# A REVIEW OF POTENTIALS OF LIFECYCLE FACTORS IN MODELLING RESIDENTIAL LOCATION CHOICE AND ENSURING SOCIAL SUSTAINABILITY

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**Abstract -** Rapid urbanization had occurred mostly in developing countries globally. This has caused urban sprawl and transform rural agricultural land into new urban, which is dominated by housing areas to serve the growing population in most metropolitan cities. As the housing prices increase in cities, people tends to choose residential location outside of the city center, which is in suburban or periphery where residential cost are lower. As the residential is the start and ending point of the daily movement and journey, residential location influence the social, economic and environmental factors in sustainable development. Social sustainability is one of the essential dimension in sustainable development. It can be defined as the ability to accommodate and provide an environment that is conducive, compatible and act as a viable space for human interaction, communication and cultural development for current and future generations to come. In modelling Residential Location Choice (RLC), the decision of residential location will affect the mobility patterns and the costs involved. Many researchers focused on the decision of residential location by considering the determinants of RLC but minor attention has been given to the potentials of lifecycle factors in RLC and ensuring sustainable development, particularly in social sustainability. Therefore, this paper aims to investigate the influence of lifecycle factors on the determinants of RLC. Then, this paper aims to address the gap by investigate the potentials for ensuring social sustainability by the inclusion of lifecycle factors in modelling RLC. From the result, we can conclude that there are significant connection and potentials of the inclusion of modelling RLC in achieving social sustainability. Furthermore, ensuring social sustainability can be enhanced by paying extra attention to the determinants of RLC that influenced by the lifecycle factors. This review will enable a deeper understanding on how lifecycle factors are essentials and highly need to take into consideration in modelling RLC in order for planners and practitioners to make better plan for human settlement in cities and its inhabitants.

**Keywords -** Residential location choice, social sustainability, lifecycle, urban sprawl, suburban, periphery, residential, sustainable development.

## I. INTRODUCTION

Rapid urbanization and population growth has occurred globally since the beginning of the 20th century (Benna & Garba, 2016). According to United Nations (2012), the world urban population is expected to increase by 72 per cent by 2050, from 3.6 billion in 2011 to 6.3 billion in 2050. This rapid growth has gained attention and continuously been addressed by urban scholars, planners, as well as development practitioners. One of the evidence of this rapid growth can be seen in most urban areas, in the shape of sprawling. Urban sprawl has become the underpinning issues and recognized by many geographer, urban and rural planner as well as researcher. It is widely known in bringing various adverse unsustainable impacts to the region with more investment will be required for new infrastructure and increase commuting time and distance of people which eventually consumes massive energy and produce discharges that pollutes the environment.With the current situations, moving towards in achieving sustainable development in rapid urban growth is a very challenging road to be taken as it depends on the ability of urban planning to shape the Residential Location Choice (RLC) of households within the space (Acheampong & Anokye, 2013).

In modelling RLC, the decision of residential location will affect the mobility patterns and the costs involved. Many researchers focused on the decision of residential location by considering the determinants of RLC but minor attention has been given to the potentials of lifecycle factors in RLC and ensuring sustainable development, particularly in social sustainability.

This area is essential to be addressed in this current time because (letak importance of lifecycle in RLC in social sustainability)In order to address this gap this paper draws upon the examination of evidence from the literature on the influence of lifecycle factors on the determinants of RLC and their relationship to the aspects of social sustainability to seek potentials in ensuring social sustainability.

The paper follows in 3 sections. Section 2 discusses the influence of lifecycle factors on the determinants of RLC. Section 3 discusses the potentials of ensuring social sustainability with the inclusion of lifecycle factors in modelling RLC follows with summary and discussion. The final section will be the summary and conclusion.

## II. THE INFLUENCE OF LIFECYCLE FACTORS ON THE DETERMINANTS OF RESIDENTIAL LOCATION CHOICE

### 2.1. Determinants of Residential Location Choice

Modelling RLC will enable researchers to obtain a clear understanding of households' behaviour and the determinants that influence the decisions of residential location. According to Fujita (1989), households' RLC can be viewed as the trade-off situation problem, in which there are three fundamental factors: accessibility, space, and environmental amenities.Previous researchers have identified that households' behaviour regarding RLC are influenced by a set of factors simultaneously; commonly, housing cost (Zürich et al., 1996; (Acheampong & Anokye, 2013; Jin & Lee, 2017), residential and neighbourhood quality (Aliu & Ajala, 2014; Guo & Bhat, 2001; Jin & Lee, 2017), environmental quality (Acheampong & Anokye, 2013), access to work (Acheampong & Anokye, 2013; Ben-akiva & Bowman, 1998; Guo & Bhat, 2001; Waddell, 1996; Zürich et al., 1996), ICT (Kwan & Weber, 2003) and facilities (Goffette-nagot, 1996; Guo & Bhat, 2001). Table 1 summarize the determinants of RLC by previous researchers.

