

# Public-Private Partnership Arrangements for Boosting the Supply of Affordable, Adequate and Quality Houses: Lessons for Papua New Guinea

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## Abstract

Providing adequate, quality and affordable housing for its population have been a long-standing issue for governments of some countries. To address the issue, some of the governments have adopted Public-Private Partnership (PPP) with the hope of improving housing delivery. However, identifying the most suitable PPP arrangement for providing houses is often problematic. This paper reports on a study of the different PPP arrangements that can be applied in housing delivery, critical success factors and challenges associated with the arrangements. It also reports lessons that Papua New Guinea (PNG) can draw from other countries that have applied PPP extensively in housing delivery. The study is based on a historical narrative literature review that was analysed using manifest qualitative content analysis. The findings revealed that there are several PPP arrangements that can be used in providing houses such as the direct relationship ownership housing which is similar to the build-lease-operate-transfer. Another type of arrangement is the direct relationship rental housing which is similar to the build-own-operate. Critical success factors for a PPP project include the need for transparency at all stages of the PPP, risks must be allocated properly between the public sector and the private sector, the PPP should have adequate political and community support. The performance of a PPP arrangement can be restricted by high transaction costs, poor contracting and procurement procedures, the dominance of the public sector in the arrangement, poor communication between the partners and inadequate legal frameworks. The lessons that PNG can draw from other countries include the identification of PPP arrangements that are most suitable for the country and how to implement the arrangements in an effective manner. The findings provide more understanding on the application of PPP arrangements in housing delivery by considering the challenges and success factors associated with the arrangements.

**Keywords:** affordable housing, effectiveness in housing delivery, trunk infrastructure, Public-private partnership

## 1. Introduction

The co-operation that often emerge between the public and private sectors in working towards shared objectives through a mutually agreed arrangements associated with division of labour, committing resources, sharing of the risks and benefits has been the most acceptable paradigm used by governments of most countries for providing infrastructure (Marana et al., 2018). The arrangement between the public sector and private sector, which can also be applied in providing housing is known as Public-Private Partnership (PPP). It can be based on formal or informal arrangements made before the implementation of a project by the partners. The PPP arrangement is seen as an alternative strategy in housing delivery however, its application has come with mixed results (Muhammad & Johar, 2019). As PPP often entails a long-term agreement and several stakeholders, conflict of interest is often inevitable (Osei-Kyei et al., 2019). A good understanding of the potential drivers of conflict can assist us to reduce the tendency of conflict. The PPP is often regarded as the ultimate solution for time and budget overruns in large infrastructural projects however, not all are successful (Warsen et al., 2018). It is important to establish an effective risk allocation strategy in the PPP arrangement to boost the efficiency of the arrangement.

Access to adequate, quality, and affordable housing for all income groups has been a daunting task for

governments of most countries (Yuan et al., 2017; Özdemir, 2011; Miao, 2016). The supply of houses has been limited relative to demand, which has often resulted in housing affordability problems (Ibem, 2011). Governments of some countries have attempted to address the housing affordability problems using various initiatives however, they have not been successful in addressing the problems (Hassan, 2011; Ezebilo, 2017; Yuan et al., 2017). Different initiatives for attracting private investment in housing, aimed at boosting supply of houses, has also been explored by these governments (Ibem & Aduwo, 2012). It has been found that the private sector is more effective and efficient in providing houses than the public sector (Adegun & Taiwo, 2011; Tang et al., 2010; Cartlidge, 2006). As the goal of the private sector in the construction of houses is to maximise profit, it may find it difficult to provide houses that are affordable for low-income groups (Gravelle and Rees, 2004). This resulted in the PPP arrangement in housing delivery as a way to improve productivity in the public sector (Tang et al., 2010). Several countries have adopted PPP such as Australia, Brazil, China, Malaysia, and Nigeria (Abdul-Aziz & Kassim, 2011; Ibem, 2010; Yuan et al., 2017; Cheung et al., 2012). The PPP consists of a range of institutional arrangements between the public sector and the private sector to share responsibilities associated with providing housing (Ibem, 2011).

Providing adequate, quality and affordable housing for low-income and middle-income households is becoming a challenge for the Papua New Guinea (PNG) Government (Webster et al., 2016). The rate at which houses are constructed cannot match with the demand, as well as the high sale prices and house rent (Ezebilo et al., 2016). Major cities of PNG tend to be hit harder by the high house prices. The migration of rural dwellers to the cities in search of jobs to better their lives contribute to an increase in the demand for houses in the cities. This results in housing affordability problems for most people who live in cities such as Port Moresby because they find it difficult to pay house rent or mortgage and at the same time pay for other necessities (Ezebilo, 2016).

To boost the supply of houses, especially in major cities of PNG, several large-scale private developers — such as EDAI Town Housing Development Limited, Glory Group of Companies and Curtain Brothers — have emerged. However, these companies are often constrained by challenges that restrict their investment in the housing sector. For example, in their study of prospects and challenges of private sector provision of housing in PNG, Ezebilo and Hamago (2017) found that private property developers have the potential to provide quality houses. However, these developers are often constrained by the shortages of land with proper titles for development and lack of trunk infrastructure such as, main sewerage facilities and electric power mains.

The continuous shortages of houses and the inability of some households to afford house sale prices and house rent have led the PNG Government to increase its interest in using PPP arrangement in housing delivery in the country. This is reiterated by the National Public Private Partnership Policy 2014 and the Public Private Partnership Act 2014. However, there are several PPP arrangements which implies that each country must adopt arrangements suitable to their socio-economic conditions and traditions. The overarching question for PNG is: what PPP arrangement should the country adopt? It is hoped that the findings from this study will provide an answer to this question.

### *1.1 The Objectives of the Study Are the Following*

- i. To provide an overview of PNG housing sector, examine approaches to housing delivery and identify the different types of PPP arrangements.
- ii. To identify challenges restricting PPP arrangements and potential ways the challenges can be addressed and find critical success factors that contribute to the success of a PPP project
- iii. To identify areas that PNG can draw lessons from other countries to make PPP arrangements more effective in housing delivery in the country.

It is hoped that findings from this study will provide will provide policy-makers and development planners with more understanding of PPP arrangements that can be used to address the housing problems in PNG and potentially other developing countries that have similar problems.

## **2. Conceptual Framework**

According to the financial leverage hypothesis, PPP has the potential to provide opportunities that the government (public sector) can use to leverage greater financial resources (Kopp, 1997). Hence, the tendency of the government to adopt PPP arrangement for providing facilities is strongly linked to the budget constraints it faces, which means that the government can implement several projects with limited financial resources. Apart from budget constraints, government also adopt PPP to share the risk burden associated with providing infrastructure such housing with the private sector. This is because the private sector has greater potential to manage risk more effectively than the public sector (Cartlidge, 2006). Though risk might be more evident in the

later phases of a housing project, it requires an effective management process throughout the entire life cycle of the project.

A risk management system often applied in a PPP project must reflect the peculiarities of the project. It is also necessary to undertake a forward-looking and life cycle oriented risk approach. This has the potential to provide insights into remote and proximate causes of identified risks and potential risks at the outset of the project. An understanding of stakeholders' capacity and willingness to manage risks and respective allocation of risks among the stakeholders is important in developing PPP. Thus, involving private financing at the outset of a housing project may result in more effective and efficient management of financial resources, which can promote a disciplined risk management strategy in the PPP. The private sector is often tasked with designing a housing project so that the project can benefit from innovation and efficient use of scarce resources.

The public sector has the responsibility to guide and regulate the private sector so that the risk of the private sector deviating from the objectives of the project can be minimised. However, it is important to note that striking a balance that protects the interest of the public sector and the private sector is often challenging when defining the contractual framework of technical requirements (Campos et al., 2008). The PPP arrangement often generate technical skills, which have the potential to promote cost-effective quality services and trunk infrastructure. However, if the PPP arrangement is not properly organised it may restrict the provision of social goods originally provided by the public sector (Akintoye et al., 2003).

The engagement of the private sector can stimulate the public sector toward considering market forces more in decision-making, which has the potential to improve the competitiveness of the public sector.

Public agencies are often of the opinion that the State would always support them financially, which often results in moral hazards among these agencies. PPP is often established to avoid this risk and to improve efficiency and effectiveness in providing houses and infrastructure. This has the potential to increase value-for-money through reduced construction and operating costs and increased efficiency. The PPP arrangement promote value-for-money because it improves technical efficiency and allocation efficiency. The arrangement may also promote value-for-money when it is established in a long-term cooperative relationship between stakeholders, which involves risk sharing, proper delineation of authority, communication, responsibility and accountability (Reeves, 2004).

