

Article

Evaluation of Affordable Housing Program in Papua New Guinea: A Case of Port Moresby

Eugene E. Ezebilo

Property Development Program, National Research Institute, P.O. Box 5854, Port Moresby, Papua New Guinea; eugene.ezebilo@pngnri.org or ezebilo@hotmail.com

Received: 8 July 2017; Accepted: 17 August 2017; Published: 18 August 2017

Abstract: Providing affordable housing has been a long-standing issue for governments of most countries. In an attempt to address the issue, affordable housing programs have been introduced with the aim of improving household's access to housing, as well as sustain their wellbeing. This paper reports on a study of the activities of affordable housing program (AHP) in Papua New Guinea (PNG), using Port Moresby as a case. It also reports a potential strategy for improving effectiveness of the program. Data was collected from interviews involving private property developers, building contractors, and an official of the National Housing Corporation. Documents related to PNG housing sector and AHP were also reviewed. The results show that the criteria used for measuring housing affordability is lacking in PNG. Low-income households do not benefit from the AHP, which focuses mainly on homeownership scheme. Role of the public sector and private sector in the provision of affordable housing is not clear. Most private developers would like to supply more houses to the housing market. However, the developers face challenges such as shortages of secure land, high cost of materials for constructing houses, and lack of trunk infrastructure. If the aim is to improve effectiveness of the AHP, there is a need to develop criteria for measuring housing affordability and to introduce affordable housing schemes that meet low-income household's preferences and demand. It is necessary to reduce housing costs by making more secure land available for development, providing trunk infrastructure, and sourcing building materials locally. The sustainability of AHP should be given due consideration during the planning and design phase. The findings could assist urban development managers and planners in designing a more effective AHP in PNG.

Keywords: homeownership scheme; house price; housing affordability; housing policy; social housing; urban development

1. Introduction

Housing shortages, and the corresponding increase in house prices, have been a policy issue for most countries [1,2]. However, providing houses that most people could afford, and at the same time, pay for other necessities, is becoming a challenge for the governments of most countries [3,4]. Expenditures associated with housing often restrict access to food, clothing, health care and education for low-income households, as well as lower the households' standard of living [5,6]. To sustain human wellbeing, housing must be affordable for all households. For this reason, housing reforms have been introduced in most countries to boost supply of houses. One of these reforms is the affordable housing program (AHP), which mainly targets housing for low-income households [3,7,8]. However, for AHP to be effective in supplying the desired low-cost houses, there is a need to develop criteria for measuring housing affordability [9–11]. Furthermore, quality of houses supplied through AHP must be monitored to ensure that the houses meet minimum standard. In addition, roles of the public and private sectors in the AHP must be streamlined [12,13].

Housing affordability entails the relationship between expenditure on housing and household income [14]. Expenditure associated with housing often accounts for the largest share of the low and middle-income households' expenditure [15]. For this reason, the low and middle-income households are often hit harder when they have housing affordability problems. There are two major approaches for measuring housing affordability. These include ratio measure, which is the relationship between housing expenditures and household income. The other is the residual measure, which focuses the capacity of a household to maintain an acceptable standard of living after housing costs [11,14].

A house is said to be affordable when it is affordable to people with a median household income that has been established by a country, province, or a municipality, using a recognized housing affordability index [16]. The median multiple indicator, which rates housing affordability by dividing the median house price by gross (i.e., before tax) annual median household income, can be used for determining housing affordability index. For example, in the United States and Canada, housing is affordable when housing cost is not more than 30% of household's gross income [17,18]. It is 40% for India [19]. According to the National Affordable Housing Summit Group of Australia, affordable housing is:

“housing reasonably adequate in standard, and location for low or middle income households and does not cost so much that a household is unlikely to be able to meet other basic needs on a sustainable basis” [20].

The United States Department of Housing and Urban Development (HUD) defines housing affordability as housing that does not exceed 30% of the household's monthly income [21]. The HUD uses the indicator of area median income, i.e., the median income for a selected area, to determine whether households qualify for some public housing programs [22,23]. For the case of the United Kingdom, affordable housing is based on housing expenditure to income ratio, and it tends to fulfil the housing needs of eligible households at sufficiently low cost [24,25]. In China, affordable housing is provided for low to lower-middle-income households that meets certain income level requirements [26,27].

Housing cost to income ratio is the most commonly used standard for measuring housing affordability [5]. This has been the standard used in many countries, such as countries in the European Union, Australia, Canada, United States, New Zealand, China, and India [11,19,28–31]. Most policy makers and academics, as well as the general public, are more familiar with the use of ratio of housing cost to income as a measure of affordability. This is because it is simple to calculate, it can be easily applied in practice, and has the sanction of the governments of most countries [11]. Though housing price to income ratio is the commonly used housing affordability measure, it is important to note that it has some limitations. For example, incomes for the poor are likely to have housing affordability problem and are often lesser than the median income. Segregation by income often exists in metropolitan areas, which might make the poor face lower housing prices than the median income worker.

Some academics, such as Stone [11,32], argued that using housing cost to income ratio as a measure of housing affordability is not convincing; once a household has paid housing costs, it becomes “shelter poor” if the remaining income is not enough to cover other basic non-housing necessities. For this reason, it is important to also consider money spent on other necessities, as well as family size, in housing affordability discussions. To incorporate non-housing costs into the measure of housing affordability, Stone [11,32] proposed the use of “residual income”. This posits that housing is affordable if a household can meet its non-housing needs after paying for housing [11]. The residual income approach leads to a sliding scale, and reflects that housing affordability is sensitive to differences in household size and income.

Authors such as Bogdon and Can [33], and Mulliner and Maliene [34], suggested that housing affordability measures should focus more on the condition, location, and neighbourhood characteristics of housing, rather than only on housing costs. For example, in a study of housing affordability in

relation to attributes of a housing area, it was found that housing affordability depends on amenities, which influence the welfare of households [35]. In a study of low-income renters' perceptions of housing affordability, Seelig and Phibbs [36] found that low-income families do not often choose housing areas that have poor amenities. This suggests that it is important to consider availability of basic amenities in the provision of affordable housing.

Several factors have been identified in the literature that influence housing affordability. These include shortage in supply of houses relative to demand increases in housing price, which decrease housing affordability; policy instruments that promote rent regulation reduce the tendency for real estate to manipulate house prices [4]; policies that promote rise of income of households in low-income groups increases housing affordability [5,37]; an increase in the ability of households to access housing loans increases their housing affordability; household's preferences for housing also influences their affordability [38]; low interest rates on housing loans improve affordability of homeownership [39]; high quality houses supplied with necessary trunk infrastructure and located in high-income areas, such as the central business district, have the potential to attract more costs and lowers housing affordability [40]; increase in land price increases the cost of building houses; increase in population of an area increases housing demand relative to supply, which consequently increases house prices and lowers housing affordability [41].

There are several economic, social, and environmental factors which should be considered in the planning, designing, and implementing an AHP [42]. The economic factors include the continuous availability of funds from the state for the AHP, availability of land and flexible design standards that incorporate the needs of affordable housing. Zoning restrictions that might prevent developers from building high-rise multi-family houses must be relaxed to allow developers lower marginal cost. Regulatory mechanisms, that encourage developers to participate in constructing affordable housing, has the potential of promoting AHP. Social factors such as the "not in my backyard" sentiment, especially among house and landowners, is often one of the barriers to AHP. It is associated with the perceptions that affordable housing often devalues properties in the neighborhood. Furthermore, if affordable housing is provided in distant areas from the city centre, low-income households might be pushed there, which might be far from jobs, social networks, and infrastructure, which creates additional travel costs [43]. To promote effective implementation of an AHP, all relevant stakeholders should be well informed on the benefits of AHP and affordable housing built in areas that have necessary infrastructure and services. The other is environmental factors, such as the quest to meet environmental standards by the strict implementation of green building techniques or regulations. This often increases the cost of building houses, which might increase house price. It is important to consider potential strategies for using simple environmental friendly techniques for building houses.

