



Centre for Affordable
Housing Finance
in Africa

ASSESSING RWANDA'S AFFORDABLE HOUSING SECTOR

MARCH 2019

HOUSING AND THE
ECONOMY

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Executive Summary

During 2018, CAHF worked with the World Bank and the International Finance Corporation (IFC) to develop a 'Deep Dive' report on the catalytic role the affordable housing sector could have on Rwanda's future economic growth. This will be used to identify and implement a plan of action for the World Bank Group's future engagements and investments in Rwanda.

This study—to be released during the first half of 2019—has served as a key component of a new World Bank Group diagnostic process, the Country Private Sector Diagnostic (CPSD). Initial research into Rwanda's prospects for future growth indicated two high potential sectors: affordable housing and agribusiness. Detailed reports on the status and potential of these two sectors were drafted, with a CAHF-led team undertaking the Affordable Housing Deep Dive.

The Affordable Housing Deep Dive was discussed in detail with government, private sector and NPO stakeholders in Rwanda during a mission to Rwanda in January 2019. This research confirms the close ties that the housing construction and rental sectors have to Rwanda's future economic and social development. Because of this, there is a high potential for Rwanda's affordable housing sector to be a driver of future economic prosperity in the country. Using CAHF's Housing Economic Value Chain assessment methodology, Rwanda's housing economy is estimated to directly contribute 9.5 percent to Rwanda's GDP (RWF724 billion / US\$ 841 billion). Approximately 40 percent of this amount is gross value added in the housing construction sector, and 60 percent comprises intermediate inputs into house construction (materials and services). The importance of Rwanda's informal housing development sector (SMMEs and households themselves) is also identified as an important element for future growth.

The study also identifies key constraints in the housing value chain. These include: legislative and policy constraints; a limited and under-developed housing finance sector; very low housing affordability for the majority of Rwandan households; and a growing mismatch between the demand for housing and the cost of products most readily being developed by formal developers. This underlines the need for intermediate-sized housing products, more dense developments and greater focus on slum upgrading and serviced land release for housing.

It is imperative that Rwanda's future housing strategy drives the development of more affordable and appropriate housing for purchase and rental. This will require a combination of reducing the relatively high costs of housing development in Rwanda in comparison to other African countries, and providing more appropriate housing typologies, sizes and densities of housing that are better aligned with Rwanda's projected rapid urban expansion. CAHF's cost benchmarking study of standard house types found that a 55m² house in Johannesburg was still less expensive than a 35m² house with similar finishes in Kigali. Construction costs comprise 46 percent of the total cost of a fully completed 55m² house in Kigali, and the balance comprises other inputs including land, infrastructure and compliance costs. This study also identifies certain intermediate inputs to housing construction that are up to 40 percent more expensive than in Johannesburg.

In order to capitalise on the catalytic role of affordable housing, Rwanda must maximise the value added by the local housing construction sector as well as improve the quantity and quality of intermediate inputs from the secondary (manufacturing) and tertiary (services) sector that are produced in Rwanda, thus minimising import leakages. In order to do this, Rwanda must create a sustainable and growing housing sector with enhanced opportunities for local participation along the value chain, rather than focusing on a few large developments driven by expatriate companies. This will require development along Rwanda's housing construction sector.

The continued enhancement of developer-friendly legislative, policy and incentive frameworks will also have a positive effect on land, finance and housing. Further, specific attention is required to streamline the identification, zoning, servicing and release of land in cities. The ability of Rwanda's households to raise end-user financing for housing is an important but under-developed link in the housing finance system. Improving access to mortgage and microfinance products is an important priority. The development of local developers and contractors, as well as the improvement of artisan and professional skills in the construction sector are also recognised as important contributors to the future housing economy.

There is also a need for a coordinative structure through which public, private and community partners in the housing sector in Rwanda can engage and coordinate their functions and roles. This also includes the need to clarify the roles and relationships between national and municipal government, specifically in respect of the financing, development and maintenance of infrastructure at the city level.



Based on this report, future opportunities for the World Bank Group to enhance the economic growth prospects of the housing sector in Rwanda will be developed and implemented to augment the technical assistance and investments that the World Bank Group has already made in Rwanda's housing sector. Current interventions include: the establishment of the Rwanda Mortgage Refinance Corporation (RMRC) which will improve the liquidity of Rwanda's housing finance banks; co-financing the 10 000 unit Kinyinya Affordable Housing Project in Kigali; partnering in the upgrading of slums; and assisting to develop public-private partnerships for the release of serviced land in Rwanda's secondary cities.

Moving forward, CAHF will also be engaging with government stakeholders in Rwanda towards the realisation of interventions identified in the Rwanda Affordable Housing Deep Dive report to support the affordable housing sector in country.

Contents

Executive Summary	2
Glossary	6
1 Introduction	9
2 Overview of Rwanda’s housing market	10
2.1 Population and urbanisation.....	10
2.2 The role of urbanisation in economic growth.....	10
2.3 Housing habitat and tenure	11
2.4 Housing demand: Size and segmentation of Rwanda’s housing market	12
2.5 Housing supply: Formal and informal construction markets	14
2.6 Levels of informal economic activity in Rwanda	15
3 Rwanda’s housing policy and programmes	16
3.1 Housing roles and responsibilities.....	16
3.2 Rwanda’s National Housing Policy.....	16
3.3 Public finance support for affordable housing.....	18
4 Exploring economic impacts of housing construction and residential rental activities in Rwanda.....	18
4.1 Theoretical approach to calculating Rwanda’s housing economic value chain	18
4.2 Economic impact of housing construction in Rwanda	19
4.3 Economic activities arising from the letting of residential accommodation in Rwanda	21
4.4 The combined contribution of housing construction and housing rental-related activities to Rwanda’s economy	22
4.5 Findings regarding Rwanda’s housing economic value chain	23
5 Rwanda Affordable Housing Cost Benchmarking.....	29
5.1 CAHF’s housing cost benchmarking methodology	29
5.2 Identifying house benchmarks for Rwanda	30
5.3 Benchmarking housing costs for Rwanda	31
5.4 Analysing Level 1 housing cost components	32
5.5 Analysing housing construction costs	34
5.6 Key Findings: Cost benchmarking	36
6 Conclusions	40
6.1 Systems view of housing	40
6.2 Housing as a lead economic sector	41
6.3 Redefinition of ‘affordable housing’.....	41
6.4 Role of government in the affordable housing market.....	41
6.5 Import substitution opportunities for local manufacturing	41
6.6 Taxation and incentives.....	42
6.7 Constraints on the development of multi-storey medium and high-rise housing	42
6.8 Housing data and information	42



Annexure A.1: Data sources and assumptions: Rwanda’s housing construction value chain.....	43
Annexure A.2: Data sources and assumptions: Rwanda’s housing rental value chain.....	44
Annexure B: CAHF benchmarked housing product plans.....	45
Annexure C: Study methodology	48
Annexure D: Detailed construction materials trade data	49
Annexure E: Alternative Building Technologies (ABTs) for affordable housing	51
Annexure F: A conceptual understanding of the housing economic value chain	54
References.....	56

Glossary

Domestic production: The local (in this case, Rwandan) production of goods and services within a particular geographic area – whether for consumption in that area, or for export.

Domestic supply: The supply of goods and services for consumption within a country's borders (in this case, Rwanda) - regardless of whether those products were produced locally or imported.

Economic value chain: An interlinked set of value-adding activities that convert inputs (for example, raw materials, or labour) into outputs (for example, window frames, or geysers) in the process of producing both intermediate inputs for use within other economic value chains, and final products.

Factor income: Income received from the different factors of production, including land (rent), labour (wages) and capital (profit).

Final demand: The total value of goods and services that are purchased in their final form in an economy in a given period. In national accounts terms, this includes products that are consumed by households and by government, capital goods that form part of gross capital formation, and products that are exported.

Full-time equivalent employment: The hours worked by a “typical” full-time employee in a particular sector or industry in a given period (day/week/month/year). The concept is used to convert the hours worked by part-time employees into the hours worked by full-time employees. For example, if a particular industry sector currently operates on a basis where full-time employees work 40 hours per week, and three people are employed on a part-time or casual basis to work 20 hours per week, their labour collectively represents 1.5 full-time equivalent employment opportunities.

Government consumption: Government expenditure used for the purchase of final goods and services. This excludes government expenditure on capital assets, which are accounted for under gross fixed capital formation.

Gross domestic product (GDP): The value of all goods and services produced within a particular geographic area (usually a country, in this case South Africa) within a particular period. It can be measured in three ways: i) as the sum of all factor incomes (labour remuneration, interest, rent and profits) earned within the defined geographic area (the income method); ii) as the value added in each sector of the economy (the production method); and iii) as expenditure on goods and services in their final form (the expenditure method). The first two methods measure the value of aggregate supply in the economy, while the third measures aggregate demand. Differences in the valuation of each method arise because of the levying of indirect taxes and subsidies at different stages of the production process, and at the final point of sale. The expenditure method is usually valued at market prices and takes account of all indirect taxes and subsidies. The production method is usually valued at basic prices and includes only indirect taxes and subsidies on production processes.

Gross fixed capital formation (GFCF): The expenditure on capital assets (buildings, civil works, machinery and equipment, transport equipment, computer and telecommunications equipment, research and development, computer software, mineral exploration, cultivated biological resources that yield repeat products - such as vineyards and orchards) - and transfer costs. It does not account for the consumption (depreciation) of fixed capital, and also does not include land purchases. The value of housing construction in a particular period (adjusted for work on hand at the start of the period) is included in GFCF.

Gross operating surplus (GOS): Represents the aggregate of returns to land (rent), capital (interest) and entrepreneurial endeavours (profits). This is often referred to generically as ‘returns to capital’. It reflects that part of the value added by a company that is not attributable to labour.

Gross value added (GVA): Represents the payments (returns) made to the owners of the different factors of production (labour, land, capital and entrepreneurship) by a producer of goods and services in a particular period. It reflects the difference between the sales/income of the producer and the payments made to third-party suppliers of intermediate goods and services. The sum of the value added by each sector or industry in an economy is equivalent to the GDP of that economy, but differences in valuation can arise due to the inclusion or exclusion of indirect taxes and subsidies on production processes and products. GVA is typically valued at basic prices or factor cost, while GDP is usually valued at market prices (inclusive of all indirect taxes and subsidies).

Highly skilled employment: Employment requiring a high level of skill, often at a senior management or professionally certified level.

Household consumption expenditure: Expenditure on final goods and services by households, or on behalf of households (for example, when the state subsidises the cost of housing which is transferred to a household). The

purchase of these goods and services may be facilitated by the factor incomes of the households themselves (earned income), or from transfers and subsidies from government or individuals outside the household unit (unearned income).

Imports and Exports: An import is a good or service brought into a country from another country. An export is a good or service taken from a country to another. These imports and exports may be in either a final, or intermediate form. For simplicity, we consider houses themselves to be supplied and demanded only within the domestic market, albeit that small numbers of prefabricated houses may be exported or imported.

Imputed rent (also referred to as owners' equivalent rent): Represents the opportunity cost of owning and living in a property. Choosing to occupy a property that you own means that any rent that could have been earned on that property is foregone. According to the OECD, "Imputed rents are defined as rental equivalents – that is, the estimated rent that a tenant would pay for identical accommodation let unfurnished, taking into consideration factors such as the type of dwelling (single-family or multi-family), its size (useable surface, number of rooms), its facilities (running water, indoor toilet and bathroom, electricity, central heating, etc.), its location (city centre, suburban or rural) and neighbourhood amenities."¹ Failure to take account of imputed rents in the national accounts makes it difficult to compare the GDP of countries with significantly different levels of private home ownership, and – in the case of a single country with rapidly changing home ownership patterns – to compare GDP from one period to the next. For this reason, the rental equivalent value of owner-occupied dwellings is imputed and the GDP of the country (and its components) is adjusted accordingly. Methods of determining the imputed rent vary depending on the nature and extent of the rental market in that country and the data available. The accuracy of these estimates depends on the efficient functioning of rental markets across the entire spectrum of housing options and locations.

Informal employment: The informal sector or informal economy represents that part of the total economic activity that is not registered with, and directly monitored by, relevant government departments and agencies and not directly taxed (it will typically be subject to at least some forms of indirect taxation such as value added tax). Informal employment relates to all people deriving income from this informal activity. Because of its prevalence, most countries include some estimates of the economic contribution of the informal sector in the construction of their national accounts.

Intermediate demand: Demand for a product that undergoes further transformation through value adding activities during a production process. The output of a particular sector or industry can be used to satisfy either intermediate demand from other sectors and industries, or final demand.

Intermediate inputs: Goods and services that are inputs into a production process and that undergo further transformation as a result of value-added activities during the production process. For example, bricks, sand and cement are just some of the intermediate inputs that are used in the process of producing a house by the construction sector.

Labour: Economic measure of work done by human beings. Labour is a factor of production that is remunerated by wages and salaries that constitute one possible source of income for households.

Multiplier effect: A multiplier effect is an economic impact that arises from an initial economic stimulus – such as the sale of a house – that causes changes in other related economic variables (value added, output, employment, tax collections, imports etc.). The cumulative impact of these changes is typically greater than (a multiple of) the initial stimulus that caused them.

System of National Accounts (SNA): The implementation of complete and consistent accounting [techniques](#) for measuring the economic activity of a nation. Most countries have adopted an SNA that complies with guidelines collectively developed by the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations and World Bank.²

Net Indirect Taxes: The value of indirect taxes paid, less any subsidies received, by an economic actor. An indirect tax may be levied on part of a production process (such as a skills levy on labour remuneration) or on a product (such as an excise duty or value added tax). Indirect taxes are distinguished from direct taxes (such as corporate tax or personal income tax).

¹ Eurostat-OECD (2012). "Housing", in Eurostat-OECD Methodological Manual on Purchasing Power Parities, OECD Publishing. Pg. 138.

² European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations and World Bank (2009).

Primary sector: Those sectors of the economy related to primary industries including agriculture, forestry, fishing and mining and quarrying. They are often referred to as extractive industries because they extract resources and products from the environment. These extracted products may be “renewable” or “repeatable” - as in the case of sustainable agriculture and fishing - or “non-renewable” - such as metals and minerals extracted by mining and quarrying.

Secondary sector: Those sectors of the economy related to secondary industries including manufacturing, electricity, gas and water and construction works of finished goods and services.

Semi-skilled and unskilled employment: Employment requiring less skills than skilled employment.

Skilled employment: Employment requiring a special skill, training, knowledge, and (usually acquired) ability to be productive. Organisationally, skilled employment typically includes artisans, supervisors and lower levels of management.

Tertiary sector: Those sectors of the economy that produce and sell a wide range of services including wholesale and retail trade, transport, storage and communication, financial, insurance, professional business advisory, and community and personal services. Because of this the tertiary sector is often referred to as the services sector.

1 Introduction

This document analyses the affordable housing sector in Rwanda. It evaluates the current status of Rwanda's housing sector and, using two analytical instruments developed by the Centre for Affordable Housing Finance in Africa (CAHF), considers specifically the cost composition of affordable housing development and the impact of housing on Rwanda's economy.³ Finally, it proposes strategies for improving the role and impact that affordable housing plays in Rwanda both as a social and economic development strategy.

This analysis is intended to inform policy discussions with national treasury, central bankers, human settlements departments, financial intermediaries and banks, housing development institutions and private sector financial institutions. At the core of this analysis is the principle that a more efficient housing – economy nexus improves the potential for every household to secure adequate housing whether through formal or informal processes, and that all housing activity ultimately contributes to national economic wellbeing.

During 2018, the World Bank Group (WBG) partnered with CAHF to undertake a 'deep dive' analysis of the affordable housing sector in Rwanda. This 'deep dive' is the second phase of the WBG's Country Private Sector Diagnostic (CPSD) process. The first phase of the study identified housing and agriculture as two potential lead sectors for Rwanda's future economic growth, and the 'deep dive' study outlined the potential and constraints to housing becoming a key economic growth sector in the future. While this study was jointly supported by CAHF and the WBG, this document outlines CAHF's findings in relation to the study and does not purport to represent the views of the WBG.

CAHF's **Housing Economic Value Chain (HEVC)** framework is applied to quantify the direct impact of the construction and rental of housing on the Gross Domestic Product (GDP) of Rwanda.⁴ This analysis quantifies intermediate inputs into housing construction and rental from 'upstream' primary, secondary and tertiary economic sectors. Furthermore, the value-added components of residential construction and rental including Labour, Gross Operating Surplus and Net Indirect Taxes are quantified which enables the value added in that sector to be compared with the value added from upstream inputs.

The HEVC methodology uses the best available economic and socioeconomic data for Rwanda or makes assumptions where sufficient data does not yet exist. The analysis ultimately highlights the importance of housing construction as a contributor to Gross Fixed Capital Formation, shows the potential catalytic role that housing construction and rental activities can play as both secondary and tertiary sector stimulants, and illustrates the comparatively high economic value-add and employment creation potential of housing construction and rental in comparison with many other economic sectors. The HEVC outcomes can therefore inform the development of more nuanced economic, housing and housing finance policy focused on further stimulating economic growth and affordable housing provision.

In order to quantify and analyse the costs and composition of costs of affordable housing in Rwanda, CAHF's **Housing Cost Benchmarking (HCB)** methodology has been applied to ascertain detailed cost breakdowns of three benchmarked housing products in Rwanda. These are compared with a costing for exactly the same product in South Africa and Kenya, as a means of identifying cost differences and anomalies for closer analysis.

Given the lack of a clear definition of 'affordable', CAHF takes the view that the analysis should consider how the housing sector can benefit households as low down the income pyramid as possible. However, in order to ensure continental comparability with previous cost benchmarking studies undertaken by CAHF, the products used for the HCB study are affordable, but not low-cost houses. Nonetheless, these products provide rich source material for understanding the constraints and opportunities for reducing the cost of houses in Rwanda.

³ The study methodology is outlined in **Annexure C**.

⁴ Flowing from an initial analysis of the contribution of housing construction and rental activities for the South African economy, David Gardner and Keith Lockwood were commissioned by CAHF to undertake similar analyses for Nigeria, Tanzania and Uganda. Presentation of the draft findings of this analysis at a housing conference in Uganda in 2018 led to an approach from the World Bank and International Finance Corporation to undertake a similar analysis of the housing sector's contribution to the economy of Rwanda.

2 Overview of Rwanda's housing market

This section provides an overview of Rwanda's demographic characteristics, household income and housing market.

2.1 Population and urbanisation

Rwanda's population was estimated to be 11.9 million in 2017 and is growing at 2.45 percent per annum. Just under 30 percent of Rwandans are urbanised⁵ but urban populations are growing at an estimated 5.75 percent per annum,⁶ over double the rate of population growth overall (United Nations, 2014). This means that Rwanda's population grows by 61 000 households per annum, of which 25 000 are in urban areas and 36 600 are in rural areas (NISR, 2016).

Urbanisation is projected to increase to 33.5 percent by 2020. This is low by international standards, when compared with the global projection of 56.2 percent urbanisation by 2020 in relation to the 40.4 percent projection for sub-Saharan Africa as a whole, 43.3 percent for Zambia, 45.1 percent in the DRC, 58.9 percent in Botswana, 51.7 percent in Nigeria and 67.2 percent in South Africa. However, the share of Rwanda's population that is expected to be urbanised by 2020 is still higher than the average for all East African countries (27.9 percent), and some of its close neighbours Kenya (also 27.9 percent), Malawi (17.3 percent), and Uganda (17.9 percent).

The population of Rwanda's capital Kigali is projected to grow from 1.26 million in 2015 at 3.3 percent per year,⁷ to reach 1.48 million in 2020. Each year, an additional 17 000 households are formed or migrate to Kigali. Given the projected urban population growth rate highlighted above, this suggests that Rwanda's other urban areas will experience substantially faster rates of growth than the capital. However, Kigali will remain the dominant urban agglomeration, accounting for close to half of Rwanda's urban inhabitants.

The migration of people from rural to urban areas is typically accompanied by demographic changes (accelerated growth in the number of households, and households that have – on average – fewer people). This creates additional demands for housing of different forms, shifts the geographical distribution of housing units across the country, and changes housing densities, specifically in large cities.

2.2 The role of urbanisation in economic growth

Until relatively recently there was a general consensus about the relationship between industrialization, economic growth and urbanisation. It was widely accepted that economic development required that an economy undergo a transformation from an agricultural-based economy to an industrial and service-based economy, and that the externalities of scale in manufacturing and services associated with this transformation are served by urbanisation. The causative link was therefore assumed to run from urbanisation to economic growth. In this context, two types of scale externalities were typically identified: those arising from the local concentration of economic activity within an industry (often referred to as localisation economies); and those arising from the agglomeration and diversification of economic activity (urbanisation economies). The former is typically synonymous with industry size and the latter with city size.

There is certainly evidence that per capita incomes in urban areas are substantially higher than in rural areas: urban disposable incomes in China were around three times higher than comparable rural incomes in 2012. A study conducted by the McKinsey Global Institute (2010) points to similar differentials in India, and in South Africa average real GVA per capita (a proxy for earned income before transfers) was some 4.5 to 5 times higher in the metros than in the small, predominantly rural municipalities in 2013. CGIDD (2017) data shows that across Africa urban households generally have higher incomes than rural households. These income differentials are thought to arise because of the productivity gains from scale (localisation and urbanisation) referred to earlier. In turn, higher urban incomes generate additional demand for products: in China, urban households own more appliances (computers, washing machines, fridges, air conditioners etc.) than their rural counterparts. These

⁵ United Nations, Department of Economic and Social Affairs, Population Division (2014) projected that 28.8 percent of Rwanda's population would be urbanised in 2015.

⁶ According to the United Nations, Department of Economic and Social Affairs, Population Division (2014) Rwanda's urban populations will grow at an average annual rate of 5.8 percent per year between 2015 and 2020.

⁷ According to UN DESA projections. A 2012 World Bank study references projected growth rates for Kigali of 7 percent – 8 percent a year.

indicators tend to support the proposition that concentrating people in urban areas will result in higher incomes and faster economic growth.

