



Master of Science in
International Business

ECOBUILD: PLASTIC BRICKS FOR SUSTAINABLE HOUSING

AUTHORS: Lisa Bernardi, Pedro Gaspar, Javier Ozcoidi, Manon Randé

ACADEMIC YEAR: 2016-17

SUPERVISOR: David Cosculluela

KEYWORDS: sustainable housing, construction, recycling, plastic waste, South Africa

DATE: June 12, 2017



Abstract

Ecobuild: Plastic Bricks for Sustainable Housing is centered around a proposed new company, Ecobuild, which recycles plastic waste and processes it into bricks that can be used to build sustainable houses. This project takes an existing technology, which has already been proven successful as a business venture in other parts of the world, and adapts it for launch in South Africa, followed by an international expansion to Ghana and Mozambique. It presents itself on three fronts: first, as a new, low-cost, and ecologically friendly way of building houses and closing the housing gap; second, as a solution to the mounting waste management crisis in South Africa and across the entire African continent, a pressing issue with dire health and safety consequences for the general public; and third, as a solution to the housing crisis that has resulted from rapid urbanization. The ultimate goal of this project is to create a positive social, economic, and environmental impact in our locations, while also remaining profitable and viable as a business.

Abbreviations

BPA: Bisphenol A
CAGR: Compound annual growth rate
CAHF: Centre for Affordable Housing Finance in Africa
CIPC: Companies and Intellectual Properties Commission
CSR: Corporate social responsibility
DEHA: Diethylhydroxylamine
DFI: Direct foreign investor
DHS: Department of Human Settlements
ECOWAS: Economic Community of West African States
FRELIMO: Mozambique Liberation Front
FTA: Free trade area
GHS: Ghanaian cedi
GNI: Gross national income
HDPE: High density polyethylene
ICT: Information and communication technologies
IMF: International Monetary Fund
IWMSA: Institute of Waste Management of South Africa
LDPE: Low density polyethylene
MZN: Mozambican metical
OECD: Organisation for Economic Co-operation and Development
PAYE: Pay As You Earn
PP: Polypropylene
PTY LTD: Proprietary Limited
PwC: PricewaterhouseCoopers
RENAMO: Mozambican National Resistance
SADC: South African Development Community
SDL: Skills Development Levy
S&P: Standard and Poor's
UIF: Unemployment Insurance Fund
UN: United Nations
WGI: Worldwide Governance Indicators
ZAR: South African rand

Table of Contents

1. Executive Summary	1
1.1. Business Description	1
1.2. Value Proposition	2
2. External Analysis	3
2.1. PEST: South Africa	3
2.1.1. Political Analysis	3
2.1.2. Economic Analysis	3
2.1.3. Social Analysis	4
2.1.4. Technological Analysis	5
2.2. PEST: Mozambique	5
2.3. PEST: Ghana	5
2.4. Market Research	6
2.4.1. Construction Market, South Africa	6
2.4.2. Affordable Housing Segment, Africa	7
2.4.3. Public Housing Segment, South Africa	7
3. Internal Analysis	8
3.1. SWOT	8
3.2. Stakeholder Analysis	9
3.3. Entry Plan	9
3.4. Internationalization Plan	10
3.5. Exit Plan	10
4. Marketing	12
4.1. Market Definition & Quantification	12
4.2. Clients vs. Consumers	12
4.3. Segmentation	12
4.4. Competition	12
4.5. Marketing Mix	13
4.5.1. Product	13
4.5.1.1. Production Process	13
4.5.1.2. Product Development	13
4.5.2. Price	14
4.5.3. Placement	14
4.5.4. Promotion	14
4.6. Budget	15
5. Logistics	16
5.1. Supply Chain Structure	16

5.2. Location Theory & Network Design	16
5.3. Aggregate Planning	17
5.4. Transportation	17
5.5. Franchising Logistics	17
6. Human Resources	18
6.1. Organization	18
6.2. Compensation & Benefits	18
7. Financial Analysis	20
7.1. Funding	20
7.2. Sales Forecast	20
7.3. Costs Forecast	20
7.4. Income Statement	21
7.5. Cash Flow Statement	21
7.6. Currency Risk Analysis and Hedging	21
8. Viability Analysis & Conclusion	23
Appendix	24
Figure 1. SADC members	24
Figure 2. Timeline of the SADC integration process	25
Figure 3. Ease of doing business by distance to frontier, SADC	26
Figure 4. <i>Doing Business</i> scores by topic, South Africa	27
Figure 5. SADC member state GDPs (\$)	27
Figure 6. SADC member state GDPs per capita (\$)	28
Figure 7. SADC member state annual GDP growth rates (%)	28
Figure 8. Selected economic indicators, South Africa, 2011-2020	29
Figure 9. Exchange rate, South African rand/US dollar, 2007-2017	29
Figure 10. Population growth, South Africa	30
Figure 11. Mozambique PEST	31
Figure 12. Ghana PEST	32
Figure 13. African construction sector, number of projects and continental share	33
Figure 14. Sources of construction project funding, Africa	34
Figure 16. Stakeholder map	35
Figure 17. Legal procedures to start a business, South Africa	36
Figure 18. Standard brick	36
Figure 19. Corner brick	37
Figure 20. Types of recyclable plastic	37
Figure 21. Plastic extrusion process	38
Figure 22. Housing affordability, South Africa	38

Figure 23. Housing affordability, Mozambique	39
Figure 24. Housing affordability, Ghana	39
Figure 25. Supply chain structure	40
Figure 26. Center of gravity model	40
Figure 27. Major cities, roads, and ports, South Africa	41
Figure 28. Labor and time requirement to build one unit	41
Figure 29. Employee structure	42
Figure 30. Sales forecast	43
Figure 31. Materials costs forecast	44
Figure 32. Salaries forecast	45
Figure 33. Other costs forecast	46
Figure 34. Income statement	47
Figure 35. Cash flow statement	48
Figure 36. Franchising financial analysis, Mozambique	49
Figure 37. Franchising financial analysis, Ghana	50
Sources	51

1. Executive Summary

1.1. Business Description

Ecobuild is a proposed new company which recycles plastic waste and processes it into bricks that can be used to build sustainable houses. The company will be headquartered in Johannesburg, South Africa and subsequently expand its operations to Mozambique and Ghana through industrial franchising.

The idea for this project was born when we first learned of similar companies operating successfully in South America and the Asia-Pacific region and wondered about the model's applicability on the African continent. Through our research we discovered a growing potential market for this type of product, particularly within sub-Saharan Africa, a region which is struggling to keep up with its own urbanization.

Rapid urban migration has led to increasingly unmanageable waste levels in most southern African countries. The South African Development Community (SADC) describes waste management as a pressing issue for public health and safety, and currently faces three main challenges: "high volumes of waste, low capacity to management and high costs involved in management" ("Waste Management," 2012). As a result of local governments' inability to effectively tackle these issues, much of the waste management across the region has been privatized, which has led to limited success in some areas and worsening conditions in others.

Fast urbanization is also increasing the portion of the population affected by gap housing, a "term that describes the shortfall or gap in the market between residential units supplied by the State and houses delivered by the private sector households that cannot afford basic formal housing and end up settling up in slums and surrounding townships" (Tibane, 2016, p. 120). These groups are essentially too poor to afford a house, but too wealthy to be provided one by the government.

Ecobuild plans to provide a solution to these issues 1) by incentivizing the proper collection and disposal of certain types of plastic waste and 2) by offering an affordable product to the underserved gap housing market. The ultimate goal is to position the company as a socially and environmentally friendly organization while still remaining profitable as a business.

1.2. Value Proposition

When compared to traditional construction companies, Ecobuild offers the following value proposition:

Ecobuild Method	Traditional Construction
Positive impact on the environment (removal of waste)	Material sourcing destroys the environment (deforestation, CO2 emissions, etc.)
Easier to afford through micro-credit or self-financing	Houses are unaffordable to lower and middle class
Low skill requirement to build; little to no training time for workers	Often requires education in trade schools, lengthy apprenticeships, licensing
Fast production time: takes 4 workers 6 days to build 1 unit	Depending on the type of construction, can take weeks or months to build 1 unit
Predictable costs, accurate budgeting	Costs are often unpredictable and change mid-project, project can go over budget
Structural simplicity, meaning less can go wrong in the long term	Expensive long term maintenance

2. External Analysis

2.1. PEST: South Africa

Our core reasons for choosing South Africa as Ecobuild’s operational center are its physical location, political and economic stability, and well-developed infrastructure. However, based on the following analysis, there are many factors that should be taken into consideration while starting and operating the business.

2.1.1. Political Analysis

South Africa is a member of the SADC, which was established in 1992 among a series of liberation movements which intended to bring an end to the colonial and mostly white-minority rule in southern Africa (refer to *Figure 1* and *Figure 2* for a map and full integration process details). The SADC’s core goals are to boost regional integration, eradicate poverty, and ensure peace and security within the region.