Port Moresby is one of the cities in Papua New Guinea (PNG) where access to quality and affordable housing has become beyond the reach of many people. This is mainly due to shortages in the supply of houses relative to demand, which push up house prices [44]. Economic development in the city attracts the attention of people from rural areas, who migrate to Port Moresby in search of jobs. Several authors found that most urban residents in PNG might find it difficult to pay for housing [44–46]. In response to the housing shortages and the corresponding high house prices in PNG cities, the PNG government introduced several initiatives such as the First Home Ownership Scheme (FHOS), Land and AHP including the Duran Farm Housing Development, Gerehu Stage 6B. However, the initiatives have not been able to address the housing affordability problems [45,46]. It is important to have greater understanding regarding potential reasons that the affordable housing initiatives have not been able to address the housing problems in PNG. This paper contributes to this by evaluating the different AHPs, and identifying potential strategy for improving effectiveness of the AHPs.

Port Moresby is the capital of PNG, as well as the largest, and one of the fastest-growing, cities in the country. In addition, it has the largest housing market in PNG. Many people have continued to migrate from rural areas to Port Moresby in search of jobs and other opportunities, to better their lives. This results in an increasing housing demand. However, housing supply has not been able to match the

demand, and this has contributed to the rising informal housing market, and the emergence of slums in the city. This is partly due to that the housing sector has been dominated by the public sector, which was involved in building houses. However, due to the falling price of crude oil in the international market, the PNG government has been in financial problems. As Port Moresby is the seat of the PNG government, the city is often given more attention than other cities in the country, and most housing strategies are often tested in Port Moresby before using the strategies in other cities. To address problems associated with access to housing in Port Moresby, the PNG government introduced AHP without involving relevant stakeholders in its planning and design. Potential lessons from the findings of this study would include the need for public–private partnership in the AHP. In addition, it is necessary to consider potential AHP beneficiaries' preferences and demands in the planning and design of the program.

Furthermore, the state-owned land, which is cherished by property developers because of its secure tenure and low transaction costs, is almost exhausted. The remaining land belongs to the community, and it is often difficult to access the customarily-owned land for development, because of insecure tenure and high transaction costs. This has led to an increase in house prices, which many people, including the low to middle-income households, might find difficult to afford. The inability of this group of households to afford quality housing might have an adverse effect on their welfare. To cope with the high house prices in Port Moresby, it is common to see several households living in the same apartment, where they use the same toilet and bathroom. As more people make the city their home, the social, economic, and environmental challenges associated with housing must be addressed. There is a need to develop an efficient and effective framework for affordable housing in Port Moresby in order to achieve sustainable housing and urban development. The findings from this study will be useful for improving housing policy related to providing affordable housing in Port Moresby and in the major cities of PNG.

The aim of this study was to examine affordable housing program (AHP) in PNG, using Port Moresby as a case, and to assess the program using housing affordability measures, and by drawing lessons from other countries. A potential strategy for improving effectiveness of the AHP in meeting needs of targeted households was explored, and policy implications discussed.

The findings from this study will assist urban development planners and policy-makers in making informed decisions in regard to making AHP in PNG more effective. This could be useful for providing affordable housing in countries that have socio-economic conditions which are similar to that of PNG.

The next section describes affordable housing programs in PNG, Singapore, and Australia, followed by material and methods. Section 4 reports the results, followed by discussion and policy implications. The final section is devoted to conclusions.

2. Affordable Housing Programs in Papua New Guinea, Singapore, and Australia

In order to boost the supply of houses in the major cities of PNG, the PNG government introduced several housing schemes, such as:

2.1. Government Housing Schemes

2.1.1. First Home Ownership Scheme

The First Home Ownership Scheme (FHOS) was introduced by the PNG government to provide loans for housing to households, so that they could buy houses of their choice. For this reason, the government allocated 200 million Papua New Guinea Kina (PGK) or 60,606,061 USD to the FHOS in 2013 [47]. The fund is managed by the Bank of South Pacific (BSP). To be eligible for the housing loan, the individual must be a citizen of PNG, employed in the formal sector, and willing to pay 10% of the worth of the loan (equity). An individual can get a maximum loan of 400,000 PGK (121,212 USD), which attracts an interest rate of 3%. The repayment period is 40 years.

2.1.2. Social Housing Program—The Duran Farm Housing Development

The PNG government established a social housing program in 2014 at Duran Farm Housing Development in Port Moresby through the National Housing Corporation (NHC). The affordable land and housing program was launched at Gerehu Stage 6B, Port Moresby in 2015 by the Office of Urbanisation. The NHC oversees Duran Farm Housing Development. It is responsible for facilitating provision of trunk infrastructure, such as clean portable piped-borne water, good road networks, sewerage, and electric power. House building contractors were engaged in constructing houses in Duran Farm. Upon completion, the houses are expected to be sold to the general public, especially public servants, at a price below the market price. Several visits to the project site in October 2016, February and May 2017, revealed that some houses have been completed, but were not yet occupied by people, due to lack of trunk infrastructure, which governmental agencies ought to have introduced. The sales price of houses at Duran Farm range from 350,000 to 450,000 PGK (106,061 to 136,363 USD), as reported by Nao and Ezebilo [48].

Most Papua New Guineans, who are either in the low-income or middle-income groups, might find it difficult to afford the lowest house price at Duran Farm. For the case of Gerehu Stage 6B, houses have not been built there, which raises the question of whether the project will be implemented. The Duran Farm Housing Project and the Gerehu Stage 6B are expected to supply 40,000 houses to Port Moresby residents.

2.1.3. Two Million District Housing Program

In addition to the social housing program, the PNG government launched the “Two million District Housing Program” for government workers in 2015. It entails the state government allocating 1 million PGK (303,030 USD) to each of the district administrators in the country, whereas provincial governors, in collaboration with open members of the parliament, contribute 1 million PGK for building 10 houses in each of the 89 districts in PNG [49]. To date, little is known about the progress or implementation of the program.

2.2. *Private Sector Participation in Provision of Housing in Port Moresby*

Several large scale private property developers have been involved in providing housing in Port Moresby. The notable private developers operating within, and in the vicinity of Port Moresby, are Edai Town, Glory Group of Companies, and the Curtain Brothers.

2.2.1. Edai Town Development Limited

Edai Town originated from a partnership between Borea village and a private property developer. It is located 20 km from Port Moresby along the PNG liquefied natural gas corridor. The land is under a state lease for 99 years. Edai Town builds mainly four types of houses: the traditional home (3 + 1 rooms), modern two storey home (3 + 1 rooms), double storey duplex (3 rooms), and double storey town house (3 rooms). The sale prices of houses at Edai Town range from 300,000 to 803,000 PGK, i.e., 90,909 to 243,333 USD [50].

2.2.2. Glory Group of Companies

The Glory Group of Companies was established in 2008, and consists of Glory Estate Ltd., Glory Holding Ltd., Glory Development Ltd., and other subsidiaries [51]. It has residential properties in several areas of Port Moresby, including Ela Vista at Ela Beach, Glory Garden at 8 Mile, and Skyview. The Glory Group has more than 500 houses, which have been built to meet the demands of middle and high-income households, as well as corporate clients. For example, houses in Glory Garden are primarily built for middle and high-income households, Skyview for middle-income households, and Ela Vista for corporate clients. Prices of Glory Group houses range from 500,000 to 1.2 million PGK, i.e., 151,515 to 363,636 USD [52].