### *2.1 PPP Project Delivery Models*

PPP has several types of models depending on the funding arrangements and the responsibilities of each of the partners for owning and maintaining the assets at the different stages of a given project (Terrell, 2023). PPP models include the following:

- Design-build (DB). This involves the private-sector designing and building an infrastructure following specifications provided by the public sector at an agreed price. All the risks associated with the project is borne by the private sector.
- Build-own-operate (BOO). In this type of model, the private sector finances, builds, owns and operates the infrastructure indefinitely. However, the public sector regulates all activities associated with the building and operating the infrastructure.
- Build-own-operate-transfer (BOOT). This entails the financing, designing, building and operating of an infrastructure by the private sector for an agreed period time, after which ownership is transferred to the public sector.
- Buy-build-operate (BBO). It involves the transfer of public-owned asset legally to a private sector for an agreed period of time. When the period elapses, the asset reverts back to the public sector if the agreement is not renewed.
- Build-lease-operate-transfer (BLOT). In this case, the private sector designs, finances and builds an infrastructure on a leased State-owned land and operates the infrastructure for the duration of the lease. At the end of the lease, the infrastructure is transferred to the public sector.
- Operation and maintenance contract (OM). It involves the private sector operating a public-owned infrastructure for an agreed period. However, the public sector retains ownership of the infrastructure.
- Finance only. This entails the private sector partner financing an infrastructure and it charges the public-sector interest for the use of the funds.
- Design-build-finance-operate (DBFO). In this arrangement, the private sector designs, finances and constructs a new infrastructure and operates and conducts maintenance of the infrastructure under a long-term lease.

However, when the lease expires, the infrastructure is transferred to the public sector.

### 3. Data Collection

The data was obtained from a review of relevant documents related to PPPs and approaches used for housing delivery. A narrative review, which is a comprehensive, critical overview and objective analysis of published papers on a specific subject of interest (Onwuegbuzie & Frels, 2016) was used. Types of narrative reviews include the following:

- **General literature review.** This is often used to provide a review of the most important and critical aspects of the current knowledge on a topic. It is often used to generate the introduction section of a manuscript.
- **Theoretical literature review.** It is used to examine how theory shapes or frames a research.
- **Methodological literature review.** This is used to describe research methods and research design. It outlines the strengths and weaknesses of the methods used in the research and to provide future research direction.
- **Historical literature review.** This focuses on the examination of research over a period of time. The primary purpose of this type of review is to place research in a historical context as a way of showing the familiarity with state-of-the-art development on a given subject and to identify potential directions for future research.

In this study, we used historical narrative review approach which is useful for gathering a volume of literature over a given period of time on a specific subject area and summarising and synthesising it. This approach was used because several policy documents and other forms of grey literature such as technical reports were used in the study because the documents are important for the study. The body of literature used is made up of primarily relevant studies and knowledge that addresses the subject area.

Drawing upon the literature and practice of reviews in social sciences (Petticrew and Roberts, 2012; Pickering & Byrne, 2014) and the importance of PPP in housing delivery (Abdul-Aziz & Kassim, 2011) a historical narrative review was used to identify and collect relevant journal articles and grey literature associated with different arrangements to housing delivery, critical success factors in PPP and different models of PPP. The review consists of the following five stages (Pickering & Byrne, 2014, see Box 1):

- i. Determination of the review objectives and research questions
- ii. Development of the literature review process such as identification of search keywords, identification of relevant databases and development of publication selection criteria.
- iii. Searching of relevant papers in the databases using keywords and according to paper selection criteria.
- iv. Important information are extracted from the final list of papers used for reviews and the information summarised.
- v. Information gathered from final list of papers generated from the review are synthesised, analysed, and reported.

#### 3.1 Publication Inclusion/Exclusion Criteria

The following criteria were used to select papers during the review of the literature:

- Paper must be published between 2005 to 2022.
- Paper must be relevant to the keywords used for search.
- Paper to focused on the subject of the study such as PPP in housing or on critical success factors in PPP
- The paper should be peer reviewed article or grey literature such as reports, working papers, and government policy documents.
- Paper originated primarily from developing country but some key papers from developed countries are included
- The paper should be written in English
- The paper must belong to social science

The public-private cooperation in providing infrastructure in PNG began in 2008 following the endorsement of a national PPP policy by the Government of PNG (Public Private Partnership Task Force, 2014). So, our review period covered from 2005 to 2022 because we believe that before the endorsement of PPP by the Government some groundwork must have been made some years before 2008.

Grey literature was included in our review to avoid biases against useful studies and projects that were conducted by government agencies, non-government agencies and others which are not often published in the journals. Papers from low to middle- income countries context or context similar to PNG were prioritised with papers from high-income countries reporting on more marginalised populations in those countries were included.

**Box 1.** Literature review procedure adopted from Pickering and Byrne (2014)

**Stage 1. Define research questions**

- Determine literature review aim
- Formulate research questions

**Stage 2. Formulate review protocol**

- Identify search terms
- Identify databases
- Draft literature selection criteria

**Stage 3. Literature search**

- Search databases
- Screen search outcomes against literature selection criteria

**Stage 4. Extract literature**

- Structure a summary table
- Enter bibliographic information
- Extract relevant information

**Stage 5. Synthesis of findings**

- Analyse summary table

*3.2 Databases Used for Literature Search*

The following databases were used for the search of literature:

- Google Scholar: <https://scholar.google.com/>
- Science Direct: <https://www.sciencedirect.com/search>
- Papua New Guinea Research Institute: <https://pngnri.org/index.php/our-research/home>

*3.3 Screening of the Papers*

In terms of screening of papers that were captured in the databases, the following was conducted:

- Title of each captured papers was read to see whether the paper is relevant to the subject of the study. If the title is not relevant, the paper was excluded.
- If title of a paper is relevant to the subject of the study, the abstract was read. If the abstract does not provide enough information, the conclusion section was read. If the information in the abstract and conclusion deviates from the subject of this study, the paper was excluded.
- If the information in the abstract and conclusion conform with the subject of the study, then the whole paper was read especially the objectives, methods used and the most important results.
- All papers that were selected must have been released within the period under study, that is from 2005 to 2022.

The papers selected were screened for duplication and the final list of the papers included in the review was

arrived at.

### 3.4 Quality Appraisal

Quality appraisal is often used to assess the methodological quality of a study and it assist the author in identifying the most rigorous research that can be used to make informed decision (Wendt & Miller, 2012). To explore study quality, the papers under review are often divided into three categories based on the paper's quality (Petticrew & Roberts, 2012): high, moderate and low. Only papers in high and moderate categories make the final list of papers for review. As this study is based on narrative review and it is exploratory in nature and that grey literature which is not often associated with methodological rigour was also included, quality appraisal was not conducted.

### 3.5 Analysis and Synthesis

All the selected papers from the review were analysed using manifest qualitative content analysis, which involves describing what the authors reported in the papers that were captured in the review. Each of the papers were read several times and the following information were extracted from the papers, summarised in a tabular format and findings and methods associated with the papers synthesised:

- Full reference of each paper
- Year of publication
- Country of study/geography of the study was conducted
- Objectives of the study
- Most important findings relevant to the subject of this study.

### 3.6 Papers Relevant to PPP in Papua New Guinea

Policy documents associated with PNG used in this study include:

- PNG Public Private Partnership Act 2014.
- PNG National Public Private Partnership Policy 2014.
- PNG National Housing Policy 1994.
- Independent Consumer and Competition Commission (ICCC) report of 2010.

Several papers published on the subject by research institutions in PNG, such as the PNG National Research Institute (PNG NRI), were also reviewed such as:

- Webster et al., (2016).
- Ezebilo (2016)
- Nao and Ezebilo (2017)

For the policy documents, PNG Public Private Partnership Act 2014 was captured from Google search engine by using the keywords "PNG PPP ACT", whereas the National Housing Policy 1994 document was collected from the PNG NHC office, Port Moresby. The PNG National Public Private Partnership Policy 2014 was captured from Google by using the keywords "PNG PPP Policy". The ICCC report was captured from Google search engine by using the keywords "PNG housing + real estate + industry + ICCC".

To draw lessons on the subject from other developing countries, a brief review of previously published papers in peer-reviewed international journals was conducted. Google Scholar and Science direct search engines were used to identify papers related to the subject of this study.

Several keywords such as:

"housing provision approaches"

"Public Private Partnership + housing"

"public private partnership + critical success factors"

"public private partnerships + types" were used to capture relevant papers.

The review was used to generate an overview of the PNG housing sector and PPP policy in PNG, approaches to provision of housing; factors that could promote effective and efficient PPP, and potential strategy for promoting PPPs in providing houses in PNG. A total of 235 papers were captured in the review however, after screening a 38 out of the 235 was useful for the study (Table 1).