South Africa’s multi-ethnic society makes its political environment somewhat complex and challenging. The country’s political scene is still highly influenced by its colonial past, the rule of Dutch and British, and apartheid, which led the country into several political crises and was still legal until the early 1990s; its effects are still present today. According to the World Bank, South Africa has shown an improvement in political stability, corruption control, rule of law, and quality of regulations for the past 15 years (“Worldwide Governance Indicators”, 2017). However, it is currently experiencing a troubled political environment due to recent public corruption scandals under President Zuma (Chutel, 2016). Urgent reforms are needed in the labor market, specifically the mining sector, to avoid strikes (Anand, Kothari, and Kumar, 2016).

Despite some political uncertainty, we believe these short-term factors will minimally affect Ecobuild’s main operations, if at all. Moreover, South Africa is still considered to have high mid- to long-term growth potential, remarkably transparent political institutions and markets, and a strong political commitment to maintaining macroeconomic stability.

2.1.2. Economic Analysis

South Africa’s currency is the rand (ZAR), which is notated with the symbol R. In this report, we will use the following exchange rate:

$$\mathbf{R1.00=\$0.0753384}$$

South Africa has benefitted from the SADC’s economic policies, particularly its Free Trade Area (FTA) which to date has been adopted by 12 of the 15 SADC member states (Angola, the Democratic Republic of the Congo, and Seychelles have not yet joined). The establishment of this FTA helped to increase intra-SADC trade from \$13.2 billion in 2000 to \$34 billion in 2009 (“Free Trade Area”, 2012).

While SADC members’ ease of doing business scores vary widely, South Africa’s is relatively high for the region with a score of 65.2 out of 100 (*Figure 3*). Breaking down these scores into individual topics, it is clear that some aspects are much easier than others (*Figure 4*). Starting a business, paying taxes, and dealing with construction permits are the easiest parts of doing business, while enforcing contracts, getting credit, and resolving insolvency are the most difficult (“Ease of Doing Business in South Africa”, 2017). Taking this analysis into consideration, for example, Ecobuild

will likely have an easier time securing the necessary permits for its many projects than collecting upon and enforcing contracts with clients. The company may also need to consider getting credit from other foreign sources due to complexities in its home country.

South Africa is the economic cornerstone of the region, with a GDP greater than those of the remaining 14 SADC member states combined (*Figure 5*). South Africa ranks third out of this group in terms of GDP per capita (*Figure 6*). However, the country is currently experiencing a very low annual real GDP growth of 1.4% (*Figure 7*). This is mainly attributed to volatile commodity prices and weakening demand from China. An S&P report lists pessimistic growth forecasts for the upcoming years, with 1.8% and 2.0% growth predicted for 2018 and 2019, respectively (“South Africa Long-Term Foreign Currency Rating”, 2017). According to the same report, this low growth is correlated with the political instability mentioned in section 2.1.1. Government and party divisions have caused delays in the implementation of key policies and reforms, harming relationships with investors, business leaders, and labor representatives. Weak economic growth is also linked to longstanding skill shortages in the labor market, compounded by a current unemployment rate of 26.5%, which is predicted to remain unchanged at least until 2020 (“South Africa Long-Term Foreign Currency Rating”, 2017).

Inflation rates, while historically volatile in Africa, have remained relatively stable in South Africa at a rate of 4-6%, and are expected to remain constant in the coming years (*Figure 8*). Exchange rate fluctuation, however, has historically shown some volatility (*Figure 9*). This is mainly due to the country's dependence on commodities exports, “investor risk-on/risk-off sentiments”, and political uncertainty (Navée, Perrelli, & Schimmelpfennig, 2016, p. 11).

South Africa is ultimately rated BB+ with a negative outlook by S&P due to its low GDP growth and deteriorating political environment. However, it is still considered one of the more economically stable countries in the region, and we expect progressive economic recovery and political environment normalization in the coming years. Furthermore, we anticipate that any current issues will have a minimal impact on Ecobuild’s operations.

2.1.3. Social Analysis

South Africa is the 26th largest country in the world, comprising 0.73% of the worldwide population. The population was 56 million in 2016 and was forecasted to reach 59 million in 2020 (*Figure 10*). According to the World Bank, 64% of the South African population lives in urban areas; of this urban population, 23% live in slums, representing a total of more than 8 million people (“World Development Indicators”, 2017).

Eleven languages are present in South Africa, the most spoken languages being IsiZulu (22.7%), Afrikaans (13.5%), IsiXhosa (16%), and English (9.6%) (“The World Factbook: South Africa”, n.d.). The ethnic structure is composed by 5 main groups; black Africans represent the majority of the population (80.2%), followed by white (8.4%), colored (8.8%), and Indian/Asian (2.5%) (“The World Factbook: South Africa”, n.d.). The abolishment of apartheid led to many cultural shifts, including a more restrictive immigration policy due to an influx of illegal immigrants (Tessier, 1995).

2.1.4. Technological Analysis

Fifteen percent of the South African population has no access to electricity, representing more than 7 million people (The World Factbook: South Africa”, n.d.). Infrastructure is good for the region and still improving, but still lagging; as of 2014, only 158,952 of South Africa’s 747,014 km of roads were paved (“The World Factbook: South Africa”, n.d.). In 2013, the country had 566 airports, although only 144 had paved runways. Major ports are located in Cape Town, Durban, Port Elizabeth, Richards Bay, and Saldanha Bay.

According to the World Bank, R&D investment grew to R22.2 billion (\$1.7 billion) in 2012, maintaining South Africa’s R&D spending at 0.7% of total GDP (“Gross Spending on R&D”, 2017). The South African government’s National Development Plan (NDP) promises an increased R&D spending of 1.5% of GDP by 2019 (Manuel, T., et al., 2011).

The South African information and communication technologies (ICT) sector is well-established, particularly in mobile software and electronic banking services (“ICT and Electronics”, 2013). South African companies are world leaders in prepayment, revenue management, and fraud prevention systems. The country also has the most developed telecommunications network in Africa, including advanced digital wireless and satellite communications.

South Africa has experienced an influx of entrepreneurship in the past ten years, leading to a wave of startups. However, this movement has been limited by the fact that buying power is still too low to support such a wide range of new businesses (“GEM 2015/2016 Global Report”, 2016).

2.2. PEST: Mozambique

Mozambique is one of two countries that we have identified as an ideal market to expand Ecobuild internationally. Mozambique is in an ideal geographic location and is also a member of the SADC, reducing both physical and intangible barriers to international business. Its economy is growing quickly, with an annual GDP growth rate of 6.6% in 2015 (*Figure 7*). There is also a rapid urbanization rate; 80.3% of the population currently lives in slums, accounting for over 20 million people, which makes affordable housing a main priority for the government.

For a complete PEST analysis of Mozambique, please see *Figure 11*.

2.3. PEST: Ghana

Ghana is the second country that we have chosen to target for international expansion. Although not a member of the SADC, which will increase some barriers to international business, Ghana is experiencing an elongated period of political stability that has helped it become a regional power in western Africa. Economically, the country is wealthier than its sub-Saharan neighbors; its GDP was \$37.54 billion in 2015 with a GDP per capita of \$1,696.64 (“Ghana GDP”, 2017), and its economy grew at a healthy level of 3.9% (“GDP Growth”, 2017). In terms of market size, there are more than 9 million people living in slums, representing 37.9% of the total population of the country (“Worldwide Governance Indicators”, 2017). There is also a major materials sourcing opportunity in Ghana, as only 11% of the population currently has their garbage collected, causing widespread waste dumping and pollution (Achankeng, 2003).

For a complete PEST analysis of Ghana, please see *Figure 12*.

2.4. Market Research

Ecobuild's initial target market will be the affordable housing sector in South Africa. Since minimal data exists on this specific segment, the market research portion of this report will be divided into three parts: first, the general construction market in South Africa; second, the affordable housing segment in Africa as a whole; and finally, public housing within South Africa. Ecobuild's market lies at the intersection of these three segments.

2.4.1. Construction Market, South Africa

The construction sector is a key contributor to economic growth across Africa. However, all areas of the continent except northern and western Africa have experienced slowing growth in this sector since 2015. Despite this, southern Africa still holds a third of all projects on the continent with an estimated annual value of \$93.4 billion (*Figure 13*). The construction sector is a significant contributor to employment and economic growth in South Africa, composing about 3.9% of the national GDP ("Key Trends", 2017). However, the sector has slumped following the completion of the 2010 World Cup projects, which were accompanied by strikes and labor union protests and caused delays on a significant number of unrelated projects across the country.

The South African government, through its NDP, has made an official commitment to a public infrastructure investment of R810 billion (\$61 billion) over the next few years, which remains a positive forecast for the sector (Manuel et al., 2011). A report by Timetric reveals that the construction industry in South Africa is projected to expand at a compound annual growth rate (CAGR) of 2.62% from 2016 to 2020, which is a slight improvement over the CAGR of 2.33% recorded between 2011 and 2015 ("Construction in South Africa", 2016). The report also mentions that the government's investment in other sectors, such as housing and energy, and the modernization of infrastructure will have a positive impact on the construction industry.

