Perpetuation of informality in the face of rising demand for standard housing in Port Moresby, Papua New Guinea

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ABSTRACT

This study is an investigation of the characteristics and patterns of informal housing market in squatter settlements relative to those of the formal housing market in Port Moresby. The main purpose of the study is to understand how the informal rental housing market in the city competes with the formal housing market with a view to predicting the seeming perpetuation of informality in the face of rising housing demand and the limited supply of urban land within the city. Purposive random sampling technique was used to interview 100 respondents comprising 40 landlords, 40 tenants and 20 professionals and elites living in the city, based on several questionnaire surveys that yielded a combined representative sample. Using SPSS for descriptive statistics and Pearson correlation, GIS and Remote Sensing technologies, three research questions were answered. Findings reveal that 44%of landlords have owned rental housing in the informal settlements for not more than two years, while 51% had acquired less than 200m² of land for building their houses. The informal settlements were recently infiltrated by highly educated people with high income (33%), while entrepreneurial motives have helped in pushing the destitute further into the outskirts of the city through a process akin to gentrification. Lack of effective control of urban development by the municipality ranked first on the Likert Perception Index measuring factors of informality, while shortage of land in the formal areas of the city ranked as the least important factor. Furthermore, the size of land and the fortnightly income of landlords were positively significant factors influencing the total number of rental houses owned by landlords in the informal areas of Port Moresby ($p<0.01$ and $p<0.05$). GIS and Remote Sensing techniques reveal that the rate of change of informal settlements (67%) was twice as high as that of the formal housing areas (33%), which is an indication that the rising trends in housing informality may continue in the foreseeable future. This study also confirms the significance of competition between the formal and informal built-up areas for limited state land

in Port Moresby. Recommendations are made forcost-effective and transparent government intervention programmes based on its role as a housing market regulator and facilitator.

Keywords: *Informal settlements, informality, formal built-up areas, competition, GIS, Remote Sensing, rental housing market, Port Moresby, Papua New Guinea.*

1. INTRODUCTION

The scarcity of land with a 'clean legal title'remains the single most important constraint facing standard housing development tin Port Moresby (Kaitilla, 1999). The mineral boom in Papua New Guinea in the last five years has placed a high demand on urban land to adequately serve the economic and social needs of the urban population. According to Storey (2010) and the UN-Habitat (2012), more than 35 percent (3.5 million) of Papua New Guineans will be leaving behind 97 percent of their customary land and moving into the urban centres to compete with the formal land users (government and private developers) for less than 3 percent of the alienated land in the country by the end of the year 2030. However, in all urban centres around the world, one of the essential conditions for a vibrant and well-functioning housing market is the availability of serviced residential land at an affordable price (Angel, 2000; 192). The inability of migrants to access land and the inability of the government to provide serviced housing sites in the formal areas of major cities have resulted in the multiplicity of illegal or informal settlements in the major cities across Papua New Guinea (Duncan, 2005).

The purpose of this paper is to investigate the dynamics of the informal housing market and its seeming perpetuation and harmful competition with the formal housing areas for the apparently limited supply of land for housing in Port Moresby City. Broadly defined, the present study concurs with the findings of some previous studies indicating that many developments within the urban areas contravening the locally approved environmental planning and building regulations constitute the informal housing sector (Chand and Yala, 2006). However, according to Chand and Yala, the formal built-up areas in Port Moresby had been acquired from customary land holders either through private treaty, agreement or compulsory acquisition by the past colonial administration and subsequently by the Papua New Guinean government. On the other hand, the informal settlements are mushrooming on vacant state lands, customary lands and private lands mostly in the marginal areas of the city (Oram, 1976).According to Chand and Yala

(2006), most informal settlements are on vacant state lands with property rights that are rooted in political patronage. In addition, the informal settlements on customary land mostly originate from any explicit agreements of purchase, sale, and lease of land and properties without any evidence of title legitimacy that is registered in the Department of Lands and Physical Planning (Chand and Yala, 2016). Hence, the informal settlements that are located on good buildable customary lands in the peri-urban areas as well as those on vacant state lands that had been acquired through political patronage have been strongly competing with the formal housing areas in Port Moresby.

The paper is divided into five sections. After the introduction in the first section, section 2 presents the research problem, while the theoretical framework is presented in section 3. The research method and findings are presented in sections 4 and 5 respectively, while the concluding section presents the policy implications of the paper.