2.2.3. Curtain Brothers

The Curtain Brothers was established in 1996, and at that time, they focused primarily on construction of infrastructure [53]. For example, they played an important role in the development of Harbour City, and constructed the wharf in Port Moresby. The Curtain Brothers have indicated their interests in developing residential properties. To this end, they have established South Pacific Homes to manage the properties.

2.3. Affordable Housing in Singapore

Residential housing development in Singapore is primarily built and managed by the state housing agency, Housing and Development Board (HDB). Shortages of housing in the 1960s led to the establishment of the HDB, whose primary activity is to provide affordable housing to Singaporean residents [54]. During the first five years of its establishment, the HDB built many low-cost housing units for rental to low-income households. A home ownership scheme was introduced during the fourth year. As there was a shortage of land in Singapore, the HDB focused on constructing high-rise buildings with multi-family flats [54]. After building low-cost housing, the HDB introduced a housing scheme that focuses on building and selling middle-income flats.

2.3.1. Sales of Housing and Development Board New Flats

The HDB has various new flat sales programs such as Built-To-Order (BTO) and Sale of Balance Flats (SBF). In the case of the BTO, Singaporean citizens who are interested in buying new HDB flats place their orders. The HDB begins constructing housing units when the orders reach approximately 70% of the units to be built. Flats that the HDB could not sell during previous BTO exercises are sold through the SBF program. The flats are sold on a 99-year leasehold. The following requirements must be met to buy a new HDB flat in Singapore HDB [55]:

- The applicant must be aged at least 21 years, a Singaporean citizen, and have a family.
- The monthly income of the household must be between 10,000 and 12,000 SGD.
- Single Singaporean citizens must be aged at least 35 years, and should have a monthly income of at most 5000 SGD. They are only allowed to buy a two-room flat.
- Singaporean–foreigner couples are only allowed to buy a two-room flat.

The HDB flats are meant to be affordable, which makes flats cheaper than privately built flats. For example, the sale price of a privately developed flat could be greater than that of a HDB flat by more than 50% [54].

2.3.2. Maintenance of Housing and Development Board (HDB) Units and Estates

Town councils and the HDB conduct maintenance work on HDB housing units and estates [54]. For example, town councils are responsible for maintaining elevators, water tanks, external lighting, common corridors, void decks, and open spaces surrounding the estates. The HDB is responsible for maintaining rental flats and inspecting home renovations carried out by private individuals.

2.4. Affordable Housing in Australia

Affordable housing programs in Australia target low to middle-income households. The primary aim of the Australian National Affordable Housing Agreement (NAHA) is to ensure that all Australians have access to affordable, safe, and sustainable housing that contributes to social and economic participation [56]. The NAHA provides 6.2 billion AUD worth of housing assistance to low and middle-income Australians for the first five years [56]. Examples of affordable housing schemes in Australia include the National Rental Affordability Scheme (NRAS) and the Affordable Homes Programs.

2.4.1. National Rental Affordability Scheme (NRAS)

The NRAS involves providing funds for Australian investors to build or buy houses, which are rented to the middle-income group at a discounted rate, whereas the investors are given tax incentives. It aims to reduce rental costs for low to middle-income households, as well as increase the number of affordable rental houses [56]. To be eligible to rent a house under the NRAS, the person must:

- be an Australian citizen, have permanent residency or have Temporary Protection visa XA visa subclass 785 or Temporary Protection visa XC visa subclass 785;
- not own or part-own property in Australia or overseas;
- not have money in bank accounts, shares, or investments exceeding 87,125 AUD; and
- not have a household combined annual gross income exceeding 47,904, 66,228, and 84,552 AUD for one, two, and three adults, respectively, at the commencement of the NRAS tenancy.

During the tenancy period, the person's income should not exceed 59,880, 82,785, and 105,690 AUD for one, two, and three adults, respectively.

2.4.2. Affordable Homes Program

The affordable homes program provides low to middle-income household access to properties below the market price. It is used to support single people and couples whose annual income is at most 75,000 and 95,000 AUD, respectively, to have their own house [57]. In order for a person to be qualified for the program, the person must meet the following requirements as reported by the Department for Communities and Social Inclusion [57]:

- be a current Housing South Australia or Community Housing tenant;
- be aged at least 18 years and be a South Australian resident;
- not own or part-own any residential property or land;
- intend to be the owner occupier;
- meet the income and asset tests for the AHP; and
- not have a debt with Housing South Australia.

3. Material and Methods

3.1. The Study Area

Port Moresby is the capital and largest city of PNG, and has the largest residential property market in the country [45]. As a result of an economic boom and various projects springing up in the city, many people have moved from rural areas to Port Moresby, in search of opportunities to better their lives. This has contributed to the teeming population of Port Moresby. In 2011, the population was 364,125, and in 2015, it was over 400,000, with an average population density of 16 people per hectare [58,59]. The construction phase of the PNG liquefied natural gas project attracted many people from various areas of the country, and experts from other countries, to Port Moresby. However, the supply of houses to accommodate the teeming population could not match with demand. For example, average weekly house rental prices in Port Moresby range from 633 PGK (192 USD) to 4250 PGK (1288 USD), as reported by Ezebilo et al. [45], which most low-income households in the city may not be able to afford. Public servants, who belong to the lowest salary scale, receive an annual gross salary of 8290 PGK (2512 USD), corresponding to approximately 159 PGK (48 USD) weekly. Low-income households cannot afford houses provided by the AHP. An affordable housing rental scheme, which could provide housing for low-income households until such a time they have saved enough money to buy their own house, is lacking in PNG. For this reason, low-income households and some middle-income households have housing affordability problems, because their income is not enough to pay for housing, and at the same time, pay for other necessities. Considering that extended family system is practiced in PNG, the housing affordability problem hit low-income households harder.

3.2. Housing Development in Port Moresby

The National Housing Commission, which later became NHC, was established in 1968, and is the main governmental housing agency in PNG. The primary task of the NHC is to implement government's policies on housing. When the NHC was established, its activities focused primarily on constructing houses for government workers. This served as motivation for the private sector to also provide houses for only its workers [60]. For this reason, there was not enough economic incentive for investment in residential properties, development of the housing market, and real estate related businesses. Over time, more economic developments took place in Port Moresby, and more people from rural areas migrated to the city. However, supply of houses could not match with housing demand from the migrants [52]. In an attempt to address the housing shortages, the PNG government established the National Housing Taskforce (NHT) in 2007. The NHT was mandated to study the housing problems and provide recommendations on a potential strategy for addressing the problems. The NHT recommended that governmental housing agencies, such as the NHC, should focus on playing facilitating roles in providing housing, whereas the private sector should be directly involved in building houses. The recommendations were not adopted, and governmental agencies continued building houses for government workers.

Furthermore, the PNG government commissioned the Independent Consumer and Competition Commission (ICCC) to review the activities of housing and real estate industry. The ICCC found that government housing agencies have had little success in providing housing for city residents, and that the high housing prices are triggered by inefficient and insufficient supply of land, and unclear government policy on housing [61]. For example, the price for a 3 bedroom house at Duran Farm housing project, which is operated by public sector, is 350,000 PGK (106,060 USD), whereas it is approximately 300,000 PGK (90,909 USD) at Edai Town Development, which is owned by a private developer. In addition, basic trunk infrastructure is lacking in Duran, whereas it is available in Edai Town.

Only a few of the ICCC recommendations have been adopted, such as the continued work of the National Land Development Program in raising awareness among customary landowners. In addition, the Customary Land Development Office was established in 2016 by the National Executive Council [62], but was abolished after a few months. The PNG Vision 2050 highlighted the need for improved infrastructure and efficient delivery of public goods and services [63]. In 2011, the PNG government established the National Housing Estate Limited (NHEL), which is a subsidiary of the NHC, and was tasked to construct houses in Port Moresby and other major cities of PNG to boost housing supply.