Table 1. Papers captured from the review of literature on public-private partnership in housing delivery and its critical success factors

No.	Author	Year	Objectives	Findings	Country
1.	Abdul-Aziz & Kassim	2011	Examined objectives of housing PPP and success factors.	<ul style="list-style-type: none"> <li>- To enhance organisational reputation is the most important factor for adopting PPP.</li> <li>- The most important success factor for PPP is action against errant developers.</li> <li>- Absence of robust and clear agreement restricts success of PPP</li> </ul>	Malaysia
2.	Abdullahi et al.	2011	Private sector participation in housing development for low income group.	<ul style="list-style-type: none"> <li>- Success of private sector depends on the existence of a favourable socio-economic environment and an effective institutional and regulatory framework.</li> <li>- Inadequate of affordable houses for the low-income households.</li> </ul>	Malaysia & Nigeria
3.	Adegun & Taiwo	2011	Challenges to initiatives to boost housing delivery using public-private partnership.	Macroeconomic environment, dominance of the public sector, bureaucratic bottlenecks, and socio-cultural issues are key challenges to private sector participation in housing delivery.	Nigeria
4.	Cheung et al.	2012	Analyse the perceptions of respondents from Hong Kong, Australia and the UK on the importance of PPP success factors.	Most important success factors are: "Commitment and responsibility of public and private sectors; strong and good private consortium; and appropriate risk allocation and risk sharing".	Hong Kong, Australia & UK
5.	Hassan	2011	To find prerequisites needed to improve the success of the enabling approach in housing delivery.	The main role of the State is housing supply by directly provision or by enabling its provision.	Egypt
6	Ibem & Aduwo	2012	Examined the prospects and challenges of public-private partnerships in housing provision.	The key challenges militating against public-private partnership in housing are: <ul style="list-style-type: none"> <li>- inadequate supply of land by government, housing finance, high cost of building materials, graft as well as the exclusion of low-income people from the PPPs.</li> </ul>	Nigeria
7	Ibem	2011	The extent to which PPP in housing provision has contributed to solving the housing challenges in the Lagos Megacity region of Nigeria.	PPP has provided affordable housing units for some high-income elites, it has contributed very little to providing housing units to low-income people in Lagos.	Nigeria
8	Ibem	2010	Examined the role of government agencies in Public-Private Partnerships in housing.	Concluded that government agencies should be involved in providing basic amenities and subsidies to ensure that Public-Private Partnership housing serves the interest of most Nigerians.	Nigeria
9	Jacobson & Choi	2008	Analysed and compared principal factors that contribute to successful public-private partnerships.	Success factors for PPP: specific plan/vision, commitment, open communication and trust, willingness to compromise/collaborate, respect, community outreach, political support, expert advice and review, risk awareness, and clear roles and responsibilities.	World
10	Ke et al.	2010	To identify the preferred risk allocation in PPP projects.	Public sector preferred to retain most political, legal, and social risks, and share most micro-level risks and force majeure risk; while the majority of meso-level risks were preferred to be allocated to the private	China & Hong Kong

				sector.	
11	Li et al.	2005a	Examined the relative importance of potential critical success factors for PPP construction projects in the UK.	The most important factors are: a strong and good private consortium, appropriate risk allocation and available financial market.	UK
12	Li et al.	2005b	Examined preferences in risk allocation.	Some risks should still be retained within the public sector or shared with the private sector. These are mainly <b>macro</b> and <b>micro</b> level risks.	UK
13	Liu & Wilkinson	2011	To find drivers and obstacles that restrict the adoption of PPPs in New Zealand and how these obstacles can be overcome addressed.	The drivers for PPP adoption include acceleration of infrastructure provision, better risk allocation, whole of life cost savings, improved quality of services, access additional revenue sources, benefits for local economic and social development, and improved project scrutiny.	New Zealand
14	Mazouz et al.	2008	A typology based on the management of public projects that constitute partnerships with private firms was proposed.	The following PPP models were identified: situational, elementary, symbiotic, and forward-looking.	World
15	Ministry of Housing and Urban Affairs	2017	Examined different PPP models that can be used to provide affordable housing.	For any strategy to enhance the provision of affordable housing, government interventions through financial and non-financial support as well as through policy reforms is critical.	India
16	Olotuah & Taiwo	2015	Examined the strategies for providing of houses in Nigeria and the nexus with quality of housing.	The consequences of all the interplay of forces in housing provision has been poor quality of housing in the country.	Nigeria
17	. Osei-Kyei & Chan	2015	To methodically review studies on the CSFs for implementing PPP from some selected top tier academic journals from 1990 to 2013		The world
18	Özdemir	2011	Examined the changing role of the public sector in Turkey with regard to housing provision and seeks to clarify how public intervention has affected housing provision and urban development dynamics in major cities.	Three periods may be identified, with central government acting as a regulator in a first period characterized by a 'housing boom'. During the second period, from 1980 to 2000, a new mass housing law spurred construction activity, although the main beneficiaries of the housing fund tended to be the middle-income classes.	Turkey
19	Rouboutsos & Anagnostopoulos	2008	Perception of parties interested in PPP and their predisposition towards risk and the types of risks they are willing and able to undertake.	Findings revealed that stakeholders were, for the majority of risks identified, in agreement as to preferred risk allocation.	Greece
20	Sock-Yong & Helble	2016	Key pillars of housing policy, specifically land acquisition, the HDB-CPF system, the role of markets, housing market interventions, the Ethnic Integration Policy, and the Lease Buyback Scheme were examined.	Singapore developed a unique housing system, with three-quarters of its housing stock built by the Housing & Development Board (HDB) and homeownership financed through Central Provident Fund (CPF) savings. As a result, the country's homeownership rate of 90% is one of the highest among market economies.	Singapore
21	Tang et al.	2010	Using review of literature to compare and contrast the	Suggestions for further research are risks, financing, contractual agreements,	World



			findings of studies so as to provide insights for directing further PPP research and improving the existing practices of PPP projects.	development of PPP models, concession periods, and strategies in choosing the right type of PPP.	
22	Yuan et al.	2017	To find factors influencing the rents of PRH delivery by PPPs in China.	Six critical factors were identified: construction costs, household income, floor area and structure, transportation, market rents in the same district and public facilities. In addition, future research should focus on six critical factors and the relationships among three factor packages can be used to determine the housing delivery by PPPs in China.	China
23	Zhang	2005	This study identifies, analyses, and categorizes various critical success factors (CSFs) for PPPs in general based on a public-private win-win principle.	Agreement analysis shows that there is a good agreement in the ranking of these CSFs and SSFs between respondents from the industrial sector and those from the academic sector.	World
24	Kavishe et al.	2019	To investigate the cost and affordability; the influence of sustainability factors; and the associated benefits of PPP.	The most critical cost and affordability factors were: is it economical compared to traditional methods; it offers value for money; and it can facilitate affordable housing supply outcomes. The major sustainability factors were: beginning sustainability assessment from the feasibility stage and considering sustainability in project viability evaluation.	Tanzania
25	Chileshe et al.	2022	To investigate the perceptions of Kenyan public and private stakeholder's concerning the Critical Success Factors (CSF) to the implementation of PPPs in infrastructure and housing projects.	Results show that "acceptance and support given by the community", "project feasibility", "the laws, regulations and guidelines put in place", "available financial market" and "having a well organised and committed public agency" were the highly ranked CSFs.	Kenya
26	Muhammad & Johar	2019	This comparative study uses case study approach to analyse the similarities and differences of the critical success factors that influence the success of PPP housing projects in Malaysia and Nigeria.	While 'equitable risk allocation', 'stable political system', and 'reputable developer' are the most critical success factors in the case of Nigeria, 'action against errant developer', 'consistent monitoring', and 'house buyer's demand' are the most critical factors that influenced the success the PPP housing project in Malaysia.	Malaysia & Nigeria
27	Kavishe et al.	2018	To identify and rank the challenges influencing the delivery of the housing public-private partnership in Tanzania; and to suggest solutions in the form of a conceptual public-private partnership framework model that will address the identified challenges and boost the chances of success.	The top five ranked challenges influencing the delivery of housing PPP were "inadequate PPP skills and knowledge"; "poor contracting and tendering documents"; "inadequate project management"; "inadequate legal framework"; and "misinformation on financial capacity of private partners".	Tanzania
28	Xiong et al.	2020	Examine China's PPP experience to identify the ways to steer China's PPP development toward	Our analyses show that an off-balance-sheet treatment is critical for PPPs to function as a sustainable financing approach; the choice of PPP governance structure- is a trade-off between safeguarding public values and	China