However, a study by Hoffman and Wan (2013) found that urbanisation may be better explained by a country's development across a range of economic and human dimensions, rather than simply by a correlation with increases in GDP. They argue that "...the direction of causality runs from GDP growth to urbanisation, rather than vice versa" and also found "positive and significant effects of industrialization as well as education on the urbanisation rate, which is consistent with the existence of localization economies and labour market pooling." (Hofmann and Wan, 2013, pg.6)

A recently-released study by the United Nations Population Fund (2017) titled "Unlocking Rwanda's Potential to Reap the Demographic Dividend" suggests that Rwanda's rapid population growth, youthful age structure, and rapidly growing urban population has the potential – under the right conditions – to generate a "dividend" that could generate additional per capita income of around US\$10 000 relative to a "business as usual" baseline by 2035. According to the study, fully reaping this "demographic dividend" will require both an economic and social focus, that accelerates the fertility decline; creates and sustains a healthy workforce; creates a skilled and educated workforce; accelerates economic growth and the growth of quality employment opportunities; strengthens governance, efficiency and accountability; and promotes gender equity and empowers women.

No explicit role is identified for housing and human settlement development in attaining the desired outcomes, although housing is known to have positive correlations with health, incomes and gender equity. However, there is an implicit assumption that the rate of urbanisation will be accommodated and supported, and that infrastructure development will support continual gains in efficiency.

2.3 Housing habitat and tenure

Table 1 shows the proportion of households living in different habitats in Rwanda's rural and urban areas. Based on the EICV4 (2014) household survey, Rwanda's housing landscape is dominated by households living in Umudugudu - rural villages (49.2 percent of all households) and isolated rural housing (25.6 percent of all households), and 8.9 percent in unplanned clustered housing. 12.6 percent of households (319 104) live in unplanned urban housing, 2.2 percent (54 846) in small urban settlements and 1.6 percent (39 888) in modern planned areas. In Kigali, 79 percent (233 050 households) live in unplanned urban settlements, and only 2.6 percent (7 670 households) live in modern planned areas – a factor of 30 to one.

	Umudugudu	Unplanned Clustered Housing	Isolated Rural Housing	Unplanned Urban Housing	Small Settlement	Modern Planned Area	Total Households	Annual HH Growth
Urban %	17,1%	6,4%	3,2%	62,6%	2,1%	8,6%	100,0%	5,75%
Urban Households	72 846	27 264	13 632	266 676	8 946	36 636	426 000	24 495
Rural %	55,8%	9,2%	30,2%	2,5%	2,2%	0,1%	100,0%	1,77%
Rural Households	1 153 386	190 164	624 234	51 675	45 474	2 067	2 067 000	36 584
Total %	49,2%	8,7%	25,6%	12,8%	2,2%	1,6%	100,1%	2,45%
Total Households	1 226 556	216 891	638 208	319 104	54 846	39 888	2 493 000	61 079
Total % Kigali City	2,7%	2,2%	13,4%	79,0%	0,1%	2,6%	100,0%	5,75%
Total Households Kigali City	7 965	6 490	39 530	233 050	295	7 670	295 000	16 963

Table 1: Distribution of households per habitat (2014) Source: NISR (2016).

Considering the average floor space of houses in different habitats, there is five times more combined floor space in unplanned urban areas than in modern planned areas, even though modern planned homes are on average almost twice as large (80m²) as houses in unplanned areas (45m²). Unplanned settlements are therefore the pervasive form of housing in urban areas and are likely to remain the major deliverers of housing in Rwanda in the future.

Tenure distribution per habitat type is shown in **Table 2**. Rwanda's urban houses are 50 percent owned by occupants, 44 percent rented, 5 percent occupied for free, and less than 1 percent employer-provided. In Kigali, 48 percent of households own their houses, and 47 percent rent – not unusual for a growing capital city in Africa. In unplanned urban areas, 45 percent of households own and 50 percent rent, while in modern planned areas, 56 percent own and 37 percent rent. This high level of rental even in modern planned areas is noteworthy.

TYPE OF DWELLING							All Rwanda	Kigali City	Urban	Rural
	Umuhugudu	Unplanned Clustered Housing	Isolated Rural Housing	Unplanned Urban Housing	Small Settlement	Modern Planned Area				
Single DU	94,3%	89,0%	95,4%	67,1%	93,1%	79,6%	90,4%	67,1%	71,8%	94,2%
Households	1 156 642	193 033	608 850	214 119	51 062	31 751	2 253 672	197 945	305 868	1 947 114
Multi Household DU	2,9%	5,8%	1,5%	16,3%	5,5%	6,5%	4,6%	15,3%	13,3%	2,8%
Households	35 570	12 580	9 573	52 014	3 017	2 593	114 678	45 135	56 658	57 876
Multi Story Building	0,0%	0,0%	0,0%	0,3%	0,5%	0,5%	0,1%	0,4%	0,3%	0,0%
Households	0	0	0	957	274	199	2 493	1 180	1 278	0
Group of Enclosed DUs: Mul	1,3%	1,9%	0,6%	12,8%	0,3%	7,6%	2,7%	12,9%	10,6%	1,1%
Households	15 945	4 121	3 829	40 845	165	3 031	2 253 672	2 253 672	2 253 672	2 253 672
Group of Enclosed Dus: Sing	1,5%	3,3%	2,4%	3,5%	0,6%	5,9%	2,2%	4,3%	3,9%	1,9%
Households	18 398	7 157	15 317	11 169	329	2 353	54 846	12 685	16 614	39 273
Total: All %	100,0%	100,0%	99,9%	100,0%	100,0%	100,1%	100,0%	100,0%	99,9%	100,0%
Total: Households	1 226 556	216 891	638 208	319 104	54 846	39 888	2 493 000	295 000	426 000	2 067 000

Table 2: Distribution of households by tenure (2014) Source: NISR (2016).

2.4 Housing demand: Size and segmentation of Rwanda's housing market

The National Housing Policy (2015) outlines different segments of Rwanda's housing market, yet these are not clearly defined. 'Social housing' is intended to provide for very poor households, holocaust survivors and other indigent households not able to meet their own housing needs. Such households generally earn less than RWF35 000 per month (US\$39)⁸. 'Affordable Housing' is intended for households earning below RWF200 000 per month (US\$232). 'Mid-Range' housing is for households earning up to RWF900 000 per month (US\$1 045), and 'Premium Housing' for those earning above RWF900 000 per month.

According to the Rwanda Habitat III Report (2015), a Housing Market Study for Kigali conducted in 2012 estimated total housing needs for the capital of almost 460 000 units between 2012 and 2022, of which almost 345 000 units would need to be newly constructed. The study – conducted by the Planet Consortium - stratified the housing demand in Kigali as follows in 2012:⁹

- 43 436 units for 'social housing' (12.6 percent of the total) for households with monthly income of less than RWF33 500 (US\$39);
- 186 163 units for affordable housing (54.1 percent) for households with monthly incomes of between RWF33 500 and RWF200 000 (US\$39 to US\$232);
- 112 867 units for mid-range housing (32.8 percent) for households with monthly incomes of between RWF200 000 and RWF900 000 (US\$232 to US\$1 045); and
- 1 601 units for premium housing (0.5 percent), for households with monthly incomes above RWF900 000 (greater than US\$1 045).

If the urban areas in the six secondary towns collectively account for the other half of the urban population in Rwanda, it suggests that similar numbers of additional housing units will need to be constructed outside Kigali. This translates into an average of 69 000 units per year over the ten-year period from 2012 to 2022, segmented as reflected in **Figure 1**.

⁸ Monetary values have been converted from Rwandan franc (RWF) to US\$ using the exchange rate of RWF787.25/US\$1 – the average rate for 2017.

⁹ A new, detailed housing demand survey has been undertaken for Kigali by the International Growth Centre (2019), but at the time of drafting this report it was not yet in the public domain. A new IGC (2019) study still in progress estimates that around 415,000 houses will need to be built in Kigali during the period from 2015 to 2032 to provide dwelling units of adequate standard to all additional households in Kigali during this period. This represents an annual demand of 21,000 in 2015, rising up to 28,000 during the same period.

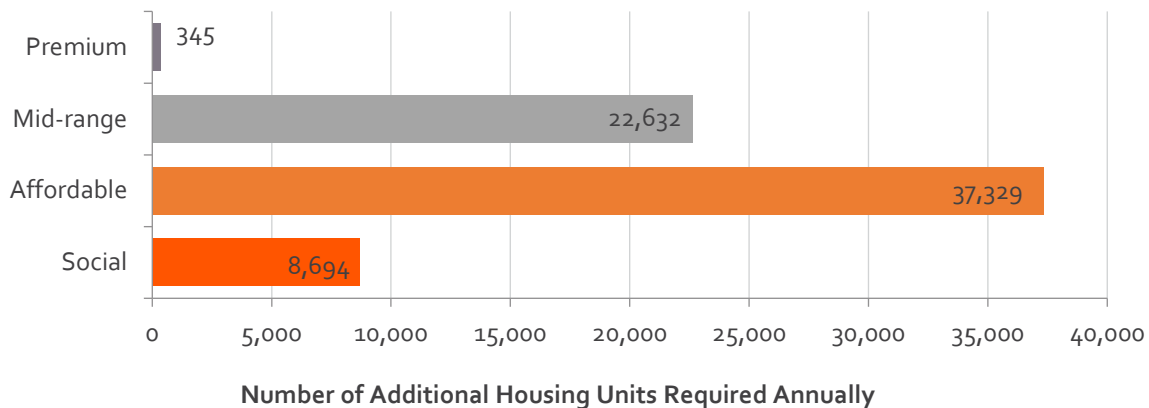


Figure 1: Estimated number of residential units that should be constructed in Rwanda annually by market segment
 Source: Own estimates based on Kigali needs assessment.

One of the reasons for the apparent lack of progress in meeting housing delivery “targets” is low housing affordability. While the most recent Labour Force Survey for August 2017 indicated average monthly remuneration of RWF58 677 per month (US\$65) for paid employment, median remuneration was only RWF20,800 (US\$23). Employed members of households would therefore need to be earning substantially more than the national average, and/or a number of household members would need to be employed, in order for aggregate household incomes to meet the affordability requirements for mid-range or premium housing indicated above.

Rwanda’s housing policy is less clear on the affordability for housing across different housing sub-markets and income groups. Calculations using CAHF’s Housing Affordability Calculator suggests the following housing affordability profile, based on a household’s ability to afford the repayments on a bank-financed house given prevailing mortgage terms in Rwanda:¹⁰

- US\$50 000 (RWF43.5 million) unit: Affordable to 0.1 percent (approximately 250) Rwandan households, with a repayment of US\$780 (RWF 71 000) per month;
- US\$25 000 (RWF21.8 million) unit: Affordable to 0.7 percent (approximately 17,500) Rwandan households, with a repayment of US\$390 (RWF 336 000) per month;
- US\$15 000 (RWF13.1 million) unit: Affordable to 2.0 percent (approximately 50 000) Rwandan households, with a repayment of US\$234 (RWF 201 000) per month;
- US\$10 000 (RWF8.6 million) unit: Affordable to 4.0 percent (approximately 100 000) Rwandan households, with a repayment of US\$156 (RWF 134 000) per month;
- US\$5 000 (RWF4.3 million) unit: Affordable to 11.7 percent (approximately 292 000) Rwandan households, with a repayment of US\$78 (RWF67 000) per month.

Despite the fact that per capita incomes have risen more rapidly in Rwanda than in most of its regional neighbours, housing affordability remains a key challenge. **Figure 2** indicates that on a purchasing power parity basis, GDP per capita is projected to increase by around 83 percent by 2023, or by close to 5 percent per annum. If house construction costs can be contained, this should mean a steady increase in the proportion of households that can afford the mortgage on a basic US\$25 000 house, assuming the cost of such a house doesn’t escalate concomitantly. However, this will not match the rate of growth in urban populations – suggesting growing informal housing in urban areas, the need for more significant subsidisation, or a revision in housing standards and costs.

¹⁰ These figures are calculated using the CAHF Housing Affordability Calculator, based on an estimated prevailing interest rate of 17.3 percent over 15 years, with the borrower paying a 20 percent deposit. Lending data provided by the Development Bank of Rwanda, 2016. It is noted that currently Diaspora mortgages are available from some institutions at 15 percent and 16 percent, but often only for shorter terms (5 to 10 years). See <http://housingfinanceafrica.org/dashboards/calculating-mortgage-and-housing-affordability-in-africa/>

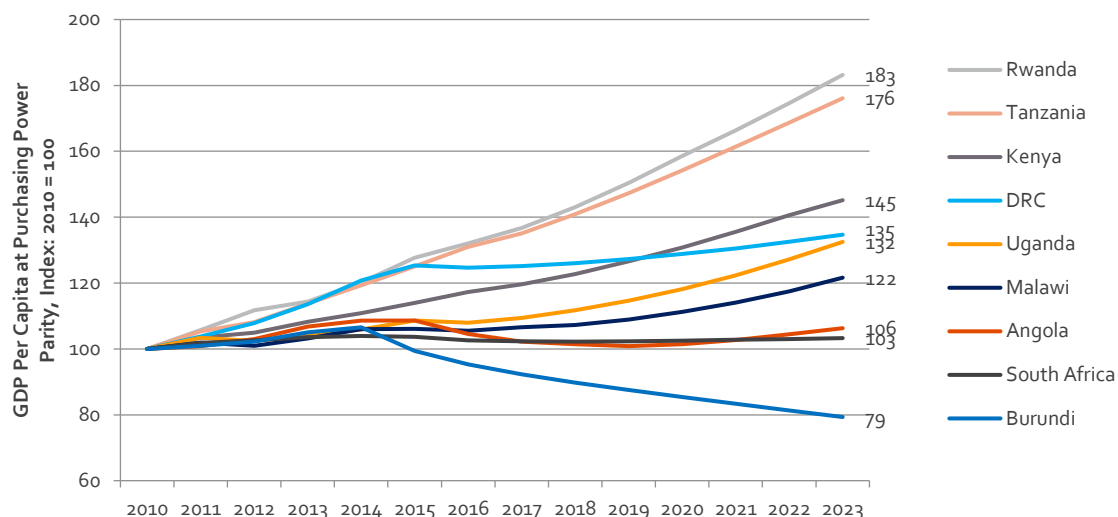


Figure 2: Comparative trends in per capita GDP at PPP Source: IMF WEO (April 2018).

2.5 Housing supply: Formal and informal construction markets

Rwanda's residential development and construction market has a number of distinct categories. Households that were able to secure land themselves in the past undertake the majority of Rwanda's home building activity, most of which occurs informally and incrementally depending on availability of resources. Households either build with 'sweat equity' or more commonly through the use of local micro-contractors and sub-contractors, predominantly using locally-sourced and manufactured wall materials (clay or cement bricks), with locally-manufactured roof, window and door frames (manufactured using imported steel). Links to formal infrastructure networks are not common, albeit that more areas of Kigali are being linked to paved roads, water and electricity supply.

A cadre of small-scale developers, mostly locally-owned, undertake small-scale developments (ten to twenty per phase, as part of larger land parcels owned by them) on land purchased from government or private individuals. These products are mostly aimed at the middle-upper income groups (US\$25 000 to US\$50 000) and use a combination of local (cement and clay bricks) and imported materials that generally result in good quality finishes. These units are generally purchased using formal mortgage financing or for cash.

There are also a limited number of larger locally-based developers, mostly with international connections (generally to Europe, India and the Middle East) giving them access to external equity and working capital, that undertake larger developments (50 to 100 units per phase, resulting in developments of 250 to 500 units, generally aimed at the upper income segment, costing in the US\$30 000 to US\$90 000 range). These developments also often include higher density apartments in 'walk-up' configuration. These developers generally construct developments on large land parcels procured at reasonable cost from government and provided with link and internal infrastructure co-ordinated by the Ministry of Infrastructure or occasionally by the City of Kigali. They are mostly of international quality and make extensive use of imported materials and professional services.

Finally, there are very large, international construction companies that are often responsible for large civil works and very large housing developments. These companies generally originate from China and India, and often rely on extensive imports of materials, skills and labour. There are currently very few large-scale 'new city' or 'lifestyle estate' developments of this nature, and most are focused on the US\$100 000 per unit and above market aimed at upper-echelon civil servants, high net worth individuals and expatriates.

While much attention is focused on the larger developers and international companies, it is the smaller developers and households themselves that produce the majority of new housing units in Rwanda. If it is assumed that housing delivery in modern planned settlements in urban areas is around 5 000 units per annum,¹¹ informal / incremental housing delivery is delivering four times that number, or 20 000 houses per annum, in

¹¹ More research is required to corroborate this delivery figure, but little evidence has been found that indicates formal / modern housing delivery is higher than 5 000 units per annum.

urban areas to cater for new household formation alone. It is therefore critical that housing and economic policy considers the constraints and growth potential of household builders and small-scale developers as well.

2.6 Levels of informal economic activity in Rwanda

Housing affordability is also impacted by, and impacts on, the size and breadth of the informal economy in Rwanda. The International Labour Organisation (ILO) defines informal employment as: "... all employment arrangements that do not provide individuals with legal or social protection through their work, thereby leaving them more exposed to economic risk than the others, whether or not the economic units they work for or operate in are formal enterprises, informal enterprises or households" (ILO, 2013. Pg. 3).

Based on this definition, informal employment includes:

- Persons employed in the informal sector (including those rare persons who are formally employed in the informal sector): employers in informal enterprises; employees in informal enterprises; own-account (self-employed) workers in their own informal enterprises; contributing family workers working in informal enterprises; and members of informal producers' cooperatives.
- Persons in informal employment outside the informal sector, specifically: employees in formal enterprises not covered by social protection through their work; paid domestic workers not covered by social protection through their work; and contributing family workers working in formal enterprises.

The ILO notes that some countries also include own-account workers engaged in the production of goods exclusively for final use by their households, such as subsistence farming and do-it-yourself construction of own dwellings, but that most countries exclude such workers from the definition of informal employment. Given that most housing construction in Rwanda is undertaken for 'own account', the definition used will be material.

Lilenstein (2016) argues that "... most people in informal employment are better off than they would be in unemployment or outside the labor force. Despite the relative vulnerability of informal employment, the incomes generated from these activities result in increased consumption and decreased poverty for the informally employed. This is especially true due to the general lack of unemployment benefits in Africa. Home-based enterprises in Burkina Faso, Cameroon, Ghana, Mozambique, Rwanda and Uganda have been shown to increase consumption by as much as 27 percent in urban areas and 32 percent in rural areas."

The benefits of informality for inclusive economic growth depend largely on their impacts on productivity growth. Informal enterprises and activities that can sustain productivity gains but choose not to formalise because of barriers such as regulatory costs and taxation levels will tend to undermine inclusive growth. But the vast majority of people in the informal economy are there because their low skill-levels exclude them from more formal activity, or because formal economic activity cannot absorb more employment. In such cases their informal activity increases the level of economic activity above what it otherwise would have been and therefore supports inclusive growth.

Schneider and Williams (2013) estimated that just over 39 percent of national income in Rwanda was earned from informal activity.

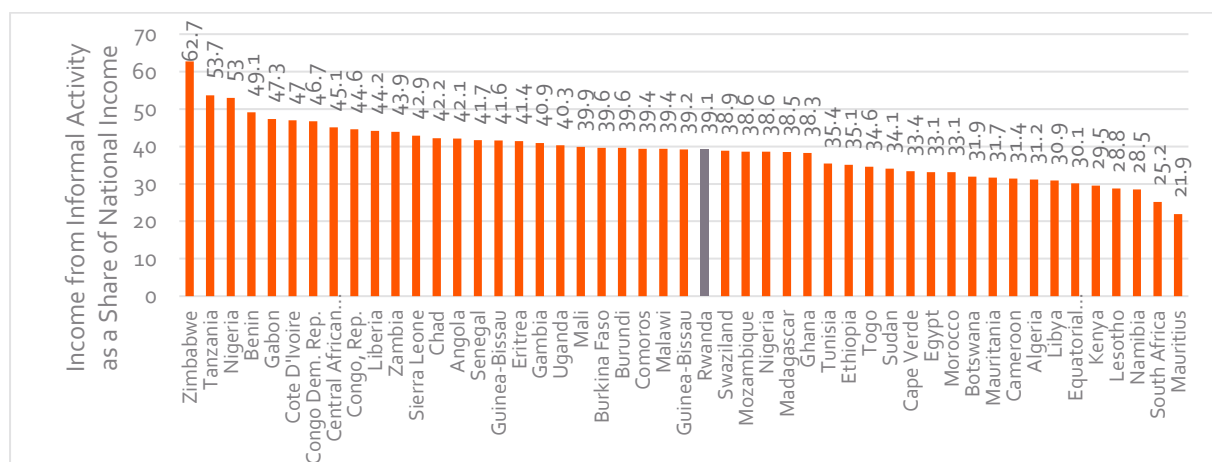


Figure 3: Contribution of informal activity to national income across different African countries Source: Schneider and Williams (2013).

3 Rwanda's housing policy and programmes

The overall approach to housing development in Rwanda follows the national economic strategy. Rwanda is pursuing a clear economic management approach, as set out in the second Economic Development and Poverty Reduction Strategy (EDPRS) 2013-2018 (Ministry of Infrastructure, 2015). This is based on 'private sector as the engine of growth' (Ibid),¹² and calls for significant investments in infrastructure, services and skills development to proactively guide urban growth.

3.1 Housing roles and responsibilities

Responsibility for urban development vests with multiple actors, but urbanization and human settlements are specifically guided by the Urbanization and Rural Sector Strategic Plan (2013-2018). This strategy identifies (inter alia) the following priorities relating to urban development and housing in addition to the three EDPRS objectives above: developing urban and rural settlements around economic activities; collaborating with the private sector; and building institutional and human capacity in the urbanization and rural settlement sector.

A definition of the potential roles of government in respect of housing is provided in the National Housing Strategy (2015). "Administrative procedures for assessment and approval and the effective implementation of the planning and housing development framework will be established. The principal roles are:

- Local governments are responsible to approve site and building plans submitted by a developer in the regular authorization process. After general compliance with planning and building regulations, a developer may request financial support from the government.
- The government agency responsible for housing will assess the fulfilment of criteria to receive government support and shall submit the recommendation to a National Steering Committee responsible for the approval of support to affordable and social housing.
- The National Steering Committee will approve or reject government-support to housing development projects under consideration of actual housing deficit assessments and the results of the technical eligibility assessment.
- The government agency responsible for housing will audit and monitor the implementation of the approved housing projects."