More interesting for our business is that major public investments in educational infrastructure and affordable housing have been announced, with the government promising to allocate R8.3 billion (\$767.8 million) to the construction of educational buildings by 2023 ("Growth in South Africa's Construction Industry", 2016). The government also aims to construct 1.5 million houses by 2019 to address the country's housing deficit (Khumalo, 2016). Private domestic investment and international DFIs should also be taken into consideration, as they supply approximately 28% of total construction funding on the African continent (*Figure 14*), with projects funded by foreign countries such as China, the UK, and France having the most significance (Labuschagne, J. P., et al., 2016).

In general, expectations are for South Africa's construction industry to expand over the forecast period (2016–2020), supported by major investments in infrastructure, affordable housing, and energy projects. Of course, there are still certain risks associated with doing business South Africa's construction industry, most notably labor union strikes, power crises, high unemployment, and a weak currency.

2.4.2. Affordable Housing Segment, Africa

Demand for low-income houses is increasing across Africa due to rapid urbanization. The total number urban residents on the continent is predicted to reach 1.2 billion by 2050, with an average of 4.5 million people expected to relocate to informal settlements each year (Parby et al., 2015). The UN estimates that 200 million people in Africa will live in slums by 2020 (“World Urbanization Prospects”, 2014).

According to Parby et al., many families in Africa cannot afford basic formal housing and have no access to mortgage loans; when they do, mortgages take approximately 50 years to pay off (2015). The reason for this is that “incomes in sub-Saharan Africa have not kept pace with urbanization” (p. 1). In fact, in the majority of these countries, the price of the cheapest home greatly exceeds the GNI per capita (*Figure 15*). The report by Parby et al. also refers to the cost of building materials as a contributor to the affordability gap, stating that “the cost and availability of quality construction materials are a major impediment to reducing the cost of all types of housing” (p. 11). This creates an opportunity for Ecobuild, as the recycled plastic used to make the company’s houses are much cheaper and more abundant than the building materials that are currently available.

2.4.3. Public Housing Segment, South Africa

The South African government, supported by the Department of Human Settlements (DHS), is committed to the NDP’s mission of “transforming human settlements and the spatial economy to create more functionally integrated, balanced and vibrant urban settlements” (Tibane, 2016, p. 120). As mentioned in section 2.4.1., the DHS’s goal is to build 1.5 million public housing units by 2019. Some of these units have been specifically earmarked for those affected by “gap housing”, the term introduced in section 1.1. of this report. In South Africa, the gap housing population is defined as urban households that earn between R3,500 (\$263.68) and R15,000 (\$1,130.08) per month; the DHS initiative is expected to provide this group with 17,333 gap housing units in 2018 and an additional 27,000 units by 2019 (“Housing”, 2017). Ecobuild plans to take advantage of these initiatives by aggressively pursuing gap housing contracts. In fact, we anticipate the South African government to be Ecobuild’s main client.

There are a few existing social housing projects that exemplify the type of gap housing contracts Ecobuild intends to pursue. To name one, the Marikana Housing Project is a R700 million (\$52.7 million) project located in Rustenburg, South Africa. The site opened in January 2016 as part of government’s plan to relieve worsening conditions in poor mining communities. At its opening date, the project contained 544 units with an additional 2,000 units scheduled for future completion (“Housing”, 2017).

3. Internal Analysis

3.1. SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> - Unique and differentiated product - Economically, environmentally, and socially responsible (strong CSR values) - Innovative process & market pioneer - Easy production and assembly process - Low resources needed and abundance of raw material - Simplified supply chain - Positive impact on local communities 	<ul style="list-style-type: none"> - Large initial investment required (machinery) - Relatively easy to replicate - Complexity of the distribution network: suppliers, clients, public institutions, end consumers - Supply and demand variability - New company; no brand awareness - Reliance upon market acceptance of a new concept
Opportunities	Threats
<ul style="list-style-type: none"> - Cheaper and more abundant than existing products in the market - Quick growth via industrial franchising model - Translatable to new markets - New trend; new way of doing things - Plenty of room for product development - Collaboration with NGOs and other organizations - Possible vertical integration (short term) and/or horizontal integration (long term) 	<ul style="list-style-type: none"> - Potential supply shortage due to sourcing difficulty - Ease of acquiring funding subject to economic situation - Direct and indirect competition - Franchises could evolve into future direct competition - Local community response is uncertain - Government could fall behind on public housing build schedule - Legal framework and regulation changes

Ecobuild's main strengths lie in its unique value proposition as a new product offering. A simple product design translates to time and cost savings in the production process and lower prices for the consumer. The product also generates a strong image of economic, social, and environmental responsibility, giving Ecobuild's business model a strong competitive advantage over traditional construction methods. However, there are some weaknesses to this model. Simplicity also means that the product can be easily replicated by potential competitors. This is a new business concept, so there are some unknowns that may cause uncertainty, such as distribution network complexity and supply and demand variability. Finally, as with any new company, Ecobuild will have to face the challenge of generating awareness as an unknown brand and market disruptor; the company will need to change the way things are currently being done in the construction sector.

The main opportunity for Ecobuild is the fact that the raw materials used to make the product are much cheaper and more abundant than the existing construction alternatives that are currently available, such as wood and concrete. The business model is also self-sufficient and widely applicable to new markets, so it should be relatively easy to expand internationally. On the other hand, this replicability means that Ecobuild may be threatened by followers who copy the business model and become direct

competitor. The company could also face major challenges due to unforeseeable external forces such as economic or political changes.

3.2. Stakeholder Analysis

Ecobuild requires the collaboration and participation of a large number of stakeholders in order to operate successfully. We have identified and divided these stakeholders as follows (*Figure 16*):

- 1) **Employees:** All individuals who are directly employed by the company; their families, who will benefit indirectly
- 2) **Partners and owners:** Those who will provide the initial equity
- 3) **Lenders:** Financial institutions supplying credit
- 4) **Suppliers:** Plastic/raw material suppliers; complementary product suppliers (doors, windows, roofs, etc.); service providers (transportation, legal services, etc.); public institutions (Institute of Waste Management of Southern Africa (IWMSA), Environmental Affairs, etc.)
- 5) **Clients:** A variety of corporations, organizations, and public and private institutions; national, regional, and municipal governments; multinationals (Google, Microsoft, Coca-Cola, etc.); foundations (Bill & Melinda Gates Foundation, Nelson Mandela Foundation, etc.); NGOs (Shelter Afrique, Habitat for Humanity International, African Union for Housing Finance, Development Action Group, Habitat for Humanity, etc.)
- 6) **Customers:** The individuals and families who will ultimately occupy Ecobuild houses, mainly in the low income bracket, living in townships and slums
- 7) **Franchisees:** Those who will invest in the expansion of Ecobuild's business internationally
- 8) **Donors:** Government grants; NGOs; foundations; international organizations (IMF, World Bank, United Nations); multinationals; educational institutions (universities); crowdfunding donors
- 9) **Competitors:** Traditional construction companies already present in the local markets; industry competitors in other areas of the world (NevHouse, Conceptos Plasticos, etc.); possible new entrants
- 10) **Media:** Television; radio; press; social media

3.3. Entry Plan

Ecobuild will enter the South African market as a new company, with its headquarters and production facilities located in Johannesburg. It will be founded as a private company (PTY LTD) with paid-in capital equal to its equity. The very first step will be for the owners to recruit and hire a director to oversee the entry plan and perform all tasks until additional employees are hired. The director will then begin the legal process to found Ecobuild. The legal procedures for starting a business in South Africa consist of 7 consecutive steps that typically take about 43 days (*Figure 17*).

After completing these initial procedures to start the company, the next two hurdles will be to acquire electricity, which can take up to 84 days, and get credit, which should take about 7 days assuming all documentation has been properly prepared.

Next, Ecobuild will set up its office space and begin the recruiting process for its first salaried employees, which we estimate will take another 60 days. The warehouse and production facility will also need to be prepared and the necessary machinery

purchased and installed, an approximate 6-month process. Ecobuild will need to purchase an extrusion machine, which is the piece of equipment used to manufacture the bricks. While this is ongoing, the new production manager can begin to contact suppliers in order to procure the initial inventory of raw material, for which we will allot 45 days. Ecobuild also plans to develop an initial mockup project in order to test production capabilities, quality standards, and budget accuracy; this model can then be used for marketing purposes to show potential clients. This test project should take approximately 15 days to complete.

In total, we estimate that it will take about one year to get Ecobuild up and running at production-ready capacity.

3.4. Internationalization Plan

After considering several expansion and internationalization procedures, we concluded that Ecobuild should expand its operation through an industrial franchising model. Among the other alternatives, such as licensing and wholly owned subsidiaries, we detected several threats and risks that caused us to rule these options out.