2. RESEARCH PROBLEM AND CONTRIBUTIONS TO KNOWLEDGE

According to Koczberski, *et al.* (2001), the informal areas in Port Moresby have grown rapidly in the last three decades. However, up till now, no one has explained the mystery behind the perpetuation of informality in the face of standard legislative and policy frameworks that government has put in place for housing development in Papua New Guinea. It is no longer a hidden fact that even middle-income public servants are now living in squatter settlements, which should not be so. We argue that it is high time that a proper investigation was conducted to clearly reveal the root causes of the perpetuation of informality in the Nation's capital city. There is a dearth of empirical findings that clearly explain the operations of informal rental housing market in Papua New Guinea on the one hand, while there is also scanty information, if any, on the unhealthy competition between the formal housing areas that are not yet subjected to any form of rent control policy and the squatter settlements, on the other hand. The present study seeks to bridge these gaps. Specifically, the study seeks to explain the dynamics of the informal rental housing market relative to those of the formal housing market, and then make an attempt to predict the perpetuation of informality given the inelastic supply of urban land within the city. Towards this end, this paper seeks to answer three research questions as a means of contributing to the knowledge of housing markets in cities, particularly in developing countries, namely:

i) What are the demographic and socio-economic characteristics of the landlords and tenants engaged as actors in the informal residential property rental market in Port Moresby?

ii) What are the perceptions of professionals and elites, concerning the factors responsible for informality?; and

iii) How can we predict and compare patterns of informality and formal housing in cities, using Port Moresby as a case study?

3. THEORETICAL FRAMEWORK

The theoretical framework for this paper consists of two classical land use models that were developed in the 1920's and 1930's, by Ernest Burgess (1925) and Homer Hoyt (1939) respectively. It was from these two models that we derived the idea of making 'adjustments' between a city's housing structure and its composite land use structure in a manner that truly reflects the existing city structure of Port Moresby, the case study (Figures 1a and 1b).

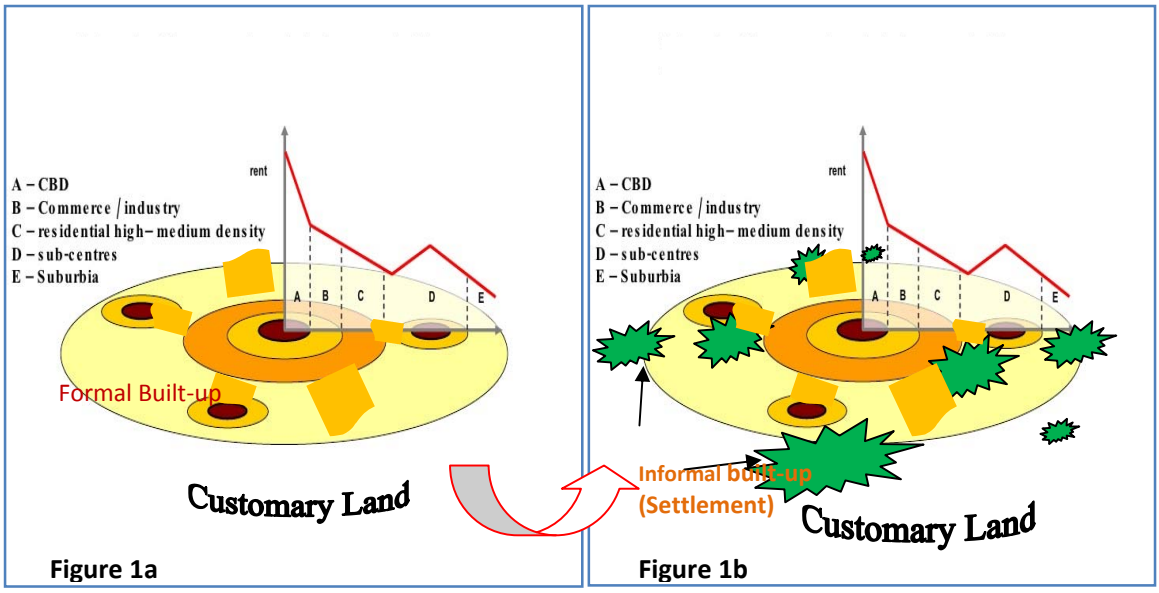


Figure 1a: The classical rent-bid theory for cities. **Figure 1b:** Adjustments made for Port Moresby to include informal settlements. **Sources:** Adapted from Burgess (1925) and Hoyt (1939)