3.2 Rwanda's National Housing Policy

Rwanda's National Housing Policy (2015) recognises housing as a basic human right, and states as its vision that "...[e]veryone independent of income, base of subsistence, and location shall be able to access adequate housing in sustainably planned and developed areas reserved for habitation in Rwanda." The housing policy aims to overcome the key constraints of "...low purchasing power based on low incomes and low rate of saving, the limited accessibility of financing models, and the high formal construction and sales costs...with high quantities demanded, and land being a scarce resource... sustainable and compact development" by implementing the following strategies:

- Collaborative finance and investment;
- Promotion of saving for housing;
- Collaborative development and land pooling;
- Strengthening the local construction industry by emphasising professionalism, skills development and increased local material production and SMEs; and
- Optimum use of land.

The National Housing Policy outlines three major Policy Pillars, each with their own policy statements and strategies, as set out in **Box 1**.

¹² The National Investment Strategy (2002) also emphasises the support of the private sector in infrastructure development.

Box 1. Policy pillars of Rwanda's National Housing Policy

Policy Pillar 1: Public benefits

- Adequate housing will be accessible to all, through a variety of schemes. These include private urban rental, co-operative rental, progressive ownership rights, mortgage finance, savings schemes, self-construction and incremental development.
- Different access groups and schemes will be facilitated, including affordable housing provision (for low- and irregular-income households), social housing for special needs and vulnerable groups; upper-mid and high-end housing.
- Participatory and collaborative schemes based on the pooling of resources will enable individual small-holders of developable land, or individuals with limited financial resources willing to invest in housing and economic development.
- Existing informal housing units will be upgraded and integrated into the formal housing stock to the highest degree feasible. Housing improvement and urban renewal will improve existing stock.
- Housing finance options will improve access to mortgage finance, housing microfinance and collective financing schemes. A mortgage guarantee scheme will be considered, along with savings schemes to encourage investment in housing.

Policy Pillar 2: Resource-efficient planning, green technology and professionalism

- Efficient planning, use of land and selection of development locations, sustainable urban neighbourhoods and urban expansion and access to social and physical infrastructure.
- Transformation of the built environment through energy efficiency, building standards, grey and rainwater recovery, and ICT facilitation.
- Cultural identity and new lifestyles.
- Compact, clustered and dense layouts and housing typologies for all forms of housing development, including detached housing, semi-detached housing, cluster housing, town houses and apartments.
- Resilience, disaster risk mitigation and adaptation.
- Effective building standards, including green site planning and design.
- Promotion of the local production of building materials and elements and local construction technology.
- Quality and professionalism in planning and building sectors.
- Incentives to support local production and assembly, investment in green technologies and production, preferential use of local materials, use and reuse of waste materials and use of alternative energy.

Policy Pillar 3: Governance and partnership

- The government will (financially) support housing projects which provide housing accessible to low income and vulnerable households under defined conditions. This will be done through 'affordability criteria' or an 'accessible housing finance mechanism.'
- Efforts to work jointly shall be increased between the Government and the private and banking sector, to establish a variety of financing scenarios for housing, and ensure a supportive legal framework.
- National programs shall be well interlinked across sectors to enable the framework for housing development pre-conditions, which enhances saving for a shelter, and promotion of efficient houses.
- The City of Kigali and all districts shall be capacitated in physical planning and development.

3.3 Public finance support for affordable housing

The National Housing Policy states that "...The respective framework with divided responsibilities of different levels of governance, public, non-governmental and private sector and will also determine rights and obligations of sellers and buyers of dwelling units in government supported projects; minimum and maximum public infrastructure standards in government supported projects for fair and reliable standardization and implementation auditing. A government-supported affordable housing scheme shall result in improved living conditions and shared prosperity for citizens and permanent residents, particularly addressing low income groups."

The National Housing Policy lists the following potential types of government financial support for affordable and social housing developments:

- Full financing of land and/or service infrastructure to and within a project;
- Financing of construction materials for shelter construction;
- Advancing of service infrastructure finance to and within developments with cost recovery schemes;
- Implementation of service infrastructure to and within housing projects;
- Tax incentives for investment in affordable housing according to the Investment Code;
- Financial support to NPOs for small and medium-scale rental housing stock for vulnerable groups; and
- Support for the provision of infrastructure for upgrading of existing settlements is also provided for.

Most commonly, government allocates free or cheap land to private developers for 'affordable' and 'social housing' developments, and installs or pays for bulk, link and internal infrastructure. At current costs, this infrastructure [and land] contribution amounts to between US\$7 000 to US\$10 000 per unit. The Ministry of Infrastructure either contracts in contractors to install bulk, link and internal infrastructure, or these are developer-built with public funding appropriations. Developers indicate that construction costs of an 'affordable' unit can be contained to below US\$20 000 – the price that purchasers are expected to pay – but such units can sell for as much as US\$30 000 to US\$40 000 if they have good access to roads and other bulk infrastructure.

4 Exploring economic impacts of housing construction and residential rental activities in Rwanda

Understanding the economic contribution of a particular sector and its links with different sectors of the economy in relation to its "upstream" intermediate inputs is a useful tool for identifying and quantifying key dependencies, risks, threats and opportunities facing that sector. This, in turn, informs policy. The following analysis is intended to serve as a base on which to make high level findings about the current status of the housing market in Rwanda, and possible interventions that could assist in further unlocking economic value from housing construction and rental in that economy.

4.1 Theoretical approach to calculating Rwanda's housing economic value chain¹³

Economic value chain theory can be used to calculate the direct impact, indirect impact and induced impacts of housing construction and rental on an economy. This paper focuses on the direct impact of housing on Rwanda's economy only - that is, the initial impact of economic value-added directly during the construction and rental of houses combined with the first-round impact generated from the intermediate inputs required to construct or rent accommodation. In this way, we show what areas of the economy are directly stimulated, and to what degree, by housing construction and residential rental activity.

An economic value chain describes the linkages and quantifies the economic value creation in an economy arising from a specific type of activity. Producing housing involves construction value-adding activities (digging and laying foundations, bricklaying, plastering carpentry, plumbing, electrical, tiling, roofing etc.). The housing

¹³ Readers requiring a more in-depth background to CAHF's Housing Economic Value Chain methodology can refer to the following document: *Comparing Housing Economic Value Chains in Four Africa Countries (2019)*. This document provides more background to the methodology and approach used to assess the impact of housing on the developing economies of various African countries. A series of summary *blogs* on Housing in the Economy are also available on CAHF's website. See <http://housingfinanceafrica.org/projects/housing-and-the-economy/>

value chain describes the extent to which developers, contractors and households add value to the economy during the process of building, improving and renting houses (gross value added) through the addition of their intellectual property, management and skills (labour), rentals and profits, overheads and plant (gross operating surplus). Subsidies and indirect taxes cause the market value of the output to diverge from the cost of production and must therefore be taken into account.

However, in order to engage in these value-adding activities, contractors need to purchase material and service inputs from other sectors of the economy. These inputs can range from sand procured from the mining and quarrying sector; to cement, bricks, window frames, doors, plumbing, tiles, timber and electrical equipment procured from various manufacturing sub-sectors; to electricity and water; and to transport, financial, architectural and even legal services provided by various tertiary sectors. The housing economic value chain sets out what raw materials, manufactured goods and services (intermediate inputs) are required to feed housing construction and rental activity, and where these are sourced in the economy.

The value chain then calculates the economic value of the housing stock produced and rented in a given period (domestic production) and the impact of this production being added to the country's overall supply (domestic supply). The combined value of the intermediate inputs purchased in a particular period and the value added by the different factors of production engaged in the construction process itself represents the output of the residential housing "sector" in that period.

This output is then used to meet the demand from different consumer groups. Housing is classified as gross fixed capital formation because it forms part of the fixed capital stock of the country. If – on a common pricing basis – the value of additional housing constructed in a particular period exceeds that which is "consumed" through use or destroyed, then the value of the country's housing increases, implying more households can be housed, and/or that there are qualitative improvements in the housing that people are already accommodated in. This accommodation may take the form of owner-occupation or rental. All other things remaining the same, an increase in the stock of housing should contribute to an increase in the productive capacity of the economy as a whole.

Value chain theory can also be used to calculate the indirect impact of the construction or rental of this accommodation on the economy, because activities in any economy are closely linked. The suppliers of intermediate inputs into the housing construction and rental value chains have their own unique value chains to create or procure their products. The indirect impact calculates how the purchases from upstream suppliers impact the economy further in those suppliers' specific value chains. This is not the end of the impact that residential construction and rental have on an economy. Finally, the value chain can also assist to estimate the induced impact of how the salaries, interest, rents and profits earned in the housing value chain stimulates spending in the broader economy. The economic impact of housing is also felt 'down-stream'. The creation of housing for occupation, purchase or rent stimulates demand for related goods such as furniture, appliances, garden equipment, as well as services, including financial services, transport, security and other home-related services.

4.2 Economic impact of housing construction in Rwanda

Producing residential housing involves construction value-adding activities that are typically coordinated and undertaken by construction contractors, who may be formal or informal entities. In order to engage in value adding activities, these contractors need to purchase material and service inputs from other sectors of the economy.

The intermediate inputs needed for building housing are sourced from many different sectors of the economy. Raw materials (e.g. raw timber, sand and stone) are sourced primarily from the primary economic sectors: Agriculture, forestry, and fishing (SIC1) and Mining and quarrying (SIC2), while manufactured goods and utility inputs are sourced from the secondary sectors: Manufacturing (SIC3), Electricity, gas and water (SIC4), and Construction (SIC5). A number of manufacturing sub-sectors provide significant inputs into the housing construction process. These include:

- Wood and wood products (SIC321-322) such as timber, roof trusses, door and window frames, doors and cupboards;
- Petroleum, chemicals, rubber and plastics (SIC331-338) in the form of chemical products and fibres such as paints, solvents, insulation materials and plastic plumbing and electrical fittings;

- Non-metallic mineral products (SIC341-342), which importantly include cement and manufactured cement products such as cement blocks, window sills, reinforced lintels, clay bricks and ceiling boards;
- Basic metals, fabricated metal products and machinery and equipment (SIC351-359), including iron and steel products such as roof sheeting, reinforcing bar, frames, nails, screws and hinges, as well as plant and machinery; and
- Electrical machinery and apparatus (SIC361-366) such as electrical wiring, distribution boards, geysers, switches, globes and transformers.

Even electricity and water; and transport, financial, architectural and legal services provided by various tertiary (services) sectors are engaged in the housing value chain.

This indicates an output of around RWF657 billion (US\$763 million), of which 65 percent (RWF428 billion/US\$497 million) is made up of intermediate inputs and 35 percent (RWF229 billion / US\$266 million) is value added during the house construction process. The intermediate inputs are sourced from primary sectors (2 percent), secondary sectors (45 percent) and tertiary sectors (53 percent). The value-added during construction is estimated to comprise labour remuneration (48 percent), gross operating surplus (34 percent) and net indirect taxes less subsidies (18 percent). All of the output is classified as gross fixed capital formation.¹⁴

The value of intermediate inputs into housing construction was equivalent to 6.8 percent of Rwanda’s GDP in 2017 as estimated by National Institute of Statistics of Rwanda (NISR). The GVA of the construction activity directly contributed 3.6 percent of GDP, resulting in a total housing construction output equivalent to 10.4 percent of GDP.

Given the limited formal housing delivery in Rwanda, it can be assumed that much of this economic value added is generated in the informal housing sector. If there were no import leakages, every RWF1 spent on construction value adding activity would result in RWF1.87 of sales in “upstream” intermediate supplier sectors – implying a maximum direct impact multiplier of 2.87.¹⁵ Employment sustained by this level of economic activity is estimated at close to 160 000 during 2017.

The data sources and assumptions for these estimates are detailed in **Annexure A.1**.

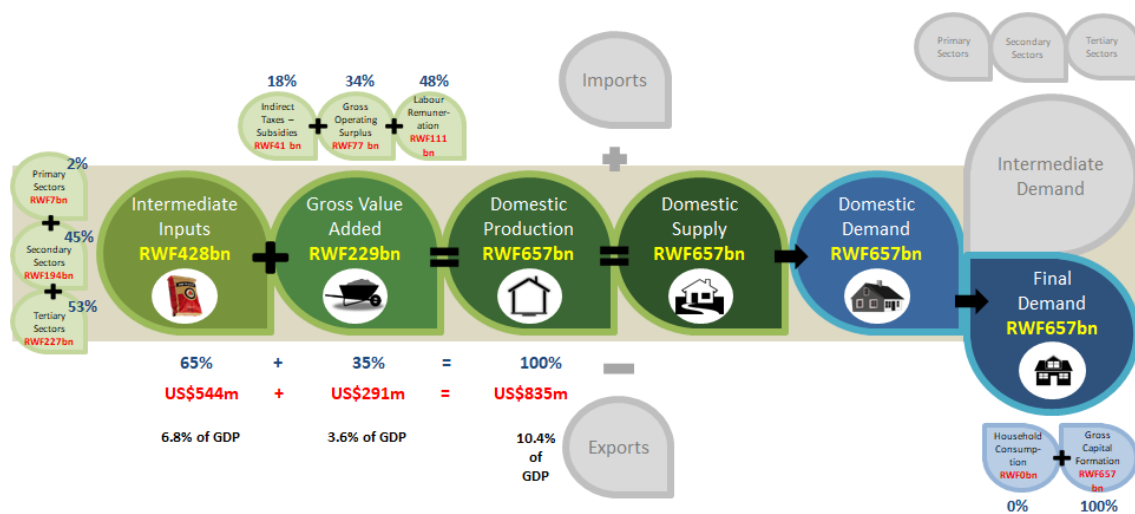


Figure 4: Estimated economic value chain for housing construction in Rwanda (2017) Source: Calculations by Keith Lockwood based on available information. Note: Values and percentages may not add up due to rounding.

¹⁴ It is assumed that net inventory changes reflecting work in progress at year-end are not significant.

¹⁵ The direct impact multiplier does not indicate the full impact of housing construction on the economy. These impacts are extended by indirect multipliers that reflect the impact of orders placed by intermediate suppliers with their suppliers, and induced impacts (the impact on sectors of the economy that arise when the factor incomes that arise from the direct and indirect impacts are spent in the economy). However, imports of intermediate inputs result in a leakage from the domestic economy and reduce the direct impact multiplier.

4.3 Economic activities arising from the letting of residential accommodation in Rwanda

The economic value added, and employment associated with the construction of particular housing stock persists only for the duration of the construction phase. For these impacts to be sustained, the completed projects must be replaced with orders for new construction. By contrast, rental activities associated with the letting of residential properties tend to persist and are derived from that proportion of the total housing stock that is made available for rental, not just from new additions to the housing stock. Data obtained from the National Institute of Statistics of Rwanda (NISR) indicates the composition of real estate GVA in 2014 as shown in **Table 3**.

Activity	Value in 2014 (RWF-m)	Share of total
Total real estate activities	477 388	100 %
Rents for rented dwellings	67 486	14.1 %
Rents for owner-occupied dwellings ¹⁶	271 847	56.9 %
Other real estate activities	138 055	28.9 %

Table 3: The composition of real estate GVA (2014) Source: NISR (2018).

Figure 5 shows the estimated value chain for housing rental activities in Rwanda in 2017. It reflects output valued at around RWF68 billion (US\$77 million), consisting of intermediate inputs of RWF3 billion (US\$3.5 million) or 5 percent of output, and GVA of RWF64 billion (US\$74 million) or 95 percent of total output – all of which went to satisfying household demand for rental accommodation. Intermediate inputs are sourced from secondary sectors (67 percent) and tertiary sectors (33 percent). Labour remuneration makes almost no contribution to GVA,¹⁷ while net indirect taxes less subsidies are estimated at around RWF12 billion (19 percent of GVA), and the gross operating surplus is estimated at RWF52 billion (81 percent of GVA).

Total paid employment is estimated at less than 400. Considering that the household census indicates a total housing rental stock of less than 15 000 units in modern, planned areas, this low level of employment outside of the informal market makes sense. It is clear though that the national accounts do not include remuneration or employment in Rwanda’s very large informal/unplanned housing market, which comprises 188 000 rental units in urban areas alone.

Intermediate inputs that are required in support of housing rental activities can range from gardening and landscaping materials, to cleaning materials and products associated with housing maintenance (paints, plumbing and electrical hardware) to cleaning, gardening, security and management services. The value of intermediate inputs into housing rental activities was equivalent to only 0.1 percent of GDP in 2017, while the GVA amounts to 1.0 percent - resulting in total output being equivalent to 1.1 percent of GDP.

The very low value of intermediate inputs means that every RWF1 spent on value added in housing rental only generates RWF0.05 in additional spending in “upstream” sectors and a direct impact multiplier of only 1.05. These figures will be reduced to the extent that there are import leakages.

¹⁶ This represents the value of imputed rents.

¹⁷ The reasons why this may be a significant understatement are discussed in **Annexure A.1**. Specifically, the formal rental sector in Rwanda is very small, and it is very likely that informal rental activities are not fully captured in national accounts. Also, income derived by informal landlords may be classed as profits rather than wages.

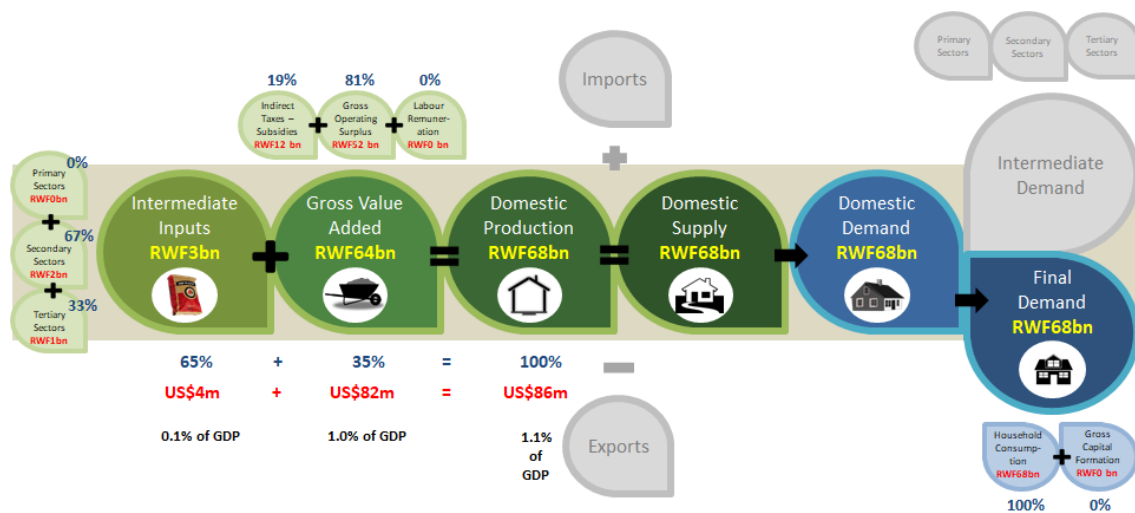


Figure 5: Estimated economic value chain for housing rental activities in Rwanda in 2017 Source: Calculations by Keith Lockwood based on available information. Note: Values and percentages may not add up due to rounding.

4.4 The combined contribution of housing construction and housing rental-related activities to Rwanda’s economy

Figure 6 reflects the estimated combined economic value chain for housing construction and housing rental and related activities. It indicates GVA of RWF293 billion (US\$373 million) or 40 percent of output, intermediate purchases of more than RWF431 billion (US\$548 million) or 60 percent of output, and output of RWF725 billion (US\$921 million). Slightly more than half of the intermediate inputs (53 percent) are sourced from tertiary sectors, with 45 percent coming from secondary sectors and the remaining 2 percent from primary sectors. Total intermediate inputs were equivalent to 6.8 percent of GDP in 2017.

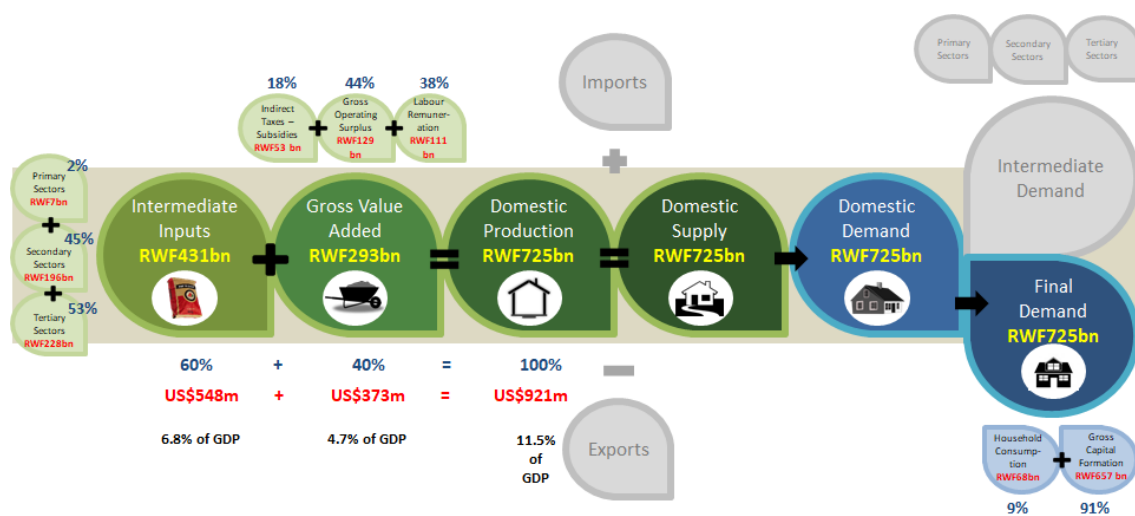


Figure 6: Estimated combined impact of housing construction and rental and related activities in 2017 Source: Calculations by Keith Lockwood based on available information. Note: Values and percentages may not add up due to rounding.

Paid labour remuneration totalled RWF111 billion and supported approximately 157 000 employment opportunities in 2017. Around RWF53 billion in net indirect taxes and a gross operating surplus of RWF129 billion was generated. The gross value added contributed by these activities was equivalent to 4.7 percent of national GVA in 2017.

Total output was equivalent to 11.5 percent of GDP, a significant figure.