If licensing was chosen, Ecobuild would license the brand name and production know-how to licensees. However, as a new company, brand recognition is very low, so it may be difficult to find willing licensees based on name alone and without providing any additional value. Licensing also carries the risk of too much loss of control, not only in sales but also in production and quality standards. As a company with a strong CSR image, control is essential in order to avoid a damaged reputation due to substandard activities, so it would be ideal to export the entire business model as opposed to mere fragments of this model. Finally, licensing carries a much higher risk that a competitor will simply enter into a licensee agreement in order to block the product from being sold in their market, effectively blocking out competition while making zero sales. This would harm Ecobuild financially as the company would not collect any royalties in that market.

Wholly owned subsidiary models carry some major drawbacks as well. The risk here is mostly in terms of a high initial investment requirement, meaning that Ecobuild would not be able to expand as quickly to new markets. The company also takes all the risk in this case, which could lead to higher long-term losses in the event of project failure.

Taking all of this into consideration, the internationalization model that fits best with Ecobuild's needs is an industrial franchising model. This model allows the company to expand more quickly due to minimal initial investment. The franchisee does business under the franchisor's name and follows the policies and procedures established by the franchisor, which gives Ecobuild a greater degree of control. Both production and marketing of the products are carried out by the franchisee, but with supervision and support from Ecobuild. The franchisee finances the production process and is responsible for distributing the product, therefore carrying all of the risk.

3.5. Exit Plan

In a worst-case scenario in which the business fails, Ecobuild should be prepared with a contingent exit plan in order to smoothly cease operations while minimizing losses for the stakeholders.

The most obvious scenario in which Ecobuild would need to close its doors is if the company does not bring in enough revenue. However, a benchmark figure is needed

to determine at which financial point a dissolution would be necessary. In order to do this, we calculated the breakeven point for the year 2019 and determined that Ecobuild would need to have sold a minimum of 31 units, equivalent to a sales revenue of R4,082,303, by the end of this year in order to stay in business. It is also possible that extreme inflation could put Ecobuild out of business, a scenario which should be taken into serious consideration given the rand's volatility in the past, although it is difficult to benchmark at which specific percentage point inflation would be too high to stay in business.

In case of bankruptcy, which is legally referred to as “insolvency” in South Africa, Ecobuild's PTY LTD status protects the individuals behind the business (“Cross-Border Insolvency II”, 2012). In most cases, the insolvency court will shut the business down and take its assets in order to settle as many debts as possible; the rest remain unpaid. However, in some scenarios it is possible for the government to acquire and continue to operate the business.

It is also important for Ecobuild to know which assets can be liquidated in case of bankruptcy and which cannot. For example, the extrusion machine and any unused inventory can be sold following a business closure; however, some costs, such as those related to installation and setup, cannot be recovered. If Ecobuild has received any patents for its product development by the time of bankruptcy, it might also be possible to liquidate these by selling the rights to another company, although the potential value of these patents is highly variable and would depend on the market value of the product at that time, demand forecasts, the level of competition, and similar technologies available.

Finally, Ecobuild should have an exit plan in place with its franchises in the event that the relationship needs to be severed due to underperformance from the franchisee. This is easily achieved with a robust contract that can simply be dissolved in order to terminate the agreement. Essential clauses in the franchising contract include the obligation to pay royalties (including payment terms), standards of production (such as child labor, fair wages, and adequate working conditions), and minimum product quality requirements.

4. Marketing

4.1. Market Definition & Quantification

As previously outlined, Ecobuild's target market is the gap housing population in South Africa; in section 2.4.3., we quantified this population as urban households making between R3,500 (\$263.68) and R15,000 (\$1,130.08) per month. According to a study by the CAHF, there are approximately 4,950,000 urban households in South Africa that fall into this bracket, accounting for 47.6% of the total urban population (Ramparsad, 2016).

4.2. Clients vs. Consumers

Ecobuild is a B2B marketing project at its core. However, in nearly every case, the organizations which contract Ecobuild will never directly use the product; for example, housing projects commissioned by the government will eventually be occupied by third party individuals and families. Ecobuild's direct clients will be both public and private institutions, such as local governments and departments, NGOs, multinationals, and private foundations. The indirect consumers, who are also the end users, will be those who reside in the housing units. It is essential to keep the difference between these two groups in mind when evaluating Ecobuild's marketing plan.

4.3. Segmentation

At the highest level, Ecobuild's clients will be divided into the public sector and private sector. In the public sector will be public housing projects, where Ecobuild believes it will find the majority of its business. The private sector is categorized into for-profit and nonprofit institutions, which has already been further expanded upon in section 3.2. Finally, as discussed in section 4.2., these segments all converge at the end with the end consumer who occupies the completed Ecobuild house.

4.4. Competition

Although similar companies exist elsewhere in the world, there are not currently any competitors that both 1) are located in the markets we intend to enter and 2) create houses from bricks made out of recycled plastic. Despite this, Ecobuild will face direct and indirect competition from a variety of sources.

Direct competition will come from traditional construction companies located in our geographical area. These companies will have significant advantages over Ecobuild in terms of historical market dominance and brand recognition. The main challenge with this type of competition will be to convince consumers to switch from traditional methods to new construction methods.

Indirect competition, on the other hand, will come from companies that use the same technology in other markets. Two of these competitors are Conceptos Plasticos, located in Colombia, and NevHouse, which is based in Australia. Conceptos Plasticos was founded in 2010 and has not yet operated outside of Colombia. However, the company is growing and plans to enter the Asian market in the next few years. NevHouse has already completed some internationalization and currently operates in Vanuatu, Indonesia, Papua New Guinea, and the Philippines. Ecobuild should keep in mind that these companies could choose to enter the southern African market at any

time and become direct competition.

In addition to these existing competitors, there is also the possible threat of new entrants to the market. Ecobuild's business model is relatively simple to replicate, creating potential opportunities for followers. There is also the possibility that Ecobuild's own franchisees could become competitors. The best way to offset these potential risks will be through constant product development and improvements to the existing product offering.

4.5. Marketing Mix

4.5.1. Product

Ecobuild uses an existing manufacturing process to turn recycled plastic waste into bricks. This is the only product that Ecobuild will produce directly; a small number of materials (such as base concrete, roofing, and doors and windows) will be purchased from suppliers. The result is an extremely simplified, non-customizable product line which is easy to manage and inexpensive to produce. The finished housing brick is shaped similarly to a toy LEGO; bricks are stacked on top of each other and fitted together without the need for any type of glue or special tools (*Figure 18*). Special corner bricks help create the frame for the structure and fit perpendicular walls together (*Figure 19*).

4.5.1.1. Production Process

To produce its bricks, Ecobuild will use only safe and non-hazardous plastic types: type 2 HDPE (High Density Polyethylene), type 4 LDPE (Low Density Polyethylene), and type 5 PP (Polypropylene). Ecobuild will not under any circumstances use plastic types 1, 3, 6, or 7, which can contain phthalates, DEHA, and BPA, all hazardous chemicals that are not suitable for long-term exposure (*Figure 20*). Our suppliers will need to verify the type and quality of raw material for every batch delivered.

Suppliers will deliver the raw material to Ecobuild in the form of pellets which has been already been cut, washed, dried, densified, extruded, and finally pelletized and bagged (Haig, Morrish, Morton, and Wilkinson, 2012). These pellets are added to the extrusion machine, heated, and molded into Ecobuild's standard brick size (*Figure 21*).

4.5.1.2. Product Development

Ecobuild plans to produce non-customizable, standardized brick sizes in order to reach economies of scale and offer an even more affordable product. However, the company is also committed to increasing quality and creating value-added products. To this effect, we plan to invest around 6% per year in R&D.

The first development that Ecobuild plans to implement is the use of fire retardants in the production mix. The goal would be to create a plastic brick with an extremely low combustion rate or auto-extinguisher. Fire retardants can also be used to reduce smoke and prevent the emission of hazardous substances in case of a fire. We expect this to be a major selling point for the product due to the prevalence of house fires in low-income housing. In South Africa alone, there are an average of ten "shack fires" per day, resulting in approximately one death every two days (Birkinshaw, 2008).

For further R&D projects, Ecobuild also plans to develop specialized brick

modules with built-in features such as electrical installations and sewage collection through collaboration with third party companies. We believe that these types of additions will increase value perception of the brand.

The other reason for this emphasis on product development is patentability. Since Ecobuild's technology is already patented elsewhere in the world, while we are able to use this technology in Africa without fear of repercussions, we may have difficulty patenting the technology ourselves and therefore protecting Ecobuild's status as the sole provider of this product in our target markets. However, should Ecobuild develop proprietary improvements to the existing product, these new technologies would be patentable. This will be the best way to solidify our position in the market and protect ourselves from future competition.