The most relevant land use model adapted for this study is the sector model postulated by Hoyt (1939) (Figure 1a), which has evolved from Ernest Burgess' (1925) concentric model by showing that city structures are really not in the form of as depicted in the concentric rings but that they expand through encroachment and succession as depicted in a concentric land use model, but that cities expand through encroachments and successions. Hoyt (1939) argued that the city actually expands outwards in the form of wedges forming sectors. The city of Port Moresby has expanded in wedges and sectors depicting that commuting or transport cost and distance are the two factors behind diminishing rent from the Central Business District (CBD), resulting in a slope as one moves further away from the CBD. According to Figure 1b, the informal settlements with a rental housing sub-sector are included in the land use model and are rapidly becoming a permanent landscape of the City of Port Moresby (UN-Habitat, 2008). The informal settlements have encroached on the formal areas designed on state and private lands as well as on customary lands in the periphery and within some pockets of formal built-up areas resulting in an unhealthy competition for land (Figure 1b). However, while the informal settlements are seen as an eyesore by the public and government officials, most critics fail to notice or appreciate the stack reality of the important role that the informal settlements are playing in supporting the city. In fact, the informal settlements have been accommodating more than 50 percent of the city's labour force who produce garden food for the city dwellers (UN-HABITAT, 2010). This surprising finding agrees with more recent calls for increased urban agriculture in cities in order to make cities smarter and more sustainable in food production as edible cities (Hardman, 2016). Nevertheless, we argue that edible cities are likely to face stiff criticisms for possible infringements on private property rights that may result in litigations due to trespass or encroachments.

In contrast to the classical land use theories of Burgess (1925) and Hoyt (1939), most migrants entering the workforce in Port Moresby have seen the squatter settlements as their first point of call for residential accommodation that is relatively cheap and affordable, before eventually moving on to the formal residential areas if promoted on their jobs with housing entitlements or with opportunity to raise a mortgage loan for private home ownership in the planned areas of the city. Corresponding to the formal housing areas, the informal settlements also have different social classes and different house types that are available for rent. There are also signs of gentrification happening in the informal settlements. This happens when the older

locations with old houses that become infested with criminals and ethnic clashes and are deserted by their former owners or tenants, and subsequently taken over by migrants who encroach on the properties left behind on state and customary lands. In addition, there is a disparity between rental fees in various informal areas. Some illegal rental houses that had been built with good amenities such as pipe-borne water and electricity close to city roads and job-rich areas soon begin to attract higher rents after (illegal) land use conversion compared to those that are far away and right in the middle of informal settlements. For example, we have observed that in Port Moresby, certain informal settlements such as Morata, 8 Mile, 9 Mile and Taurama Valley are informal areas with high standards of amenities using up good buildable lands meant for formal housing development in line with the city's Master Plan.

4. RESEARCH METHODS

i) Questionnaire Surveys

Port Moresby, PNG's federal capital, is the study area. A purposive random sampling approach was used to select 3 squatter settlements in the city, considering the risks involved with interviewing squatters. A total of 100households were successfully interviewed out of the 150 questionnaires distributed. The sample consists of40 landlords, 40 tenants and 20 professionals that is considered representative of the total population of squatters in the three settlements. A structured, pre-tested and validated interview schedule was used to collect primary data from the tenants and landlords living in the informal rental housing sector located in the 3 selected settlements. The responses were then combined with the perceptions of professionals and elites living in the same informal settlements. Data was collected on the personal and socio-economic characteristics, experiences, perceptions and observations of the settlers regarding conditions in the informal rental housing areas. Data analysis was undertaking using a combination of the Perception Index, Remote Sensing and GIS, and the SPSS software.

ii) The Perception Index

We adopted the Perception Index to measure the independent variables, which consist of personal and socio-economic characteristics of the respondents, while the perceptions of tenants and landlords living in the squatter settlements were adopted as the dependent variables. To

measure the independent variables we adopted the personal and socio-economic characteristics of the respondents, while the perceptions of tenants, landlords, elites and professionals living in the informal housing sector were adopted as the dependent variables. The perceptions of the landlords and tenants were obtained using both close-ended and open-ended questions, which included the number of years in rental housing, ownership of land, modes of marketing, number of rental housing units and size of land used for rental housing. These were all coded, qualitatively recorded and analysed. The perceptions were measured using a five-point Likert scale. In doing so, seven criteria were developed to assess the perceptions of professionals and elites regarding the performance of the rental housing market. Six criteria were also developed to assess the perceptions of professionals and elites regarding the perpetuation of informal settlements that are competing with formal housing areas.

All the criteria were positively constructed and do not need a reverse coding, which might involve the use of negative statements that are assigned with large scores. Scores were assigned to positive perceptions as follows: 5 for “strongly agree”, 4 for “agree”, 3 for “not sure”, 2 for “disagree” and 1 for “strongly disagree”. The Perception Index (PI) (Karthikeyan, 1994; Bue, 2005) was used to calculate the perception scores for professionals and educated elites regarding the performance and perpetuation of informal rental housing market in the informal areas, which were then ranked from the highest to the least perception. The formula for the Perception Index is as follows:

Existence Perception Index (EPI) = (Ea x 1) + (Eb x 2) + (Ec x 3) + (Ed x 4) + (Ee x 5)

