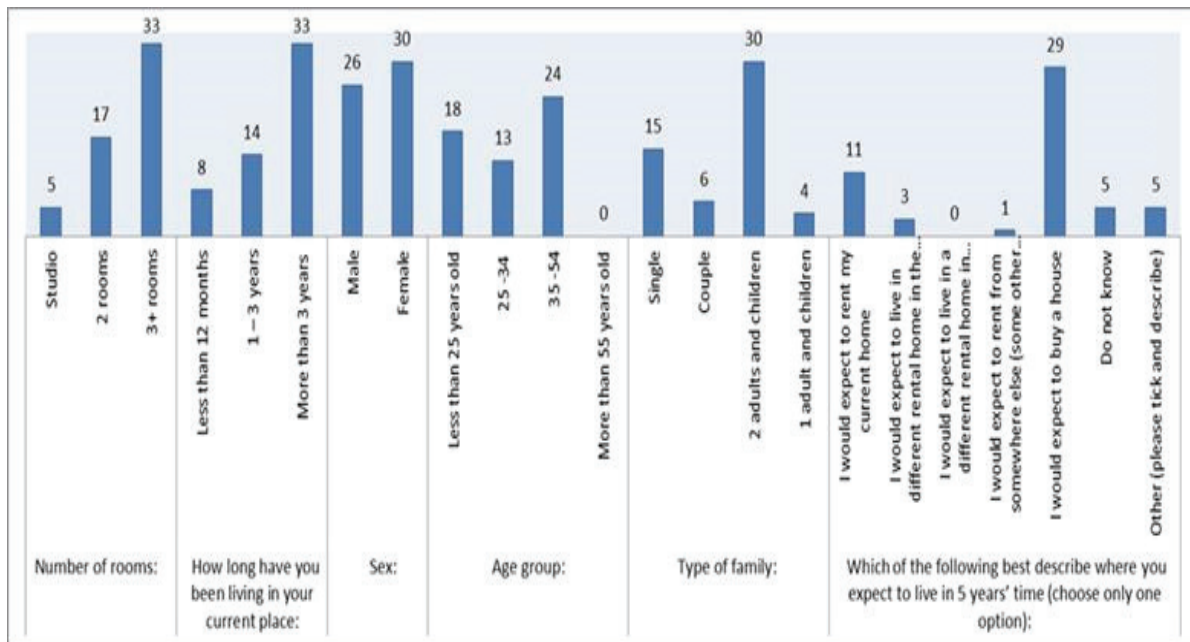


Figure 9: presentation of demographic data of AH customer in Wuhan

Correlation analysis shows that the following item are positively correlated to each other:

- The security and safety of the neighbourhood & The amount of your rent (including service charges) provided value for money , 95%
- Mass transportation & Company as a housing provider , 95%
- Outdoor areas (parks, recreational facilities etc.) & Company as a housing provider, 95%
- Layout of your home & Company as a housing provider, 91%

Defining overall impact factor for the results which is =importance*experience, the highest priorities for AH customers in city of Wuhan is Access to private services like shops, banks, restaurants etc. while having sauna in the apartment & The overall quality of the building (public areas, corridors, lift etc. have the lowest priorities to improve in order to improve customer satisfaction.

7. Discussion and conclusion

This paper evaluates the operational performance of affordable housing projects in city of Wuhan with the model which has been developed and implemented in Finland, City of Turku. In detail, this research indicates the need and measures the satisfaction of all three stakeholders in AH project in city of Wuhan and propose an improvement plan for future. Overall, this research obtained the following results about AH project in city of Wuhan: 1. at macro level strategy, decision makers are trying to improve the affordable houses condition either by demolishing current house and make new houses or by providing financial resources for maintenance of the houses, 2. It seems that companies have tendency to sell houses in free market at macro level strategy to provide monetary resources to follow AH projects, 3. Companies which provide AH services are mainly analyser meaning that they try to consider cost and quality at the same time to encourage customer and to gain competitive advantage over other competitors and finally 4. For the customers of AH, having access to private services like shops, banks, restaurants etc. has the highest priority while the overall quality of the building (public areas, corridors, lift etc. has the least importance compare to other criteria.

Generally there are money reasons to put large population permanently or temporary in need of affordable houses in today's world. One of those is urbanization which is growing very fast. Other

reasons such as natural disaster, conflict around the world, big number of immigrant and asylum seekers and etc. are also some causes of the need of affordable houses around the world. Considering the issue which is described above, providing house and especially affordable houses for low income of society is an important problem which is needed to be considered by decision makers.

This study applied the model which was developed in Finland to evaluate the performance of AH situation in city of Wuhan. Despite Finland, the AH project in China is still at initial stage and this study is a start point for further studies in other cities/region of China. The results of such study provide decision makers with more realistic picture of AH in studies and help them to follow better strategies for future.

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