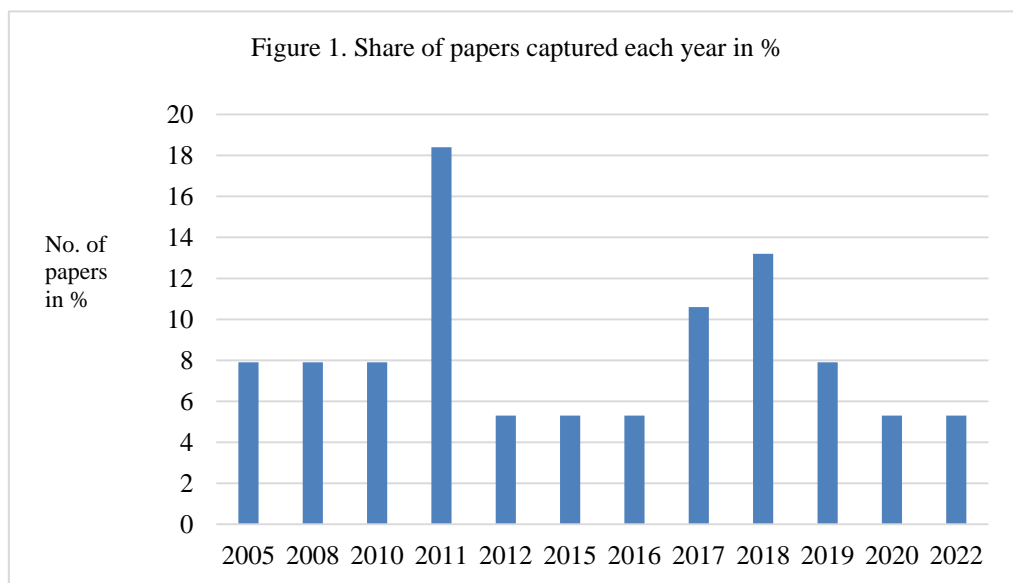
			sustainability.	improving efficiency.	
29	Lee-Yun et al.	2022	To assess the discount rates and estimates the risk profile of social housing delivery faced by public agencies.	The findings recommend the use of an estimated 30-year treasury bond rate (3.14%) as the PSC discount rate for social infrastructure. Additionally, the results suggest the use of a PPP discount rate for social housing of 6.01%, given a risk-free rate of 3.14% and a systematic risk premium of 2.87%.	Australia
30	Cui et al.	2018	This study aims to review the existing PPP research to explore the status quo, trends, and gaps in research for PPP infrastructure projects.	The research gaps and research directions can serve as a motivation for researchers and practitioners to work on the next generation of PPP studies to support the development of infrastructure.	World
31	Warsen et al.	2018	Examined the degree to which trust and managerial activities correlate to the perceived performance and cooperation process in PPP projects.	Both trust and management correlate significantly to the perceived performance of these projects. Moreover, trust is associated with a good cooperation process.	Netherland
32	Osei-Kyei et al.	2019	This paper aims to explore and evaluate the root causes of conflicts in PPPs through a comparative study between Ghana and China. Further, the most suitable conflict resolution mechanisms are explored from the Ghanaian and Chinese perspectives.	Results show that causes of conflict ranked higher in Ghana directly relate to poor governance and contract arrangement, whereas causes related to poor risk management and communication are ranked higher in China. Further, <b>arbitration</b> and <b>negotiation</b> are the most suitable conflict resolution mechanisms for PPPs in Ghana and China respectively.	Ghana & China
33	Mohamad et al.	2018	To identify the important performance indicators used in assessing public private partnership (PPP) performance in terms of the two aspects of PPP which are “financing and markets” and “innovation and learnings.	The top three important performance indicators for financing and markets are: Operational cost, Construction cost and construction period. While the top three important performance indicators for innovation and learning are: Technology innovation, “Employee training” and “Financial innovation”.	Malaysia
34	Marana et al.	2018	Review to develop a framework that defines and describes the successful characteristics of public-private-people partnerships (4Ps) in the city resilience-building process.	The framework revolves around two criteria for classification: the dimension of the characteristics (stakeholder relationship, information flow and conflict resolution), and the attributes of the partnership.	World
35	Ezebilo	2020	This paper reports on a study of the activities of a private developer in the construction, management and marketing of houses in the vicinity of Port Moresby, Papua New Guinea.	The results revealed that Edai Town Development Limited (ETDL) has an effective development framework and that it had built 144 houses. The sales price of the houses ranges from 294,800 PNG Kina (89,333 US\$) to 803,000 PNG Kina (243,333 US\$). However, low-income households might find it difficult to afford the houses. The results also revealed that ETDL had established different types of basic infrastructures and had introduced an infrastructure maintenance strategy.	Papua New Guinea
36	Ezebilo	2016	It provides insights into developing an effective and efficient affordable housing strategy in Port Moresby.	Government housing agencies play facilitating roles, such as providing trunk infrastructure, monitoring the quality of houses and developing housing policy.	Papua New Guinea

			Private property developers are directly involved in building houses.	
37	Nao Ezebilo &	2017	This paper uses lessons drawn from the Duran Farm Housing Project (DFHP) in Port Moresby to show that trunk infrastructure such as portable pipe-borne water supply, good road networks, sewerage and electricity must be provided before houses are constructed.	Papua New Guinea
38	Ezebilo	2017	The importance of private developers in providing trunk infrastructure and potential strategies for its sustenance was examined	Papua New Guinea

**4. Findings from the Study**

*4.1 Characteristics of Papers Captured in the Review*

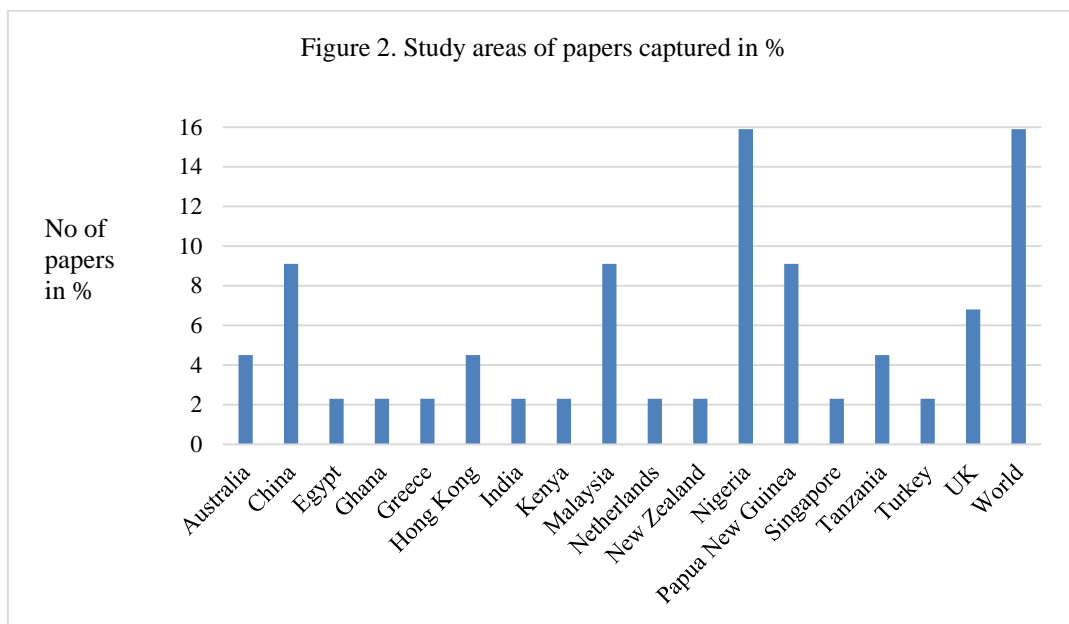
Of the 235 papers that were captured during review, 38 papers (16.2%) were the most relevant to the subject of this study. Of all the years (2005 to 2022) that the review focused on, 2011 had the highest number of papers (18.4%), followed by 2018 (13.2%) and 2012, 2015, 2016, 2020 and 2022 had the lowest number of papers respectively (5.3%), see Figure 1.



The results in Figure 1 suggest that PPP and related subjects have continued to feature in the ongoing discussion concerning how best to provide housing to the different income groups. However, the discussion in the literature tends to be more in 2011, 2018 and 2017. It appears that the as the discussion gains momentum in a year, it tends to lose the momentum the following years apart from the years 2017 and 2018 where the momentum increased gradually but declined thereafter 2018. More may be achieved in the use of PPP to provide houses if the momentum of the discussion on the subject is almost steady.

