Developing a Conceptual Framework of Living Cost to Income Approach for Depicting Affordable Housing Locations: Policy Implications for Housing Affordability in Melbourne, Australia

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ABSTRACT
Affordable housing locations in metropolitan cities are usually assessed by rental cost or mortgage payment relative to income. Affordable housing locations are also influenced by locational characteristics such as distance from public transportation, service centres, city centre and employment centres. Once the costs of locational amenities such as public transport and basic services are focused in, rental price or median house price is increased, sometimes making these locations unaffordable. This paper develops a conceptual framework of living cost to income approach to examine relative changes in affordable housing locations in Melbourne. The conceptual framework is a method to identify changes in affordable housing locations but it also identifies as policy implications of living cost to income approach of analysing housing affordability in Melbourne as well as in other large metropolitan cities in Australia.

1. INTRODUCTION
Affordable housing has long been an important target of public policies in many developed countries. This is defined as an appropriate housing for the needs of low to moderate-income households so that these households are able to meet other basic needs such as food, clothing, transport, medical care and education (Akbar, Rolfe and Smith, 2015; Baker and Beer, 2007).

ABS (2016, par. 44) stated that “households with relatively low income (e.g. lower income households) and housing costs greater than a certain proportion of income, often 30%, are sometimes said to be in ‘housing stress’”.

Residential housing locations are usually determined by several factors include housing cost, transportation cost and location attributes such as the distance from the central business centres (CBD), accessibility, mobility and proximity to public transportation and employment centres (Ewing and Cervero, 2001; Mattingly and Morrissey, 2014; Mulliner, Smallbone and Maliene, 2013; Steiner et al, 2011). Similarly, the choice of affordable housing location is usually associated with a low rental or mortgage while travel cost and other amenities are ignored (Mulliner et al, 2013; Seelig and Phibbs, 2006). However, cheap housing does not mean housing is affordable (Burke and Hayward, 2001; Seelig and Phibbs, 2006) because a house in a distant location from social, human and community services appreciate more costs to the household and also create a range of social and economic disadvantages (Akbar et al, 2015; Beer, Kearins and Pieters, 2007; Dufty-Jones and Rogers, 2016; Mulliner, Malys and
Maliene, 2016; Mulliner et al, 2013). This paper develops a conceptual framework that can consider both economic and location factors affecting housing affordability that can deliver a new approach to housing affordability study i.e., the living cost to income ratio approach.

2. **Changes in Affordable Housing Locations: Theories and Evidence**

Many studies have used economic criteria such as average rental price or median house sale value to locate affordable housing locations for the low-income city dwellers (Hulchanski, 1995; Yates et al, 2005). Most of these locations have failed to provide essential human services and are also far from the employment locations, CBD, hospitals, banks, stations and bus stops, major transportation facilities (Mulliner et al, 2016). For this reason, low-income renters or house owners are often changing their location because of poor amenity and services (Arafat, 2011). However, this approach of identifying affordable housing location has been criticised by several researchers such as Bogdan and Can (1997), Hulchanski (1995), Martinez (2000) and Mulliner, Malys and Maliene (2016). Bogdan and Can (1997) advocated for affordable housing location with liveable neighbourhood characteristics. According to Stone (2006) and Mulliner et al. (2013), housing affordability is not separable from housing standard. Mulliner, Malys and Malne (2013, 2016) and Yates (2005, 2008) stated that building more homes to meet demand often do not build liveable communities and also do not meet the demand for the low-income people. Some impoverished areas in cities have less demand for properties because of population loss which can create high vacancy rates (Flood and Baker, 2010) and low or medium income household do not like to move to those areas because poor connectivity, poor public services, crime and anti-social behaviour (Mulliner et al, 2016).

Jobs, shops, social and human services and transport are essential to creating a functional urban community (Steiner et al, 2011). An affordable housing location should be in a place where people like to live and work, now and in the future (Ioannides and Zabel, 2008). Seelig and Phibbs (2006) stated that housing affordability must be defined and assessed in a more meaningful way. This requires a new paradigm of thinking that goes beyond the financial implications experienced by households.

Marshall et al. (2003) reported that residential locational choice is influenced by several factors such as employment opportunity, neighbourhood characteristics, relocation considerations, dwelling quality, and lifestyle and place satisfaction. Access to public transport, human services, low-cost transport and lower rental or mortgage payments are the major locational factors of affordable housing (Dufty, 2007; Levin, 2012; Waxman, 2007; Wu, Zhang and Dong, 2013). Also, some other studies found some discrete social or psychological implications of affordable housing location (Seelig and Phibbs, 2006), while many of them either ignored or did not comprehend the relative changes in affordable housing locations.