4.5.2. Price

In order to determine the price of an Ecobuild house, we had to take several variable and fixed costs into consideration. To build one unit, we must spend R53,968.08 (\$4,065.87) on materials and R40,620.95 (\$3,060.32) on labor. Additional fixed costs include salaries, marketing, sales, transportation, and rent. When all is said and done, we have decided to price each standard Ecobuild unit at R132,734.44 (\$10,000.00). Obviously, this does not include the cost of the land, or any appliances or furnishings. We should also note that these are the costs and prices for 2019, and will increase each year due to inflation.

In comparison, according to the CAHF, the cost of the least expensive new house in South Africa in 2016 was R268,428 (\$23,962) (*Figure 22*). Only 35.8% of the urban population was able to afford this house (Ramparsad, 2016). Using this same research, we estimate that just under 65% of the urban population will be able to self-finance an Ecobuild house, without even taking into consideration additional funding sources such as donations, grants, and government assistance programs.

For our internationalization plan, we should note that the CAHF study shows huge opportunities in these target markets as well. In Mozambique, the lowest price for a new housing unit is \$63,000, which is affordable to just 0.2% of the population (*Figure 23*). In Ghana, the price is \$20,223, affordable to only 4.3% of the population (*Figure 24*).

Ecobuild will also consider projects that do not fall under the scope of standard houses (such as small commercial buildings and schools), and the prices of these projects will need to be determined on a case-by-case basis depending on square footage, location, and complexity.

4.5.3. Placement

Ecobuild will hire a salaried marketing and sales manager to sell its product domestically directly to the clients outlined in sections 3.2. and 4.2. When expanding internationally, Ecobuild's franchisees will be responsible for the direct sale of their own products to the clients in those markets.

4.5.4. Promotion

Ecobuild believes that content marketing will be its strongest promotional outlet and intends to allocate the bulk of its marketing efforts to this channel. Ecobuild's indirect competitor, Conceptos Plasticos, has been quite successful using content

marketing to build global awareness and attract attention to the company’s innovations. This includes articles in magazines and newspapers and video content for TV stations and online video channels. These articles will help give Ecobuild credibility and differentiate the company from its direct competitors in the South African traditional construction market.

Personal selling and direct marketing will be the methods used to reach Ecobuild’s direct clients, the public and private organizations with which Ecobuild will need to secure contracts. It will be more difficult and highly ineffective to identify and reach these organizations through mass marketing methods, so Ecobuild will need to make contact directly through emails, phone calls, and personal introductions at trade shows and conventions. The goal of these interactions will be to prove why doing business with Ecobuild is preferential to contracting traditional construction companies, for the reasons outlined in section 1.2.

Ecobuild will also allocate small amounts of the budget to public relations, advertising, and social media. These methods will be slightly less effective for the company’s business model of low volume, high value accounts, however Ecobuild does not wish to ignore them entirely and will focus especially on building a positive social media presence.

4.6. Budget

Ecobuild will allocate around 15% of its total annual revenue to marketing, with each channel analyzed by its frequency and priority. This 15% will be subdivided as follows:

Channel	Frequency	Priority (term)	% of budget
Social media	Daily	Short	10%
Direct marketing	Daily	Short	20%
Personal selling	Daily	Short & medium	15%
Public relations	Monthly	Medium & long	5%
Content marketing	Occasional	Medium & long	40%
Advertising	Occasional	Long	10%

5. Logistics

5.1. Supply Chain Structure

Ecobuild's supply chain is composed of four steps (*Figure 25*). First, raw material is sourced from waste collection agencies. Second, the unprocessed material is stored in Ecobuild's warehouse. Third, the production process occurs, and the raw material is manufactured into bricks in-house on Ecobuild's own extrusion machine. Fourth, the completed bricks are transported to the final project site for assembly and project completion.

The supply chain will operate under a push-pull strategy. The push will occur from sourcing to storage, as we anticipate some difficulty sourcing raw materials adequately and efficiently, especially during the first years. The pull will come from assembly backwards to production, drawing from the raw material inventory in storage. This strategy allows the manufacturing process to occur on an as-needed, per-project basis, while keeping the required completion time for each project controllable and at a minimum. Since completed bricks will be transported directly to project sites, Ecobuild will not need to maintain the resources required to store this type of inventory.

This strategy provides many advantages. First, Ecobuild maintains full control over the production process, ensuring consistent quality. Second, the production process is flexible enough to respond to demand variability without unreasonable project lead times. Finally, costs associated with storing inventory are kept to a minimum.

5.2. Location Theory & Network Design

As a company that claims social and environmental responsibility, it is essential for Ecobuild to minimize the environmental impact of its operations. Therefore, the location of the company's production facilities and the selection of transportation modes are crucial. In order to determine the most effective strategy to minimize both costs and environmental impact, we have developed a center of gravity model that analyzes population density and geographic location to identify the ideal location of our production center (*Figure 26*). By using urban centers as benchmarks, we are also able to ensure proximity to sources of raw material; according to a study by the University of Adelaide, South Africa shows "a positive correlation between city population size and both the percentage of waste moved and rate of households enjoying regular waste collection" (Achankeng, 2003).

The outcome of our gravity model analysis ruled out Cape Town and Durban as candidates; Johannesburg, Rustenburg, and Pretoria scored nearly identically, likely due to their close geographical proximities to one another. Of these three, we chose Johannesburg as the final location for several reasons. First, it has the largest population, which Achankeng's claim allows us to assume also means that it has a more abundant supply of plastic waste. The city center is surrounded by several industrial townships, which creates opportunities to acquire warehouse space, transportation, and machinery ("Top Industrial Locations", 2014). Many of Ecobuild's potential suppliers and clients are located in the Johannesburg area, which will reduce costs and environmental impact, and neighboring Pretoria is an administrative hub. Finally, Johannesburg is a major junction for road transportation, with easy access to the major highways that lead to other metropolitan areas and ports (*Figure 27*).

5.3. Aggregate Planning

For its aggregate planning strategy, Ecobuild will use a chase strategy, meaning that output is constantly adjusted to match demand. In section 5.1., we explained how our push-pull supply chain structure supports this strategy; here, we will outline the complementary variable labor plan.

It takes one foreman and four workers six days to build one Ecobuild housing unit (*Figure 28*). Due to the short-term nature of the construction labor market and the low skill level required to build an Ecobuild house, foremen can be hired per project and workers can be hired per day, with a salaried Project Manager in charge of oversight, coordination, and any necessary (albeit minimal) onsite training. Using this model, we can match the variable labor requirement on a per-project basis with no added time or cost requirement. When no projects are scheduled, Ecobuild simply does not hire any workers for that day.

5.4. Transportation

As explained in section 5.2., Ecobuild plans to minimize its carbon footprint by optimizing its logistics network and reducing road transportation to essential activities. This includes 1) the transportation of raw material from suppliers to our warehouse and 2) the transportation of produced bricks from our production facility to the project site.

The delivery of raw materials will be negotiated with our suppliers, where ideally the supplier is responsible for transporting the materials to our production facilities. However, when transporting manufactured bricks to project locations, Ecobuild will hire an independent certified driver with a truck to pick the bricks up from the production facility and deliver them onsite. This will be the most cost effective method until Ecobuild can achieve economies of scale, at which point the company might consider purchasing a truck and hiring a full-time driver.

5.5. Franchising Logistics

According to Ecobuild's franchising model, franchisees will be responsible for designing, planning, and executing their own logistics plan according to the conditions of that market. However, it is assumed that as agents of the Ecobuild brands, franchisees will incorporate the same core values into their logistics models. Namely, franchisees will be expected to choose environmentally and socially responsible production methods and transportation modes in order to reduce the overall carbon footprint of the company and to engage in fair labor practices. This will be enforced through the franchising contract, and failure to meet standards will result in contract termination.

6. Human Resources

6.1. Organization

Ecobuild's employees are divided into two types: corporate employees and project workers. The corporate structure is further categorized as follows (*Figure 29*):

- 1) **Director:** Oversees high-level activities; ensures conformity with core mission and goals; coordinates all subsequent departments; recruits and manages relationships with franchisees; fulfills core HR duties such as recruiting, payroll, and evaluations
- 2) **Marketing & sales:** Plans and executes marketing strategy; sells the product; analyzes trends; forecasts demand
- 3) **Project management:** Schedules projects; coordinates project logistics (transportation, labor, etc.); hires and oversees project workers; provides onsite training as needed; ensures adherence to safety standards
- 4) **Manufacturing:** Works with project management to produce bricks according to project schedule; runs extrusion machine; ensures proper function and maintenance of machine; places orders to suppliers according to demand forecast
- 5) **Administrative assistant:** Performs daily office tasks (mail, phone calls, ordering supplies, etc.); supports the director

On the other hand, project workers are subdivided into two categories:

- 1) **Foreman:** Oversees each project site; directs workers; ensures safety compliance; hired on a per-day basis
- 2) **Worker:** Performs the physical labor required to complete each project; hired per-day basis

6.2. Compensation & Benefits

Corporate employees will be compensated with the following salaries:

Position	Annual Salary (ZAR)	Annual Salary (USD)	Monthly Salary (ZAR)	Monthly Salary (USD)
Director	R477,843.97	\$36,000	R39,820.33	\$3,000
Project Manager	R364,754.23	\$27,480	R39,396.19	\$2,290
Sales Manager	R302,634.51	\$22,800	R25,219.54	\$1,900
Manufacturing Manager	R270,778.25	\$20,400	R22,564.85	\$1,700
Administrative Assistant	R132,734.44	\$10,000	R11,061.20	\$833

These salaries are based on average salary distribution in South Africa for the construction sector (“South African Salaries”, 2015). Benefits will include health care and 21 consecutive days of paid vacation per year in accordance with national laws (“Annual Leave and Holidays”, 2017).