Where: Ea= Number of respondents who strongly disagreed;
Eb=Number of respondents who disagreed;
Ec= Number of respondents who were not sure;
Ed = Number of respondents who agreed; and
Ee =Number of respondents who strongly agreed.

iii) Remote Sensing and GIS Techniques

We also applied Remote Sensing and GIS techniques in analysing the data. High resolution bird view image at 1-meter spatial resolution for the Year 2010 was obtained with the aid of ArcGIS 10 to identify and extract data on selected informal and formal housing areas of Port Moresby for the Year 2010. This was compared with the Year 2000 base maps to calculate the changes in formal and informal housing areas between the Years 2000 and 2010. The rates of increase in spatial spread for both formal and informal areas were also calculated for the Years 2000 and 2010.The rates of change were calculated using a change detection technique with GIS and Remote sensing techniques.

To predict the next level of increase or densification of formal and informal housing areas, some factors such as the rate of change, scale factor, copy of proposed Development Plan implemented by the Lands Department, topographical features(e.g. rivers, lakes, sea, town boundaries), interviews with city planners, municipal authority and the general public, as well as observations based on road networks in the areas were transformed into suitable interfaces with the help of GIS and Remote Sensing Techniques. The predictions were made for the Years 2020 and 2030 in terms of city densification. Finally, the SPSS package was used for statistical analysis.

5. FINDINGS AND DISCUSSION

The findings in this paper are presented in three categories to reflect the three research questions, as follows:

i. What are the personal and socio-economic characteristics of the landlords engaged as actors in the informal residential property rental market in Port Moresby?

Table 1 indicates that about 44 per cent of the landlords interviewed have owned rental housing in the informal settlements for less than 2 years, indicating that rental housing in the informal settlements is a recent phenomenon in Port Moresby. The City of Port Moresby was originally established for the white people who lived and worked in PNG in the 1960's and 1970's. It was then believed that native Papua New Guineans had strong ties with their traditional customary land and could not willingly relocate to the cities. Most of the natives seemed to prefer working in the cities for some time and then return home to continue with their normal lives (Oram, 1976).

Thirty-three percent (33%) of the landlords interviewed have completed technical school, college or university education. Through informal discussions, it was observed that some high-income and highly educated people have recently moved into informal settlements to live, thereby pushing the poor further into areas dominated by customary land or marginal land. It has also been revealed by the Independent Consumer & Competition Commission (ICCC)(Housing Review, 2009) that educated people with good jobs are also accommodated in the informal settlements but the number was not easy to ascertain. The most common reasons for people moving into the informal settlements are: shortage of serviced land in the formal areas, high prices of serviced land, and to avoid corrupt dealings that are perpetrated by some landowners in the formal areas of the city.

More than half of the landlords interviewed in Port Moresby (51%) indicated that they had built their houses on state land (Table 1). As corroborated by Chand and Yala (2006), state land that is illegally occupied by migrants could still enjoy false tenure security through infrastructure service delivery made possible by political patronage that helps cement illegal occupiers'property rights. Such illegal settlements have surreptitiously become vote-gaining areas for local politicians with the possibility of perpetuation as permanent settlements in the city.

Table 1: Frequency distribution of sample population'sdemographic and socio-economic characteristics (N=40)

		LANDLORDS	
Variables	**Categories**	**(%)**	**Most Frequently occurring group**
Age group	a) 20-30 years old b) 31 – 40 years old c) 41 – 50 years old d > 51 years old	22 42 26 10	31-40 years
Education Level	a) No schooling b)Primary c) Secondary d) Colleges/ Technical e)University	12 27 28 20 13	Secondary Education
Fortnightly income	a) <K200 b)> K200< K500 c)> K500< K1000 d) > K1000	10 32 22 36	Over K1000

Years owning informal rental housing	a) < 2 years b)3-5 years c) Above 5 years	44 32 24	Less than 2 years
Land ownership	a) Customary land b) State land c) Freehold	39 51 10	State Land
Land size	a) < 200 m² b) 200 -500 m² c) > 500 m² Not sure	51 44 5 0	Less than 200m²
No. of rented houses owned	a) Only one b) Between 2 and 5 c) More than 5	49 42 9	Only one
TOTAL SAMPLE POPULATION(N)	**40**	**100**	

Forty-nine per cent (49%) of the landlords interviewed owned only one plot of land for housing, while 51% of landlords interviewed indicated that they owned a land area of less than 200m² for their residential property. These two results indicate that there is a shortage of land in the informal settlements for building more houses in response to pent-up demand. As indicated by Satterthwaite (2009), the struggle for housing in Port Moresby is most often a struggle for land. This shortage of land has resulted in the informal settlements encroaching more and more on the formal areas for purposes of housing development. The highly speculative lands in the urban fringes, particularly the customary lands, might eventually be taken up by the informal settlements due to the easy mode of acquisition by the customary landowners compared to the complicated and lengthy processes employed by the Lands Department through compulsory purchase and compensation using the eminent domain intervention strategy.

ii) What are the perceptions of professionals and elites concerning the factors responsible for the perpetuation of informality?