**Table 1: Summary of the determinants of residential location choice**

| Determinants | Indicators | Author, year, publication |
|---|---|---|
| Accessibility | Access to work/school; shopping opportunities (shops and services); recreational opportunities | Fujita (1989)<br>Goffette-Nagot (1996)<br>Ben-akiva& Bowman (1998)<br>Guo&Bhat (2001)<br>Kim, Pagliara& Preston (2005)<br>Karsten (2007)<br>Prashker, Shiftan&Hershkovitch (2008)<br>Pagliara, Preston & Simmonds (2010)<br>Boterman, Karsten&Musterd (2010)<br>Acheampong&Anokye (2013)<br>Lawton, Murphy & Redmond (2013)<br>Aliu&Ajala (2014)<br>Chiarazzo, Coppola, Dell'Olio, Ibeas&Ottomanelli (2014)<br>Beckers&Boschman (2017)<br>Jin & Lee (2017) |
| Space Quality | Cost of dwelling; size of dwelling; age of dwelling; layout; safety and security; relations; social problems | Fujita (1989)<br>Goffette-Nagot (1996)<br>Guo&Bhat (2001)<br>Clark & Huang (2003)<br>Kim, Pagliara& Preston (2005)<br>Bhat&Guo (2007)<br>Hur& Morrow-Jones (2008)<br>Prashker, Shiftan&Hershkovitch (2008)<br>Pagliara, Preston & Simmonds (2010)<br>Acheampong&Anokye (2013)<br>Lawton, Murphy & Redmond (2013)<br>Aliu&Ajala (2014)<br>Chiarazzo, Coppola, Dell'Olio, Ibeas&Ottomanelli (2014)<br>Beckers&Boschman (2017)<br>Jin & Lee (2017) |
| Environmental amenities | Water-based; land-based; backyard lawn/garden; air quality; noise | Rossi (1955)<br>Fujita (1989)<br>Earnhart (2001)<br>Guo&Bhat (2001)<br>Pagliara, Preston & Simmonds (2010)<br>Acheampong&Anokye (2013)<br>Chiarazzo, Coppola, Dell'Olio, Ibeas&Ottomanelli (2014) |

### 2.2. The Influence of Lifecycle Factors on the Determinants

A brief review was conducted in seeking other external factors that could influence the RLC of the household. It is found that there are moderating effect of lifecycle on the intensity or significance of RLC determinants. However, this part is still in process of make it as an official evidence of the moderating effect that occur. Table 2 below summarize the possible moderating effect on the determinants of RLC.