On the other hand, workers and foremen will be paid on an hourly basis. Workers will be compensated R212.38 (\$16) per day, which comes out to R26.55 (\$2) per hour; foremen will receive R849.50 (\$64) per day, or R106.19 (\$8) per hour. Both will receive safety insurance, including worker’s compensation. A compa-ratio analysis demonstrates that these salaries are more than fair, considering that the average hourly salary for construction workers in South Africa is R15.93 (\$1.20) per hour:

$$\begin{aligned}\text{CR (compa-ratio)} &= \text{AS (actual salary)} / \text{MP (midpoint of pay range)} * 100 \\ \text{CR} &= \$2 / \$1.20 * 100 \\ \text{CR} &= 66.7\%\end{aligned}$$

This shows that Ecobuild will pay 66.7% more than the average construction salary, a data point that we believe will attract a larger and better quality talent pool.

6.3. Safety

While Ecobuild’s construction method is much safer than traditional building practices due to structural simplicity and the absence of heavy machinery, the company should still have a safety policy in place in order to prevent and minimize the effects of potential safety incidents. First, each worker must dress appropriately with the proper clothing and work boots. Second, the company will need to ensure that each project site has access to sanitary facilities, drinking water, a weather appropriate rest area, and PPE (personal protective equipment). Finally, the foreman will be responsible for maintaining safety standards at the project site, ensuring appropriate use of tools and equipment, and reporting any injuries or accidents that occur on the job. In the event of a workplace injury that leads to 3 or more days out of work, employees can claim from South Africa’s public worker’s compensation fund (“Compensation for Occupational Injuries and Diseases Act”, 1993). The project manager should perform periodic audits via random inspections to ensure adherence to these rules.

7. Financial Analysis

7.1. Funding

Ecobuild will need a total of R6,636,722 (\$500,000) in initial funding to begin its operations. These funds will be collected from three main sources during the first year:

- 1) **Paid-in capital:** The owners and partners will contribute R3,318,361 (\$250,000)
- 2) **Long-term bank loan:** The company will request R2,654,689 (\$200,000) to be repaid in six years at an interest rate of 8%
- 3) **External funding:** Grants, donations, and crowdfunding totaling R663,672 (\$50,000).

7.2. Sales Forecast

The sales forecast, including total revenue, has been calculated for 2018 through 2024 (*Figure 30*) and is computed based on the estimated number of projects multiplied by the value of each project for that year; we assume that no projects will be executed in the first year. The estimated number of projects has been forecasted based on our market research outlined in sections 2.4.3. and 4.1. Ecobuild targets to deliver a total of 490 houses by 2024, which represents just 1.1% of the 44,333 housing units scheduled for delivery by the DHS. We believe that this is a very conservative and achievable number of projects.

The annual revenue, with an average growth of 25%, will reach its highest point at R20,270,699 (\$1,527,162) in 2024. Although this might seem like an impressive growth rate at first glance, approximately one fifth of its value can be accounted for by inflation. We also strongly believe that Ecobuild's growth will be strictly limited by the supply of plastic as we optimize our supply chain and build relationships with suppliers. Therefore, we are staying extremely conservative in our early years, as we estimate that our productivity will be extremely low at first and will take some time to build up.

7.3. Costs Forecast

The costs forecast is divided into three main parts: 1) materials costs forecast (*Figure 31*), 2) salaries forecast (*Figure 32*), and 3) other costs forecast (*Figure 33*).

The materials costs forecast includes all of the materials necessary to build one unit: raw plastic material, roofing, doors, windows, and concrete. The estimated cost per brick, R37.17 (\$2.80), was benchmarked on real costs reported from similar companies in other parts of the world (Conceptos Plasticos and NevHouse). It should be noted that one Ecobuild brick is the size of four standard bricks, so fewer pieces are needed to build one unit.

The salaries forecast is broken down into variable and fixed salary costs. Workers and foremen are considered variable costs and calculated by project need, as we know that it takes one foreman and four workers six days to build one unit (*Figure 24*). Fixed salaries are outlined in section 6.2. of this report; these will be paid independently of the projects completed per year. Due to the planned international expansion in year three, the company will hire an additional project manager, sales & marketing manager, and an administrative assistant, which will increase the total fixed salaries to be paid substantially during this year.

Finally, other costs forecast includes all additional costs that the company needs in order to operate: rent of both the storage and production facility and a furnished office space, electricity, maintenance services, transportation, and all other expenditures needed that will increase progressively with the number of annual projects.

7.4. Income Statement

The income statement (*Figure 34*) reflects all income from the sale of our units plus the royalties to be received from franchisees beginning in year three. Ecobuild has a healthy gross profit of between 50 and 60% thanks to the low cost of materials and an extremely efficient variable logistics network. Although the company does not become profitable until year four due to a high initial investment and no sales during the first year, profits begin at 1.3% of sales in 2021 and eventually increase to 7.6% by 2024. Salaries represent the biggest expense, with an all-time high of 29% in 2020. Some expenses increase with time, which we believe to be in line with Ecobuild's growth plan. Others are maintained fairly consistently, for example, marketing & sales (15-16%) and R&D (5-6%).

7.5. Cash Flow Statement

The cash flow statement (*Figure 35*) allows us to measure Ecobuild's cash requirement each year. We do not expect to generate a positive cash flow from operations until 2022 due to negative earnings for the first several years as well as a high working capital, which we expect to slowly reduce as the supply chain becomes more efficient and Ecobuild can work within a shorter cash cycle.

Ecobuild has a positive working capital as suppliers must be paid in 60 days, but accounts receivable will not be collected for 80 days. We have taken this cash cycle into consideration in building the cash flow statement and determining funding requirements and we are confident that Ecobuild will not have any liquidity issues.

In the first year, Ecobuild will invest in the extrusion machine needed for production at a cost of R865,429 (\$65,200) which will be depreciated over six years. To finance this and acquire the necessary initial cash, we will also secure funding during the first year as outlined in section 7.1. This will allow the company to have a comfortable level of cash from year one. We anticipate a negative cash flow at first due to the repayment of long term debt and low initial net earnings; however, in 2023 cash levels will begin to increase again.

7.6. Currency Risk Analysis and Hedging

Ecobuild will expand in its third year through an industrial franchising model, and we plan to have at least two franchisees: one in Mozambique and another in Ghana. Since we will be collecting royalties from these franchisees, we must evaluate the currency risk and consider hedging options in order to reduce this risk.

Ecobuild will receive a one-time initial payment from each franchisee of R199,102 (\$15,000) which will cover training and other setup costs. In the following years, Ecobuild will receive royalties corresponding to 6% of the franchisee's total annual sales. We have decided to use a money market hedge strategy in order to limit the potential exchange rate risk between the South African rand and the currencies of each franchisee, the Mozambique metical (MZN) (*Figure 36*) and the Ghanaian cedi (GHS) (*Figure 37*). Since there are no reliable interest rate forecasts for these

currencies, we have used current interest rate values to illustrate the money market hedge strategy.

In Mozambique (*Figure 36*), the borrowing rate on April 17th, 2017 was 21.75%. Ecobuild will invest in South Africa at 7%. The exchange rate of the Mozambican metical (MZN) against the South African rand (ZAR) is:

$$\mathbf{MT1 = R0.22}$$

In order to know the amount of money to borrow, we need to calculate the present value. For example, in 2020:

$$\mathbf{PV = MT2,003,701 / (1 + 0.2175) = MT1,645,750}$$

Then, we invest it in South Africa:

$$\mathbf{MT1,645,750 * 0.22 = R362,065}$$

And finally, we collect the money in South Africa:

$$\mathbf{R362,065 * (1 + 0.07) = R387,410}$$

In Ghana (*Figure 37*), the borrowing rate is 23.50% The exchange rate of Ghanaian Cedi (GHS) against the South African rand (ZAR) is:

$$\mathbf{GH¢1 = R3.18}$$

We calculate the present value in 2020 as follows:

$$\mathbf{PV = GH¢143,320 / (1 + 0.2350) = GH¢116,048}$$

Then, we invest it in South Africa

$$\mathbf{GH¢116,048 * 3.18 = R369,034}$$

And finally, we collect:

$$\mathbf{R369,034 * (1 + 0.07) = R394,866}$$

Another possible threat that Ecobuild could face is the volatility of its own currency (ZAR) due to external factors brought up in section 2.1.2. of this report. The solution in this extreme case could be to ask for royalty payments directly from franchisees in US dollars (USD).