The NHC and NHEL are involved in the development and supply of housing to the market. There are only a few large scale private property developers, such as Edai Town, the Glory Group of Companies, and the Curtain Brothers.

3.3. Data Collection and Analysis

The data for this study was collected from review of relevant documents related to the housing sector in PNG, and interviews held with private property developers, and an official of the NHC. The documents reviewed include publications of the National Research Institute related to the housing sector in PNG, such as Webster et al. [52], Ezebilo et al. [15], Ezebilo and Hamago [64], Nao and Ezebilo [48], and Wangi et al. [16]. Others include the ICCC report on activities of real estate industry, the NHT report on problems associated with provision of housing in PNG, and the report on PNG Vision 2050 as well as salary scale for public servants. For the interviews, an official of the NHC was asked questions related to housing development activities at Duran Farm Housing Development. The questions included the roles of NHC on provision of housing at Duran Farm, income group targeted and how the houses would be sold. Private building contractors were interviewed during visits to Duran Farm. They were asked questions such as the sales price of completed houses, provision of trunk infrastructure, and their roles in regard to constructing houses in Duran Farm. Interviews were

conducted with management of Edai Town Development Limited, which is one of the successful private property developers in Port Moresby. They were asked questions related to provision of trunk infrastructure in Edai Town, sales price of houses at Edai Town, and challenges that the developer face in constructing houses.

For comparative purposes, two countries (Australia and Singapore) were purposively selected. Information on affordable housing programs was collected from websites of relevant housing agencies of the countries. The information collected include the household groups targeted by the programs, basic standards used for measuring housing affordability, the role of public and private sectors in providing AHP, and the main focus of the program in terms of home ownership or for rental. For Singapore, data was collected from the Housing and Development Board website, and for Australia, the Department of Social Services, Department for Communities and Social Inclusion. A brief review of housing affordability literature using Google Scholar was conducted to identify commonly used standards for measuring affordability and factors influencing it.

For data analysis, a comparative analysis was made between AHP in PNG and Singapore, as well as Australia. The analysis focused primarily on land supply, consideration of local housing needs, investment, funding resources, provision of trunk infrastructure, and maintenance of housing units. Other factors included standards for measuring housing affordability, households targeted by AHP, and length of time households could benefit from affordable housing. Additionally, whether there is a clear affordable housing strategy, the roles of the public and private sectors in providing affordable housing, and whether affordable housing is for rental, homeownership, or both. Incentives for attracting private property developers and whether affordable housing minimize the use of land resources was also considered.

The AHPs reviewed came from two developed countries, whereas PNG is a developing country. This is because PNG aspires to have an organized, effective, and efficient AHP, as well as move towards becoming a developed country in the near future. It is important for PNG to learn from developed countries, especially Singapore, that was previously a developing country, but has been able to develop effective housing programs. Australia and PNG have a long-standing relationship. For this reason, it is important for PNG to learn from Australia. For example, the conceptual framework related to customary land tenure reform laws in PNG is in line with the way land is planned, developed, and marketed in the Australian Capital Territory [65].

4. Results

4.1. Affordable Housing Program in Papua New Guinea Compared to Australia and Singapore

Affordable housing program was introduced in PNG without developing criteria for measuring affordability, and the group of households targeted by the program is not clear. In Australia and Singapore, affordability measures are in place, and affordable housing program mainly targets low-income households (Table 1). PNG has focused primarily on home ownership scheme, whereas Australia and Singapore have focused on house rental and home ownership schemes.

The household income to median house prices for Australia was 6.6 in 2016, whereas it was 4.8 for Singapore [14,66]. This indicates that housing in Australia is severely unaffordable, whereas it is seriously unaffordable in Singapore. Housing affordability data is not available in PNG. This could be because the real estate market in PNG is still in infancy stage.

Table 1. Provision of affordable housing in Papua New Guinea, Australia, and Singapore.

Characteristics	Papua New Guinea	Australia	Singapore
Supply of land	Supplied by the state and community. Use of available land is not maximized due to the types of houses built. Houses are mainly single-family homes.	Supplied by the state. Houses are a mixture of multi-family homes with single-family homes, which optimizes use of land.	Supplied by the state. Most houses are high-rise and multi-family homes, which maximizes use of land resources.
Housing affordability standard	This has not been developed.	30% of household's monthly income.	30% of household's monthly income.
Households mainly targeted by affordable housing	Not clear.	Low-income and middle-income households.	Low-income households.
Roles of public and private sectors	In theory, private builds houses and public facilitates. In practice, roles are mismatched.	The public play facilitating roles, whereas private build houses.	The public builds houses and provides an enabling environment.
Provision of trunk infrastructure such as water, electric power, and sewerage	The public. But often delays due to bureaucratic bottlenecks means private sector may provide.	Public sector.	Public sector.
Management of housing unit	Not clear.	Public.	Public or private, under supervision of public.
Consideration of local housing needs	Targets mainly home ownership scheme but not houses for rent.	Targets both home ownership and houses for rent.	Targets both home ownership and houses for rent.
Funding resources	Public funding, but not stable.	Public.	Public.
Investment	Insufficient investment.	-	-
Is affordable housing program orderly?	No. It starts with home ownership instead of houses for rental.	Yes. Starts from houses for rental followed by home ownership.	Yes. Starts from houses for rental followed by home ownership.
Type of houses	Detached and semi-detached. No high-rise buildings.	Dominated by multi-family houses.	Dominated by high-rise multi-family buildings.
Can low-income households afford houses under the program?	No.	Yes.	Yes.

4.2. Can Low-Income Households Access Houses Provided by Affordable Housing Program in Papua New Guinea (PNG)?

The annual income of public service workers ranges from 8290 to 147,937 PGK (2512 to 44,829 USD). The lowest house sales price in the PNG government's affordable housing project at Duran Farm is 350,000 PGK (106,060 USD) and the loan repayment under the program is 40 years with interest rate of 3%. The total monetary value for the house is 360,500 PGK (109,242 USD), which is 9013 PGK (2731 USD) each year for 40 years. Converting the 9013 PGK to a monthly amount gives 751 PGK (228 USD) each month. The PNG public service pay scale for public servants show that low-income workers will not be able to access the country's AHP (Table 2).

Using 40% gross annual income as housing affordability measures only workers within the median pay scale, i.e., midpoint between pay scales 10 and 11 (846 PGK/month), and those in higher pay scales can afford a house at the AHP. However, using 30% gross annual income as affordability measure revealed that only workers that belongs to pay scale PS12 and higher could have access to housing at the AHP.

The results show that only public service workers who belong to PS09 and above will be able to access a house from Edai Town Development, which is the estate that has the lowest house sales price. For example, the lowest house sales price there is approximately 300,000 PGK, and including the interest rate of 3%, gives a total price of 309,000 PGK. The repayment amount for 40 years is 7725 PGK each year, which corresponds to 643 PGK each month. Using an affordability measure of 40%, workers

who belong to PS09 and higher will be able to afford a house at Edai Town, whereas it is from PS11 for 30%.

Table 2. Salary scale in relation to annual salary for public service workers.

Salary Scale	Annual Salary	30% Salary	40% Salary
	(PGK)	Per Month	Per Month
PS01	8290	207	276
PS02	8808	220	294
PS03	9724	243	324
PS04	11,370	284	379
PS05	12,617	315	420
PS06	14,505	363	484
PS07	16,229	405	541
PS08	18,192	455	606
PS09	21,051	526	702
PS10	23,782	595	793
PS11	26,989	675	900
PS12	30,907	773	1030
PS13	33,544	839	1118
PS14	36,285	907	1209
PS15	42,640	1066	1421
PS16	46,763	1169	1559
PS17	61,132	1528	2038
PS18	94,327	2358	3144
PS19	107,577	2689	3586
PS20	147,937	3698	4931

Note: PS is pay scale. The annual salary is the median salary point within each scale and it includes base salary and allowances. Income tax is excluded. Salary is adopted from [67]. 1 USD = 3.3 PGK.