4.5 Findings regarding Rwanda's housing economic value chain

Based on the above analysis, the following initial findings are:

Impact of housing construction and rental on GDP

The estimated direct contributions (gross value added plus intermediate inputs) of housing construction and housing rental activity collectively account for 11.5 percent of Rwanda's GDP. This is high when compared with the 4.1 percent of South Africa's GDP, and the 8.3 percent of Kenya's GDP, but on par with Nigerian estimates of 11.6 percent. However, these figures may all be overstated because of import leakages on intermediate inputs. Further sectoral analysis would be required to determine the exact nature of imports in relation to housing construction in Rwanda, although the housing benchmarking exercise offers useful analysis in this regard.

It must also be restated that this figure only considers direct economic impact of housing construction and rental activities and does not consider the indirect impact and induced impact arising from housing in the economy which are more difficult to calculate. Including these would increase this impact of housing on Rwanda's economy still further. Furthermore, the relative level of under-development of Rwanda's formal housing market indicates that housing could contribute significantly more in the future if initiatives are able to catalyse the local housing development sector.

This finding corroborates the World Bank Group's identification of housing as a potential lead economic sector for Rwanda in the CPSD, not just because of its overall impact on GDP, but also due to its high potential for local value added in the intermediate inputs as well as the high housing sector gross value added. However, driving housing sector growth to capitalise on this will require a multi-faceted strategy, key elements of which are outlined in the recommendations.

Size of Rwanda's housing market

Notwithstanding the high impact that housing construction and rental have on Rwanda's economy, the overall size of Rwanda's formal housing market is limited in scale. The total domestic housing supply of RWF725 billion (US\$921 million) is about one twelfth the size of South Africa's housing market (with a population of about one fifth of South Africa's and much lower rates of urbanisation), and small even in comparison to Kenya (US\$3.5 billion).

While this is not necessarily an impediment to growth and development of the sector, it may impose limits on aspects of residential construction and rental growth especially in the middle and upper income housing sub-markets. Low household affordability also implies that the market for formal houses is limited, especially given the up-market focus of housing projects in Rwanda at present. However, factors that point to a future growth potential for this sector include Rwanda's rapid urbanisation rate and desire for formalisation of unplanned housing.

Scaling up a local construction and manufacturing sector to serve Rwanda's housing market only may face constraints, especially in relation to the production of high-cost houses and materials that require high volume markets (such as cement and steel). A consistent growth path for the housing sector will be required to ensure the nascent construction industry and formal housing rental sector achieve consistent growth that does not rely as extensively on external construction capacity and materials imports as it does currently. Growing Rwanda's local manufacturing inputs into the housing sector may also require a focus on the Great Lakes region, and not solely on Rwanda's local market.

Formal and informal economic activity

It is common practice amongst policymakers to give attention to the formal housing economy to the detriment of the more pervasive informal housing sector, but in the context of most African countries this will continue to focus housing provision on the highest-income households only. It is clear that informal construction and rental activities dominate Rwanda's housing sector and will continue to do so into the future. Formal construction and rental activity comprise a very small proportion of the total value of housing construction and rental, and an even smaller proportion of units constructed. The small formal housing construction sector is believed to be producing less than 5 000 houses per annum at present, in the face of an annual growth of around 25 000 households. Data collected by CAHF for HOFINET in 2018 estimates formal housing production to be only 250 units per annum, while the informal market is estimated to be delivering around 12 000 units per annum

(HOFINET, 2017). The entire rental market in modern planned settlements is estimated to be less than 15 000 units, even though 44 percent (188 000) of urban households rent.

Harnessing the full economic growth potential of Rwanda's housing construction and rental markets will require a dual strategy: first, implementing policies and strategies that will impact the entire housing ecosystem in the country (informal and formal); and second, a focus on deepening and broadening the formal housing construction and rental sectors.

Undeveloped rental linkages within Rwanda's economy

Despite the relatively high contribution of housing rental and construction to GDP, the linkages between Rwanda's small formal residential rental market and other sectors of Rwanda's economy are poorly developed. For example, housing rental and related activities have intermediate inputs equivalent to 43 percent of output in South Africa in 2016 while Rwanda's was only 5 percent. This is largely due to the predominantly informal nature of housing rental in Rwanda. It is also likely that informal rental intermediate inputs are significantly under-represented in this figure, given prevailing volumes of informal rental in Kigali. As many informal landlords receive cash for rentals directly, this is most likely shown as an addition to income, not as rental receipts or rental profits.

To the extent that both incomes and urban populations are growing, the ratio of intermediate inputs to GVA in Rwanda's rental sector is likely to increase over time. Further, as more focus is placed on formal housing development for rental, this will also improve the formal economic links.

It is recommended that, given Rwanda's economic growth trajectory, mechanisms to stimulate formal rental markets - such as the establishment of legal frameworks supportive of REITs and institutional rental investments should be encouraged. In addition, policies that facilitate the growth, development and formalisation of small-scale formal and informal rental landlords must be pursued, as it is clear that this sector provides the majority of accommodation for new urban migrants and for the lower-income urban population. The small and household landlord market currently manages an estimated 44 percent of urban housing stock and could grow substantially if facilitated.

Impact of construction sector import leakages

A key determinant of a country's ability to extract economic and employment value from its housing construction and rental value chains arises from its ability to limit import leakages on intermediate inputs. While the overall composition of output in housing construction tends – with similar housing models and construction methods – not to differ too significantly from country to country, the economic impact and multiplier effects can vary widely depending on the proportion of intermediate inputs that are imported. South Africa, for instance, was found to have an import leakage of only 16 percent of its intermediate inputs into housing construction in 2016.

A World Bank study titled "Informal Housing: Reducing Disaster Vulnerability Through Safer Construction" that was released in March 2012 compared the "palette" of traditional building materials used in Rwanda's informal housing construction with that used in formal housing. It found that: "Labor skills in the use of these materials are easily available, and most homeowners understand the possibilities and limitations of this material palette. In addition, these materials are affordable for most Kigali households since they are locally sourced. There is a general disaffection with this palette of materials amongst many quarters of policy makers and it is seen as being 'non-modern' and regressive." (World Bank, 2012. P.18). The study goes on to find "...[t]here is little local manufacturing capacity for the formal material palette. Most of these are imported and are heavily taxed. Import taxes and transport and logistics costs increase some materials prices by up to 43 percent and put homes built of these materials out of reach of most Kigali households. The construction cost alone for homes built of the formal materials is US\$38/ft² (US\$416/m²) which is very high compared to, say, building costs in India for affordable housing INR1 500/ ft². In the United States the cost per ft² is between USD 70 to 110." (World Bank, 2012. P.19). These findings are corroborated by the housing cost benchmarking undertaken for this study and are outlined later in the report.

Because local contractors are less skilled/experienced in the use of these materials, the construction of modern formal housing developments is largely being undertaken by larger foreign-owned companies, with limited transfer of skills and development capability to the local population. This not only serves to inflate the price of housing further, but also results in additional import leakages from the value adding stage, as skilled labour and other factors of house production are imported instead of developed locally.

In housing construction, Rwanda's ratio of intermediate inputs to output is comparatively high (65 percent) compared with South Africa (54 percent) and Kenya (56 percent). This appears to be primarily a function of the relatively high cost of building materials inputs into house construction in Rwanda. This is corroborated by the housing cost benchmarking undertaken for this study, which shows a very high price premium on most manufactured intermediate inputs into Rwanda's housing construction value chain. This high ratio of intermediate inputs to GVA is further increased by the extent of owner-building and informal construction activity, which reduces the formally calculated gross value-added contributions in 'modern' housing developments built by intermediate and large contractors.

The ability to more effectively "capture" intermediate inputs in the value chain will largely be a function of Rwanda's efforts to localise the production of key intermediate inputs where possible. A two-pronged approach should be considered:

1. Facilitating more regular use of locally produced and traditional building materials for lower income/affordable housing while at the same time trying to formalise local production of these materials to a greater extent; and
2. Identifying opportunities for import replacement in respect of modern building materials where feasible.

It is questionable whether high import tariffs are an effective policy approach in facilitating the latter (localisation) approach.¹⁸ The resulting high costs of building materials simply serve to make formal/modern housing even less affordable and accessible and reduce the scale of demand for materials, thereby acting as an additional barrier to the entry of local firms. A more appropriate solution could be the active facilitation of local production by the Rwanda Development Board or other appropriate organisation. To the extent that local demand can be supplemented by demand from neighbouring countries, many of which face similar building materials constraints, scale economies are likely to generate additional materials cost reductions over time.

Revealed competitiveness in Rwanda's building materials manufacturing sector

To identify potential areas of comparative advantage, an analysis was undertaken of Rwanda's international trade in building materials. These materials are not used exclusively for the construction of housing - they are also used in other building and civil construction works - but construction processes for most formal houses will use many of these materials. To the extent that other construction processes (such as the provision of bulk infrastructure) also use these materials, they can impact both directly and indirectly on the cost and provision of houses.

A total of 44 product categories of building materials were identified at the 4-digit Harmonised System (HS) Code level. **Table 4** summarises the results of the analysis.

Out of the 44 product categories, Rwanda did not have any exports in 20 categories, gained global market share in 14 categories, and lost global market share in 10 categories. Export earnings amounted to US\$9.3 million in 2016, but import payments were substantially higher at US\$139.4 million, resulting in a trade deficit for building materials of just over US\$ 130 million. It is noteworthy that Rwanda had a trade deficit in all the performance categories, including those where it has gained global market share over the past five years (2012 to 2016).

Table 5 indicates the share of Rwanda's total merchandise exports and imports of the different performance categories, as well as the estimated average import tariffs applicable. In total, building materials exports accounted for 0.93 percent of Rwanda's total merchandise exports in 2016, and for more than 5.7 percent of the country's merchandise imports. The estimated average import tariff applicable to building materials was around 15.4 percent. Tariffs were generally lower in those performance categories where Rwanda exported nothing, or in which Rwanda gained global market share, and higher in those performance categories where Rwanda lost global market share.

¹⁸ In fact, these may be counter-productive, as tariffs are often reduced substantially for very large construction projects. High tariffs therefore punish small and intermediate-sized developers more, who are the very entities that are likely to be able to reach further down-market and be more nimble than large international developers.

Performance Category	Number of Product Categories	Value of Exports in 2016 US\$m	Value of Imports in 2016 US\$m	Trade Balance in 2016 US\$m
Product categories where Rwanda had no exports in 2016	20	0.00	35.94	-35.79
Product categories in which Rwanda gained global market share between 2012 and 2016	14	9.05	88.98	-79.93
Product categories in which Rwanda gained global market share between 2012 and 2016 in a growing global market	7	0.89	24.38	-23.49
Product categories in which Rwanda gained global market share between 2012 and 2016 in a declining global market	7	8.16	64.60	-56.44
Product categories in which Rwanda lost global market share between 2012 and 2016	10	0.08	14.45	-14.37
Product categories in which Rwanda lost global market share between 2012 and 2016 in a growing global market	4	0.07	4.91	-4.83
Product categories in which Rwanda lost global market share between 2012 and 2016 in a declining global market	6	0.01	9.54	-9.53
All building material categories	44	9.28	139.36	-130.08

Table 4: Rwanda revealed competitiveness analysis for building materials (2016) Source: TradeMap using COMTRADE data.

Performance Category	Share of Total Merchandise Exports in 2016	Share of Total Merchandise Imports in 2016	Estimated Average Import Tariff in 2016 (%)
Product categories where Rwanda had no exports in 2016	0.00 %	1.47 %	13.38
Product categories in which Rwanda gained global market share between 2012 and 2016	0.91 %	3.65 %	14.90
Product categories in which Rwanda gained global market share between 2012 and 2016 in a growing global market	0.09 %	1.00 %	17.74
Product categories in which Rwanda gained global market share between 2012 and 2016 in a declining global market	0.82 %	2.65 %	12.06
Product categories in which Rwanda lost global market share between 2012 and 2016	0.01 %	0.59 %	20.21
Product categories in which Rwanda lost global market share between 2012 and 2016 in a growing global market	0.01 %	0.20 %	19.08
Product categories in which Rwanda lost global market share between 2012 and 2016 in a declining global market	0.00 %	0.39 %	20.97
All building material categories	0.93 %	5.72 %	15.41

Table 5: Share of Rwanda's merchandise imports and exports (2016) Source: TradeMap using COMTRADE data.

Africa, and particularly the regional Common Market for Eastern and Southern Africa (COMESA) are the main, and in most cases the only, export market for Rwandan building materials exports. As shown in Table 6, in total, Rwandan exports of building materials to other African economies amounted to US\$9.26 million in 2016, out of total international exports of building materials of US\$9.28 million. All these exports were destined for

other COMESA states. While some level of dependence on the regional market is expected, the fact that it accounts for 99.7 percent of total exports suggests significant challenges in respect of competitiveness that probably have as much to do with transport and logistics costs as they have with the efficiency of domestic production.

Performance Category	Value of Exports to Africa in 2016 US\$m	Value of Exports to COMESA in 2016 US\$m	COMESA Exports as % of Total Exports to Africa in 2016
Product categories where Rwanda had no exports in 2016	-	-	0 %
Product categories in which Rwanda gained global market share between 2012 and 2016	9.05	9.05	100 %
Product categories in which Rwanda gained global market share between 2012 and 2016 in a growing global market	0.89	0.89	100 %
Product categories in which Rwanda gained global market share between 2012 and 2016 in a declining global market	8.16	8.16	100 %
Product categories in which Rwanda lost global market share between 2012 and 2016	0.08	0.08	100 %
Product categories in which Rwanda lost global market share between 2012 and 2016 in a growing global market	0.07	0.07	100 %
Product categories in which Rwanda lost global market share between 2012 and 2016 in a declining global market	0.01	0.01	100 %
All building material categories	9.26	9.26	100 %

Table 6: Share of Rwanda's merchandise imports and exports (2016) Source: TradeMap using COMTRADE data.

Table 7 contrasts the 10 most significant building material import and export product categories by value in 2016. There is a significant amount of overlap between the largest imports and exports, and the fact that imports generally exceed exports suggests that many of these products are not locally produced but are re-exports of products that had previously been imported and cleared customs. Detailed trade performance data is included as **Annexure D**.

From a policy perspective, it is important to recognise the need to phase any expansion of housing production with a simultaneous expansion of domestic production capacity of building materials (as part of a localisation/import substitution programme). A failure to do so will result in a mushrooming of the already-high trade deficit that could give rise to significant currency depreciation and/or foreign exchange shortages.

Longer term commitment to a steady expansion of a coherent housing programme could provide the necessary assurance to encourage investment in domestic production capacity. An ill-conceived and hurried programme could result in substantially-increased import leakages that reduce the multiplier effects associated with housing construction.

Product Category	Import Value in 2016 (US\$'000)	Product Category	Export Value in 2016 (US\$'000)
Cement, incl. cement clinkers, whether or not coloured	56 776	Cement, incl. cement clinkers, whether or not coloured	5 551
Glazed ceramic flags and paving, hearth or wall tiles; glazed ceramic mosaic cubes and the ...	12 207	Bricks, blocks, tiles and other ceramic goods of siliceous fossil meals, e.g. kieselguhr, tripolite ...	2 315
Tubes, pipes and hoses, and fittings therefor, e.g. joints, elbows, flanges, of plastics	12 120	Tubes, pipes and hoses, and fittings therefor, e.g. joints, elbows, flanges, of plastics	303
Unglazed ceramic flags and paving, hearth or wall tiles; unglazed ceramic mosaic cubes and ...	5 423	Baths, shower-baths, sinks, washbasins, bidets, lavatory pans, seats and covers, flushing cisterns ...	243
Plywood, veneered panel and similar laminated wood (excluding sheets of compressed wood, cellular ...	4 884	Granite, porphyry, basalt, sandstone and other monumental or building stone, whether or not ...	174
Builders' joinery and carpentry, of wood, incl. cellular wood panels, assembled flooring panels, ...	4 795	Glaziers' putty, grafting putty, resin cements, caulking compounds and other mastics; painters' ...	132
Paints and varnishes, incl. enamels and lacquers, based on synthetic polymers or chemically ...	3 942	Screws, bolts, nuts, coach screws, screw hooks, rivets, cotters, cotter pins, washers, incl. ...	125
Bitumen and asphalt, natural; bituminous or oil-shale and tar sands; asphaltites and asphaltic ...	3 635	Paints and varnishes, incl. enamels, lacquers and distempers (excluding those based on synthetic ...	53
Paints and varnishes, incl. enamels and lacquers, based on synthetic polymers or chemically ...	3 075	Angles, shapes and sections of iron or non-alloy steel, n.e.s.	45
Screws, bolts, nuts, coach screws, screw hooks, rivets, cotters, cotter pins, washers, incl. ...	2 997	Natural sands of all kinds, whether or not coloured (excluding gold- and platinum-bearing sands, ...	44

Table 7: Rwanda's top ten building materials imports and exports (2016) Source: TradeMap using COMTRADE data.

Housing finance development

Finance assists households to access serviced land, receive and pay for utilities, and to aggregate demand in order to stimulate demand in the housing market. This in turn improves developers' productivity and competitiveness. Currently, Rwanda's housing finance systems are in very early stages of development, which constrains the ability to reap value from the construction value chain. CAHF (2017) estimates that Rwanda has only 3 700 mortgages, with a combined value equivalent to less than 3 percent of GDP.¹⁹

The financial frameworks required for well-functioning housing markets are complex. In order to ensure sustainable and affordable housing delivery, multiple types and sources of finance are required across the housing construction value chain (CAHF, 2018). These include municipal recurrent expenditure budgets, capital budgets for land purchase and service installations, recoupment of municipal revenues from local taxes, service charges and levies, and subsidy budgets. Local and international private sector investments in housing development are also required, along with DFI and private capital grants and loans. Furthermore, developer equity and construction finance are critical for a well-functioning construction sector. It is clear from the limited

¹⁹ It is noted that this figure is not certain, and more analysis of the size of Rwanda's mortgage market is required. The establishment of the WBG-supported Rwanda Mortgage Refinance Corporation is intended to create a better platform for improving liquidity in the mortgage market, in order to grow the scale of the mortgage market.

rate and scale of formal housing development in Rwanda, as well as the number of incomplete and stalled projects, that the flow of financing throughout the housing system is constrained.

The extent to which newly constructed house prices are increasingly more competitive will influence the size and depth of the formal housing market – specifically, the turnover of existing properties and upward market mobility of households. As incomes rise, households in informal unplanned houses will engage in house upgrading which will further stimulate demand. As the market matures, upward mobility of households will further generate new housing activity, facilitated by the efficient and relatively inexpensive property transfer system in Rwanda.

It is recommended that policies and instruments must be implemented that continue to build trust and participation in the overall financial system in Rwanda by developers, financiers and households themselves. The development of more effective and widely available housing finance instruments will further expand the potential size of Rwanda’s domestic housing market and the incremental growth of the impact of housing construction and rental on the economy. End-user finance instruments in the form of mortgages, housing microfinance, savings-based loans and SACCOs and housing savings instruments will be important for Rwanda’s housing sector development as they offer mechanisms for households to realise their full housing demand through purchase of completed houses. In addition, construction finance, equity release financing and project finance for rental entrepreneurs must be encouraged.

5 Rwanda Affordable Housing Cost Benchmarking

An analysis of housing costs was undertaken for Rwanda to cost three affordable housing products in Kigali, using CAHF’s Housing Cost Benchmarking methodology. For comparative purposes, one of these products was also costed in South Africa for the same time period.

5.1 CAHF’s housing cost benchmarking methodology

CAHF’s 2015 “Benchmarking Housing Costs in Fifteen Countries in Africa” study develops and implements a consistent methodology for specifying, detailing and costing a standardised house on a uniform basis in two cities across fifteen African countries.²⁰ The pilot housing cost benchmarking study defines a ‘standard house’ that is acceptable to and can be compared across divergent cultures, geographies and climates, breaks this down into its component parts, and ensures that costing is consistent and comparable across English, French and Portuguese-speaking countries and different quantity surveying and costing conventions.

A basic, generic house was designed that is viewed as acceptable across Africa.²¹ This 46m² house with a 9m² balcony, built on a 120m² stand was broken down into a detailed yet standard Bill of Quantities (BoQ) covering nearly 400 cost items: land, services, construction materials, labour, profit and financing costs. This BoQ was sent to qualified quantity surveyors identified in each country and was costed based on prevailing in-country costs for a notional 20-unit development in the capital city and a secondary city. This costing information has been collated, checked, consolidated and analysed.

CAHF has an extensive database of the elemental costs of a standardised house in thirty cities across fifteen countries. We can compare the total cost of building to completion this standard house across countries and cities; break this cost down into broad categories (land, infrastructure, construction, other costs) or sub-categories (foundations, walls, roof, finishes); or separate costs into component costs (labour vs. materials, cost of cement, or timber, or steel). Finally, we have categorized the input costs according to their Standard Industry Classifications (SIC), so that we know what economic sectors are stimulated, and to what extent, by the

²⁰ This study was conceptualized by CAHF, managed by David Gardner and implemented by the Affordable Housing Institute (AHI) with the support of local quantity surveyors in each country. The study was undertaken in Cameroon, DRC, Ghana, Kenya, Liberia, Malawi, Morocco, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda and Zambia. A Housing Cost Dashboard is available on CAHF’s website:

<http://housingfinanceafrica.org/dashboards/benchmarking-housing-construction-costs-africa/>

²¹ It is recognised that this house is not necessarily the most affordable formal housing product that can be - or is currently - produced in Rwanda. Rather this product offers a generic, universally accepted housing unit that can be used as a base for analysis. Using the HCB methodology, a range of other more affordable products can then be analysed in order to ascertain how down-market formal housing production can penetrate. In South Africa, for example, seventeen different products have been benchmarked, from a basic in-situ upgrading based serviced site to a high-rise formal housing unit.

construction of this generic house.²² Most importantly, we can compare these things - categories, components, inputs, products, sectors - across cities and countries and economic sectors.

This study shows that the US\$ cost of building this generic house varies by over 100 percent between the included African cities, and even varies between cities in the same country. More importantly, the analysis is able to demonstrate where these cost differences are in the cost composition of the house. Major differences are indicated in between countries and cities in almost all elements, including land, services, construction materials and labour costs.