8. Viability Analysis & Conclusion

Ecobuild brings a disruptive innovation to the market and provides a solution to two major problems in sub-Saharan Africa: 1) the housing deficit and 2) the lack of an efficient waste management system. Based on the analysis provided in this report, we have concluded that the Ecobuild business plan is viable not only within South Africa, but through its expansion to markets across the entire region.

The three countries analyzed in this report, despite possessing certain sets of risks, show promising market opportunities and ideal economic situations for our business model, including rapid urbanization, growing populations within our target household income range, and strong commitments from national and regional governments to provide gap housing solutions in the coming years. Ecobuild plans to enter these markets with a product that is less expensive and easier to source than the options that are currently being provided by the market.

We have also identified the opportunity to improve the existing recycled brick technology through value-added product features such as fire retardants and the introduction of built-in electric and sewage modules. This ongoing product development, we believe, is the best way to protect Ecobuild from potential followers and competitors and to become a world leader in this specific technological sector.

From a financial standpoint, our analysis has demonstrated that Ecobuild will become profitable in its third year of business and generate healthy amounts of cash each year. Furthermore, we have shown that the company can be easily expanded through an industrial franchising model with very little investment required from Ecobuild. Although we have only analyzed the feasibility of expanding to two international markets in the context of this report, we believe the applicability of this model to be virtually limitless.

Appendix

Figure 1. SADC members



Source: SADC Overview. (n.d.). Retrieved from <http://www.sadc.int/about-sadc/overview/>.

Figure 2. Timeline of the SADC integration process

1975	Establishment of the Frontline States – Angola, Botswana, Lesotho, Mozambique, Tanzania, Zambia, Zimbabwe
1980	Lusaka Declaration (Southern Africa: Towards Economic Liberation), signed by 9 states (Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe), launching SADCC
1982	SADC Secretariat establishes headquarters in Gaborone, Botswana
1992	Windhoek Summit – SADC Treaty and Declaration signed, transforming SADCC into SADC
1994	South Africa becomes 11 th member of SADC
1995	Mauritius becomes 12 th member of SADC
1998	DRC and Seychelles become 13 th and 14 th members of SADC
2000	Restructuring of SADC. SADC Secretariat moved entirely to Gaborone
2004	Regional Indicative Strategic Development Plan (RISDP) launched in Arusha, Tanzania
2005	Regional Indicative Strategic Development Plan (RISDP) and Strategic Indicative Plan for the Organ (SIPO) initiated
2005	Madagascar becomes the 15 th member of SADC
2005	SADC Tribunal inaugurated in Windhoek, Namibia
2006	Consultative Conference, Windhoek, Namibia – SADC and its International Cooperating Partners (ICPs) adopted the Windhoek Declaration – a framework for a partnership between SADC and its ICPs.
2009	SADC Secretariat moves to new premises in Gaborone new CBD
2010	30 th anniversary of SADCC/SADC
2011	Desktop Assessment Review of the Regional Indicative Strategic Development Plan published, reviewing 5 years of progress in implementing the Regional Indicative Strategic Development Plan

Data from: History and Treaty. (2012). Retrieved from <http://www.sadc.int/about-sadc/overview/history-and-treaty/>.

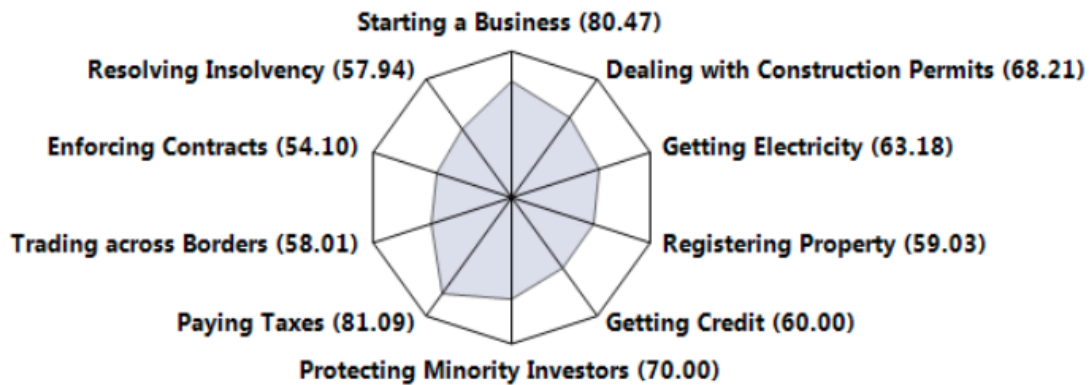
Figure 3. Ease of doing business by distance to frontier, SADC



Note: “The distance to frontier score benchmarks economies with respect to regulatory practice, showing the absolute distance to the best performance in each *Doing Business* indicator. An economy’s distance to frontier score is indicated on a scale from 0 to 100, where 0 represents the worst performance and 100 the frontier.” (“*Doing Business*”, 2017, p. 7).

Data from: *Doing Business 2017: Southern African Development Community*, p. 7. (2017). Retrieved from <http://www.doingbusiness.org/reports/regional-reports>.

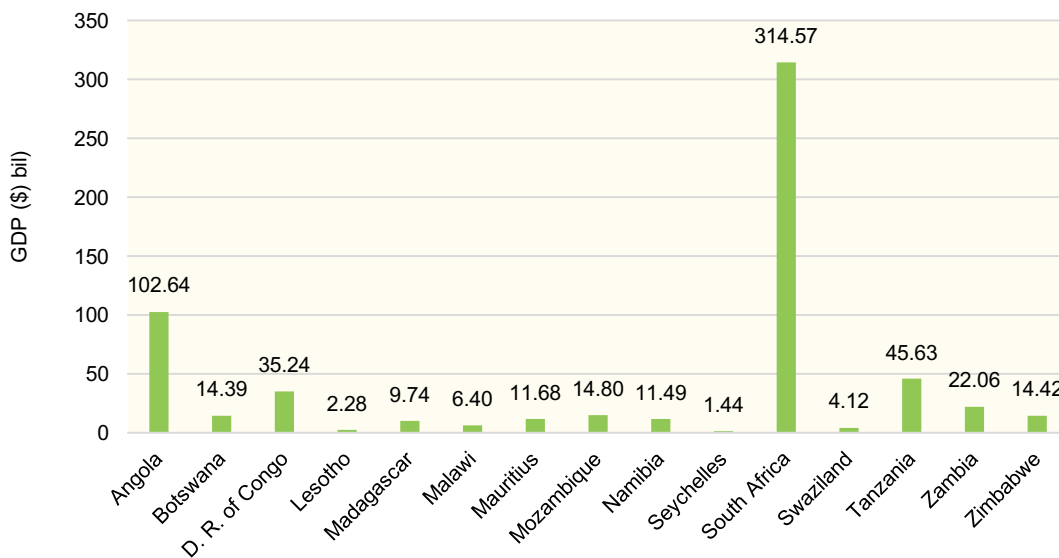
Figure 4. Doing Business scores by topic, South Africa



Note: An economy's distance to frontier score is indicated on a scale from 0 to 100, where 0 represents the worst performance and 100 the best performance.

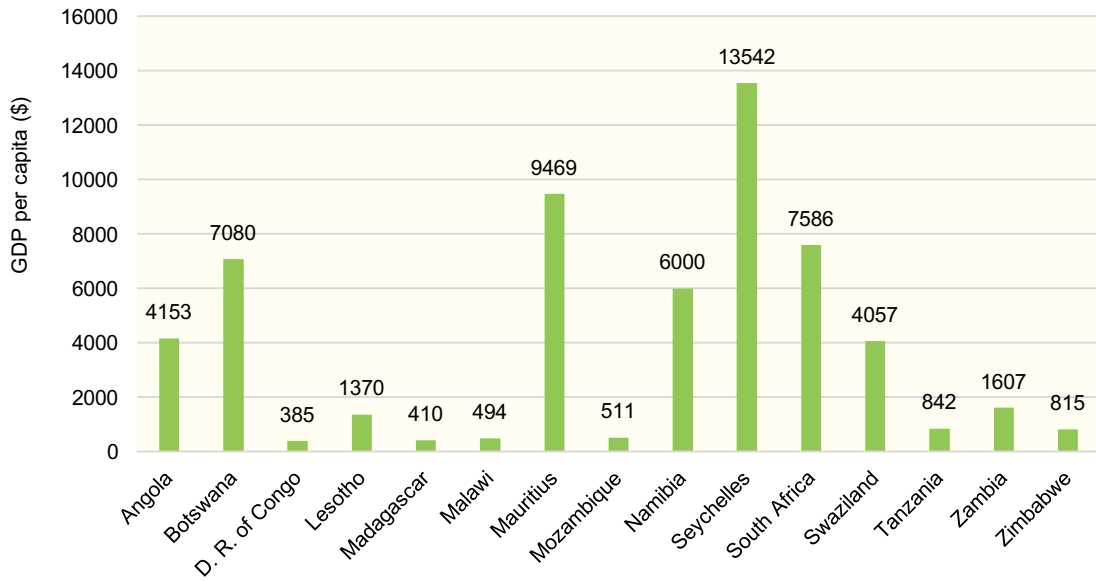
Data from: "Ease of Doing Business in South Africa." (2017). Retrieved from <http://www.doingbusiness.org/~media/wbg/doingbusiness/documents/profiles/country/zaf.pdf>