As indicated in Table 2, lack of properly controlled urban development by the municipal authorities topped the ranking of the perceptions of the professionals and elites (Rank 1) who were interviewed in Port Moresby. In support of this finding, some previous studies (Kombe and Kreibich, 2000; Webster and Duncan, 2009; Webster, 2016) had advocated for political will, support and appropriate legislation for urban development in Papua New Guinea. Thus, the state ought to appreciate the strategic economic benefits achievable in supporting and making the

informal settlements more efficient. However, through informal discussion, it was observed that most areas that were good topographically for housing development have yet to be put to effective use. Hence, those lands that had remained vacant and undeveloped for a long time were encroached upon by squatters. Over time and with the connivance of some politicians, the settlers gained tenure security over the land through legitimate means.

Table 2: Ranking of professionals' and elites' perceptions about the existence of informal rental housing in Port Moresby (N=20)

Perception	**Perception Index (PI)**	**Ranking Order**
Municipality not in effectively controlling urban development in Port Moresby	90	1
High rental charges in formal housing resulted in the rise of informal housing market	89	2
Current formal housing rent is unaffordable for most working class people	88	3
Lack of Government policies on housing raises the status of informal housing market	87	4
Recent mining boom increased rentals in the formal housing market	85	5
Some public servants' allowances are not sufficient to rent a house in the formal housing sector	80	6
Shortage of land in the formal areas has resulted in informal housing	78	7

A total of 17 out of 20 professionals and elites (85%) interviewed indicated that the high rental charges in the formal housing market have pushed more people into the informal housing market (Table 2). The professionals and elites in their perceptions about the informal housing market in the settlements further agreed that unaffordable rentals in the formal housing market (Rank 3), lack of government intervention (Rank 4), are the major factors that have influenced the development and operations of informal housing market (Table 2). "Some public servants lacked the financial capacity to rent houses in the formal rental housing market" was ranked sixth (6^{th}). Most of these public servants are normally expected to live in the formal housing areas either in the institutional or government houses allocated to them. However, our informal interviews during the field surveysindicated that a significant number of public servants were still living in the informal areas in rental houses. Their full salary cannot even meet one-third of the rentals in the formal housing market in the lower end of the market (Pyati, 2011). "Shortage of land in the formal areas has resulted in informal housing"emerged as the least important factor (Rank 7). If the government can put in place effective mechanisms to manage, plan and control developments in the city and execute urban renewal schemes to promote formal land use activities, this would

facilitate the upgrading of informal settlements to be in harmony with the formal housing areas because urban planning creates land values.

iii) How can we predict and compare patterns of informality and formal housing in Port Moresby?

To answer the third research question, we used a combination of Pearson correlation statistics, Remote Sensing and GIS techniques to predict patterns of informality and formal housing in Port Moresby up to the Year 2030, which would allow for the some impact of PNG Vision 2050 on housing and city liveability to become visible. The Pearson correlation analysis of the relationship between the total numbers of rental houses owned by the 40 landlords in the informal settlements and selected characteristics like land tenure and years spent in the informal rental business (Table 4) indicates a relationship that is not statistically significant, although the trend is positive.

Table 3: Pearson correlation coefficients (r-values) between selected housing characteristics and rental houses owned by landlords in the informal settlements (N=40).