Figure 7 compares the total cost of this generic house in the capital city of each country studied, and breaks this cost down into its first-level constituent parts. Note that at the time of the study, costs assumed for land and services in Rwanda were exclusive of government 'subsidy' contributions, which made Rwanda's overall housing cost lower than the absolute cost. Notwithstanding this, Kigali's housing costs were fourth lowest out of the fifteen countries surveyed, although the new modelling undertaken for this study indicates that this cost for Kigali is under-stated.

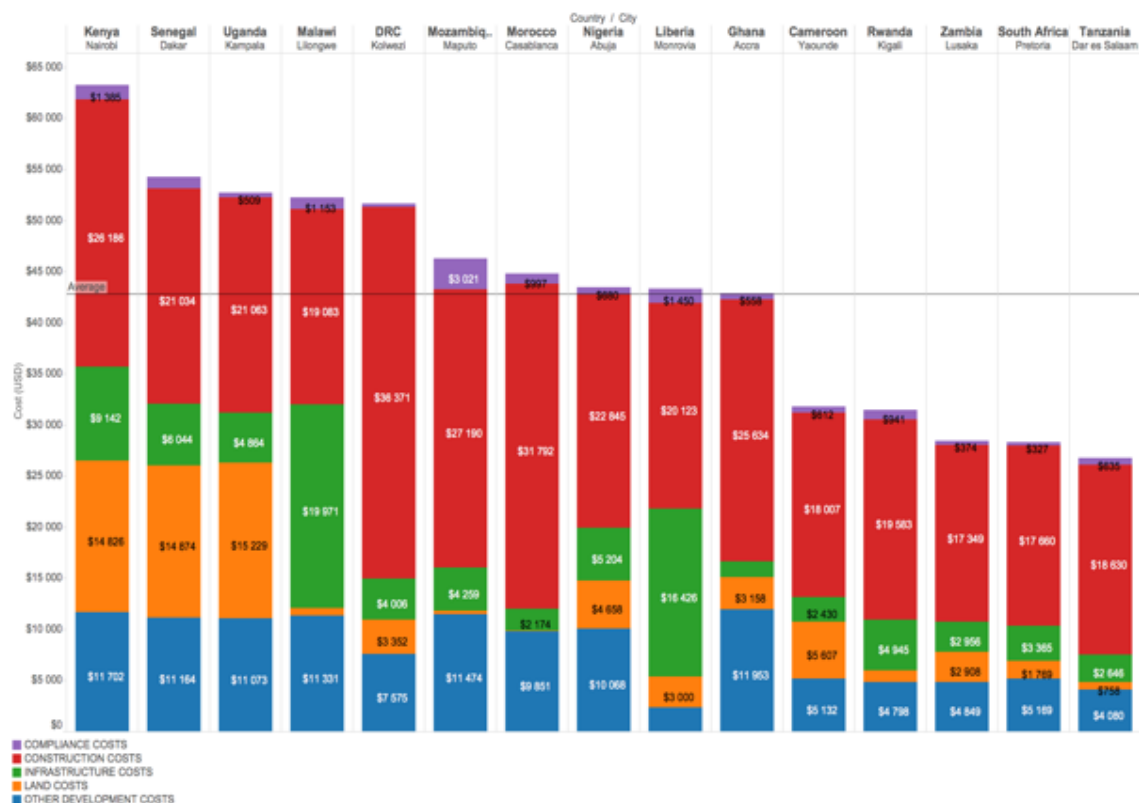


Figure 7: Costs of CAHF's benchmarked house across fifteen African cities (2016) Source: CAHF. Dashboard: Benchmarking Housing Costs in 15 African Countries (2016).

5.2 Identifying house benchmarks for Rwanda

Three housing products have been selected and costed for Kigali, Rwanda in May 2018.²³ These products are deemed to offer a cross-section of the current 'affordable' market in Rwanda and below. These are:

- Type C1: 55m² CAHF House - 46m² two bed, one bath house with 9m² veranda = Total 55m² (2018 prices), on a 225m² stand.
- Type C2: 45m² CAHF House - 40m² two bed, one bath house with 5m² veranda = Total 45m² (2018 prices), on a 225m² stand.

²² Note that this step has not been undertaken for Rwanda.

²³ These three products were costed by our specialist Quantity Surveyor, Jacus Pienaar, who also undertook a visit to Kigali to complete this exercise.

- Type C3: 35m² CAHF House - 30m² one bed, one bath house with 5m² veranda = Total 35m² (2018 prices), on a 225m² stand.

Plans for these three products are included in **Annexure B**. Type C1 is the original CAHF Benchmark product, but closely resembles the design of the lowest-cost units currently being developed in the Kigali market. Types C2 and C3 have been chosen to generate interest in the provision of more affordable housing options in Rwanda, because there is no evidence of any scale development of formal units below the C1 specification.

In order to provide a counterfactual, Type Co (CAHF's original specification costed in the Africa benchmarking study) was costed for South Africa (Johannesburg) for the same year. This enables a comparison with the most well-developed African housing market, as a means of identifying anomalies and outliers in the Rwanda costing data.

- Master Type Co: 55m² CAHF House - 46m² Two bed, one bath house with 9m² veranda = Total 55m² (2018 prices), on a 120m² plot.

It is important to note that this methodology provides for a 'like for like' comparison of costs between regions and countries, as it is based on a standardised design, level of specification and cost calculation. As a result, it may not match practical experience of the costs of housing products in the Rwandan housing market. This could be due to, amongst other factors:

- Differences in property size;
- Differences in the allowance for the cost of bulk and link services (water, sanitation, electricity, roads and sanitation, which are all costed into this product cost);
- Different standards of and levels of provision for on-site provided services (e.g. generator where electricity cannot be accessed; septic tank provision and specifications where no bulk sewer exists, etc);
- Difference in design and layout, level of finishes specified; and
- Cost differentials of materials costed in the benchmarked product.

In addition, assumptions regarding developer and contractor profit margins, holding costs and the costs of planning approvals, plan approvals, permitting and registration are all included in this cost for a 'like for like' comparison.

5.3 Benchmarking housing costs for Rwanda

Figure 8 shows the Level 1 cost breakdowns of the three benchmarked houses in Kigali, Rwanda for 2018. This disaggregates costs into the following categories: Land costs; Bulk, link and connector infrastructure costs; Compliance and approval costs; Construction costs; Other development costs; and Sales taxes. The cost of the first product (C1) for Johannesburg, South Africa is included for comparison. Product Co (55m² house, 120m² plot) costs US\$38 599 (RWF33.6 million) in Johannesburg, and Product C1 (55 m² house, 225m² plot) costs US\$50 297 (RWF43.8 million) in Kigali – a price increment of 30 percent.

Further, the costs of Product C1 (55m²: US\$50,297 / RWF43.8 million), Product C2 (45m²: US\$46 659 / RWF40.6 million) and Product C3 (35m²: US\$41 429 / RWF36.1 million) in Kigali indicates the relatively low elasticity of total house price to reduction in size: an 18 percent size decrease between C1 and C2 yields only a 7.2 percent price decrease in Kigali due to the relatively greater costs of other components of the price not impacted by house size, such as land and services costs.²⁴ Overall, the cost of Product Co (55m² unit) in Johannesburg is still marginally less expensive than the Product C3 (35m²) in Kigali, for a 20m² (36 percent) smaller house.

²⁴ It is noted that a minimum property size of 450m² has been assumed for Rwanda, based on current minimum plot specifications being applied. Full services provision on all products is also assumed as standard.

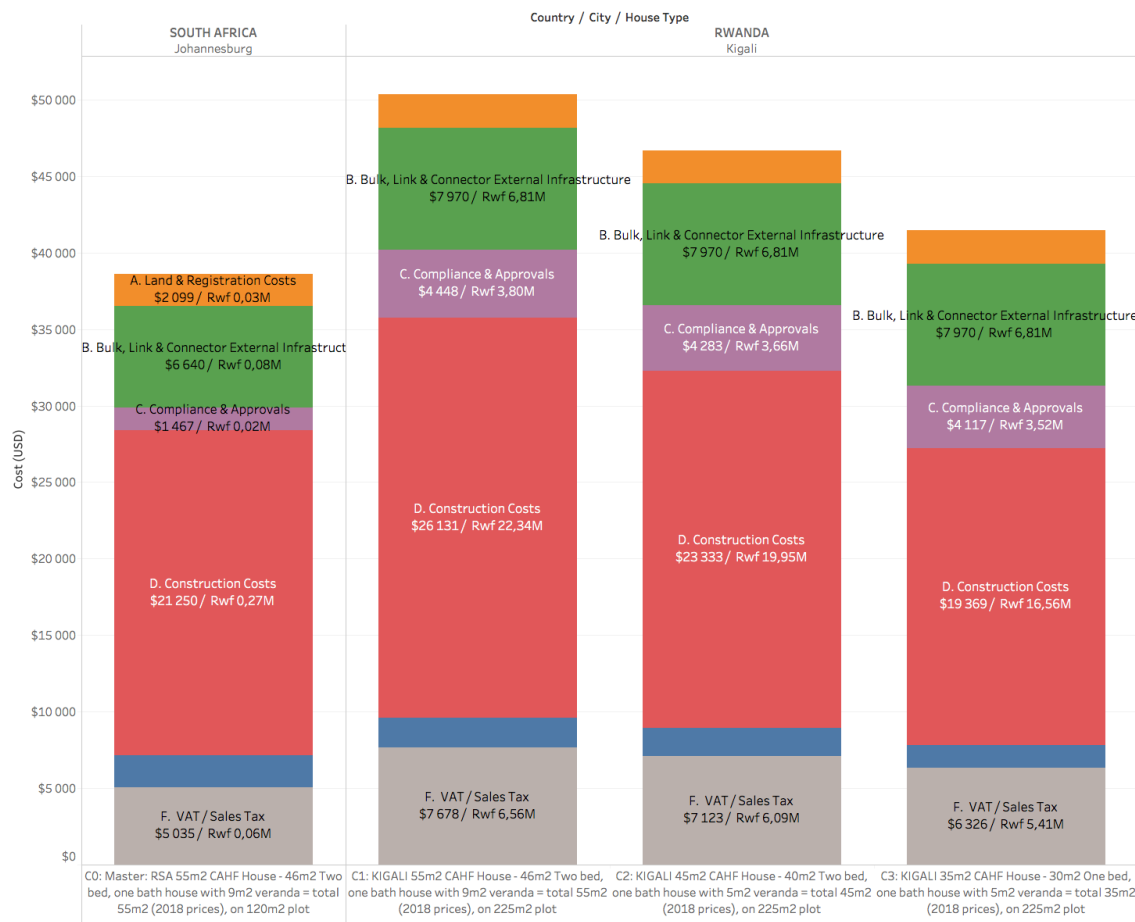


Figure 8: Costs of CAHF's benchmarked houses in South Africa and Rwanda (2018) Source: CAHF calculations.

The above cost benchmarking has significant implications for the overall affordable housing market in Rwanda. Considering unsubsidised house construction costs, it is estimated that less than 500 Rwandan households are deemed able to afford a US\$50 000 (55m²) product if mortgaged,²⁵ and a number of households in this income group may already have purchased housing. While effective demand in this market segment is likely to grow over time with rising growth rates and household incomes, it will remain a small part of Rwanda's overall housing demand. Even the C3 (35m²) product benchmarked at US\$41 429 would be affordable to less than 1 percent of households.²⁶

5.4 Analysing Level 1 housing cost components

Analysing the first-level cost breakdown of Product C1 between Johannesburg and Kigali in **Table 8**, land costs are roughly equal across the two cities, although land & registration comprises a relatively smaller proportion in Kigali (4 percent of product cost versus 5 percent in South Africa). Compliance and approvals are 203 percent higher,²⁷ and comprise 4 percent of total product cost in Johannesburg versus 9 percent in Kigali. Construction costs are 30 percent higher and VAT is 53 percent higher in Rwanda than Johannesburg - due to a higher VAT rate on a higher overall product cost. Given that construction costs comprise 55 percent (Johannesburg) and 50

²⁵ We note that this does not indicate the entire effective demand for such products in Rwanda. There are expatriate purchasers, and households in Diaspora who are able to afford such products and more.

²⁶ Housing affordability is generally a function of three things: (1) a household's income, (2) the price of the house that is available for sale, and (3) the terms of the mortgage loan for which the household qualifies. This calculation uses CAHF's "Calculating Mortgage and Housing Affordability in Africa" dashboard, based on CGIDD income data and prevailing mortgage terms in Rwanda (<http://housingfinanceafrica.org/dashboards/calculating-mortgage-housing-affordability-africa/>).

²⁷ This is more a factor of South Africa's low costs than Rwanda having high costs. Compliance and approval costs are relatively low by international standards in Rwanda, making these two countries amongst the most efficient in respect to registration costs in Africa.

percent (Kigali) of total product cost, this accounts for the most significant difference in costs of any of the Level 1 cost components.

	SOUTH AFRICA				RWANDA							
	Johannesburg				Kigali							
First Level	C0: Master: RSA 55m2 CAHF House - 46m2 Two bed, one bath house with 9m2 veranda = total 55m2 (2018 prices), on 120m2 plot		C1: KIGALI 55m2 CAHF House - 46m2 Two bed, one bath house with 9m2 veranda = total 55m2 (2018 prices), on 225m2 plot					C2: KIGALI 45m2 CAHF House - 40m2 Two bed, one bath house with 5m2 veranda = total 45m2 (2018 prices), on 225m2 plot		C3: KIGALI 35m2 CAHF House - 30m2 One bed, one bath house with 5m2 veranda = total 35m2 (2018 prices), on 225m2 plot		
	Cost (\$)	% of Total	Cost (\$)	% of Total	Difference: Rwanda - South Africa	% Increase over South Africa (C0)	% of Total Cost Difference	Cost (\$)	% of Total	Cost (\$)	% of Total	
A. Land & Registration Costs	\$2 099	5%	\$2 137	4%	\$38	2%	0%	\$2 137	5%	\$2 137	5%	
B. Bulk, Link & Connector Infrastructure	\$6 640	17%	\$7 970	16%	\$1 330	20%	11%	\$7 970	17%	\$7 970	19%	
C. Compliance & Approvals	\$1 467	4%	\$4 448	9%	\$2 980	203%	25%	\$4 283	9%	\$4 117	10%	
D. Construction Costs	\$21 250	55%	\$26 131	52%	\$4 881	23%	42%	\$23 333	50%	\$19 369	47%	
E. Other Development Costs	\$2 107	5%	\$1 933	4%	(\$175)	-8%	-1%	\$1 813	4%	\$1 510	4%	
F. VAT / Sales Tax	\$5 035	13%	\$7 678	15%	\$2 644	53%	23%	\$7 123	15%	\$6 326	15%	
Grand Total	\$38 599	100%	\$50 297	100%	\$11 698	30%	30%	\$46 659	100%	\$41 429	100%	
Cost Increment (C0: SA 55m2 = 100)	100%		130%					121%		107%		

Table 8: Cost differences in Level 1 housing cost components in Johannesburg and Kigali (2018) Source: CAHF calculations.

The first-level cost breakdown above are analysed in greater detail below. The 30 percent (US\$11 698) cost premium between Co (Johannesburg) and C₁ (Kigali) comprises 50 percent materials costs, 17 percent infrastructure costs, 15 percent VAT, 9 percent compliance and approvals and 5 percent land and registration costs. Therefore, the most important areas to seek cost relief in the Kigali construction economy are building materials costs and infrastructure costs. It is also noted that Rwanda's higher VAT rate of 18 percent is a significant additional cost in the affordable housing development market. However, it must be noted that exactly half of the total house cost in Kigali comprises non-construction elements, meaning that seeking more affordable accommodation needs to look to cost efficiencies across the housing delivery value chain.

The similarity (and relatively low cost compared to other African countries) of land registration costs is a result of these two countries being the only two African countries with digitised deeds registries, and both of these systems being very efficient by international standards.²⁸ The relative affordability of land in Kigali is also notable, comprising only an estimated 4 percent of the total Product C₁ cost.²⁹ While the total land costs are roughly equal between Johannesburg and Kigali, the property sizes assumed in Johannesburg is 120m², versus 225m² in Kigali. This does not imply that land costs are not high relative to the rest of Rwanda, nor even in the Great Lakes region – it is simply a comparison with land in one of the highest cost land markets in Africa. This does indicate, however, that the contribution of land cost to total housing cost is not as significant a cost factor as is often believed. Note for instance that compliance costs (land titling and registration) cost more than double the estimated raw land cost. Access to land, rather than absolute cost of land, is likely to be a greater impediment to affordable housing development.

Infrastructure costs are calculated to be 20 percent higher in Kigali than in Johannesburg.³⁰ This is attributed primarily to higher input materials costs. While labour on many publicly funded infrastructure projects is routinely subsidised through public works programmes,³¹ the costs of intermediate input materials rely extensively on imported goods, which also attract high import tariffs. Given the lack of widespread bulk infrastructure networks and facilities across Kigali, calculating the true costs of infrastructure installation on a specific site is hard to

²⁸ Rwanda has recently streamlined and digitised its property registration process. The World Bank Doing Business study now ranks Rwanda second only to New Zealand internationally in terms of its ease and efficiency of property registration. Registering a standard property in Kigali now requires only three procedures, taking seven days, and costing only 0.1 percent of the property value. Overall, the quality of the land administration index scores 28 out of a possible 30 points. <http://www.doingbusiness.org/data/exploreconomies/rwanda#registering-property>

²⁹ It is noted however that benchmarking land costs in a capital city is challenging, due to the many criteria that influence such cost. In Kigali, notably, there seems to be a direct relationship between access to trunk infrastructure (roads, water and sanitation) and land price. A general immobility in the land market also artificially increases land costs. As Kigali grows, this is likely to become a greater cost pressure on urban development costs.

³⁰ While South Africa's infrastructure costs are based on a municipal services contribution calculator developed and implemented for Cape Town, Rwanda's contributions to service costs are calculated on a site-specific basis, making direct comparison difficult.

³¹ Note that subsidised labour still costs the state in real terms - it is just allocated in a different budget category.

ascertain. Servicing a particular land parcel often requires significant capital works to link to existing - or newly constructed - city grids. Infrastructure costs could therefore be significantly higher than indicated here.

Compliance costs are over 200 percent higher in Rwanda than in Johannesburg, primarily due to the comparatively high costs of professional services such as engineers and architects. In particular, there is a requirement for a professional construction signoff, but limited professional capacity exists within the City of Kigali to do this. As a result, this function is mostly outsourced, and is often expensive.

Most importantly, construction costs are 30 percent higher in Kigali than in Johannesburg. However, analysing this category further shows two contrasts: labour costs are significantly lower³² in Kigali (-31 percent), while construction materials costs are significantly higher (+45 percent). The net cost increase of labour and materials combined is therefore 23 percent for Kigali. This is illustrated in **Figure 9**.

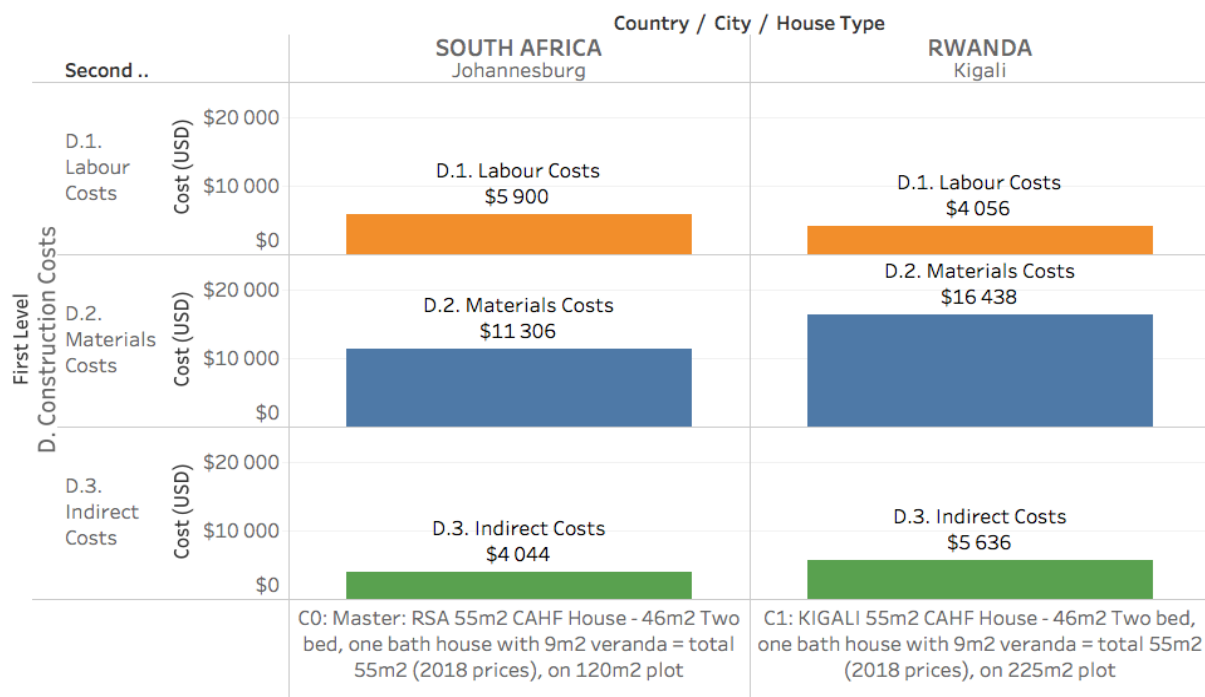


Figure 9: Comparison of construction and labour costs in Rwanda and South Africa (2018) Source: CAHF calculations.

5.5 Analysing housing construction costs

Looking at the highest component cost increment – building materials – shows that it is manufactured goods that add most significantly to the high costs of construction in Kigali, when compared with costs in Johannesburg. **Table 9** shows a comparison of a sample of materials sourced from the mining and quarrying sector. Without exception these materials are on average one-third cheaper in Kigali than in Johannesburg. It must be noted that during the site visit, concerns were raised as to the environmental impact of the quarrying activities in Kigali, much of which is unregulated and is stripping materials from natural areas such as riverbeds and wetlands.