Lovett et al. (2002) used spatial analysis and spatial statistical measures. Arafat (2011) did a similar study but added transport costs with rental or mortgage payments in affordable housing location. He also developed a model to preserve affordable housing location; however, local and global market forces in the metropolitan cities, such an urban area conservation or preservation approach does not work because both urbanisation and its forces are dynamic in nature.

In Australia, declining housing affordability, high levels of unemployment and continued centralization of jobs and services have created financial stress for individuals who relocated from inner and middle-ring areas of metropolitan Sydney, Melbourne and Brisbane to the outer suburbs (Burnley, Murphy and Jenner, 1997; Milligan et al, 2009; Yates, 2008).
Segregation of income in Melbourne’s residential communities is widening (Nygaard, Wood and Stoakes, 2006). The gap was widening between rich and poor push out the low-income residents to the edge of the Melbourne city (Wood et al., 2008). This push out phenomena is very common to other metropolitan cities in Australia (idem) and most low-income residents are always either searching for a lower rental or lower value houses. Therefore they are more vulnerable to the economic, infrastructure and service changes and they are becoming isolated from urban services and employment centres.

Moreover, affordable housing zones with some recently developed facilities are becoming unaffordable zones in many metropolitan cities (Bamford and Jacobs, 1999; Burns and Inglis, 2007; Liu and Engels, 2012; Randolph and Holloway, 2005a, 2005b; Yates et al., 2005), entailing trade-offs between housing accessibility and the availability of local jobs and services (Birrell and McCloskey, 2015). However, in some places, Asian ethnic people tend to live close to their community, especially in metropolitan cities in Sydney and Melbourne that makes a suburb with poor dwelling standard with higher rents. For example, Lakemba in Sydney and Footscray in Melbourne have higher rental value because not of the quality of services in the suburb but because of the ethnic concentration of the suburb (Bolt, Phillips and Van Kempen, 2010; Hugo, 2011; Poulsen and Johnston, 2000). This might be only of many reasons why there may be higher demand, which then reduces affordability. Therefore an affordable housing location is also becoming unaffordable but not only because of improved services provision but because of social reasons.

3. DETERMINANTS OF AFFORDABLE HOUSING LOCATIONS

Housing location and contextual theory given by Ioannides and Zabel (2008) and Suhaida et al. (2011) measure housing affordability for medium cost house among first house owner and the impact of social context on economic behaviour, often referred to as a neighbourhood. Kyttä et al. (2013) considered contextually sensitive location-based evidence from residents concerning local experiences and behaviour patterns which recognizes the varying potentials the urban structure provides accessibility, density, diversity, connectivity and transportation services. By accounting for neighbourhood choice, the model of housing demand is, in essence, solely the demand for housing structure (idem). In this context, the social effect captures how one’s demand for housing structure is affected by one’s neighbours’ demand for housing structure (Getz and Page, 2016) such as how one’s decision to maintain, renovate, repair, and make additions to one’s house is influenced by one’s neighbours’ decisions to do the same.

In the case of spatial models for housing location, residential location choice becomes very important (Berry, 2003; Ioannides and Zabel, 2008; Rashidi, Auld and Mohammadian, 2012; Suhaida et al., 2011). Affordable housing location is also influenced by the residential housing local theory (Guan, 2012). Guan (2012) described the affordable location for housing in a sense of environmental attributes as the location of houses, land values, flooding risk, and ageing of the house, the value of scenic views, property taxation and zoning in a metropolitan city in Xuchang in China. Housing location preference depends on the closeness to the service centres facilities to satisfy the affordability and suitable environment for a house owner (Ibem and Aduwo, 2013). Housing value can positively influence by easy access to the service centres location (Guan, 2012).

Ioannidas and Zabel (2008) developed a continuous demand in housing services model which was influenced by neighbourhood choices. Locations, regular income, dwelling size, neighbourhood characteristics, distance to the service centres and quiet areas were highlighted as relevant to affordable housing location in Medford, USA (Ioannides and Zabel, 2008).
Personal-Socio-economic information and neighbourhood effects were the major factors for choosing affordable housing location in major cities in China especially in Beijing (Wu et al., 2013). The convenient location of the local facilities in the neighbourhood, such as shops, schools, and workplace are important for the housing locations (Beer et al., 2007; Djebarni and Al-Abed, 2000).