4.3. Challenges Associated with Provision of Housing by Private Developers in Papua New Guinea (PNG)

Private property developers encounter several challenges in the development and sales of houses in PNG. This contributes to increase cost of building houses, which push up house prices. The challenges are:

- Financial constraints. The interviewees reported that commercial banks in PNG rarely comprehend the importance of project finance, and do not often provide loan facilities to private property developers.
- Bureaucratic problems. There are a lot of bottlenecks in accessing housing loans through the FHOS from the BSP, which results in delays in the house buying process. In addition, there are often delays in receiving approval from customs officials for evacuation of imported building materials at the seaport. Building Board meetings are not frequent, which often leads to delay in the approval of relevant documents. These problems often discourage potential private property developers from investing in the housing sector.
- Unsupportive policy environment. The current PNG housing policy is outdated and does not reflect realities in the country. In addition, the policy does not have enough legislation for regulating housing industry in PNG.
- Capacity constraints. There are shortages of skilled labour in the house construction industry in PNG, and people that are available require more training, which contributes to the cost of building houses. Furthermore, the country lacks industry that could support large scale housing projects.
- High cost of building materials, trunk infrastructure and land. Most housing building materials are imported and attract import duties (tariffs), which add to the cost of production. In addition, locally produced materials are often more expensive than the imported materials. It is the responsibility of the state to provide trunk infrastructure and services. However, there is often lack of infrastructure

and services in some segments of PNG. This often compels private property developers to provide infrastructure, which is often a very huge investment. State-owned land, preferred by most private property developers, is almost exhausted, and access to secure customarily-owned land is difficult, which makes land for development very expensive.

5. Discussion and Policy Implications

The findings from this study show that low-income households, that should benefit from affordable housing, do not have access to the AHP in PNG. The country does not have criteria for measuring housing affordability, and the household groups targeted by the AHP are not clear. The findings are not in line with the practice of AHP in other countries. For example, AHP in Australia, Singapore, China, New Zealand, and India targets primarily low-income households [3,7,8,55]. In addition, most countries where AHP is practiced have criteria for measuring housing affordability [18,19,21]. This indicates that the PNG AHP is lacking in its design, and it might be difficult to implement it effectively. To improve the effectiveness of the AHP, it is important for governmental agencies in charge of housing, such as NHC, to draw lessons from countries that have been successful in providing AHPs. It is also important for AHP planners and policy-makers to develop criteria for measuring housing affordability in PNG, and modify the design of the AHP so that low-income households could benefit from it. Furthermore, housing affordability is influenced by areas where the house is located, and accessibility to trunk infrastructure [68]. It is necessary for AHP planners to consider developing affordable housing projects in low-income areas, and provide trunk infrastructure there to attract potential residents. Developing an AHP in low-income areas has the potential of lowering house price in the AHP. However, it is important to consider that residents of low-income areas might incur costs associated with travels to and from the central business district for work and other businesses, which increases costs associated with housing. This suggests the need for AHP planners to consider the location and accessibility to services in decisions associated with planning and implementing AHP.

Affordable housing program often involves house rental schemes and home ownership schemes. However, in PNG the AHP has focused only on a home ownership scheme, which requires at least 10% equity. Some people, especially low-income households, might find it difficult to have the 10% equity. For this reason, only middle to high-income households might have access to the AHP in PNG. Findings from other countries, such as Singapore and Australia, reveal that AHP provides a mixture of affordable house rental and home ownership schemes [54,56,57]. An affordable house rental scheme has the potential to provide low-income households with the opportunity to spend less money on housing. In the long-term, low-income households could save enough money for buying a house under the home ownership scheme. If the aim of the PNG AHP is to provide housing for low-income households, it is necessary to include a mixture of homeownership and affordable house rental schemes in the AHP, to meet low-income group preferences and demand for housing.

In order to promote effectiveness and efficiency in the housing sector, the role of public and private sectors in provision of housing must be streamlined [13]. In PNG, the roles of the public sector and that of the private sector is not clear. In some cases, governmental agencies are directly involved in building houses, and in other cases, the private sector is involved in building houses and developing trunk infrastructure [52,65]. In some cases, governmental agencies engage building contractors to construct houses before introducing trunk infrastructure [63]. This indicates that orderly housing development is at risk in PNG, which has negative implications for urban development. In most countries, the current paradigm entails governmental agencies playing facilitating roles, whereas private sector builds houses [69,70]. PNG has the Public–Private Partnership Act 2014 [71]. However, it is important to develop a public–private partnership strategy, which is specifically for the housing sector. It is also necessary to develop an effective strategy for monitoring housing developments in PNG cities.

The findings show that the private property developers are willing to supply more houses in major cities of PNG. However, the developers face several challenges, especially shortage of secure land, trunk infrastructure, and the high cost of house building materials. It is important to note that the housing sector has the potential to provide employment opportunities for many people, and the PNG government gets revenue from the sector through stamp duties and goods and service tax from the sale of houses. For these reasons, it is necessary for the government to put more effort in making more land available for housing, carry out maintenance works on existing infrastructure, and introduce new infrastructure where it is lacking. It is also necessary to provide more funds for research on potential local materials for building houses. This has the potential of attracting more private investment in the housing sector, and consequently, increase supply of houses relative to demand, which should push down house prices.

The lowest sales price for houses in state-owned housing estate is higher than that of houses in private-owned estate. This raises questions regarding whether governmental agencies are interested in providing affordable houses to Port Moresby residents. The finding confirms the assertion that the private sector is more effective and efficient in building houses than the public sector, as reported by Tang et al. [70] and Mazouz et al. [72]. This is because the private sector is more disciplined by market forces and competition. For example, the lowest sales price of a house in the Duran Farm housing project is 350,000 PGK, and it is approximately 300,000 PGK at Edai Town. This reaffirms the need for governmental agencies in charge of housing in PNG, such as NHC, Department of Planning and Monitoring, and Department of Treasury, to focus on playing facilitating roles, whereas the private sector would build houses. In regard to location and accessibility to trunk infrastructure, Duran Farm is located a long distance from the central business district of Port Moresby and lacks basic infrastructure, and the completed houses have not been occupied. Edai Town is also located a long distance from the central business district, but it has all the necessary trunk infrastructure, and most of the completed houses there have been occupied. This suggests that the differences between house sales price in Duran Farm and Edai Town could be due to the differences in the system used for building houses. For the case of Duran Farm, the NHC contracted the building of houses to private housing contractors, whereas private developers who own Edai Town are directly involved in building houses there.

The findings reveal that all the houses that have been built under the AHP in PNG are single-family houses of one storey. This leads to inefficient use of land resources and contributes to the pushing up of house prices. In countries such as Singapore, where land is very scarce, multi-family high-rise houses are often built. This promotes efficiency in the use of available land and reduces the cost of building houses.

In regard to methodology, it is important to note that public service salary scale was used in this study to explore housing affordability, which suggests that any income that some of the public servants might generate from other sources was not captured. In addition, some of the workers could have spouses that earn an income and contribute to household income, which could increase the housing affordability level of the household. These other income sources are important and could contribute toward capturing the total value of household income. It is necessary to conduct further research that focuses primarily on generating data on various sources of household income in PNG. The distribution of workers in the different public service salary scale was not captured, which implies that the number of workers that have housing affordability problems could not be determined in absolute terms. This is because the author of this paper could not get access to the documents associated with the distribution of public servants in Port Moresby, due to issues related to bureaucracy. Currently, PNG do not have criteria for measuring housing affordability, which motivated the use of measures from other countries that might not have the same conditions as PNG. However, 30% and 40% household monthly incomes were used for determining housing affordability in this study, to account for the differences. It is important for PNG to develop its own housing affordability measure, so that urban development managers and policy-makers could use it in making informed decisions.