³² This is due to a number of interrelated factors. South Africa’s labour market is highly unionised and regulated, although construction still has a high proportion of informal workers. Rwanda’s high unemployment rate keeps wages low. Anecdotal evidence from the site visit indicates that the daily rate for unskilled labour is around \$1, while semi-skilled workers (masons, plasterers) command between \$7 and \$10 per day. Professional / Trade Certified skilled employees (such as electricians and plumbers) are in high demand and can command from \$15 to \$30 per day.

		Country / City	
		SOUTH AFRICA Johannesburg	RWANDA Kigali
Fifth Level			
D2.1.3.2 Building sand	Cost (USD)	\$86	\$66
	Quantity	3,0	3,0
D2.1.1.2 Concrete sand	Cost (USD)	\$95	\$72
	Quantity	3,0	3,0
D2.1.1.3 19mm Stone	Cost (USD)	\$178	\$86
	Quantity	4,0	4,0
D2.2.1.3 Washed plaster sand	Cost (USD)	\$245	\$173
	Quantity	7,0	7,0
Grand Total	Cost (USD)	\$604	\$397
	Quantity	17,0	17,0

Table 9: Comparison of intermediate input costs from the primary economic sector - Johannesburg and Kigali (2018)
 Source: CAHF calculations. Note that these are example costs for specific materials measured for a particular element of construction – in this case, superstructure. These do not represent the total quantities nor costs of these materials.

Table 10 shows the prices of a sample of intermediate inputs into house construction from the secondary economic sectors (manufactured goods) for Johannesburg and Kigali. This shows the significant cost premiums of exactly the same specified items and quantities in the two cities. On average, across this sample of items, the total cost is 68 percent higher in Kigali. These items are mostly (but not exclusively) imported into Rwanda (such as plumbing and electrical components) or are locally manufactured or assembled using imported materials (such as window and door frames and roofing materials).

Fifth Level	Unit	Country / City		
		SOUTH AFRICA		RWANDA
		Johannesburg		Kigali
D2.1.2.1 Cement	50kg sack	Cost (USD)	\$178	\$309
		Quantity	28	28
D2.1.2.5 Cement blocks, bricks	item	Cost (USD)	\$393	\$596
		Quantity	510	510
D2.1.3.4 Allowance for masonry sundries (Polyethelene damp proof course (DPC), galvanised wire brick reinforce..	item	Cost (USD)	\$68	\$1 013
		Quantity	1	1
D2.1.1.4 Mild steel and high tensile strength bar reinforcement in foundations (supply, cut, bend and deliv..	ton	Cost (USD)	\$238	\$344
		Quantity	0	0
D2.1.4.1 1.2mm Pressed steel rebated frame for door size 813 x 2032mm	no.	Cost (USD)	\$115	\$234
		Quantity	5	5
D2.1.4.4 Steel windows and fittings, size 500 x 600mm	no.	Cost (USD)	\$30	\$55
		Quantity	1	1
D2.1.5.1 All roof construction materials - timber	m2	Cost (USD)	\$150	\$236
		Quantity	55	55
D2.1.5.4 Roof construction materials sundries: Steel bolts, nails, connectors, galvanised steel wire, etc	item	Cost (USD)	\$14	\$23
		Quantity	1	1
D2.1.5.3 Creosote/Carbolineum-based timber preservative	litre	Cost (USD)	\$2	\$4
		Quantity	1	1
D2.2.5.1 Floor tiles and sundries	m2	Cost (USD)	\$420	\$1 143
		Quantity	55	55
D2.2.6.1 External doors - timber	no.	Cost (USD)	\$231	\$260
		Quantity	2	2
D2.2.6.3 Internal doors - timber	no.	Cost (USD)	\$124	\$312
		Quantity	3	3
D2.2.6.7 Timber skirtings and fixings	m	Cost (USD)	\$70	\$124
		Quantity	42	42
D2.2.6.8 Supply window glass	m2	Cost (USD)	\$224	\$122
		Quantity	9	9
D2.2.7.1 Kitchen units	item	Cost (USD)	\$169	\$649
		Quantity	1	1
D2.3.1.1 All materials for electrical installation: Allowance per supplier quote: Supply cable from boundary connectio..	item	Cost (USD)	\$719	\$964
		Quantity	1	1
D2.3.1.2 Light fittings, including globes	item	Cost (USD)	\$83	\$91
		Quantity	7	7
D2.3.2.2 All materials for plumbing and drainage, including sanitary fittings, taps, etc (where breakdown a..	item	Cost (USD)	\$884	\$584
		Quantity	1	1
D2.3.2.5 WC (toilet), incuding pan, seat, flushing cistern, flush pipe, collar for connecting to soil drain	no.	Cost (USD)	\$73	\$195
		Quantity	1	1
D2.3.2.6 Wash hand basin, including fixing brackets, waste outlet, plug and chain, S-trap, connector hoses, and taps	no.	Cost (USD)	\$65	\$104
		Quantity	1	1
D2.3.4.1 Allowance: All paint and timber preservatives for walls, ceilings, doors, windows, skirtings, etc., as per sup..	m2	Cost (USD)	\$525	\$649
		Quantity	55	55
Grand Total		Cost (USD)	\$4 774	\$8 009
		Quantity	780	780

Table 10: Comparison of intermediate input costs from the secondary economic sector - Johannesburg and Kigali (2018)
Source: CAHF calculations. Note that these are example costs for specific materials required for a particular element of construction – in this case, superstructure. These do not represent the total costs of these materials to complete a house, but rather offer a ‘basket of goods’ comparison.

5.6 Key Findings: Cost benchmarking

The cost benchmarking exercise corroborates a number of assumptions regarding Rwanda’s affordable housing market, and raises others requiring further consideration. Key issues of relevance to Rwanda’s future affordable housing market development are discussed here.

Housing affordability and “affordable housing” in Rwanda

The definition of Rwanda’s “affordable housing market” must be reviewed to include much more affordable housing solutions. While most developments target new products at the US\$40 000 and above market, this excludes 88.7 percent of all households from the housing market. **Table 11** shows the number of Rwandan households who could afford products of different prices, without subsidy and with a full subsidy for land and infrastructure costs. It is evident from this that until realistic standards of accommodation, or significant subsidy budgets are available, the current formal construction market will not be able to reach a majority of Rwandan households.

Product Specification	Land and Infra-structure Cost ³³	Balance of Unit Cost	Total Product Cost	Affordability % of all households	
				No Subsidies	With Subsidies
C1 (55m ² house on 225m ² plot)	US\$10,107	US\$40,190	US\$50,297 RWF44-m	0.1 %	0.3 %
C2 (45m ² house on 225m ² plot)	US\$10,107	US\$36,552	US\$46,659 RWF41-m	0.3 %	1.3 %
C3 (35m ² house on 225m ² plot)	US\$10,107	US\$31,322	US\$41,429 RWF36-m	0.7 %	1.7 %
25m ² house on 225m ² plot	US\$10 000	US\$25 000	US\$35 000 RWF30-m	1.3 %	2.0 %
15m ² core on 225m ² plot	US\$10 000	US\$15 000	US\$25 000 RWF21-m	2.0 %	3.0 %
Wet core on 225m ² Serviced Site	US\$10 000	US\$10 000	US\$20 000 RWF17-m	3.0 %	4.0 %
225m ² Serviced Site & Self Build	US\$10 000	US\$5 000	US\$15 000 RWF13-m	4.0 %	11.3 %
225m ² Serviced Site	US\$10 000	-	US\$10 000 RWF8,6-m	11.3 %	88.7 %

Table 11: Indicative house costs and household affordability assuming full land and infrastructure subsidy (2018)

Source: CAHF calculations. Note: the 'With Subsidy' column assumes that full land and infrastructure costs are covered by the state.

Reducing housing costs

Rwanda's housing development and construction costs are high in comparison to South Africa's housing market. Construction costs are 30 percent higher, and it is also notable that half of total housing costs are for non-construction items (land, infrastructure, compliance, tax, etc.). Therefore, making housing more affordable in Rwanda will require consideration of non-construction cost inputs as well as construction cost reductions.

Firstly, the key construction cost drivers must be targeted for cost reductions. Importation of manufactured building materials is the major cost driver, given Rwanda's limited local manufacturing base for building materials, relatively high import tariffs, and the long logistics chains required to get materials to Rwanda. The competitiveness analysis indicates opportunities exist for import substitution in the building materials industry, and that such local manufacturing opportunities may also offer export opportunities to COMESA countries.

While many Alternative Building Technologies (ABTs) are also proposed as a solution to affordable housing in Rwanda and further afield in East Africa, these must be considered carefully. Often, the proportion of total housing costs impacted by such technologies are small, and they do little to reduce other costs such as land, infrastructure and registration costs. **Annexure E** outlines the most important considerations when considering ABTs.

Diversification of housing market for economic growth

Rwanda's housing sector cannot drive economic growth if it only focuses on the top few percent of households. It must, by necessity, drive a down-market focus that offers greater affordability and more chance of annual expansion and growth of the housing market. While it is still important to serve the top end of the residential market, it will quickly saturate. Rwanda's housing market growth therefore cannot be built on housing products costing US\$50 000 and above, unless consistently and heavily subsidised by government. Even if full land and services costs are covered by government, the subsidised price of this product reduces to US\$40 190 which is still affordable to less than 1 percent of households.

If housing is to be a major economic driver, it is imperative that the market for housing products costing between US\$40 000 and US\$10 000 be stimulated in order that housing opportunities such as serviced sites

³³ This cost is based on the benchmarking exercise. However, the total cost of a serviced site could be reduced further by reducing servicing standards and property size. For instance, in South Africa the subsidy determination is over R100 000 / \$7 900 / Ksh7.1 m for a greenfield serviced site in 2018.

and core units become available to the 90 percent of households only able to afford US\$5 000 or less for housing. While each of these housing units will generate less economic activity than a completed unit, the volume and depth of a vibrant and truly affordable housing market will be the cornerstone of Rwanda's future economic growth through housing.

Property typologies and standards

Property and housing standards and high household expectations in Rwanda are a major contributor to high housing costs. While many new developments show a move towards smaller properties, the prevailing development densities are still low, and formal house sizes high in comparison to other developing nations. Given Rwanda's high overall population densities, and in the context of a rapidly growing metropolitan area, the implications of low densities on urban sprawl and the increased costs of providing infrastructure and services must be considered.

Six Rwandan housing typologies are outlined by Planet Consortium (2012):

1. Detached house with one housing unit;
2. Detached house with more than one housing unit;
3. Clusters of detached houses;
4. Attached houses which form a compound with a central open space and a closable entrance;
5. Attached houses which form an open compound with a communally used open space; and
6. Individual compound with one main house and additional small back yard units.

Slightly more than half of home owners live in a detached house, while the other typologies mainly address the rental market. However, a growing metropolitan area must consider other built forms as well. These include: multi-storey construction (such as double storey development); higher-density semi-detached or row housing; medium-density four or five storey 'walk-up' apartments; high-rise apartments (5+ storeys); and 'backyard tenements, rooms and cottages', aimed to serve smaller households of one to three people. It is encouraging to see that the review of the Kigali Master Plan is considering a much wider range of more affordable typologies.

Down-market penetration of formal construction sector

Currently, Rwanda's limited formal housing construction sector focuses at the top of the 'housing affordability pyramid'. The scale and focus of Rwanda's current formal housing delivery meets a very small proportion of the potential demand that household affordability and urbanization growth rates should dictate. The relatively large minimum 'affordable house' identified in Rwanda's formal construction market is concerning – a review of existing and planned developments for this report identified no housing units in formal developments of less than 55m².

New housing developments approved in Kigali are therefore unaffordable to the vast majority of households.³⁴ Given the outcomes of this benchmarking exercise, a C1-type house, costing just over US\$50 000, is affordable to less than 1 percent of Rwanda's households. Even with government-subsidised land and services, the C1 housing product requires households to be able to afford the construction value of US\$26 000 (RWF22.3 million) – still only affordable to less than 1 percent of Rwandan households.

Land and service subsidy certainty

While land is not a major cost contributor to overall housing costs, it is still the fundamental building block on which all houses are built. Further, given the Government of Rwanda's policy of subsidising costs of land and infrastructure where this is to be used for affordable and social housing, interventions to ensure the release of sufficient serviced land is the cornerstone of ensuring large scale, affordable housing delivery in Rwanda.

A number of land parcels were priced in order to benchmark land costs in Kigali, and there are indications that the land market is facing significant speculative cost increases. This is most noticeable in relation to medium to large properties that would be suitable for 20+ unit developments. While public and private land parcels are still available, land release will need to increase in pace if a sustained housing delivery programme is to be

³⁴ This is not unusual in Africa. CAHF (2017) estimates that in most African countries, less than 10 percent of the urban population can afford to purchase the cheapest conventionally constructed newly-built house with mortgage finance. As a result, most housing - by number and economic contribution - is produced incrementally by households themselves.

encouraged. It is also likely that the City of Kigali should consider implementing land assembly instruments in order to ensure land availability over the medium term.

The costs of subsidising land and services in Rwanda will increase substantially if the delivery programme expands, and especially if greater down-market penetration is required. Careful budgeting will be required to ensure that the rate of land and service delivery expands year-on-year. Further, should Rwanda take seriously the strategy of upgrading existing informal housing areas, this will require even greater public fiscal commitments.

Housing products and urban form

The prevailing urban form of most new developments is a further concern. While there is evidence of some medium-density development in Kigali, the average unit sizes don't show much deviation from the 55m² and above sizes and most houses constructed are still detached, single storey units.

Considering evidence from South Africa's market that vertical development adds a premium to prices if unit standards remain unchanged, medium and high-rise development will further limit affordability in Kigali.³⁵

Figure 11 shows the calculated costs (2017) of developing a range of different standard housing products in South Africa. This includes:

- Land costs;
- Bulk, link and connector infrastructure contributions;³⁶
- Internal services infrastructure (roads and storm water, water, sanitation and electricity reticulation);
- Process costs (including compliances, approval costs, social facilitation and support services costs where applicable, professional fees and project management costs);
- House construction costs including labour and materials; and
- Other costs where applicable.

There are a number of observations from the cost estimates in **Figure 10**. Firstly, the 40m² FLISP house correlates very closely with the Rwanda "C3" 40m² house. While this C3 house is 20m² smaller than the current minimum produced conventional house in Rwanda, this product is modelled on the lowest-priced bank-financed houses being produced in Johannesburg at reasonable volumes at present.

In addition, a range of housing options exist below this house in the South African affordable housing market, albeit that most are funded with government subsidy funds. Most important is the shift of subsidy money to the Upgrading of Informal Settlements Programme (UISP), which regularises and provides secure tenure and basic services to households in informal settlements, leaving household investment to private initiative. The cost differential between the lowest-priced housing product (a regularised serviced site with 'wet core' of toilet and shower in existing informal settlements) and the highest-cost affordable product (a high-rise, new-built 35m² social housing unit) is nearly five times. This indicates the potential to develop smaller units on reduced property sizes that meet the affordability of a much higher proportion of Rwandan households.

A further consideration is the very limited cost difference between a freestanding basic housing unit of 42m² ('BNG Freestanding') and a medium-density (duplex, attached and semi-detached) unit of the same size. Given the density benefits accruing from the latter, more attention should be given to this typology in Rwanda, as a way of improving urban form and potentially optimising the use of scarce, well-located land.

The differential in cost between a 'BNG' house and the 'Social housing'³⁷ unit results from the higher-quality, higher-density configuration of social housing, as well as provisions for higher land costs to ensure good location. The cost increase between medium-density and high-rise social housing units clearly shows that there will also be a significant cost premium on vertical development, due to construction standards and safety requirements that are likely to prevail in Rwanda too. If a higher-rise construction typology is required, this will require higher levels of investment and affordability unless unit standards are moderated.

³⁵ The tradeoff between upfront capital cost and the life cycle costs of lower density construction in relation to transport and other unintended costs of low-density development is noted.

³⁶ Bulk services costs are calculated per typology based on the City of Cape Town Bulk Services Calculator (2015), developed by the Palmer Development Group (PDG). This is deemed to provide the most accurate reflection of true bulk services requirements in South Africa's metros at present.

³⁷ In South Africa's context, Social Housing refers to institutionally-owned, heavily-subsidised rental accommodation developed and managed by accredited housing institutions.

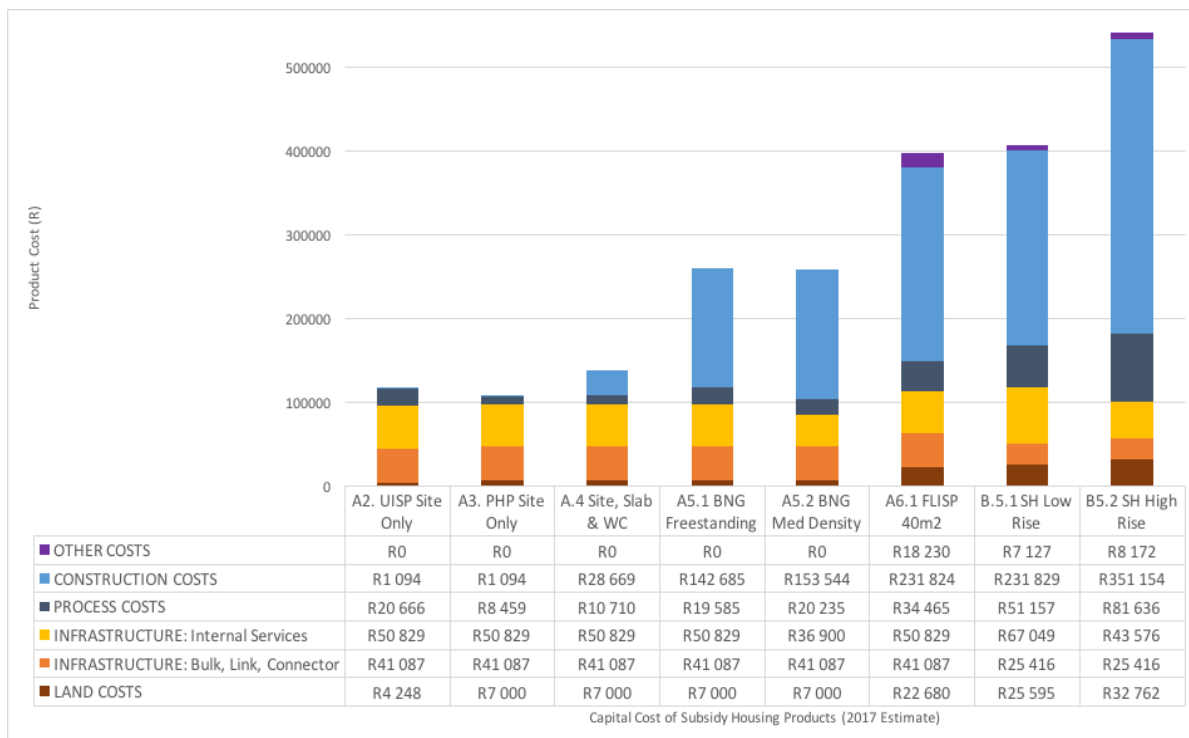


Table 12: CAHF calculated capital costs of key housing typologies in South Africa Source: CAHF Subsidised Housing Value Chain (Draft Data).

Given the many initiatives across the continent that are producing much more affordable products, this will be an important component of housing construction market growth.

Reducing building materials costs

The largest difference in the benchmarked costs between Johannesburg and Kigali is building materials costs, and specifically manufactured building materials, many of which are imported into Rwanda. While more detailed sectoral analysis is required in regard to the total materials cost contributions to the benchmarked houses in Kigali, the analysis clearly indicates extremely high premiums on certain goods such as cement, steel products, porcelain and many specialist inputs (plumbing and electrical goods). In many cases, these are more than 50 percent more expensive than the same products in South Africa.

6 Conclusions

Based on the analysis and initial findings from the Housing Economic Value Chain and Housing Cost Benchmarking for Rwanda, initial recommendations for the future growth and development of the affordable housing sector as a lead economic sector in Rwanda are outlined here.

6.1 Systems view of housing

Housing offers important economic and social impacts that can influence Rwanda’s future economic growth. It is convention to consider housing as a separate economic sub-sector, but while this ensures housing gets the recognition and policy support it needs, it also potentially limits the linkages between housing and the overall economy.

The economic value chain assessment shows the deep links between housing and other parts of Rwanda’s economy. Housing construction has the potential to drive the growth of local manufacturing sectors that supply intermediate inputs into the housing value chain, and by so doing, to ensure value creation upstream of housing construction in Rwanda. However, this will require coordinated policy covering the housing sector generally, the manufacturing and services sector and aspects of economic and fiscal policy. To exploit its economic potential, a system view of housing and its influence on Rwanda’s economy is required.

6.2 Housing as a lead economic sector

Housing by its nature is a locally consumed product. Housing influences national economies in three important ways. Firstly, while housing fulfils a basic human need for shelter, it also provides the base from which households participate in the economy. Secondly, housing is the largest asset most households will accumulate over their lives and therefore comprises an important part of most countries' generation of wealth. Thirdly, the construction, trading and occupation of housing stimulates the production and sale of related goods and services, impacting on many sectors of national economies.

For housing to be a lead economic sector in Rwanda, it will be required to broaden and deepen its reach across household affordability. In addition, housing as a lead sector will require economic stability and consistency and certainty in policy and support programmes in order to facilitate the development, localisation and growth of the local construction and rental sectors.

It is also important that policies that improve the functioning of the entire housing market are implemented, as the informal sector will continue to play a leading role in providing affordable housing for the majority of Rwandan households.

6.3 Redefinition of 'affordable housing'

As with many countries in Africa, Rwanda has not developed sufficient consensus on what constitutes acceptable affordable housing. While government has commenced implementation of WBG-supported in-situ upgrading programmes and financed housing developments, many Rwandan households still expect a fully completed house to live in. Recognising that the provision of such houses to all Rwandan households is neither practical nor affordable to government, a finer-grained determination of a range of different housing interventions in the owned and rented market are required. This will assist to create multiple sub-markets for housing that can be developed in large formal developments, as well as through smaller developments and by households themselves.

6.4 Role of government in the affordable housing market

A critical factor in Rwanda's affordable housing market growth will be the strong guiding role that government takes in the housing development process. This will require clarity of roles between public and private sectors and households themselves.