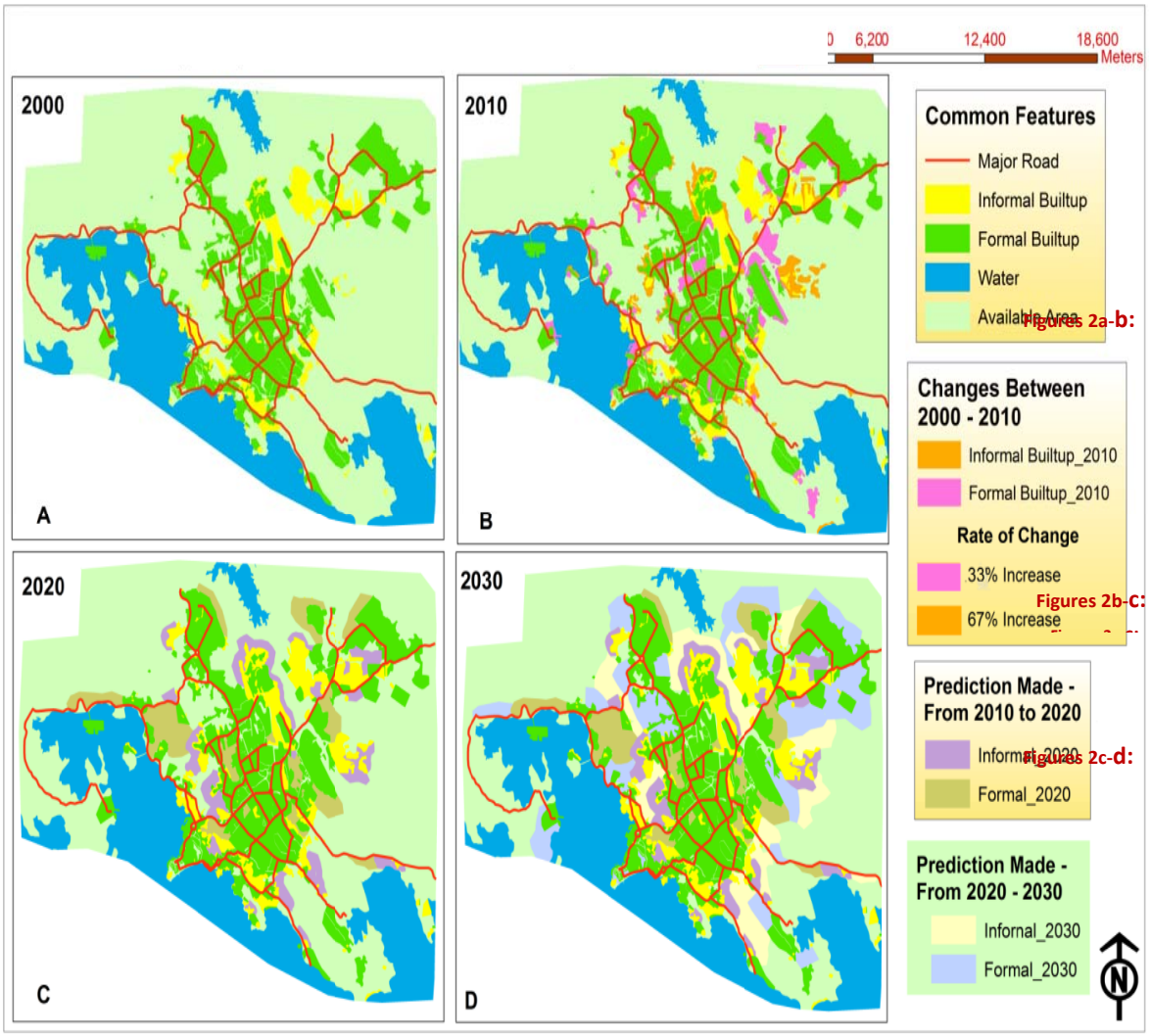
Dependent Variable	**Independent Variables**	Correlation coefficient (r)
Total number of rental houses owned by landlords in the informal areas of Port Moresby	Fortnightly income of all landlords	0.334**
		0.170^{NS}
	Land tenure (State/Customary)	0.150^{NS}
	Years in the informal rental business	0.228*
	Land size	

**Significant at the 0.01 level *Significant at the 0.05 level
NS - Not significant at 1 % and 5 % probability levels

The fortnightly income of the landlords (K1000) shows a weak but positive and significant relationship (0.334) with the total number of rental houses owned (Table 3) by the landlords in the informal settlements of Port Moresby. This indicates that an increase in the rental income of a landlord may lead to an increase in the total number of rental houses owned by that landlord in the informal settlements. A study by Cheetham (1963) had stated that an anticipated increase in income could stimulate demand for private property rights. According to

Table 3, the land size on which the rental houses were built had a weak but significant and positive relationship with the total number of rental houses owned by landlords in the informal settlements. This indicates that an increase in land size may also propel an expansion in the stock of rental housing in the informal settlements, although this might put pressure on the available land in those areas with the possible risks of encroachments on the formal areas and aggravation of land grabbing on customary lands.

In addition to Pearson correlation statistics, we also used Remote Sensing and GIS to detect change and predict the patterns of informal and formal housing in Port Moresby. According to Figures 2a-2d, a high-resolution bird-view image of the Years 2000 and 2010 base maps of Port Moresby shows a significant increase in both the formal and informal housing areas of Port Moresby between 2000 and 2010. The rates of change are 33% and 67% for the formal areas the informal settlements respectively. Based on these two highly differentiated rates of change, the predictions for the perpetuation of informal settlements were made for the Years 2020 and 2030. On the basis of the rate of change for the informal settlements, it can be argued that informal rental housing may likely continue to expand in the foreseeable future. The two computed rates of change indicate that the informal settlements (67%) in Port Moresby are expanding twice as fast as the formal residential areas (33%). These trends have been enhanced by the mineral boom in the last 5 years that has attracted more people and businesses to Port Moresby leading to shortages of land for different economic and social activities. Chand, *et al*. (2012) argued that the formal housing areas in Port Moresby have stagnated in the last 10 years. This also was supported by the previous study conducted by Chand and Yala (2006), which reported that the demand for land for housing within the urban centres of many Pacific islands has increased rapidly over the last 50 years, a trend that is also likely to continue in the foreseeable future.