If the aim is to provide affordable housing especially in Port Moresby, it is important to develop more high-rise multi-family houses for low to middle-income households, whereas single family dwellings could be provided for middle to high-income households. This might help provide different household groups with the opportunity to access housing in Port Moresby. It is also important to construct more houses in low-income areas to supply more low-cost houses to the housing market. The AHP should be designed to incorporate a mixture of home ownership and house rental schemes.

Accessibility of low-income households to housing could be improved by increasing salaries of low-income group, lowering the equity rate and addressing the factors that contribute to pushing up the cost of building houses. This includes making more secure land available for housing, supporting domestic enterprises to produce materials for building houses, and developing trunk infrastructure where it is required. The preferences and demand of targeted household groups should be considered in the planning and design of AHP.

Policy Implications

The findings from this study have several policy implications related to providing affordable housing in PNG and Port Moresby in particular. The implications are:

Criteria for measuring housing affordability is important for planning and evaluating progress of AHP. The housing sector in PNG, especially in major cities such as Port Moresby, has focused on building houses without establishing standards for measuring affordability and the sustainability of the AHP. This has made housing a luxury good, which implies that only rich people can access housing. To develop an effective AHP, it is important to consider supply and demand, as well as measures for assessing the program's progress.

Low-income households are the major target of AHP. Low-income households are often hit harder in the event of a housing crisis. However, the majority of these households seem to not be benefitting from the housing interventions provided by the state in PNG. In other words, it is important for the state to specify the categories of households targeted by the AHP. Criteria for identifying the thresholds of income groups in Port Moresby, and other major cities, should be developed so that potential beneficiaries of AHP could be easily identified.

There is not enough economic incentive to attract private developers. The main goal of private investment is to maximize profit. As such, private developers will only invest in housing when they are certain of making a profit. In PNG, most building materials and machines are imported, and are expensive, which increases the cost of building houses, and consequently increases house rental and sale prices. In addition, shortages of secure land for economic development, and high sales prices of available land, contributes to pushing up housing costs. The PNG government should consider reviewing import duties for building materials and machines, and provide tax credit to private developers that are involved in the supply of affordable housing. It is necessary to put more effort into releasing customary land for development. Regulatory mechanisms, which could motivate private developers to supply more houses, should be considered.

Trunk infrastructure is either inadequate or lacking, which contributes to housing costs. Trunk infrastructure such as roads, piped-borne water, and electric power, attract huge costs, and private developers may not have the economic means to provide them. Moreover, it is the duty of the state to provide trunk infrastructure. Government agencies in charge of infrastructure should put more effort into maintaining existing infrastructure and providing infrastructure where it is lacking, as proposed by Ezebilo et al. [45]. This will help lower the cost of building houses, which in turn, results in an increased supply of houses in Port Moresby and other major cities in PNG.

More high-rise multi-family apartments need to be built, as there is a shortage of secure land for development in major cities in PNG, especially Port Moresby. There is a need to maximize use of the available land by incorporating the principle of economies of scale to reduce the unit cost of land. To do this, property developers should be encouraged to build high-rise multi-family apartments until

the shortage of secure land has been addressed. This will help provide housing for many people per unit area of land.

To move PNG forward, government agencies in charge of housing, such as NHC, should focus on playing a facilitating role by providing trunk infrastructure, monitoring quality of houses, and developing housing policy. Private developers should focus on building houses. It is important for the PNG government to streamline the roles of government housing agencies and private developers in the provision of housing, and each party should stick to their own roles.

More houses are needed in Port Moresby, especially in low-income areas. The AHP in PNG has focused primarily on home ownership scheme. However, some people, especially from low-income households, may not have the capacity to pay the initial deposit (i.e., 10% of loan amount) required to access a housing loan. Furthermore, house prices, coupled with the interest rate of the loan (minimum of 3%), is expensive. As a matter of urgency, there is a need to supply more houses for sales and rental, so that more households could benefit from affordable housing.

There is a need to introduce several affordable housing schemes. Port Moresby residents are diverse, and so are their preferences and demands. In order to meet housing needs of Port Moresby residents, there is a need to introduce several housing schemes so that the residents could choose the scheme they prefer. To do this, government housing agencies should collaborate with private developers in developing an effective and efficient housing scheme. Currently, there is primarily one notable housing scheme, the FHOS, which may not meet the preferences and demands of all Port Moresby residents.

6. Conclusions

This study provides an insight into AHP in Port Moresby, PNG. The findings reveal that low-income households do not benefit from the AHP, and that criteria for measuring housing affordability have not been developed. The sustainability and affordability level of houses were not considered in the design of the AHP. The housing price is generally high compared to salaries of public servants, and the AHP focuses only on a home ownership scheme. Most Port Moresby residents may find it difficult to meet the requirements for accessing the home ownership scheme because of the 10% share of house sales price that must be paid upfront (equity). For this reason, AHP should be a mixture of home ownership and affordable house rental schemes, so that the preferences and demands of the potential beneficiaries could be met. It is the exclusive duty of the state to provide trunk infrastructure. However, bureaucracy in the public sector has often led the private sector to provide infrastructure, which contributes to the increasing cost of building houses, though private property developers in PNG are interested in being more involved in building more houses. However, they are often constrained by the high cost of house building materials, difficulties in accessing secure land, shortages of skilled labour, and lack of trunk infrastructure.

If the aim of the AHP is to provide housing for the less privileged, the weak, and the poor, the AHP must target low-income households, and the sustainability and housing affordability level must be considered. Preferences of low-income households must be considered, and more houses built in low-income areas to supply more low-cost houses to Port Moresby residents. The supply of more houses relative to demand should push down house prices. As price of housing is strongly linked to location, as reported by Hanushek and Yilmaz [73], houses built in low-income areas could be supplied to low-income households. It is important to note that houses located in areas long distances from the city centre will attract travel costs to and from the city centre for work and other activities. For this reason, travel costs should be considered in the planning and design of AHP. Private property developers could be provided with subsidies, such as tax credit, to enable them to provide housing below the market price. It is necessary to introduce housing affordability measures, build more multi-family high-rise houses, provide trunk infrastructure where it is lacking, and maintain existing ones. The sustainability of AHP should be considered during the planning and design phase of

the program. It is also necessary to streamline the roles of the public and private sectors in provision of housing, and the current housing policy reviewed to reflect the realities in PNG.

A housing voucher scheme could be introduced to assist low-income households to access affordable housing. This entails issuing a household voucher by a governmental agency, and the household finds a suitable house for rent, and the landlord paid a subsidy directly by the agency. The household pays the difference between the actual rent and the subsidy. As low-income households are involved in choosing houses that meet the requirements of the housing voucher scheme, they would not be limited to only houses located in low-income areas. This suggests that the scheme has the potential of meeting household's preferences. In addition, houses earmarked for the housing voucher scheme must meet minimum quality standards, which should be determined by governmental agencies such as the NHC. This could serve as a potential strategy to see that low-income households have access to quality housing. As the housing subsidy is paid directly to landlord by the governmental agency, it has the potential of reducing the tendency for a household to use the housing subsidy for other purposes.

The findings from this study contribute to a greater understanding of a potential strategy that could be used to improve the effectiveness of AHP in PNG. This could assist urban development planners and policy-makers in designing strategies for monitoring and evaluating AHP. It could also assist them in making informed decisions on provision of affordable housing, which should contribute to housing policy in PNG.