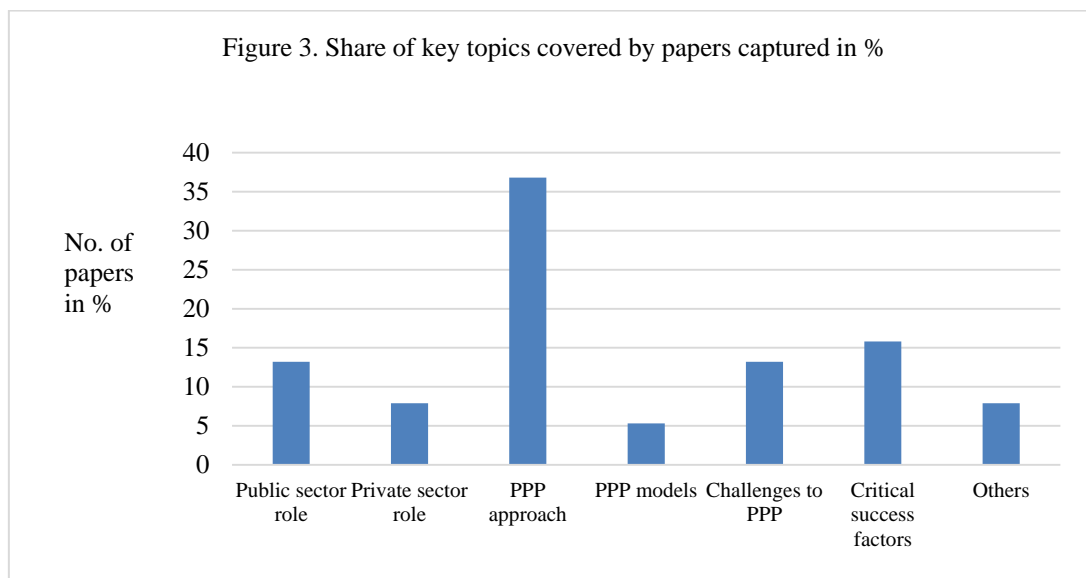
In terms of the geography of the papers captured, Nigeria and the papers that focused on several countries (world) had the highest number of papers which accounts for 15.9% respectively (Figure 2). This is followed by China, Malaysia and Papua New Guinea that accounts for 9.1 respectively. Several countries such as Egypt, Ghana,

Greece, India, Kenya, Netherlands, New Zealand, Singapore and Turkey had the lowest number of papers, which accounts for 2.3% respectively.



The results in Figure 2 indicate that Nigeria, which is the most populous country in Africa has been on the forefront on discussions concerning how to use PPP and related approaches to provide housing to its teeming population. However, in terms of continent, Asia had the highest number of papers that were captured (27.3%) followed by Africa (25%), which are the two continents with the highest population in the world. This may be because the challenges that they may be facing in providing adequate and affordable houses to the population.

Regarding the topics covered by the papers captured, the highest number of papers was captured under approaches to PPP (36.8%), followed by critical success factors to PPP (15.8%) and PPP models had the lowest (5.3%), see Figure 3.



The results in Figure 3 suggest that it appears that public sector and private sector have interest in PPP arrangement in housing delivery. However, they seem not to care much about the type of PPP models that may be best the arrangement hence there are only a few publications on PPP models. The number of papers captured under public sector role is more than that of private sector role, this may be because traditionally, public sector has been responsible for providing infrastructure. There has been ongoing discussion with the public sector on the need to transfer some responsibilities to the private sector to improve effectiveness in providing housing.

## 4.2 Historical Perspective of PNG Housing Sector and Initiatives in Housing Delivery

### 4.2.1 Overview of Historical Perspective of PNG Housing Sector

During the colonial and early post-colonial era, houses were constructed and supplied in PNG without a comprehensive housing policy (Kaitilla & Sarpong-Oti, 1994). At that time PNG Government restricted urban settlement and employees were made to return to their villages when they have completed their work in the city such as Port Moresby. The restriction was relaxed in the mid-1940's and employees were allowed to settle where they have worked and people in the villages could migrate to the urban areas freely (Kaitilla & Sarpong-Oti, 1994). This resulted in urban areas experiencing the emergence of several squatter settlements and traditional urban villages that have little or no basic services at all. In 1968, the National Housing Commission was established to address the problems which resulted in providing several housing schemes such as the settlement blocks with self-housing and low-cost houses reserved for low and middle-income workers (Webster et al., 2016). At that time, the public sector provided houses for its workers and the private sector did not have motivation to invest in real estate enterprises because there was little or no market demand for it.

The private sector provided houses for its workers like the public sector. As the cities such as Port Moresby and Lae enlarged as a result of more people migrating to these cities, the demand for houses outstripped the supply of houses and house prices went up beyond the price that most households can afford. To address the problems associated with the shortage of houses, the Morgan Committee was established and was to find a lasting solution to the shortage of houses and affordability problems. In 1978, the Morgan Committee provided several recommendations such as: the utilisation of private financing and that development should be based on equitable arrangements between landowners and developers. However, the recommendations were not implemented. In 1994, the PNG National Housing Policy was launched with the mandate of providing the framework and guidelines for the housing sector (Government of Papua New Guinea, 1994). The roles of the public sector and private sector in that Housing Policy was not clear, which resulted in a mismatch of roles between these sectors.

In 2007, PNG Government established the National Housing Task force (NHT) to identify constraints to the development of a well- functioning housing market. The NHT recommended that the private sector should be encouraged to be involved in housing projects and that governmental agencies should play facilitating and regulatory roles. The supply of land for housing should be increased and land administration systems improved. However, the NHT recommendations were not implemented.

Following the NHT submission of its recommendation the Government, the Government commissioned the Independent Consumer and Competition Commission (ICCC) to review the activities of housing and real estate industry and to offer possible solutions for the housing affordability problem. The ICCC found that government housing agencies had little success in providing houses and that the high house prices were triggered by inefficient and insufficient supply of land and unclear government policy (ICCC, 2010). The ICCC recommended that there is a need for the State to put more effort towards increasing the supply of secure land for housing.

According to Webster et al. (2016), the supply chain for housing in PNG is too long and resource- intensive and has many bottlenecks. They reported that if the intention is to move the housing sector forward, government agencies must withdraw from providing houses and focus on facilitating activities for the private sector in the housing industry to operate.

### 4.2.2 PNG Public Private Partnership Policy

Public-private cooperation in providing infrastructure in PNG began in 2008 when the PNG Government endorsement of a national PPP policy to facilitate private investment in the delivery of infrastructure. The objectives of the policy include to: achieve the development plans of the government; improve the efficiency and quality in the delivery of infrastructure and services; mobilise private sector investment in infrastructure projects; and achieve value for-money for the government (Public Private Partnership Task Force, 2014). The policy focuses on three key principles, which include value for money, competition, and transparency. It highlights the following four stages that a PPP project should undergo to succeed in PNG:

- Submission of project concept note to the PPP Centre (development stage);
- Advertisement for expressions of interest and bidding (procurement stage);
- Construction and operation stage; and
- Contract termination stage.

The Public Private Partnership Act 2014 was passed by the National Executive Council in 2014 (National

Executive Council, 2014). The Act established a PPP Centre whose primary task is to assist the government in developing, tendering and implementing PPPs (National Executive Council, 2014). The Asian Development Bank provided policy guidance and support in drafting the legislation, which is part of wider reforms to increase private investment in the delivery of infrastructure and services in PNG. The Act reflects the principles outlined in PNG's National PPP Policy, which lays out a transparent and predictable process for the PPP project cycle to reduce the risks associated with project development.

#### 4.2.3 Some PNG Government Initiatives of Housing Delivery

The PNG Government initiatives for increasing the quantity of houses supplied to the major cities of country are the following:

##### 4.2.3.1 Social Housing Program or Build-Sell-Share

To boost the supply of houses in PNG, the PNG NHC adopted the Build-Sell-Share (BSS) scheme, which aims at developing low-cost houses. Under this scheme, private developers construct houses on NHC's non-registered land, which is sold below the market price (Oxford Business Group, 2015). The BSS scheme is used in the social housing program being implemented in the Duran Farm Housing Project (DFHP), which was established in 2014. The project is expected to deliver 2500 houses each year. Amenities such as schools, clinics, hotels, shops, banks and are station are included in the DFHP development plan (Hausples, 2018). The houses at Duran Farm will be sold to public servants and the general public at prices below the market price. Several houses have been completed at Duran Farm but have not yet been occupied. This is because trunk infrastructure such as mains for the supply of clean piped water, sewerage facilities, electric power, and an access road that government agencies ought to have introduced are either lacking or not fully installed (Nao & Ezebilo, 2017). In addition to the DFHP, an affordable land and housing program was launched at Gerehu Stage 3B, Port Moresby in 2015 by the Office of Urbanisation. However, houses have not been constructed there because trunk infrastructure is still being established.

##### 4.2.3.2 First Home Ownership Scheme

The First Home Ownership Scheme (FHOS) is a partnership initiative between the PNG Government and the Bank of South Pacific (BSP). The FHOS provides a pathway for Papua New Guineans who are employed — either in the public service or private sector — to have access to loan facility for acquiring houses of their own choice (BSP, 2023). To be eligible for the housing loan, the applicant must be a citizen of PNG, employed in the formal sector, and willing to pay 10 percent value of the house to be purchased as equity or upfront payment. An individual can get a maximum loan of K400,000 (USD111,111), which attracts an interest rate of three percent per annum and a repayment period of 40 years.