Government's role in releasing land and installing services for affordable housing developments will also need to be carefully managed and controlled as the housing development programme expands. While this is likely to create initial affordability benefits for some households, it may also create longer-term dependencies and fiscal constraints on government. Transparency with regards to how, and how much, government contributes to private housing development will be important.

Currently, a number of ministries, government departments at different levels, and specialist institutions operate in the housing sector. Clear roles and responsibilities, and transparent policies, strategies and financing instruments will be important for the long-term growth and development of housing construction and rental.

6.5 Import substitution opportunities for local manufacturing

While it is beyond the scope of this study to undertake a feasibility analysis on potential import substitution opportunities, the revealed competitive analysis indicates that the following key groups of materials show promise for local manufacturing growth, as they are currently imported extensively into Rwanda and in most cases there is a small but growing export of similar materials categories to COMESA countries:

- Cement and cement products (current imports exceed US\$56-million per annum);
- Ceramic tiles: glazed and non-glazed (current imports exceed US\$17-million per annum);
- Tubes pipes, hoses, etc of plastic & vinyl material (current imports exceed US\$12-million per annum);
- Paints and varnishes (current imports exceed US\$7-million per annum).
- Manufactured steel products: screws, washers, nuts, bolts, cotter pins, etc. (current imports at US\$3-million per annum).

The relative ease of doing business in Rwanda - ranking second in Sub-Saharan Africa after Mauritius (World Bank, 2018) - offers opportunities for investors to consider the establishment of manufacturing concerns in the

above building materials sectors in order to serve Rwanda's local market and that of neighbouring landlocked countries that face similar high import costs.

6.6 Taxation and incentives

If affordable housing is to be driven as a key growth sector for Rwanda's economy, a package of favourable incentives should be considered. Rwanda's National Housing Policy (2015) states that "...the approval of incentives through implementing programs will support the following principles: a. Investment into in-country production facilities of local conventional and new construction material, involving quarries, plants, production and assembly; b. Investment into green technologies and production aligned to the green growth strategy and requirements established within planning and building regulations. Special focus due to its feasibility shall be on solar hot water heaters, photovoltaic, and rain water harvesting and its use; c. Preferred use of local materials in construction, both raw and processed, wherever possible; d. Use or re-use of waste materials including organic waste in construction material production; e. Use of solar hot water heaters, photovoltaic systems and rain water harvesting."

Import tariffs on manufactured intermediate inputs are a further impediment to more affordable construction, and uneven import tariff structures skews the 'playing fields' for developers. The impact of VAT on housing is important. At 18 percent, VAT is a significant barrier to affordability for many households wishing to purchase or rent formally constructed housing.

6.7 Constraints on the development of multi-storey medium and high-rise housing

It is not difficult for large construction companies, local or international, to build high-rise residential buildings. However, for smaller and medium-sized local companies, it is more difficult. It requires more sophistication, and greater capacity in terms of working capital, equipment and organizational, managerial, engineering and technical skills.

However, even for large companies costs of vertical development are high due to the high cost of materials such as cement, steel, aluminium, glass, ceramics, electrical and plumbing ware, much of which has to be imported or is constrained by limited and relatively expensive local supply.

General factors that will contribute to increased costs of high-rise buildings include, but are not limited to:

1. Higher land prices for well-located land and enhanced development rights (such as rezoning and intensification of coverage and bulk);
2. Increased development contributions, and the need to provide on-site water and sanitation treatment and storage facilities;
3. Strengthened foundations and structural frames;
4. Possible provision of structured or basement parking;
5. More stringent fire safety and evacuation requirements;
6. Lifts;
7. Potable domestic and fire water storage, pressure control, reticulation and pumping;
8. Anti-siphonage sanitary waste and soil drainage stacks, etc.;
9. Increased preliminaries costs due to requirement for more skilled contractors with higher overheads and plant costs for scaffolding and vertical transportation of materials and labour; and
10. Higher professional fees due to increased complexity of design, supervision and cost management.

More specifically in Kigali, small or individual owners of land parcels zoned for higher density in the master plan, are unable to muster the technical and financial resources required to build high-rises, and as a result the land lies fallow and undeveloped. One possible way of alleviating this could be to assist these small land owners to enter into joint venture arrangements with larger construction companies where the land is inserted as equity, but with the landowner sharing in the downstream value add, rather than merely sacrificing the asset at ground floor price.

6.8 Housing data and information

The growth and development of Rwanda's housing sector will require detailed data collection, monitoring and evaluation processes. Close management of the sector, and how it relates to the rest of Rwanda's growing economy is important. Information also enables corrections to policy to be made timeously, as damaging decisions can rapidly derail sectoral gains achieved.

Annexure A.1: Data sources and assumptions used in estimating Rwanda's housing construction value chain

This annexure outlines the key data sources used to develop the construction economic value chain for Rwanda, along with assumptions made in relation to this data.

1. The aggregate value of the output of housing construction is estimated using the ratio of the sum of modern and traditional housing construction to total housing construction contained in figures for 2014 obtained from the NISR (through the World Bank). According to these figures, in that year housing construction accounted for 51.6 percent of total construction activity. It has been assumed that the composition of construction activity in 2017 was similar to 2014.
2. The breakdown of output between GVA and intermediate inputs is based on the 2014 Supply and Use Tables for Rwanda obtained from the NISR. It has been assumed that this composition remained roughly the same in 2017.
3. The sector composition of intermediate inputs is derived from the 2014 Supply and Use tables for construction as a whole. It has again been assumed that this composition also applies to housing construction and that it continued to hold in 2017.
4. The estimate of total employment is based on the estimated share of GVA of housing construction of total construction multiplied by the total paid employment in construction reflected in the August 2017 Labour Force Survey published by NISR. Given that a significant proportion of labour activity in housing construction may be "own account", this figure is likely to understate the full extent of employment in the sector.
5. The labour remuneration component of GVA has been estimated by multiplying the estimated number of people employed by the annualised average remuneration of paid employees reflected in the August 2017 Labour Force Survey published by NISR. Given the significant differences between average and median remuneration contained in that publication, this estimate should be treated with some caution.
6. The net indirect tax component of GVA has been estimated using the 18 percent VAT rate. Other indirect taxes and/or subsidies that will affect this share have not been taken into account.
7. The gross operating surplus has been calculated by subtracting labour remuneration and net indirect taxes from the estimate for GVA.

A key aspect of the analysis – which this study has not been able to address – is the import leakages in the value of both intermediate inputs and GVA. They will serve to reduce the multiplier effects of housing construction on the Rwandan economy.

Annexure A.2: Data sources and assumptions used in estimating Rwanda's housing rental value chain

This annexure outlines the key data sources used to develop the rental economic value chain for Rwanda, along with assumptions made in relation to this data.

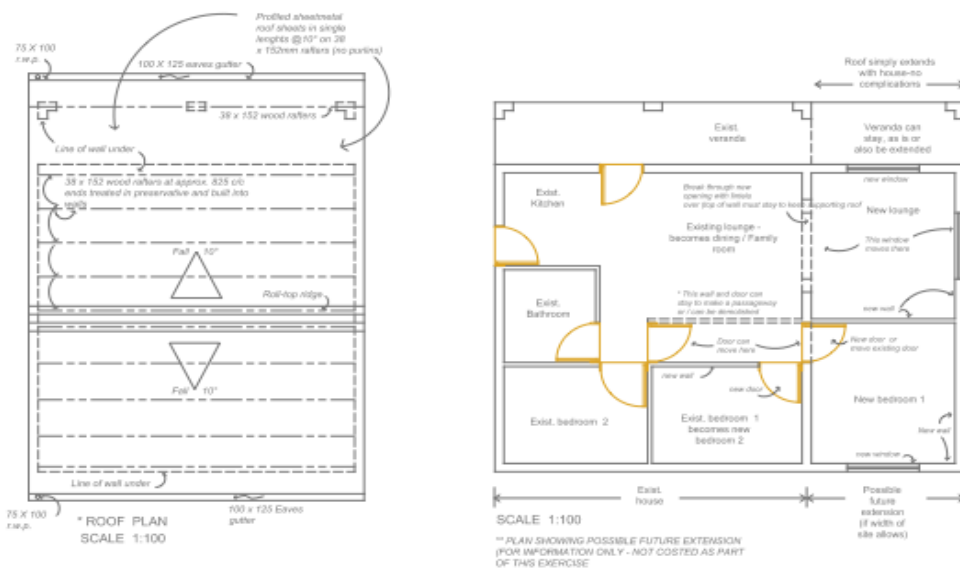
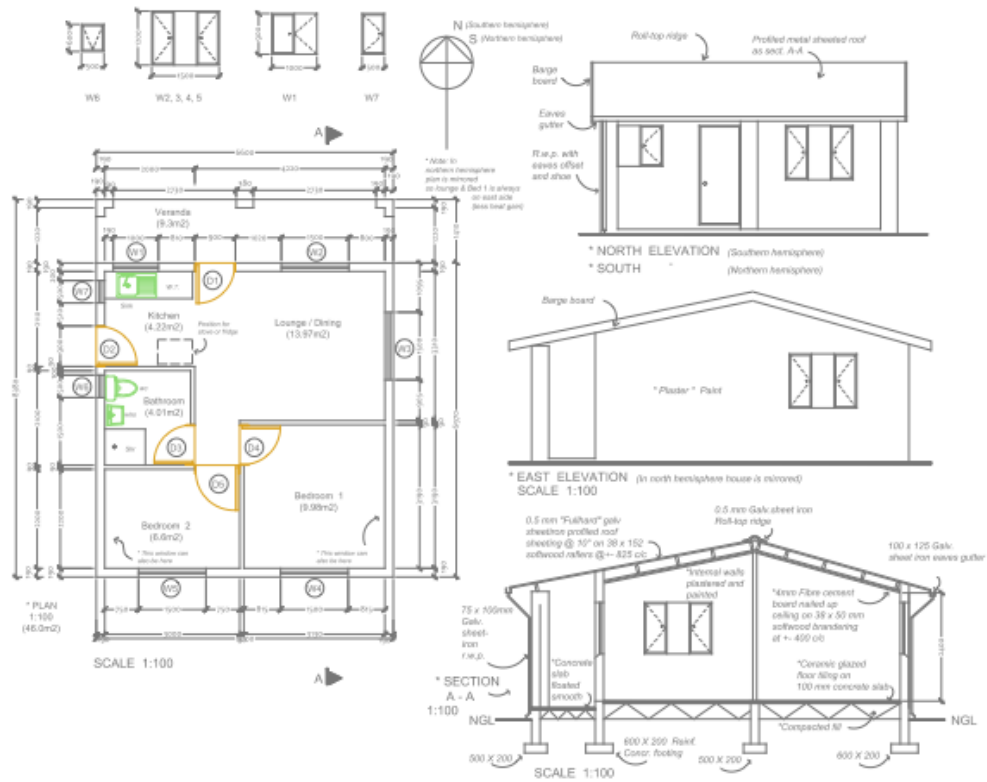
1. The aggregate value of the output of the housing rental value chain has been estimated using the share of the sum of rents for rented dwellings of total real estate output contained in figures for 2014 obtained from the NISR (through the World Bank). These figures suggest that 14.1 percent of real estate output can be ascribed to residential rental activities for which an explicit rental is charged. It has been assumed that the composition of real estate activities reflected in the national accounts was similar in 2017 to its 2014 levels.

NB: The inclusion of imputed/owner-occupied rents can be debated, given the overwhelmingly informal nature of housing rental and the very low level of formal housing rental. For consistency with analyses done for other countries, it has been decided not to include imputed rents in this analysis. Prior to these figures being obtained, output was estimated using the difference in CPI weights for housing, electricity and water between urban and rural households. This equates to around 5 percent of household expenditure (21 % - 16 %) which is similar to the explicit weight for housing rentals in Uganda. The underlying logic was that housing rental would be a feature of urban areas but would not be significant in rural areas.

2. The breakdown of output between GVA and intermediate inputs is based on the 2014 Supply and Use Tables for Rwanda obtained from the NISR. It has been assumed that this composition remained roughly the same in 2017.
3. The sector composition of intermediate inputs is derived from the 2014 Supply and Use tables for real estate as a whole. It has again been assumed that this composition also applies to housing rental and that it continued to hold in 2017.
4. The estimate of total employment is based on the estimated share of GVA of housing rental of total real estate multiplied by the total paid employment in real estate reflected in the August 2017 Labour Force Survey published by NISR. Given that a significant proportion of labour activity in housing rental may be "own account" and informal, this figure is likely to significantly understate the full extent of employment in the sector.
5. The labour remuneration component of GVA has been estimated by multiplying the estimated number of people employed by the annualised average remuneration of paid employees reflected in the August 2017 Labour Force Survey published by NISR. Given the significant differences between average and median remuneration contained in that publication, this estimate should be treated with some caution. It is also likely to be understated as a result of the low employment estimates discussed above.
6. The net indirect tax component of GVA has been estimated using the 18 percent VAT rate. Other indirect taxes and/or subsidies that will affect this share have not been considered. This figure may be a significant over-statement given the informal nature of the sector and the extremely low value/share of intermediate inputs.
7. The gross operating surplus has been calculated by subtracting labour remuneration and net indirect taxes from the estimate for the GVA of housing rental activity.

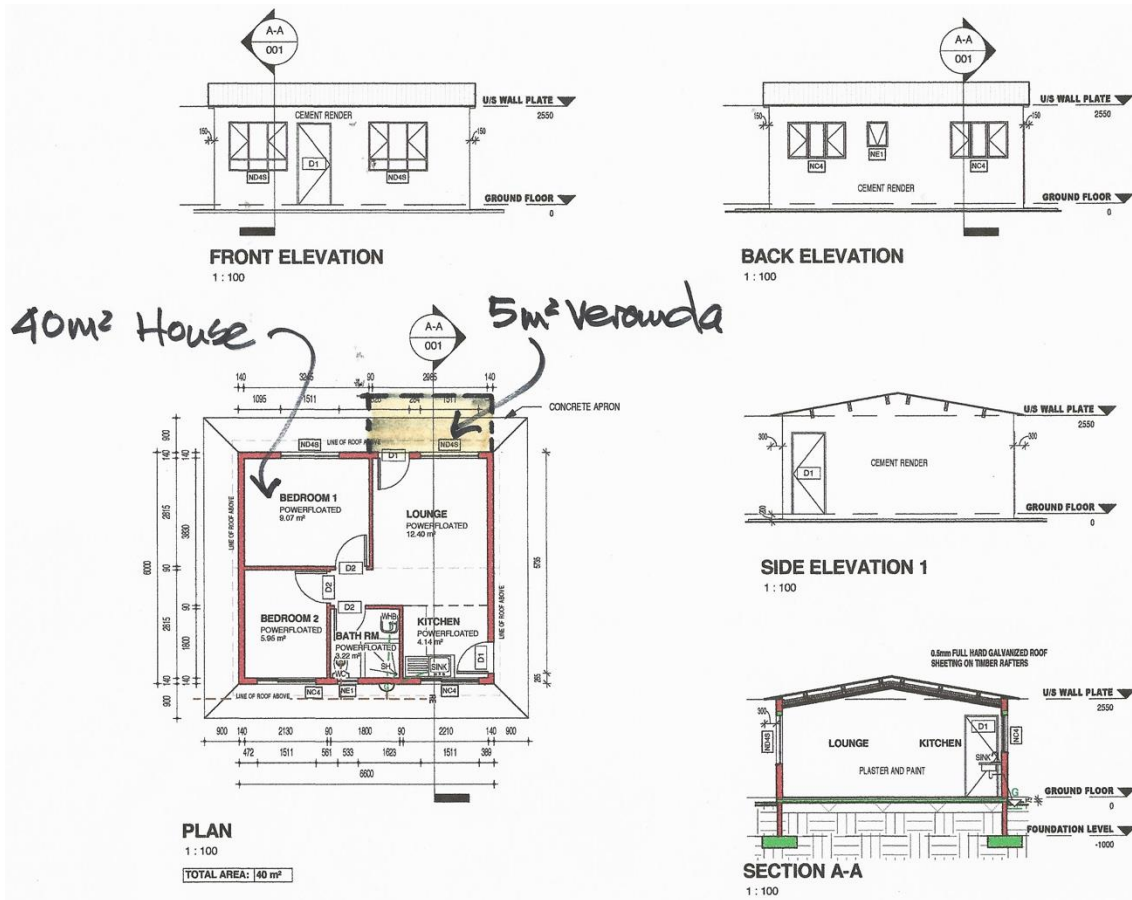
Annexure B: CAHF benchmarked housing product plans

Type Co & Type C1: 55m2 CAHF House - 46m2 two bed, one bath house with 9m2 veranda = Total 55m2 (2018 prices), on a 120m2 stand (South Africa) and 450m2 stand (Rwanda)



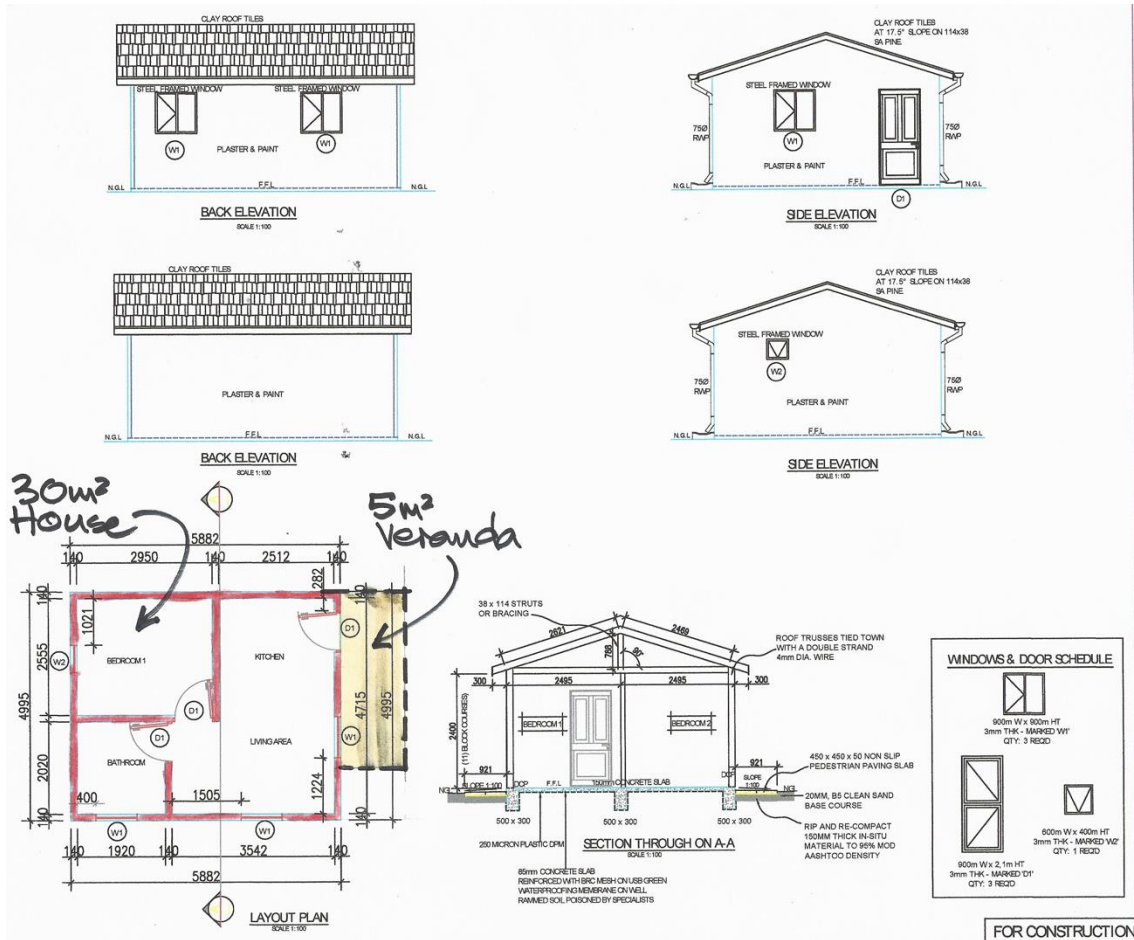


Type C2: 45m² CAHF House - 40m² two bed, one bath house with 5m² veranda = Total 45m² (2018 prices), on a 450m² stand.





Type C3: 35m² CAHF House - 30m² one bed, one bath house with 5m² veranda = Total 35m² (2018 prices), on a 4,50m² stand.



Annexure C: Study methodology

A six-step methodology has been used for this assignment, in order to meet the time and budgetary constraints of this assignment.

Step 1: Project Inception. Contracting, inception meeting, finalise methodology, Rwanda QS mobilization. Client Workshop 1 will finalise project inception.

Step 2: Data Assimilation and Analysis. Collation and analysis of statistical and other relevant housing and economic information from project team and other sources. This information is used as inputs to the model and to inform adaptations to the methodologies adopted for the HEVC modelling.

Step 3a: Housing Cost Benchmarking Costing Exercise. Undertake in-country benchmarked housing product elemental costing by local QS, under guidance of Jacus Pienaar. It is proposed that two benchmarked housing products are costed in two different cities in Rwanda (Kigali and Butare). The first product will be the generic CAHF-specified house, and the second is proposed as an entry-level, conventionally financed product.

Step 3b: Housing Economic Value Chain Modelling. Undertake HEVC analysis. This will be undertaken by Keith Lockwood and David Gardner. Macroeconomic data, census data, housing sector information and other relevant information will be consolidated into a conceptual model of Rwanda's housing market, to inform the housing construction and rental economic value chain assessments.

Step 4: Consolidation and Interpretation of HCB and HEVC modelling and costing exercises. Assimilation, analysis and interpretation of data, quality assurance and verification, data revision.

Step 5: Results Verification. Client presentation and verification workshop. We propose that this step includes a country visit to Rwanda by one team member, and a workshop with the World Bank and IFC team. This workshop will present the methodology, data analysis of the HEVC and HCB studies for Rwanda and workshop the initial policy recommendations developed from these analyses.

Step 6. Finalisation of Report. The final step in the project will entail revision of data, finalization of modelling, and drafting of the project report and presentation development. Client Workshop 3 will complete the project engagement process. Presentation of the study findings to a broader audience upon completion of the project will be discussed with the World Bank and IFC.