Acknowledgments: I would like to thank Kym Yong and Robert Cheah of Edai Town Development Ltd for providing me insights on the challenges that private property developers face in Papua New Guinea. I thank anonymous reviewers of the manuscript for their valuable comments.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Bramley, G. Affordability, poverty and housing need: Triangulating measures and standards. *J. Hous. Built Environ.* **2012**, *27*, 133–151. [[CrossRef](#)]
2. Gurran, N.; Phibbs, P. Housing supply and urban planning reform: The recent Australian experience, 2003–2012. *Int. J. Hous. Policy* **2013**, *13*, 381–407. [[CrossRef](#)]
3. Yang, Z.; Yi, C.; Zhang, W.; Zhang, C. Affordability of housing and accessibility public services: Evaluation of housing programs in Beijing. *J. Hous. Built Environ.* **2014**, *29*, 521–540. [[CrossRef](#)]
4. Haffner, M.E.A.; Boumeester, H.J.F.M. The affordability of housing in the Netherlands: An increasing income gap between renting and owning? *Hous. Stud.* **2010**, *25*, 799–820. [[CrossRef](#)]
5. Kutty, N.K. A new measure of housing affordability: Estimates and analytical results. *Hous. Policy Debates* **2005**, *16*, 113–142. [[CrossRef](#)]
6. Anderson, L.M.; St Charles, J.; Fullilove, M.T.; Scrimshaw, S.C.; Fielding, J.E.; Normand, J. Providing affordable family housing and reducing residential segregation by income: A systematic review. *Am. J. Prev. Med.* **2003**, *24*, 47–67. [[CrossRef](#)]
7. Patel, B.; Byahut, S.; Bhatha, B. Building regulations are a barrier to affordable housing in Indian cities: The case of Ahmedabad. *J. Hous. Built Environ.* **2017**. [[CrossRef](#)]
8. Austin, P.M.; Gurran, N.; Whitehead, C.M.F. Planning and affordable housing in Australia, New Zealand and England: Common culture; different mechanisms. *J. Hous. Built Environ.* **2014**, *29*, 455–472. [[CrossRef](#)]
9. Lux, M. The quasi-normative approach to housing affordability: The case of the Czech Republic. *Urban Stud.* **2007**, *44*, 1109–1124. [[CrossRef](#)]
10. Whitehead, C.; Monk, S.; Clarke, A.; Holmans, A.; Markkanen, S. *Measuring Housing Affordability: A Review of Data Sources*; Cambridge Centre for Housing and Planning Research: Cambridge, UK, 2009.
11. Stone, M.E. What is housing affordability? The case for the residual income approach. *Hous. Policy Debate* **2006**, *17*, 151–184. [[CrossRef](#)]
12. Obeng-Odoom, F. Has the habitat for Humanity Housing Scheme achieved its goals? A Ghanaian case study. *J. Hous. Built Environ.* **2009**, *24*, 67–84. [[CrossRef](#)]
13. Ibem, E.O. Public private partnership (PPP) in housing provision in Lagos megacity region, Nigeria. *Int. J. Hous. Policy* **2011**, *11*, 133–154. [[CrossRef](#)]

14. Thomas, M.; Hall, A. Housing Affordability in Australia. Available online: http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BriefingBook45p/HousingAffordability (accessed on 3 July 2017).
15. Bajari, P.; Kahn, M.E. Estimating housing demand with an application to explaining racial segregation in cities. *J. Bus. Econ. Stat.* **2005**, *23*, 20–33. [[CrossRef](#)]
16. Basudeb, B. *Analysis of Urban Growth and Sprawl from Remote Sensing Data*; Springer: Berlin, Germany, 2010; p. 23.
17. Housing and Urban Development. Community Planning and Development: Who Needs Affordable Housing? Available online: http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/affordablehousing/ (accessed on 26 May 2016).
18. Housing Corporation. *Affordable Housing: What Is the Common Definition of Affordability*; Government of Canada: Ottawa, Canada, 2011.
19. Hulchanski, J.D. The concept of housing affordability: Six contemporary uses of the housing expenditure-to-income ratio. *Hous. Stud.* **1995**, *10*, 471–490. [[CrossRef](#)]
20. Queensland Affordable Housing Consortium. *Definition of Affordable Housing*; Queensland Affordable Housing Consortium: South Brisbane, Australia, 2012.
21. Hamidi, S.; Ewing, R.; Renne, J. How affordable is HUD affordable housing? *Hous. Policy Debate* **2016**, *26*, 437–455. [[CrossRef](#)]
22. Lin, W.; Raman, K.K. The housing value-relevance of governmental accounting information. *J. Acc. Public Policy* **1998**, *17*, 91–118. [[CrossRef](#)]
23. Katz, B.; Turner, M.A.; Brown, K.D.; Cunningham, M.; Sawyer, N. *Rethinking Local Affordable Housing Strategies: Lessons from 70 Years of Policy and Practice*; The Brookings Institute: Washington, DC, USA, 2003.
24. Mulliner, E.; Malys, N.; Maliene, V. Comparative analysis of MCDM methods for the assessment of sustainable housing affordability. *Omega* **2016**, *59*, 146–156. [[CrossRef](#)]
25. Whitehead, C.M. Planning policies and affordable housing: England as a successful case study? *Hous. Stud.* **2007**, *22*, 25–44. [[CrossRef](#)]
26. Deng, L.; Shen, Q.; Wang, L. The emerging housing policy framework in China. *J. Plan. Lit.* **2011**, *26*, 168–183. [[CrossRef](#)]
27. Yang, Z.; Shen, Y. The affordability of owner occupied housing in Beijing. *J. Hous. Built Environ.* **2008**, *23*, 317–335. [[CrossRef](#)]
28. Hui, E.C.M. Measuring affordability in public housing from economic principles: Case study of Hong Kong. *J. Urban Plan. Dev.* **2001**, *127*, 34–49. [[CrossRef](#)]
29. Rea, W.; Yeun, J.; Engeland, J.; Figueroa, R. The dynamics of housing affordability. *Perspect. Labour Income* **2008**, *20*, 37–48.
30. Robinson, M.; Scobie, G.M.; Hallinan, B. *Affordability of Housing: Concepts, Measurement and Evidence*; New Zealand Treasury: Wellington, New Zealand, 2006.
31. Moore, E.; Skaburskis, A. Canada's increasing housing affordability burdens. *Hous. Stud.* **2004**, *19*, 395–413. [[CrossRef](#)]
32. Stone, M.E. *Shelter Poverty: New Ideas on Housing Affordability*; Temple University Press: Philadelphia, PA, USA, 1993.
33. Bogdon, A.S.; Can, A. Indicators of local housing affordability: Comparative and spatial approaches. *Real Estate Econ.* **1997**, *25*, 43–80. [[CrossRef](#)]
34. Mulliner, E.; Maliene, V. An analysis of professional perceptions of criteria contributing to sustainable housing affordability. *Sustainability* **2015**, *7*, 248–270. [[CrossRef](#)]
35. Fisher, L.M.; Pollakowski, H.O.; Zabel, J. Amenity-based housing affordability indexes. *Real Estate Econ.* **2009**, *37*, 705–746. [[CrossRef](#)]
36. Seelig, T.; Phibbs, P. Beyond the normative: Low income private renters' perspectives of housing affordability and need for housing assistance. *Urban Policy Res.* **2006**, *24*, 53–66. [[CrossRef](#)]
37. Quigley, J.M.; Raphael, S. Is housing unaffordable? Why isn't it more affordable? *J. Econ. Perspect.* **2004**, *18*, 191–214. [[CrossRef](#)]
38. Haffner, M.; Heylen, K. User costs and housing expenses. Towards a more comprehensive approach to affordability. *Hous. Stud.* **2011**, *26*, 593–614. [[CrossRef](#)]
39. Hashim, Z.A. House price and affordability in housing in Malaysia. *Akademika* **2010**, *78*, 37–46.