##### 4.2.3.3 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. The name is derived from the two million Kina given to each district of PNG each year. The State contributes K1 million (USD277,778) while all open members of the parliament and provincial governors contribute K500,000 each, totalling K2 million for constructing 10 houses in each of the 89 districts of PNG each year (Hausples, 2018). However, only little is known about the progress or implementation of the program (Ezebilo, 2017).

#### 4.3 Private Sector Participation in the Housing Sector

The economic boom in PNG resulted in the emergence of several large-scale property developers. The property developers include the following:

##### 4.3.1 Curtain Brothers PNG Limited

Curtain Brothers PNG Limited is based in Port Moresby and was founded in 1967 (Curtain Brothers, 2023). The company provides civil construction services for resource and construction industries and other design and construction and civil engineering services, including drilling and tunnelling. Curtain Brothers has re-directed its focus to developing residential properties through its company “South Pacific Homes”, which focuses primarily on developing residential and commercial properties.

##### 4.3.2 Lamana Development

Lamana Development focuses on developing luxury apartment units, commercial office buildings, industrial suites and high-quality hotels in PNG (Lamana Development, 2023). It also manufactures affordable quality steel- framed housing with international accreditation.

#### 4.3.3 EDAI Town Development Limited

EDAI Town is located along the PNG LNG corridor, in the Central Province, north-west of Port Moresby. It is a joint venture initiative between Boera Holdings Limited (a local landowner company) and JC-KRTA Consulting Group (a Malaysian company). As a result of this partnership, they have incorporated a company known as EDAI Town Development Limited, which is the developer of EDAI Town. EDAI Town provides a holistic approach to develop the quantity and quality of houses needed in suburban Port Moresby (Aleker, 2016).

#### 4.3.4 Glory Group of Companies

Glory Group of Companies (GGC) was established in 2008 and is based in Port Moresby. It comprises Glory Estate Limited, Glory Holdings Limited and other subsidiaries (Glory Group, 2023). The company is involved in the construction and property development. Since its inception, GGC provides houses in gated communities.

#### 4.3.5 Pacific Palms Property Limited

Pacific Palms Property Limited provides residential, commercial, retail and industrial property throughout the country. The company oversees building and land assets in Port Moresby, Lae, Madang, Wewak, Goroka, Mt. Hagen, Popondetta, and Rabaul.

### 4.4 *An Overview of Approaches Used for Providing Houses*

Countries have adopted various approaches to providing houses. However, these approaches can be classified into two of the following:

#### 4.4.1 Government Provider Approach

It entails government through its agencies been directly involved in constructing houses, developing trunk infrastructure, developing housing policy and implementing it (Ibem & Aduwo, 2012). Some countries such as Singapore are using the government provider approach (Sock-Yong & Helble, 2016). In the past, countries such as Brazil, Egypt, Malaysia and Nigeria used the government provider approach for providing houses in urban areas (Hassan, 2011; Abd Aziz et al., 2008; Abdullahi et al., 2011; Fruet, 2005). In PNG, government provider approach has been used for providing houses especially for government workers (Webster et al., 2016). Currently, the approach used by PNG is not clear because it appears that there is a mismatch of roles between the public and private sectors (Ezebilo, 2016). Several authors (such as Hassan, 2011; Aribigbola, 2008; Abd Aziz et al., 2008) have found that the government provider approach has not been able to address the shortages of quality and affordable houses. They also found that the lack of “political will”, poor funding and distortion in the housing market result in the failure of the government provider approach in Egypt, Malaysia, and Nigeria.

#### 4.4.2 The Enabling Approach

It is the approach currently used by most countries to provide houses, especially in urban areas. In this approach, public sector transfers some of its responsibilities to the private sector following established guidelines that stipulates the specific roles of each party (Olotuah & Taiwo, 2015; Daud et al., 2017). The public sector facilitates the private sector by providing enabling conditions needed for constructing houses. This includes providing trunk infrastructure, enhancing access to land with formal titles and developing housing policy. Others are implementing the policy and monitoring quality of houses constructed by the private sector. The role of the private sector is primarily to construct houses that meet minimum standards set by the government. The maintenance of the houses could be the responsibility of the public sector, private sector, or the house owners.

### 4.5 *Enabling Approach in Practice in Some Developing Countries*

#### 4.5.1 Enabling Approach in Egypt

In Egypt, the Government uses incentives to encourage the private sector to participate in the construction of houses (Hassan, 2011). The primary role of the government is to develop standards for regulating the quality of houses that are constructed. The government intervention focuses primarily on the following:

- Promoting participation of relevant stakeholders in providing houses by providing incentives to real estate investors and provision of serviced land for constructing houses according to certain requirements.
- Enabling credits and loans for private property developers.
- Developing laws associated with construction of houses.

#### 4.5.2 Enabling Approach in South Africa

This involves government creating enabling environments to stimulate investment in the social housing sector. This is achieved by providing incentives such as cash back rebates, which are tax rebates to private property

developers. Regulatory and legislative framework is also provided by the government (National Department of Human Settlements, 2005). The enabling approach takes the form of partnership arrangements that brings together government policy-makers, governmental agencies, community-based organisations and non-governmental organisations.

#### 4.5.3 Enabling Approach in Malaysia

The Malaysian Government launched several schemes to provide housing. It includes the establishment of the Perumahan Rakyat 1 Malaysia as the catalyst for providing adequate, quality and affordable housing. The Syarikat Perumahan Negara Berhad and the state government play a role in providing affordable housing at the state level. The Malaysian Government takes measures to increase accessibility to affordable housing for targeted groups, strengthen the planning and implementation to manage a better provision of public housing and encourage environmentally-friendly facilities (Daud et al., 2017). The Government provides serviced land and develops and administers housing policy. The responsibility of the private sector is to construct houses.

#### 4.5.4 Enabling Approach in Nigeria

The major thrust of the Nigerian National Housing Policy is the development of a housing finance system geared towards ensuring an enabling environment for the generation of housing finance. The National Housing Fund was established in 1992 to address the constraint of mobilising long-term funds for housing development (Olotuah & Taiwo, 2015).

### 4.6 Some PPP Arrangements/Models That Can Be Applied in Housing Delivery

Various PPP arrangements are available for use in providing houses for all income groups (low-income, middle-income and high-income). The PPP arrangements are the following (Ministry of Housing and Urban Affairs, 2017):

#### 4.6.1 Government Land-Based Subsidised Housing (GLH)

This is similar to the Build-lease-operate-transfer (BLOT). It involves relevant governmental agencies, such as the PNG NHC, providing land to selected private developers. The government agency provides trunk infrastructure. The private developer designs, constructs and finances the housing stock according to the minimum standards set by the government. The housing project is to be completed within a pre-determined cost and timeframe set by the government. Upon satisfactory completion of the housing stock, payment is made to the developer by the government based on the contractual agreement reached by the parties.

The beneficiaries of the housing units are expected to pay full worth of the units at the time of handover or pay the amount on monthly basis for an agreed period of time with the relevant government agency. The government is responsible for developing the criteria for eligibility of beneficiaries. Beneficiaries of the housing units are responsible for the maintenance of the units.

For the GLH to work well in housing delivery, it is necessary for the government agency to develop a checklist of deliverables so that payments are made to the private developer upon satisfactory completion of each deliverable.

#### 4.6.2 Mixed Development Cross-Subsidised Housing (MDH)

This is similar to the Build-own-operate (BOO). The government agency is responsible for providing land and trunk infrastructure, whereas the private developer designs, constructs, and finances the housing stock that must meet a minimum standard set by the government. However, the developer will not receive payment from the government. The developer could use the land provided by the government for constructing houses for only high-income households and provide houses for low- to middle-income groups at another location, which is arranged by the developer. The developer is required to provide houses for low- to middle-income groups (affordable housing) free of cost, whereas sell the houses built for high-income groups. Beneficiaries of the housing units are responsible for the maintenance of the units.

#### 4.6.3 Annuity-Based Subsidised Housing (ABH)

This is a variant of GLH and BLOT in which the government agency provides land and trunk infrastructure. However, in this arrangement, the government pays the private developer in the form of regular annuity for an agreed period of time instead of paying the developer a lump sum amount upon completion of the housing project. The developer is responsible for the maintenance of the housing stock, whereas the government agency monitors quality of the maintenance work. For this reason, construction risks and maintenance risks are transferred to the developer. A bonus payment from the government to the private developer might be included for each completed housing unit.