Figures 2a-d: Application of Remote Sensing and GIS for detecting and predicting changes in informal and formal built-up areas in Port Moresby. **Source:** Motoro, 2016.

We have also included "population trends" as a variable that may have a serious impact on residential land use in Port Moresby. The population growth rate indicated in Figure 3 for Port Moresby implies that there has been a steady increase in population since 1970. It is contended that this increase in population has contributed immensely to the expansions noticed in the formal and informal housing areas that are now competing for land for various activities. Out of the 240 square meters of land in Port Moresby, about 60% is state land and 40% is customary land (Chand and Yala, 2006). The informal settlements are located on both state land and customary land. According to the National Capital District Urban Development Plan (2006-2015), informal housing areas covered 47.6% of the total residential land in 2015, while the

number of informal settlements grew by more than 30% between 1996 and 2006. According to Koczberski, *et al.* (2001), informal settlements around the urban areas in Port Moresby as well as in Lae (second largest city in PNG) have grown rapidly over the past three decades (Figure 3).

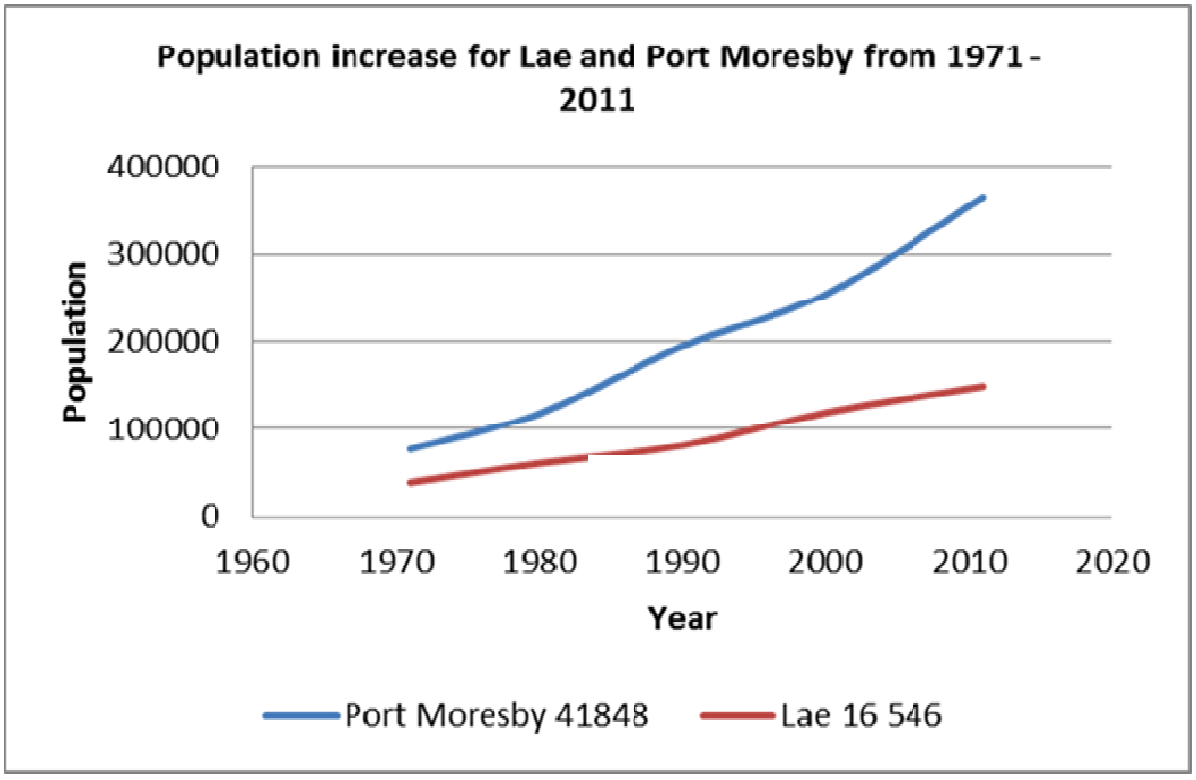


Figure 3: Population growth rates for Port Moresby and Lae since 1971

Source: PNG National Population Census, 2011

As indicated in Figure 3, the population of Port Moresby city has increased at a steady rate since 1970, more than that of any other city in the country. Port Moresby being the capital of PNG with more commercial activities has had a population well above that of Lae City since the 1970s. However, Port Moresby has been growing at a constant rate since 1971, which became steeper at the start of the Year 2000. Taking into account current projections over the 2010/2011 PNG National Census figures, Port Moresby is now expected to have a population of about 400,000with an annual growth rate of 3.3 percent and a population density of approximately 1,400 square meters per person. It is contended that, all things being equal, Port Moresby may become overpopulated in the near future with intense competition for scarce resources like

housing and land (Todaro, 1969), unless steps are quickly taken to reverse the negative influences of the factors listed in Tables 2 and 3.