**Table 2: Compilation lifecycle factors that influence other variables in RLC**

| Lifecycle Factor | Year | Contributor | Variables Influenced |
|---|---|---|---|
| Age | 2008 | Prashker, Shiftan&Hershkovitch (2008) | Access to work, cost of dwelling, layout, age of dwelling. |
| | 2010 | Arentze, Timmermans&Veldhuissen (2010) | |
| | 2013 | Lawton, Murphy & Redmond (2013) | |
| | 2017 | Jin & Lee (2017) | |
| Ethnic | 2001 | Guo&Bhat (2001) | Access to recreational opportunities, access to shopping opportunities. |
| | 2017 | Beckers&Boschman (2017) | |
| Gender | 2001 | Guo&Bhat (2001) | Access to work, access to shopping opportunities. |
| | 2008 | Prashker, Shiftan&Hershkovitch (2008) | |
| | 2010 | Arentze, Timmermans&Veldhuissen (2010) | |
| | | Eliasson (2010) | |
| Household Size | 1996 | Goffette-nagot (1996) | Access to work/school, access to shopping opportunities, access to recreational opportunities, cost of dwelling, age of dwelling, traffic noise, natural feature |
| | 2007 | Karsten (2007) | |
| | 2010 | Boterman, Karsten&Musterd (2010) | |
| | | Eliasson (2010) | |
| | | Feldman et al. (2010) | |
| | | Hunt (2010) | |
| | | Simmonds (2010) | |
| | | Waddell (2010) | |
| | 2017 | Beckers&Boschman (2017) | |
| Income | 1996 | Goffette-nagot (1996) | Access to work/school, access to shopping opportunities, cost of dwelling, air quality, traffic noise, size of dwelling, type of dwelling, age of dwelling, neighbourhood features, neighbourhood environment, and layout. |
| | 2001 | Guo&Bhat (2001) | |
| | 2007 | Bhat&Guo (2007) | |
| | | Karsten (2007) | |
| | 2008 | Prashker, Shiftan&Hershkovitch (2008) | |
| | 2010 | Boterman, Karsten&Musterd (2010) | |
| | | Eliasson (2010) | |
| | | Feldman et al. (2010) | |
| | | Hunt (2010) | |
| | | Hunt, Abraham & Weidner (2010) | |
| | | Martinez &Donoso (2010) | |
| | | Pagliara, Preston & Kim (2010) | |
| | | Simmonds (2010) | |
| | | Waddell (2010) | |
| | 2014 | Aliu&Ajala (2014) | |
| | 2017 | Jin & Lee (2017) | |
| Level of Education | 2001 | Guo&Bhat (2001) | Access to work/school, access to recreational |
| | 2008 | Prashker, Shiftan&Hershkovitch (2008) | |

| | | | |
|---|---|---|---|
| | 2010 | Boterman, Karsten&Musterd (2010) | opportunities, traffic noise, air quality. |
| | 2017 | Beckers&Boschman (2017) | |
| Marital Status | 2010 | Arentze, Timmermans&Veldhuissen (2010) | Access to work/school, age of dwelling, type of dwelling. |
| | | Feldman et al. (2010) | |
| | | Eliasson (2010) | |
| Occupation | 1998 | Ben-akiva& Bowman (1998) | Access to work, access to shopping opportunities. |
| | 2010 | Arentze, Timmermans&Veldhuissen (2010) | |
| | | Boterman, Karsten&Musterd (2010) | |
| | | Feldman et al. (2010) | |
| | | Hunt (2010) | |
| | 2013 | Lawton, Murphy & Redmond (2013) | |

## III. THE POTENTIALS OF ENSURING SOCIAL SUSTAINABILITY WITH THE INCLUSION OF LIFECYCLE FACTORS IN MODELLING RLC

### 3.1. Sustainable Development

There are many ways in defining sustainable development; either regarding its concept, goals or what it specifically seeks to achieve by using the indicators. According to (Kuhlman & Farrington, 2010), sustainable development effort that we have today was originated from the concept of sustainability in forestry, which means never harvesting more than what the forest yields in new growth (Wiersum, 1995). Then, the report of the United Nations World Commission on Environment and Development, also known as Brundtland Report adopted these concepts and became a starting point of widely used concept in achieving sustainable development. According to the Brundtland Report, sustainable development can be defined as;

"Ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs"(Brundtland, 1987).

Kates, Parris, & Leiserowitz (2016) stated that there are three major categories of "what is to be sustained" as identified by the Board on Sustainable Development; which are nature, life support systems, and community. There are also intermediate categories; which are Earth, environment, and culture. The focus on "what should be developed," should include people, economy and society have been chosen to be focused. The focus on economic development has been shifted to human development (increased life expectancy, education, equity, and opportunity) recently, and as explain by Kates, Parris, & Leiserowitz (2016) it finally includes the security and well-being of national states, regions, and institutions as well as the social capital relationships and community ties. Another model on sustainable development discussion, the three pillars of economic, social and environment) as shown in Figure 2 (that the sphere framework was originally from René Passet in the year 1979). It was created and widely used in 2002 World Summit on Sustainable Development and became the starting point of further expansion of that standard definition (Kates et al., 2016). At the World Summit, the Johannesburg Declaration stated;

"A collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development – economic development, social development and environmental protection – at local, national, regional and global levels" (Johannesburg Declaration on Sustainable Development, 2002)

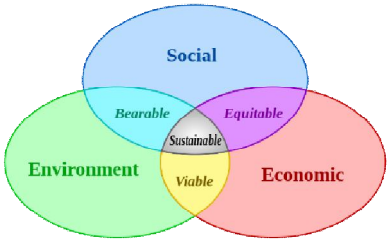


**Fig. 1: The three pillars of sustainable development**

In seeking achievement in sustainable development, there are three sets of goals in different time-horizons; the short term (2015) goals of the Millennium Declaration of the United Nations; the two-generation goals (2050) of the Sustainability Transition of the Board on Sustainable Development; and the long-term (beyond 2050) goals of the Great Transition of the Global Scenario Group (United Nations, 2015).