#### 4.6.4 Annuity-cum-capital Grant-Based Subsidised Housing (AGH)

As in GLH, it is the responsibility of government agency to provide land and trunk infrastructure. This strategy is similar to the ABH strategy; the main difference is that between 40% to 50% of the project cost is paid to the private developer during the construction phase. The remaining 60% or 50% of the project cost is paid as an annuity for an agreed period of time, which might be up to 10 years after completing the project. The developer is responsible for designing, constructing and financing the housing stock, as well as carrying out maintenance work on the housing units. The annuity payment is linked to the satisfactory performance of the housing stock and maintenance services provided by the developer. The developer might be paid a bonus for each housing unit paid for by beneficiaries. The AGH arrangement is similar to BLOT but with some variations.

#### 4.6.5 Direct Relationship Ownership Housing (DROH)

The key difference between DROH and GLH is that the beneficiaries are required to pay the developer for the housing units. The payment could be in the form of a lump sum at the time of handing over of the housing unit to the beneficiary, or paid monthly. However, the government agency is responsible for providing land and trunk infrastructure. The developer is responsible for conducting maintenance work on the housing units. The government agency in collaboration with the developer could select potential beneficiaries. This arrangement is associated with the highest level of financial risk to the developer compared to the GLH, ABH, AGH, and MDH strategies. It is because the developer is responsible for maintaining the housing units, selling completed housing units to potential buyers, sourcing for potential buyers, financing the construction of houses, and making sure that beneficiaries make payments as when due. All these activities cost money and time, and are associated with risks. The DROH is similar to the Build-own-operate-transfer (BOOT).

#### 4.6.6 Direct relationship rental housing (DRH)

The key difference between DRH and the DROH is that the beneficiaries of the housing units are required to pay rent directly to the private developer for using the units. However, the developer will continue to own the housing units. The developer is responsible for maintaining the units, whereas the government provides land and trunk infrastructure. Of all the PPP strategies that were explored in this review, the DRH is associated with the highest risk transfer to the private developer. This is because, aside from financial risks associated with the DROH, the developer has the responsibility of collecting house rent from tenants weekly. In the event that some tenants refuse to pay rent, the developer might lose money. The DRH is similar to BOO where the developer can own the house indefinitely.

#### 4.7 Key Factors That to Contribute to the Success of a PPP Arrangement

Governments of most countries tend to have interest in PPP for providing houses. However, implementing a PPP project is often associated with some challenges. It is important for the government agency and private developer that intend to engage in a PPP arrangement to understand some key factors that can be used to implement a PPP project in an effective manner. Several factors that have been identified that contribute to the long-term success of PPP are the following:

- Favourable political environment. It is important to note that PPP is a public policy, which is strongly linked to the political setting of a country (Li et al., 2005a). This implies that political support is needed for expenditures associated with PPP to be approved (Jacobson & Choi, 2008). For this reason, political support is necessary for the success of PPP projects. If the political will is not strong, potential investors might be discouraged from participating in a PPP project (OECD, 2008).
- Support of the general public and community. The support of the public and community is necessary in the initial stages of a PPP project. This support might minimise delays in the process of acquiring land and reduce transaction costs associated with negotiations between PPP parties and landowners. Public support could provide employment opportunities in the PPP project for locals, which could reduce cost of production. To ensure public support, there is a need for public awareness and assurance to the community that good quality services will be provided by the PPP (Yong, 2010).
- Transparency at all stages of a PPP arrangement. This is necessary to build trust between the parties involved in a PPP project. Transparency is strongly linked to constant communication between the parties (Li et al., 2005a). For this reason, it is necessary for the private developer and the public authority to consult regularly for clarifications on the PPP project. There is a need for the public authority to promote the project to erase any negative public perceptions that may be associated with the project.
- Proper risk allocation and risk sharing. To promote the success of a PPP project, it is necessary to identify risks associated with project and share the risks appropriately among the parties involved in the PPP

arrangement (Ke et al., 2010). The sharing of risks should be negotiated properly and higher level of risks allocated to the party that has the best capacity to mitigate and manage risks (Rouboutsos & Anagnostopoulos, 2008).

- Strong private consortium. For a PPP project to work well, a well-structured private sector arm is needed. The complexities associated with a PPP project often make it difficult for only one private arm to implement the project. For this reason, private arms often come together to establish a consortium and this influences the success of the PPP project. A weak consortium might result in failure of the project. For a PPP project to succeed, the consortium must be technically, operationally, and managerially sound (Zhang, 2005). Government might assist in strengthening local private arms financially and technically to develop their capacity, so they are able to compete with international private arms for local PPP projects (Osei-Kyei & Chan, 2015).
- Good stakeholder relationship and effective flow of information and conflict resolution (Marana et al., 2016). The partners involved in a PPP arrangement should have cordial relationship so that they can easily share useful information between themselves without fear nor favour. At the same time, they should develop an effective mechanism for conflict resolution that can stand the test of time.
- Consistent monitoring and evaluation of the PPP arrangement (Mohammad and Johar, 2018). This has the potential for the partners to identify any activity of the partners that is not in line with the agreement reached on the PPP and rectify it as soon as possible. Thus, the monitoring and evaluation of the activities of the partners serve as checks and balances during the project period, which has the potential to reduce transaction costs.
- Commitment, willingness to compromise/collaborate, respect, risk awareness, and clear roles and responsibilities (Jacobson & Choi, 2008). For a PPP arrangement to be successful the partners should have high degree of commitment to the partnership and they should be willing to accept compromise in certain situation but at the same time respect each other. The partners should have complete information about the risk associated with the PPP arrangement and the responsibilities of each of the partners must be clear.

#### *4.8 Challenges Faced by PPPs*

Several challenges that can restrict a PPP arrangement in implementing housing project in an effective manner (Grimsey & Lewis, 2007; Li et al., 2005b; Liu & Wilkinson, 2011; Osei-Kvai et al., 2018) include the following:

- High transaction costs associated with negotiations between the public and private sectors. This tends to increase the cost of implementing a PPP project, which may make it less efficient and effective compared to other approaches.
- Long procurement processes. As PPP arrangement involve several partners, if the procurement process is not streamlined to follow orderly manner it may result in a mismatch process.
- Lack of appropriate PPP arrangement management skills. The partners involved in a PPP arrangement should have experience in human relations and how to manage project in an effective manner.
- Unattractive financial market. If the housing is not attractive especially in terms of demand for houses it may discourage the partners from engaging in PPP arrangement especially when it comes to the involvement of the private sector.
- Incomplete risk transfer. If all the risks associated with a PPP project have not been identified and shared appropriately some of the partners may be discouraged if they found out that they are shouldering much of the risks without proper compensation.
- High end user charges. This may make the services from a PPP arrangement less attractive to end users which can have adverse impact in the sustainability of the arrangement.
- The dominance of the public sector, bureaucratic bottlenecks, and socio-cultural issues that restrict active private-sector participation (Adegun and Taiwo, 2011). For PPP arrangement to work well, the public sector should be willing to transfer some of its responsibilities completely to the private sector, else the private sector may not have the confidence to participate in the PPP.
- Poor contracting procedure and tendering process, inadequate legal framework and misinformation on financial capacity of private partners (Kavishe et al., 2018). It is important that the contracting procedure is streamlined and all necessary legal framework put in place to avoid confusion. The private partners should be transparent especially in providing the correct information about their financial capacity.

## 5. Discussion

The findings from this study reveal that the PPP arrangement which is most commonly used in providing houses in PNG is similar to the DROH, a variant of BLOT. It involves the government providing land, trunk infrastructure and regulating the activities of private developers. The Duran Farm Housing Project (DFHP) is an example of the DROH. However, the key difference is that land is provided to the developers at a subsidised amount by the government agency (NHC). It is not clear whose responsibility it is to conduct maintenance on the housing units. The houses constructed in the DFHP might not be affordable to the low-income group and the majority of middle-income group. This is because the land price contributes toward increasing the house sales price. The case of EDAI Town Housing Development is also similar to the DROH strategy. For example, the developer designed, constructed, and financed all the housing stock. The developer is responsible for maintenance work in the housing estate. However, the developer provided virtually all the trunk infrastructure without the help of the government. One interesting arrangement between the developer and PNG Power in provision of electric power is worth noting: the developer provided PNG Power with materials required for installing power in the housing estate. To recover the cost of the materials, the developer was provided one megawatt electricity, which must be used within five years. The PPP arrangement has not been effective in providing houses in PNG primarily due to the fact that relevant governmental agencies, such as the NHC and the Department of Lands and Physical Planning (DLPP) have not been able to carry out their responsibilities in a timely manner. For example, some houses have been completed by private developers at DFHP, but have not been occupied because trunk infrastructure was not provided in a timely manner (Nao & Ezebilu, 2017).