Annexure D: Detailed construction materials trade data

Product Description	Rwanda Export Growth 2012 to 2016 (% p.a.)	World Export Growth 2012 to 2016 (% p.a.)	Net Rwanda Export Growth 2012 to 2016 (% p.a.)	Trade Balance in 2016 (US\$ '000)	Export Value in 2016 (US\$ '000)	Import Value in 2016 (US\$ '000)	Share of Total Merchandise Exports in 2016 (%)	Share of Total Merchandise Imports in 2016 (%)	Average Import Tariff (Estimated) %
Cement, incl. cement clinkers, whether or not coloured	17.0 %	-7.5 %	24.5 %	-51 225	5 551	56 776	0.56 %	2.33 %	19.8
Bricks, blocks, tiles and other ceramic goods of siliceous fossil meals, e.g. kieselguhr, tripolite ...	111.3 %	-3.2 %	114.5 %	2191	2 315	124	0.23 %	0.01 %	0
Tubes, pipes and hoses, and fittings therefor, e.g. joints, elbows, flanges, of plastics	16.2 %	0.5 %	15.7 %	-11 817	303	12 120	0.03 %	0.50 %	21.7
Baths, shower-baths, sinks, washbasins, bidets, lavatory pans, seats and covers, flushing cisterns ...	53.0 %	0.1 %	52.9 %	-1 585	243	1 828	0.02 %	0.08 %	23.3
Granite, porphyry, basalt, sandstone and other monumental or building stone, whether or not ...	180.6 %	-7.5 %	188.1 %	-206	174	380	0.02 %	0.02 %	0
Glaziers' putty, grafting putty, resin cements, caulking compounds and other mastics; painters' ...	131.2 %	1.1 %	130.1 %	-1 246	132	1 378	0.01 %	0.06 %	23.3
Screws, bolts, nuts, coach screws, screw hooks, rivets, cotters, cotter pins, washers, incl. ...	162.7 %	1.5 %	161.2 %	-2 872	125	2 997	0.01 %	0.12 %	9.3
Paints and varnishes, incl. enamels, lacquers and distempers (excluding those based on synthetic ...	24.1 %	-2.6 %	26.7 %	-1 296	53	1349	0.01 %	0.06 %	16.3
Angles, shapes and sections of iron or non-alloy steel, n.e.s.		-4.6 %		-2 364	45	2409	0.00 %	0.10 %	13
Natural sands of all kinds, whether or not coloured (excluding gold- and platinum-bearing sands, ...	113.2 %	4.3 %	108.8 %	-543	44	587	0.00 %	0.02 %	0
Paints and varnishes, incl. enamels and lacquers, based on synthetic polymers or chemically ...		-0.7 %		-3 032	43	3075	0.00 %	0.13 %	23.3
Builders' ware of plastics, n.e.s.	-32.9 %	1.0 %	-33.9 %	-1 927	41	1968	0.00 %	0.08 %	23.3
Monumental or building stone, natural (excluding slate), worked, and articles; mosaic cubes ...	37.2 %	-3.7 %	40.9 %	-1 651	34	1685	0.00 %	0.07 %	23.3
Unglazed ceramic flags and paving, hearth or wall tiles; unglazed ceramic mosaic cubes and ...	94.7 %	22.2 %	72.6 %	-5 395	28	5423	0.00 %	0.22 %	23.3
Paints and varnishes, incl. enamels and lacquers, based on synthetic polymers or chemically ...	0.7 %	-1.0 %	1.8 %	-3 914	28	3942	0.00 %	0.16 %	23.3
Articles of cement, concrete or artificial stone, whether or not reinforced	-5.6 %	4.7 %	-10.2 %	-560	24	584	0.00 %	0.02 %	20.4
Ceramic building bricks, flooring blocks, support or filler tiles and the like (excluding those ...	18.0 %	1.2 %	16.7 %	-30	16	46	0.00 %	0.00 %	23.3
Glazed ceramic flags and paving, hearth or wall tiles; glazed ceramic mosaic cubes and the ...		-4.85 %		-12 196	11	12207	0.00 %	0.50 %	0
Copper tubes and pipes		-0.9 %		-31	9	40	0.00 %	0.00 %	23.3
Copper tube or pipe fittings "e.g., couplings, elbows, sleeves"		-0.9 %		-31	9	40	0.00 %	0.00 %	23.3
Paving blocks, slabs, bricks, squares, tiles and other articles of pressed or moulded glass, ...		-3.9 %		-283	7	290	0.00 %	0.01 %	23.3
Gum, wood or sulphate turpentine and other terpenic oils produced by the distillation or other ...		0.0 %		-67	7	74	0.00 %	0.00 %	0

Wood sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, ...	-12.9 %	1.8 %	-14.7 %	-2 266	6	2272	0.00 %	0.09 %	9.3
Sheets or profiles of glass, whether or not having an absorbent, reflecting or non-reflecting ...		-0.5 %		-1 482	6	1488	0.00 %	0.06 %	23.3
Ceramic sinks, washbasins, washbasin pedestals, baths, bidets, water closet pans, flushing ...		7.3 %		-2 911	4	2915	0.00 %	0.12 %	23.3
Sheets of glass, drawn or blown, whether or not having an absorbent, reflecting or non-reflecting ...		-19.2 %		-1 007	4	1 011	0.00 %	0.04 %	9.3
Bars and rods of iron or non-alloy steel, hot-rolled, in irregularly wound coils	32.0 %	-4.7 %	36.6 %	-341	4	345	0.00 %	0.01 %	1.7
Roofing tiles, chimney pots, cowls, chimney liners, architectural ornaments and other ceramic ...	-10.6 %	-3.1 %	-7.5 %	-43	4	47	0.00 %	0.00 %	23.3
Plywood, veneered panel and similar laminated wood (excluding sheets of compressed wood, cellular ...		0.1 %		-4 881	3	4 884	0.00 %	0.20 %	23.3
Nails, tacks, drawing pins, corrugated nails, staples and similar articles of iron or steel, ...	-30.1 %	-0.7 %	-29.4 %	-1 922	3	1 925	0.00 %	0.08 %	23.3
Refractory bricks, blocks, tiles and similar refractory ceramic constructional goods (excluding ...		-3.2 %		-122	3	125	0.00 %	0.01 %	0
Builders' joinery and carpentry, of wood, incl. cellular wood panels, assembled flooring panels, ...	-19.7 %	-2.0 %	-17.8 %	-4 794	1	4 795	0.00 %	0.20 %	23.3
Bitumen and asphalt, natural; bituminous or oil-shale and tar sands; asphaltites and asphaltic ...		-7.9 %		-3 635	0	3 635	0.00 %	0.15 %	9.3
Fibreboard of wood or other ligneous materials, whether or not agglomerated with resins or ...	-100.0 %	-0.1 %	-99.9 %	-2 427	0	2 427	0.00 %	0.10 %	23.3
Float glass and surface ground or polished glass, in sheets, whether or not having an absorbent, ...		-2.6 %		-2 252	0	2 252	0.00 %	0.09 %	9.3
Glass mirrors, whether or not framed, incl. rear-view mirrors (excluding optical mirrors, optically ...		2.6 %		-690	0	690	0.00 %	0.03 %	16.9
Wood in the rough, whether or not stripped of bark or sapwood, or roughly squared (excluding ...		0.1 %		-593	0	593	0.00 %	0.02 %	0
Stranded wire, cables, plaited bands and the like, of copper (excluding electrically insulated ...	-100.0 %	-0.5 %	-99.5 %	-248	0	248	0.00 %	0.01 %	23.3
Wood, incl. strips and friezes for parquet flooring, not assembled, continuously shaped "tongued, ...		0.0 %		-185	0	185	0.00 %	0.01 %	23.3
Pebbles, gravel, broken or crushed stone, for concrete aggregates, for road metalling or for ...	-100.0 %	-3.3 %	-96.7 %	-100	0	100	0.00 %	0.00 %	9.3
Particle board, oriented strand board "OSB" and similar board "e.g. waferboard" of wood or ...	-100.0 %	1.5 %	-101.5 %	-81	0	81	0.00 %	0.00 %	23.3
Worked slate and articles of slate or of agglomerated slate (excluding slate granules, chippings ...		-3.8 %		-22	0	22	0.00 %	0.00 %	23.3
Slate, whether or not roughly trimmed or merely cut, by sawing or otherwise, into blocks or ...		-3.3 %		-1	0	1	0.00 %	0.00 %	0
Marble, travertine, ecaussine and other calcareous monumental or building stone of an apparent ...		-3.3 %		-1	0	1	0.00 %	0.00 %	0

Annexure E: Alternative Building Technologies (ABTs) for affordable housing

Alternative Building Technologies (ABTs) are often touted as the solution to delivering affordable housing at scale. While ABTs have many potential advantages which do merit serious consideration as one option for delivering affordable housing, the belief in their ability to solve the delivery of affordable housing is often overstated. Therefore, ABTs must be considered to run in parallel with conventional construction methods and materials, and perhaps in time will overtake conventional approaches as the only feasible and desirable option. However, believing that ABTs offer the 'silver bullet' for solving affordable housing delivery often leads to unmet promises by government policy makers, programme leaders and technology providers. The usual reasons given for advancing ABTs are to:

- Save on both capital and running costs of accommodation;
- Save on construction / erection time, but still promoting labour intensive house construction, job creation and local economic development; and
- Promote more environment friendly use of resources.
- There are many ways in which to define and categorise alternative technologies. A large body of literature and documentation exists of practices used all over the world, some used extensively from pre-industrial and pre-colonial times and still serving their user communities well in the appropriate settings. Much is made of the term "appropriate technology", and in this approach, it is common to classify ABTs broadly into:
 - High technology: Processed and synthetic materials, manufactured products or systems, industrialised production).
 - Intermediate (or adapted conventional) technology: Hybrid approaches that replace some conventional or high technology materials and products used in construction (especially walling and roofing components) with recycled and/or other "found" materials.
 - Low technology: Traditional materials and usually owner-built methods (mostly used in rural settings, but often also "informal" peri-urban/urban areas).
 - ABTs are often not covered by the "deemed-to-satisfy" performance and health and safety guidelines for application of Building Regulations, and must therefore have some form of "fit for purpose" certification from competent authorities within a country (such as an Agreement Certification); or a certification from overseas organisations having reciprocal arrangements with a host country, or a rational engineering design that can be assessed in terms of the existing building regulations. This is true for application in formally constructed urban settings where building permits are normally required, and where the objective is to provide robust permanent structures delivered at scale and often requiring some form of long-term finance. This would preclude the consideration of most of the so-called Low Technologies used extensively in rural and urban informal self-help settings.

Within the broad classes of 'high' and 'intermediate' technologies, ABTs can be categorised as follows:

- Integrated systems through which an entire structure is erected (such as prefabricated completed units, 3D printing and industrially produced and locally assembled housing)
- Structural frames (often completed with intermediate or low technology solutions)
- Foundation systems
- Walling systems (including pre-fabricated panels, moulded shuttering methods, alternative materials such as fibre cement, insulated panels, biomass-plastic composites, etc.)
- Roofing systems
- Adapted conventional walling (variations on brick, block and cement)
- Alternative components or products (e.g. lightweight roof tiles of resin and recycled waste compounds) used in combination with conventional structural and envelope systems
- Energy and water saving services systems

Industrialised Building (IB) in the true sense, where monolithic cellular stacked systems, manufactured ("mobile") homes, or pre-fabricated frame and panel systems are produced in large-scale assembly lines are not currently produced or used at scale in Rwanda. All the products and systems that have been identified are used in some form of combination with conventional elements and/or alternative products from other

suppliers. In countries that have not been extensively industrialised, it is usually found that most ABTs are suitable only for use in single storey, or possibly double storey structures consisting of free-standing dwellings, or simplex/duplex row or cluster housing. Where such technologies do not have a local manufacturing base, often logistics and transport costs can become prohibitive, and can reduce the cost advantage such systems may offer.

ABTs should be evaluated against critical “success” criteria involving technical, economic and financial aspects as well as softer issues such as market acceptance and proven track record. At minimum ABTs should demonstrate:

- Current relevant certification (or international reciprocal certification arrangement), or potential for rapid re-activation where certification has lapsed, but the certificate holder has the capacity to apply for rapid re-activation.
- Local material content and production capacity, as well as local ability to make adjustments and extensions to the technology without the original installers’ assistance.
- Technical engineering fitness (robustness and durability) independent of certification (critical for medium and high density sectional title or rental stock for long-term maintenance).
- Proven acceptance to mortgage and small loans providers who need to finance developments, and track record in subsidised and bank financed residential development (where appropriate).
- Evidence of acceptability to end users – this is especially critical for institutionally managed rental housing or government subsidised or supported developments where the slightest dissatisfaction with quality of accommodation can lead to costly community mobilisation and rent boycotts.
- Cost (capital and operational) and construction time savings that make a significant contribution to cost reduction and/or speed of erection. It is often believed that ABTs applied to walling and roofing have significant cost benefits, but given the relatively small proportion of total house costs incorporated in walls and rooves, this is often over-stated.
- “Greening” benefits such as more efficient use of materials, reduction in materials wastage, and/or thermal efficiency of the final product.

In a quick scan of ABTs currently available, or planned to be made available commercially in Rwanda (an in-depth survey and evaluation falls outside the scope of the present assignment), no truly integrated building systems were found. A number of walling products appear to be on the market, or are in pre-marketing development and trial stages, either by local Rwandan companies, or more commonly in joint ventures with international partners who seem to provide the initial technical and financial input required to bring the products to local market. These include pre-fabricated lightweight wall panels such as made by Strawtech and others, variations on moulded stabilized earth, fired clay, and cement brick and block alternatives, earthbags, plant-based oil sealant for earth floors, etc.

Some of these appear to have real potential to contribute to some degree to:

- Lowering of construction costs, but with no expectation that a single product will be able to reduce costs by an order of magnitude
- Reduction of construction times
- Promotion of local employment and local economic development, by enabling small-scale “backyard” production enterprise
- Importation replacement
- More sustainable resource utilization through use of renewable and recycled raw materials, and less energy intensive and polluting production processes

It is challenging to find solid information on the technical, economic, and financial aspects of many of these products, and their current state of application, readiness and acceptance in the market. Desk-top information is available, such as a 2008 report in the World Bank Africa Human Development series titled “Building Science, Technology and Innovation Capacity in Rwanda”, and the papers presented around the theme of the AUHF 30th anniversary conference held 17-19 November 2014 in Cape Town: “The next frontier in affordable housing: alternative building technologies.”

It is proposed that an event that assists in the evaluation of key ABTs and systems currently being considered in Rwanda be undertaken in order to ascertain true cost, technical, time and other benefits, as well as levels of community and financier acceptance. The cost benchmarking exercise can assist in identifying the proportion of total housing costs comprised of the potential alternative technology. A platform (expo or conference) through which ABT providers can engage with building experts and government officials to present

specifications, experiences, pilot studies would be valuable. Such an event would enable providers and consumers to explore relationships with public and private implementers, financiers and end-user groups, and would be beneficial to the East African region generally where many alternative solutions are being proposed. For instance, a project has recently launched in Namibia, backed by the President, through which a pilot scheme of industrially produced houses will be constructed.

Annexure F: A conceptual understanding of the housing economic value chain

The economic impact of housing arises predominantly from two activities: the construction, maintenance and improvement of the housing structure; and activities associated with the occupation of the structure – either by the owner, or by a tenant. For the purposes of this analysis, the analysis of the economic impact of house occupation focuses only on those activities that are accompanied by an explicit rent payment. The housing economic value chain (HEVC) is then a consolidation of the economic value chains associated with these two activities, namely: i) the housing construction value chain (HCVC); and ii) the housing rental value chain (HRVC).

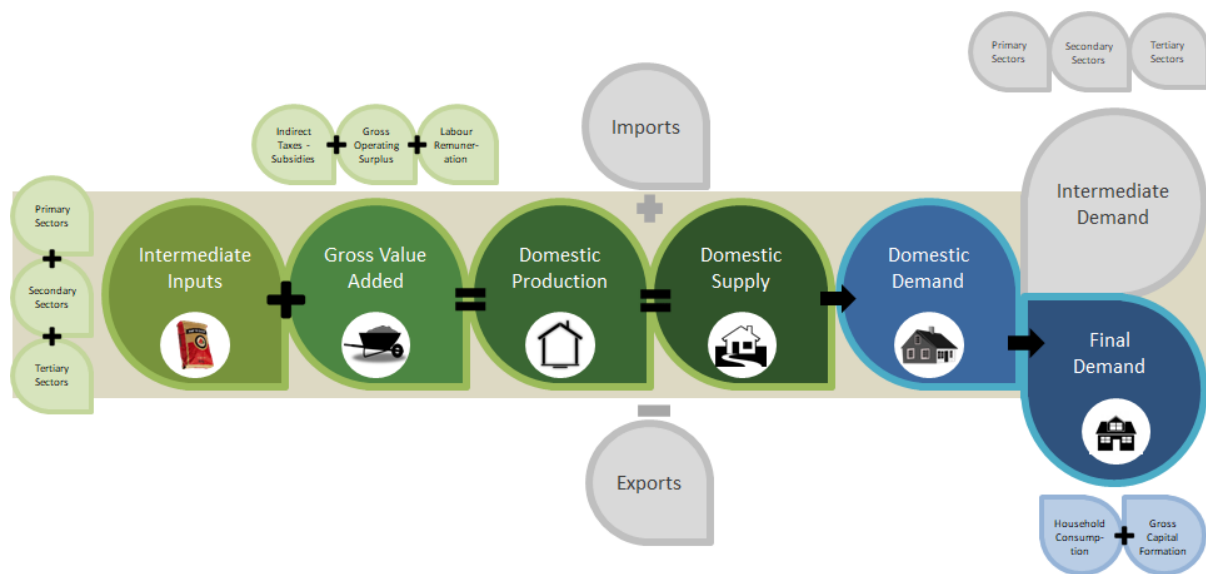
An economic value chain describes the linkages – both on the input (upstream) and output (downstream) sides of a particular economic activity and quantifies the economic value creation in an economy arising from that activity. The HEVC describes the extent to which an array of economic actors add value to the economy during the process of building, improving and renting houses or housing units through the addition of their intellect, skills and physical endeavors (labour), and their payments of rent and interest, and their generation of profits (gross operating surplus). The valuation of these activities may also be impacted by the extent to which they are subjected to indirect taxes or are subsidised by government (net indirect taxes).

In order to engage in value-adding activities, housing construction contractors (both formal and informal) need to purchase material and service inputs from other sectors of the economy. These inputs can range from sand procured from the mining and quarrying sector to cement, bricks, window frames, doors, plumbing, tiles, timber and electrical equipment procured from various manufacturing sub-sectors and to transport, financial, architectural and even legal services provided by various tertiary sectors. The HCVC sets out what raw materials and manufactured goods and services (intermediate inputs) are required to support housing construction, and identifies where these inputs are sourced from in the economy. Similarly, the renting of accommodation units may entail payments to third party letting and managing agents, cleaners and gardeners, security firms, and lawyers (to name a few) for their services that are required inputs into the provision, maintenance and management of rental housing stock. In less formalized rental markets, many of these activities may be vertically integrated and are provided to a lesser or greater extent by the owner of the rental unit/s themselves.

While owner-occupied dwellings and rented accommodation incur similar maintenance and operating costs, and support similar activities (gardening, repairs, security, household management etc.), the principal difference is that rental agreements explicitly capture an income stream (the rent) against which many/some of these costs can be offset. This is part of the reason why many systems of national accounts impute a rent to owner-occupied dwellings that should approximate the market value or user cost of the rent for an equivalent dwelling and property.

The HEVC calculates the economic value of the housing stock produced and rented in a given period (domestic production). In many other economic value chains, this production may be supplemented through imports of products and reduced by exports. However, the nature of products in the HEVC (that is, immovable property in the form of accommodation) means that international trade makes no discernible difference, with the result that the value of domestic production is also the value of domestic supply. This supply is required to meet domestic demand in the economy – irrespective of whether that demand arises from a citizen or foreigner, provided that the product is consumed within the country. In most economic value chains, this demand may arise from producers in other sectors of the economy (intermediate demand) such as the demand for electric motors being an input into fridge manufacture and from demand from households, governments and expenditure on fixed capital assets (final demand). However, in the case of the HEVC all housing construction forms part of fixed capital formation and all accommodation rents form part of the final consumption expenditure of households. The entire domestic supply of the HEVC is therefore used to meet final demand.

This economic process is illustrated in the conceptual economic value chain in the figure below.



Because neither imports and exports, nor intermediate demand are features of the housing value chains, they are reflected in grey in the value chain diagramme.

Just as there are linkages between different sectors of the economy (both upstream and downstream) within economic value chains, there are also linkages across sectors and value chains. What starts out as a sales order to a firm in one sector ultimately has – to varying degrees - an impact on all sectors of the economy. These are referred to as multiplier effects and give rise to economic multipliers that can be used to estimate the typical impact of spending in one sector on the sales, value added, employment, imports and tax collections in other sectors and across the whole economy. These multipliers are usually calculated using the supply and use tables (SUT) or input-output (I-O) tables. The different types of multiplier effects are:

- Direct impact:** To supply a good or service that is the subject of an initial order (sale), the firm receiving the order needs to employ different factors of production (labour, capital, land, entrepreneurship). The sales order (and others like it) provides an income stream to other firms or households that provide production factors to the firm in some proportion to the value that each production factor is deemed to add during the production process. These incomes represent the initial impact of the sales order. Inevitably, the firm supplying the product cannot efficiently source all the inputs required to produce that product itself, so it has to place orders with other suppliers of the intermediate inputs required. Each of these suppliers needs – in turn – to employ factors of production so the orders placed with them also give rise to additional household income streams. Collectively this is regarded as the first-round impact of the initial sales order. The initial impact and first round impact combined are referred to as the direct impact of the sale.
- Indirect impact:** In order to fulfil their orders, each of these intermediate suppliers need to order intermediate inputs from their suppliers, which generates additional income streams. This is referred to as the indirect impact of the initial order.
- Induced impact:** Finally, when the households that received income as a direct or indirect consequence of the initial order use that income to purchase goods and services, this gives rise to the generation of further sales in those sectors of the economy that supply household goods and services. This is referred to as the induced impact of the initial sales order.

The economy-wide impact of the initial sales order is the sum of each of the impacts that it gives rise to (direct, indirect and induced).

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