### 3.2. Defining Social Sustainability

Social sustainability is one of the essential dimension in sustainable development. It can be defined as the ability to accommodate and provide an environment that is conducive, compatible and act as a viable space for human interaction, communication and cultural development for current and future generations to come.There are hundreds of indicators in measuring the efforts including the global, national and local initiatives. Reviews of the indicators have

been done in effort of defining social sustainability based on sustainable development. It is done based on the twelve selected efforts to characterize and measure sustainable development by (Parris & Kates, 2003) and the indicators related to this paper are shown in Table 3 below.

**Table 3: Indicators of Sustainable Development selected for this study**

| Indicator Initiative | Num. of Indicator | Social Indicator |
|---|---|---|
| Commission on Sustainable Development (United Nations, 2015) | 59 | Equity, health, education, housing, security, stabilized population |
| Consultative Group on Sustainable Development Indicators ("International Institute for Sustainable Development," 1999) | 46 | Same as above |
| Wellbeing index (Wagner, 2006) | 99 | Needs, choices, opportunities |
| Environmental Sustainability Index (World Economic Forum, 2002) | 69 | Anthropogenic stress, health, nutrition, institutions, social patterns of skills, attitudes, networks |
| Global Scenario Group (Goodman, Hammond, Kates, & Sonntag, 1995) | 65 | Health services, institutions, human needs (food, water, and health), education, participation |
| U.S. Interagency Working Group on Sustainable Development Indicators (Berry, 1998) | 40 | Dignity, peace, equity, safety, health, quality of life |
| Boston Indicator Project (Benner, 2000) | 159 | society, culture, education, housing, health, safety, transportation |
| State Failure Task Force (Esty et al., 1998) | 75 | Peace, security |

### 3.3. The Potentials of Lifecycle Factors in Modelling RLC in order to ensure social sustainability

In order to see the potentials of lifecycle factors in modelling RLC in order to ensure social sustainability, the determinants of RLC that influenced by lifecycle factors (in Table 2, section 2.2) are systematically synthesize with the social indicators of sustainable development (summarized from Table 3, section 3.2) and the results are shown as in Table 4 below.

**Table 4: The potentials of ensuring social sustainability**

| Social Indicator | Accessibility | Space Quality | Environmental Amenities |
|---|---|---|---|
| Equity | / | / | / |
| Health | / | | / |
| Education | / | | |
| Housing | / | / | |
| Security | | / | |
| Needs | / | / | |
| Opportunities | / | / | / |
| Attitudes | | / | / |
| Networks | / | | |
| Participation | | | / |
| Safety | | / | |
| Quality of life | / | / | / |
| Society | | | / |
| Culture | / | / | |
| Transportation | / | | |

## SUMMARY AND DISCUSSION

The systematic synthesize review has been conducted to see the potentials of lifecycle factors in modelling RLC in order to ensure social sustainability. As shown in Table 4, all three determinants of RLC have potentials in ensuring social sustainability. In terms of accessibility, the inclusion of lifecycle factors will further ensure social sustainability through equitable access to work/school, recreational and to goods and services. In terms of space quality, social sustainability can be achieved through access to decent housing. In modelling RLC, decent housing condition can be measured by the cost, age, size and type of dwelling, as well as layout (neighborhood features and environment). Last but not least, in terms of environmental amenities, social sustainability may be promoted through equitable access to green space (natural feature), which will further promote people to interact and socialize and to participate in communities. Thus, attitudes of sense of place will take place followed by feeling secured and safe as a community.

## CONCLUSIONS

The potentials of lifecycle factors in modelling RLC in order to ensure social sustainability was studied. From the synthesized result, we can conclude that there are significant connection and potentials of the inclusion of modelling RLC in achieving social sustainability. Furthermore, ensuring social sustainability can be enhanced by paying extra attention to the determinants of RLC that influenced by the lifecycle factors. This review will enable planners and practitioners to maximize the utilization of modelling RLC with the inclusion of lifecycle factors in ensuring social sustainability for the current and future generations.

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