40. Mulliner, E.; Smallbone, K.; Maliene, V. An assessment of sustainable housing affordability using a multiple criteria decision making method. *Omega* **2013**, *41*, 270–279. [CrossRef]
41. Kamal, E.M.; Hassan, H.; Osmadi, A. Factors influencing the housing price: Developers' perspective. *Int. J. Soc. Behav. Educ. Econ. Bus. Ind. Eng.* **2016**, *10*, 1594–1600.
42. Bosche, L.; Durante, E.; Patterson, M. *Senior Capstone in Environmental Studies* Spring, 2015. Available online: <https://www.skidmore.edu/wri/documents/6-BoscheDurantePatterson.pdf> (accessed on 3 August 2017).
43. King, R.; Virsilas, T. *Challenges to Safe and Affordable Urban Housing*; World Resources Institute: Washington, DC, USA, 2016. Available online: <http://www.wri.org/blog/2016/10/3-challenges-safe-and-affordable-urban-housing> (accessed on 3 August 2017).
44. Endekra, B.; Kwapena, F.; Yala, C. *Understanding Property Movements in Port Moresby: Lessons from a Price Tracking Experiment*; National Research Institute: Port Moresby, Papua New Guinea, 2015.
45. Ezebilo, E.; Hamago, L.; Yala, C. *Assessment of Market Prices for Residential Properties in Port Moresby: Do Location and Property Type Matter?* National Research Institute: Port Moresby, Papua New Guinea, 2016.
46. Wangi, T.; Ondopa, J.; Ezebilo, E.E. Housing allowance for public servants in Papua New Guinea: Does it meet housing affordability criteria. *Spotlight* **2017**, *10*. Available online: <https://pngnri.org/wp-content/uploads/2017/03/SL10-03-201703-Wangi-Housing-allowance.pdf> (accessed on 18 August 2017).
47. Bank of South Pacific. First Home Ownership Scheme (FHOS) Loan FAQ. Available online: [http://www.bsp.com.pg/Personal/Retail-Banking/Loans/Home-Loans/First-Home-Ownership-Scheme-\(FHOS\)-Loan-FAQ.aspx](http://www.bsp.com.pg/Personal/Retail-Banking/Loans/Home-Loans/First-Home-Ownership-Scheme-(FHOS)-Loan-FAQ.aspx) (accessed on 5 July 2016).
48. Nao, L.; Ezebilo, E. Trunk infrastructure must be established before houses are constructed: Lessons from the Duran Farm Housing Project in Port Moresby. *Spotlight* **2017**, *10*. Available online: <https://pngnri.org/wp-content/uploads/2017/06/SL10-07-201706-Nao-Trunk-Infrastructure.pdf> (accessed on 18 August 2017).
49. Hausples. Affordable Housing for PNG. Available online: <http://hausples.com.pg/more-affordable-housing-for-png/> (accessed on 15 December 2015).
50. Edai Town. Prices for Limited Period. Available online: <http://www.edaitown.org/price.html> (accessed on 16 June 2016).
51. Glory Group of Companies. Available online: <http://glorygrouppng.com> (accessed on 16 June 2016).
52. Webster, T.; Chand, S.; Kutan, L. Property and housing policy development. In *National Research Institute Discussion Paper, No. 149*; National Research Institute: Port Moresby, Papua New Guinea, 2016.
53. Curtain Brothers. History. Available online: <http://www.curtainbros.com.au/> (accessed on 14 June 2016).
54. Housing and Development Board. Conditions after Buying a Resale Flat. Available online: <http://www.hdb.gov.sg/cs/infoweb/residential/buying-a-flat/resale/conditions-after-buying> (accessed on 3 June 2016).
55. Housing and Development Board (HDB). HDB Flat. Available online: <http://www.hdb.gov.sg/cs/infoweb/residential/buying-a-flat/new/hdb-flat> (accessed on 16 October 2015).
56. Department of Social Services. National Rental Affordability Scheme. Available online: <https://www.dss.gov.au/our-responsibilities/housing-support/programmes-services/national-rental-affordability-scheme> (accessed on 16 November 2015).
57. Department for Communities and Social Inclusion. Eligibility for Affordable Homes. Available online: <https://www.sa.gov.au/topics/housing-property-and-land/buying-and-selling/affordable-houses-to-buy/eligibility-for-affordable-homes> (accessed on 11 June 2016).
58. Global Cities Research Institute. Placemarks. Available online: <http://global-cities.info/placemarks/port-moresby-papua-new-guinea> (accessed on 8 January 2016).
59. Papua New Guinea National Statistical Office. *Results of 2011 National Census*; National Statistical Office: Port Moresby, Papua New Guinea, 2015.
60. Stretton, A. *Urban Housing Policy in Papua New Guinea*; The Institute of Applied Social and Economic Research: Port Moresby, Papua New Guinea, 1979.
61. Independent Consumer and Competition Commission. *PNG Housing and Real Estate Industry Review: Final Report*; Independent Consumer and Competition Commission: Port Moresby, Papua New Guinea, 2010.
62. National Executive Council (NEC). *NEC Decision No: 33/2016*; NEC: Port Moresby, Papua New Guinea, 16 February 2016.
63. National Strategic Plan Taskforce. *Papua New Guinea Vision 2050*. Available online: <https://sustainabledevelopment.un.org/content/documents/1496png.pdf> (accessed on 20 February 2016).

64. Ezebilo, E.; Hamago, L. Prospects and challenges in private sector provision of housing in Papua New Guinea: Lessons from Edai Town Development. In *National Research Institute Discussion Paper*; National Research Institute: Port Moresby, Papua New Guinea, 2017, in press.
65. Yala, C. *Study Tour of Land Development in the Australian Capital Territory: Lessons and Policy Options for the National Land Development Programs*; National Research Institute: Port Moresby, Papua New Guinea, 2010.
66. Lim, J. Housing in Singapore Seriously Unaffordable but Survey Says Singapore a 'Notable Exception'. Available online: <http://mothership.sg/2017/01/housing-in-spore-seriously-unaffordable-but-survey-says-spore-a-notable-exception/> (accessed on 2 August 2017).
67. Wangi, T.; Howes, S. Public Sector Pay Scales in PNG: Are Academics Underpaid? In *Development Policy Centre Discussion Paper, No. 35*; Australian National University: Canberra, Australia, 2014.
68. Leung, C.K.Y.; Sarpa, S.; Yilmaz, K. Public housing units vs. housing vouchers: Accessibility, local public goods, and welfare. *J. Hous. Econ.* **2012**, *21*, 310–321. [[CrossRef](#)]
69. Ibem, E.O. An assessment of the role of government agencies in public-private partnerships in housing delivery in Nigeria. *J. Constr. Dev. Ctries.* **2010**, *15*, 23–48.
70. Tang, L.Y.; Shen, O.; Cheng, E.W.L. A review of studies on public-private partnership projects in the construction industry. *Int. J. Proj. Manag.* **2010**, *28*, 683–694. [[CrossRef](#)]
71. National Parliament. *Public-Private Partnership Act 2014*; National Parliament: Port Moresby, Papua New Guinea, 2014.
72. Mazouz, B.; Facal, J.; Viola, J.M. Public-private partnership: Elements for a project-based management typology. *Proj. Manag. J.* **2008**, *39*, 98–110. [[CrossRef](#)]
73. Hanushek, E.; Yilmaz, K. Schools and location: Tiebout, Alonso and government Policy. *J. Public Econ. Theory* **2013**, *15*, 829–855.



© 2017 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).