The key elements of affordable housing locations are proximity to service centres facilities from the housing location especially by walking or by car or by trains (Berry, 2003). In regard to community-based basic needs theory by Peredo and Chrishman (2006), a potential strategy for local sustainable development in poor populations emerging form of entrepreneurship, which rooted in community culture, nature and social cohesions.

To investigate the affordable housing location with the help of GIS system, two following important factors will be needed to be taken into consideration. The first factor is the economic context of housing affordability in terms of household income, employment status, and employment availability. A second factor is a locational or social contexts such as locational advantages and disadvantages with accessibility to urban services, human and social services and employment opportunity (Akbar et al., 2015; Martı́nez, 2000; Shen, 2005; Yang, Wang and Wang, 2015). Locational or social determinants for this study are supermarkets or shopping malls, Banks, health care centres, Hospitals, auto service centres, restaurants, libraries, convenient stores, schools, colleges or the University, government offices or community or human services office, train stations and bus stops. Based on above information, the determinants for this research are: distance from the CBD and service centres; opportunity of living; and access to service centres.

Distance from the CBD and Service Centres

The measurement of distances from CBD identifies to relative changes in the spatial pattern of the affordable housing relative to those CBD centres in the metropolitan area where all services of urban components will be increasingly concentrated. The distance measure indicates insight into a specific question about access that affordable housing needs comfortable access to rail bus transports. Low-income households are more likely to be dependent on rail and bus transport urban services and who are likely to have relatively low or no car ownership. So bus and rail transportation can access affordable housing that is imperative to the metropolitan bus and rail network.

Accessibility to a destination e.g. service facility via a specified transportation network has been measured by physical distance (Ahmad, 2012; Guagliardo, 2004; Ingram, 1971), travel time (Hansen, 1959; Ingram, 1971; Iversen and Kopperud, 2005), or even travel cost (Ingram, 1971; Kang, 2006; Leedahl, 2013; Lovett et al., 2002). Satisfaction housing needs anchors many other consumption activities, such as schools, neighbourhoods and other publicly natural amenities (Beer et al., 2007; Stone, Burke and Ralston, 2011).

Opportunity of Living

Housing affordability locations include the opportunity of living in one dwelling over another, (Drakakis-Smith, 2012). For example, a house may be cheaper in an outer city suburb, however, there will be relative changes in access to employment, education, recreation, transport and other amenities with lower access (Haslam McKenzie and Rowley, 2013; O’Sullivan, 2012).

Access to Service Centres

Adequate, and easy access to basic service centres is an important criteria for relative changes in affordable housing locations (Burns and Inglis, 2007; Geertman and Ritsema Van Eck,
1995; Hewko, Smoyer –Tomic and Hodgson, 2002; Pearce, Witten and Bartie, 2006; Smoyer -Tomic, Hewko and Hodgson, 2004; Talen and Anselin, 1998; Wang, 2005). To ensure adequate and easy access it is essential that service facilities and the transportation infrastructure need to be positioned around the affordable housing neighbourhoods (Powell and Exworthy, 2003).

4. CONCEPTUAL FRAMEWORK OF LIVING COST TO INCOME APPROACH OF HOUSING AFFORDABILITY

The conceptual framework of this paper is constructed based on three theories (see below description) and determinants of residential housing location. The conceptual framework will help identify the gaps in research context and finally interpret the gaps in a way that can provide contribution to the existing field of knowledge (see Figure 1).

Figure 1: Conceptual Framework for a Research

Source: Developed by Monash University, [www.monash.edu.au/lhs/hdr/design/2.2.1.html](http://www.monash.edu.au/lhs/hdr/design/2.2.1.html).

As mentioned earlier, the critical review of literatures were done in housing location and contextual theory (Suhaida et al, 2011), community and basic need theory (Getz and Page, 2016; Peredo and Chrisman, 2006), social and affordable housing (Milligan et al, 2015; Stone 2006; Beer, Bolam and Maude, 1994), and residential housing location theory (Guan, 2012; Ioannidas and Zabel, 2008) to draw the conceptual framework and identify key determinants of affordable housing location (Figure 2).