Our findings conform to those of Mazouz et al. (2008) who found, in their study of housing project-based typology, that the public sector is strongly associated with inefficiency and bureaucracy. In a PNG study of prospects and challenges in private sector provision of housing, Ezebilu and Hamago (2017) found that private developers have the potential to effectively provide and manage trunk infrastructure. This suggests that government agencies such as the NHC and DLPP should develop a strategy to meet all their responsibilities associated with the provision of housing by collaborating with service providers such as PNG Power, Water PNG, and Department of Works. If the intention of the PNG Government is to provide affordable houses, the NHC must provide land to private developers for free. This will contribute towards reducing the cost of constructing houses and will consequently reduce house sale prices in Duran Farm. If budget constraints restrict the government from providing infrastructure, a tax credit scheme associated with the provision of trunk infrastructure should be considered so that private developers that provide infrastructure could benefit. However, it is necessary to monitor the quality of infrastructure provided by the private developer, as well as put appropriate value on it to establish the worth of tax credit to be granted.

Considering that buying a house is associated with huge investment, the DRH which is a variant of BOO can be used to assist people who are unable to afford house sale prices to have access to houses for rent. In addition, most Papua New Guineans might find it difficult to access loan facility through the FHOS because of the upfront payment (equity) they are required to make. According to the DRH, the developer will continue to own the house; however, a hybrid of DRH could be developed so that tenants who have paid house rent for an agreed number of years could own the housing unit. It is important to note that PPP arrangement for providing affordable housing in PNG is not reflected in the country's National Housing Policy 1994, which makes it difficult to understand the strategies being advocated by the policy. For this reason, it is necessary to review and update the policy by incorporating potential PPP arrangements for providing affordable housing.

The findings from this study show that an enabling approach is the current paradigm used to provide houses in most countries. This entails the public sector transferring some of its responsibilities to the private sector. The primary roles of the public sector in this approach are providing trunk infrastructure, promoting access to land with secure title and developing housing policy, whereas the private sector is responsible for constructing houses that meet minimum standards. Maintenance of the housing units could be by the public sector, private sector, or house owners. For example, in an Egyptian study, Hassan (2011) found that the roles of the public sector are primarily to develop standards for controlling the quality of houses constructed by the private sector, develop housing policy and to provide serviced land for constructing houses. In Malaysia, the government provides quality control services and incentives to facilitate private developers (Abdullah et al., 2011). In Nigeria, the National Housing Policy focuses primarily on the development of housing finance, which has resulted in the establishment of the National Housing Fund for providing long-term loan facility to the private sector (Olotuah & Taiwo, 2015). However, the roles of the public sector and private sector are not clearly delineated in the PNG National Housing Policy 1994, which contributes to the mismatch of roles. For this reason, it is difficult to identify the approach being used in providing of houses in PNG. To move the PNG housing sector forward, it is

necessary to review and update the National Housing Policy 1994 by delineating the roles of the public and private sector.

PNG has several housing schemes that have the potential to reduce the housing affordability problem, especially in cities such as Port Moresby. However, the schemes have been poorly implemented. The DFHP is an example of a good housing scheme that has not followed the principles of orderly housing development. The District Housing Program is another good scheme that has the potential to reduce the housing problems in towns; however, it is not clear why this Program has not been fully implemented in all the districts in PNG. This highlights the need to develop an effective framework for monitoring housing schemes. There is also a need for a strategy to improve the effectiveness of the NHC and the Department of National Planning and Monitoring in monitoring housing projects, as well as reduce the bureaucracy found there. For the case of the District Housing Program, money should be released in instalments following an established guideline. The instalments could be divided across three phases and money released to the developers or project managers only upon satisfactory completion of each phase.

In developing a PPP arrangement for housing project, it is necessary to consider challenges that might restrict the project. This could provide us with the opportunity to explore strategies that could be used to address the challenges. For example, issues associated with transaction costs could be reduced by developing a guideline that stipulates the roles of the public and private sectors and improves communication between them. The guideline must indicate how costs and benefits should be shared between the parties involved in the PPP project (Liu & Wilkinson, 2011). The PNG Government could establish a mortgage financial institution that can provide long-term loans to private developers to assist them construct more houses, which is in line with the practice in Nigeria (Olotuah & Taiwo, 2015). Unclear roles of the public and private sector often impinge on the activities of PPP. This highlights the need for the public and private sectors to reach an agreement before the commencement of the PPP project, about the roles each of the sectors should play. It also highlights the need for the roles of the public and private sectors in PPP housing project to be outlined in the updated PNG National Housing Policy so that the policy can be a reference document for parties to consult to gain more understanding of PPP arrangements.

The findings reveal there are several critical factors that must be considered for a PPP project to succeed. Most of the housing projects in PNG are established without much public awareness, which makes some of the projects unpopular. This highlights the importance of involving relevant communities in all stages of the project, which has the potential to engender community support for the project (Yong, 2010). In addition, it is important for the public and private sectors to promote transparency in all stages of the PPP project. It has the potential to improve trust and the sharing of valuable information between the parties involved in the PPP project. The case of DFHP is an example of a project where transparency appears to be compromised. The contractual agreement was that the public sector would provide trunk infrastructure, whereas the private developers would construct houses. The developers did their own part, but the public sector did not do theirs in a timely manner.

For PPP arrangement to be successful in PNG, transparency must be promoted in every aspect of the project (Li et al., 2005a). The private sector has greater potential than the public sector to manage risks because the private sector is often more influenced by market forces (Ke et al., 2010). This highlights the need for the private sector to be responsible for activities that are strongly linked to high level of risks. However, in PNG the public sector dominates the housing sector and consequently shoulders greater risk. This may be a reason that providing adequate, quality, and affordable housing in PNG has continued to be problematic. If the housing sector in PNG is to move forward, the private sector needs to be more involved in the design, construction and financing housing projects.

In choosing a PPP arrangement from a basket containing different arrangements, it is necessary to consider the socio-economic characteristics of a country. It is also necessary to consider risks and complexities associated with each of the PPP arrangement, as well as the housing policy of the country. Considering that PNG residents are heterogeneous in terms of income, aspiration and the value they have for different PPP arrangements, it is necessary for the chosen PPP arrangement to reflect this heterogeneity. In choosing a PPP arrangement, it is necessary to explore the arrangement that has been used in the country, reasons associated with its failure or success and what could be done to improve the arrangement.

For example, the DROH or BLOT arrangement has been commonly adopted in PNG. The main drawback with the arrangement has been the inability of the public sector to play its roles properly. To improve the commonly practiced PPP arrangement in PNG, the public sector must play its roles by providing land for free to selected private developers, as well as provide trunk infrastructure in an orderly and timely manner. However, in

instances where the government does not have the capacity to provide trunk infrastructure, private developers that provides it could be given tax credit for an agreed length of time so they could internalise the cost associated with the infrastructure. In this case, the government must monitor quality of the infrastructure provided by the developer. To ensure quality, the government must provide minimum standards for private developers to meet.

Considering that buying a house is associated with huge investment, which low-income and some middle-income groups may not be able to afford in the short-term, it is important to have a PPP arrangement that can capture the interest of these income groups. This will help to cater for residents who do not have the financial capacity to buy a house and are willing to rent a house. However, it might be better to have a hybrid of DRH or BOO that could provide tenants with the opportunity to own a house after paying house rent for an agreed length of time.

## 6. Conclusions

This paper provides highlight into PPP arrangements in housing delivery, challenges that restrict the effectiveness of the arrangements and key factors that contribute to the success of PPP. It also highlights the lessons that PNG can draw from other countries where PPP arrangement have been practiced extensively. The findings reveal that there are several PPP arrangements that can be applied in housing delivery which the public sector and private sector that want to go into partnership can choose from. However, in the course of choosing an arrangement the potential partners should consider whether the arrangement is the most suitable one for providing houses and whether the partners have the capacity to use the arrangement especially in terms of managing risks associated with the arrangement. Some of the key factors that can contribute to the success of a PPP arrangement include the presence of “political will” to support the arrangement, presence of community support, transparency at all stages of the arrangement, proper allocation of risks between the partners, presence of strong private consortium, the willingness of the partners to collaborate.

Some of the challenges often faced by a PPP arrangement include high transaction costs, incomplete transfer of risks between the partners, poor contracting and procurement procedures, inadequate management skills, the dominance of the public sector that restrict active participation of the private sector and inadequate legal framework. PNG can draw several lessons from other countries especially in terms of choosing the correct PPP arrangements that can meet the aspiration of Papua New Guineans and how to implement the arrangements in effective manner by considering key success factors and the potential challenges that can restrict the PPP from achieving its goals.

PNG has some impressive housing schemes that have the potential to increase the pool of available houses and reduce the housing affordability problems in the country. However, the inability of the public sector to meet its responsibilities has been the major drawback. To correct this anomaly, it is necessary to improve the effectiveness and efficiency in the public sector by developing a framework to minimise the bottlenecks associated with the sector. The findings will assist urban development managers, planners and policy-makers in identifying the most suitable PPP arrangements to use in providing houses by considering critical success factors and challenges associated with PPP.

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