6. CONCLUSION AND RECOMMENDATIONS

In this paper, an attempt has been made to investigate the perpetuation of informality in Port Moresby in the face of rising demand for standard housing in the formal sector. Three research questions were answered. The first research question investigates the personal and socio-economic characteristics of landlords in the informal housing sector. Findings indicate an average period of 2 years of home ownership in the informal settlements, which suggests that the informal housing market in Port Moresby is a recent phenomenon that is expanding as more people with college and university qualifications and people with entrepreneurial skills continue to migrate from villages to the city. Over 50% (51%) of the respondents in the study built their houses illegally on state land, while the majority of respondents (51%)have built their houses on plots less than 200m² (Table 1). The second research question captured the perceptions of the professionals and elites regarding factors responsible for informality. Findings show that ineffective urban development control by the municipality and the impact of market forces ranked as the two most important factors behind the proliferation of informality in Port Moresby. The third research question was mainly an attempt to estimate the rates of change in both formal and informal housing areas between the Years 2000 - 2010, 2010 - 2020, and 2020 – 2030, using Remote Sensing and GIS techniques. Findings indicate that the informal settlements have expanded twice as fast as the formal housing areas (67% and 33% respectively) within the last 10 years.

Based on the calculated rates of change and the ranked perceptions of factors considered in Table 2, we believe that safe and reliable projections can be made for the foreseeable future subject to regular evaluations of ground conditions by the municipality and other stakeholders. For now, it appears that the future is not very bright, considering the fact that Port Moresby has been ranked as one of the five least liveable cities in the world (The Economist Intelligent Unit, 2015).However, this gloomy picture may be reversed if the municipality and other stakeholders will sit up and take drastic measures to take firm control of urban development in Port Moresby. The rapid expansion of informal settlements needs to be halted and replaced with cost-effective

slum upgrading and urban renewal strategies. An effective mechanism has to be put in place to transparently deal with vacant state lands and acquire more customary lands for city expansion in the peri-urban areas. However, the shortage of land for development in the city ranked least on the perception index because there is abundant land in PNG, to the extent that people who are interested and are financially capable of constructing standard houses can find a suitable site for use. Hence, the government has to collaborate effectively and transparently with the state and customary land owners and ensure that they are actively involved in processes and policies concerning land use planning and land development in the city. Such steps would also assist the state in speedily acquiring more buildable lands for city expansion without havingto continue complaining about shortage of land for development purposes.

The findings in this paper have shown that people of all backgrounds are migrating to Port Moresby. More than fifty percent of the migrants have settled in the informal areas due to easy access to land for economic gain. Furthermore, the rates of change of informal settlements and formal built-up areas have shown that the informal areas have expanded twice as fast as the formal areas. There is definitely a competition for buildable land in Port Moresby on both state land and customary land. The trend would most likely continue into the foreseeable future given the steady population growth rate in the country since 1971(Figure 3).

Consequently, informal settlements with rental housing as one of the major land uses have become a cancerous component of the city landscape. The settlements are homes to most of the city's labour force comprising people with entrepreneurial skills and producers of the city's agricultural products that feed the city. The informal settlements are probably here to stay. However, inorder for the informal areas to coexist in harmony with the formal built-up areas, the government has to proactively play its predominate role as a regulator and facilitator. The way forward is for the entire city stakeholders to begin to effectively review the existing Development Plan and local plans for the city, while simultaneously pursuing the legitimisation of the squatter settlements through the provision of appropriate services and utilities to increase the supply of buildable lands. The state has to put in place effective and transparent mechanisms with the proactive involvement of customary landowners in the hinterland so as to improve living conditions in the rural areas including livelihoods, stem rural-urban migration, expand the city boundary so as to arrest shortages of land in the city. As indicated by Kaitilla (1999), most forms of economic activity operated by non-owners on customary land can only be sustained

through partnerships with the traditional landowner(s), while all illegal operations on state land can be safely removed through the use of development control measures that are devoid of corruption and abuse of political power by the politicians. It is high time that the politicians stopped being indifferent to the dilemma of squatter settlements by making concerted efforts to fulfill their election campaign promises to all sections of the city.

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