The conceptual framework includes spatial dimension (e.g. location of the service facilities of housing affordability factors) and economic dimension of the affordable housing. Economic and locational dimensions can be defined as an interaction of non-spatial factors of two different entities; for example an interaction between the characteristics of the population by the income level and characteristics of the service providers and users.
According to Figure 2, spatial accessibility of data can be conceptualized as the ease of reaching a destination location (such as convenience stores, shopping malls, health centres, bus stops, rail stations, post offices etc.) from a Collection Districts (CDs are a small geographic unit used in the census) centroids by a member of the household. The member of the household, who is driving or walking and will be measured as a travel distance or travel time to the nearest service centre facilities via a transportation network.

**Figure 2: Conceptual framework of analytical procedures for living cost and spatial locations**

**Theories and Determinants**  
(Housing location and metropolitan cities)

**Affordable Housing**

**Approaches to study affordable housing**

**Housing cost to income approach**
- Household annual income
- More demand
- Higher prices in other suburbs
- Government policies

**Living cost to income approach**
- Basic household costs
- Bills
- Transport costs
- Educational costs

**Locational factors**
- Distance from CBD
- Access to transportation
- Access to basic services

**Factors affecting affordable Housing**

**Spatial analytical analysis**
- Spatial variation in housing affordability
- Locational factors affecting housing affordability
- Relative changes in housing affordability

Sources: Based on Getz and Page (2016); Milligan et al. (2015); Liu and Engels (2012); Guan (2012); Suhaida et al. (2011); Ioannidas and Zabel (2008); Stone (2006); Peredo and Chrisman (2006); Martinez (2000); and Beer, Bolam and Maude (1994).

5. **Potential method to apply the conceptual framework**

Based on above conceptual framework, the study will collect secondary data on median house price, rental costs, household average income, access to employment centres, transport and communication networks, distance from CBD, distance from bus stops and train stations, distance from shopping malls, banks, hospitals and educational centres, employment centres, and health centres. This data will be collected from Government’s Spatial data offices, Bureau
of Statistics, Department of Human Services (DHS), Yellow pages, Roads and Highways department, Post office, and maps Australia.

The collected raw data will be processed through ArcGIS analytical tools and this data will be geocoded as Australian Statistical Geographic Standard (ASGS). The unmatched addresses data will be identified in Google earth and summarized in a kml file, which will export to shapefiles and then merged with those already geocoded addresses. During the geocoding processes, the unmatched data will be excluded outside or inside the threshold areas of the study areas. Finally, the geocoded addresses of data will be imported into a geodatabase for supporting subsequent visualization and analysis.

Processed data will be classifying as dependent and independent variable data. There will be numerous regression and correlation analysis by ArcGIS analytical tools for a conceptual framework for living cost to income ratio (LCIR) approach to study relative changes in affordable housing locations of less than 30%. The study will develop a framework from which one can calculate living cost to income ratio. This procedure will be based on the fundamental urban general equilibrium model to adjust different levels of locational amenities across the metropolitan Melbourne (Ioannides and Zabel, 2008; Rapaport, 1997; Zabel, 2004). The conceptual framework will propose living cost to income approach in locational amenities in residing in particular jurisdiction areas. Residing in particular areas would depend on the income of the marginal household in regard to better accessibility to jobs, transport, and proximity to CBD, quality life, services facilities, and security or safety.

Temporal variation in variables of relative changes in affordable housing locations will be identified by relatively affordable housing depending on better or worse than average. There would be no effect on the price distribution in the area with average accessibility when the price accessibility could close to 0 in regression analysis.

6. Likely Outputs of Living Cost to Income Approach

This conceptual framework helps to understand the relative changes in the affordable housing locations with a living cost approach compare to only housing cost approach in the city councils of Melbourne. In particular, it will explore the factors affecting the relative changes in affordable housing locations, which is important to the context of future urban policy and planning development. In particular, the outcome of this research paper may be used for policy and planning guidelines to minimise the implications of relative changes in affordable housing locations for the low-income families in Melbourne and other metropolitan cities in Australia. Finally, this research will play a significant role in providing an analytical framework to predict the future relative changes in affordable housing locations.

7. Conclusion and Likely Policy Implications

The living cost to income approach is a new approach to the study of affordable housing locations because 30 per cent spending for house price/rent obscures other important costs such as travel cost and the basic need costs for education and food. None of the studies is yet to address this issue. This basic living cost to income ratio approach will able to provide better understanding the trend and pattern of relative changes in affordable housing in Melbourne. The likely outcome of the study can be used for policy guidelines in tracking the housing affordability problems faced by low and medium income residents in Melbourne and/or similar metropolitan cities in Australia.
REFERENCES