Figure 5. SADC member state GDPs (\$)



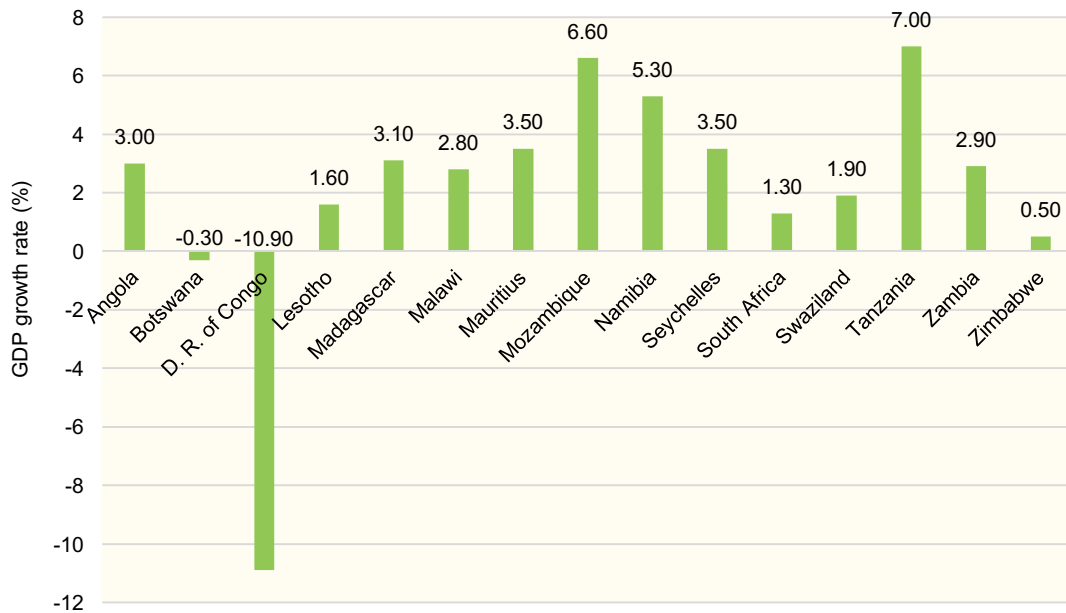
Data from: GDP: Africa. (2017). Retrieved from <https://tradingeconomics.com/country-list/gdp?continent=africa>.

Figure 6. SADC member state GDPs per capita (\$)



Data from: GDP Per Capita: Africa. (2017). Retrieved from <https://tradingeconomics.com/country-list/gdp-per-capita?continent=africa>.

Figure 7. SADC member state annual GDP growth rates (%)



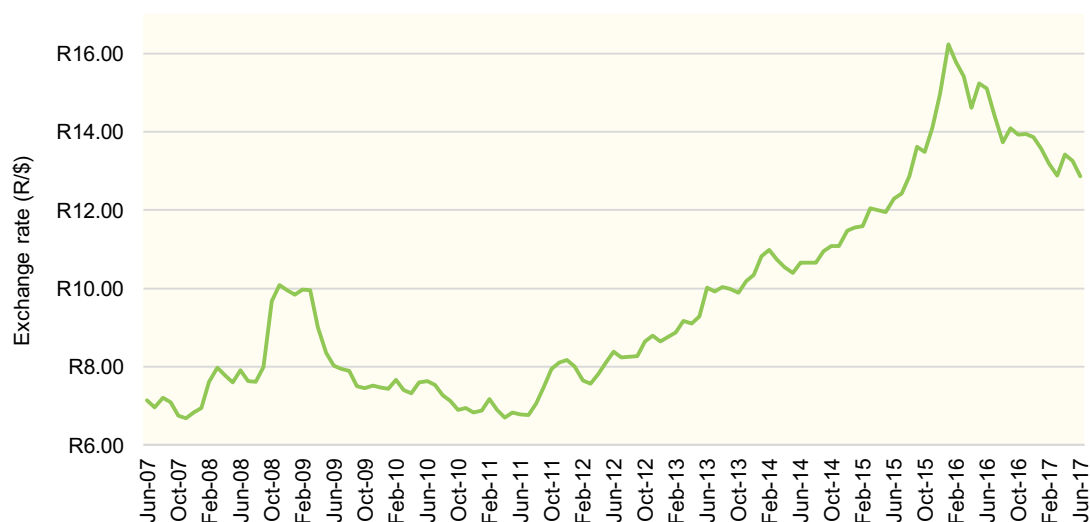
Source: GDP Growth. (2017). Retrieved from <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>.

Figure 8. Selected economic indicators, South Africa, 2011-2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Nominal GDP (bil. R)	3,024	3,254	3,540	3,808	4,050	4,337	4,640	5,001	5,400	5,834
Nominal GDP (bil. \$)	416	396	367	351	317	295	344	351	359	369
GDP per capita (000s \$)	8.1	7.6	6.9	6.5	5.8	5.3	6.1	6.1	6.1	6.2
Real GDP growth	3.3	2.2	2.5	1.7	1.3	0.3	1.4	1.8	2.0	2.0
Real GDP per capita growth	1.7	0.6	0.9	0.1	-0.4	-1.4	-0.2	0.2	0.4	0.4
Real investment growth	5.5	2.6	7.2	1.7	2.3	-3.9	1.3	2.0	2.5	2.5
Investment/GDP	19.8	20.2	21.2	21.1	21.1	19.9	20.0	20.4	20.0	19.6
Savings/GDP	17.5	15.1	15.4	15.8	16.7	16.7	16.3	16.5	16.0	15.5
Exports/GDP	30.5	29.7	30.9	31.2	30.4	30.3	30.3	30.6	31.2	32.0
Unemployment rate	24.7	24.9	24.7	25.1	25.4	26.7	26.5	26.3	26.3	26.0

Source: *South Africa Long-Term Foreign Currency Rating Cut To 'BB+' On Political And Institutional Uncertainty; Outlook Negative.* (2017). Retrieved from http://www.standardandpoors.com/en_US/web/guest/article/-/view/type/HTML/id/1825424.

Figure 9. Exchange rate, South African rand/US dollar, 2007-2017



Data from: OANDA Currency Tools. (2017). Retrieved from <https://www.oanda.com/currency/>.

Figure 10. Population growth, South Africa



Source: “South Africa Population”. Retrieved from:
<https://tradingeconomics.com/south-africa/population-growth-annual-percent-wb-data.html>

Figure 11. Mozambique PEST

Political Analysis	Economic Analysis
<p>Located on the east coast of the African continent and bordering South Africa, Mozambique gained its independence in 1975 after four centuries of Portuguese rule. Just two years later, the country became immersed in a 15-year civil war that left one million dead. Finally, in 1994, Mozambique held its first multi-party elections and entered a period of peace, which lasted for almost 20 years until the resurgence of the Mozambican National Resistance (RENAMO) in 2013. Sporadic fighting and tensions between this group and the dominating Mozambique Liberation Front (FRELIMO) are still ongoing (“Mozambique Long-Term Foreign Currency Rating”, 2017).</p> <p>The deterioration of the political environment was reflected in Mozambique’s Worldwide Governance Indicators, which showed a spike in many data points related to terrorism, corruption, and government ineffectiveness after 2013 (“Worldwide Governance Indicators”, 2017). However, we do not expect the political situation to affect the core operations of Ecobuild’s franchise.</p> <p>Mozambique is also a member of the SADC and its FTA and scores 53.78 in ease of doing business (<i>Figure 3</i>).</p>	<p>Mozambique is one of the poorest and most underdeveloped countries in the world; its GDP per capita ranks 180 out of 186 according to the World Bank (“Worldwide Governance Indicators”, 2017).</p> <p>However, the country is endowed with rich natural resources, especially minerals, petroleum, and gas reserves. Despite this, the economy is still based in agriculture, with a growing industry and service sectors. Since 1996, the county has experienced steep economic growth at an annual average of almost 8% (“GDP Growth”, 2017).</p> <p>Inflation and depreciation of the metical remain problematic, forcing the central bank to set extremely high interest rates of 23.3% (“Mozambique Long-Term Foreign Currency Rating”, 2017).</p> <p>Despite this, the long-term outlook is positive, as the mineral, oil, and gas industries are expected to make Mozambique one of the fastest growing economies in Africa.</p>
Social Analysis	Technological Analysis
<p>Mozambique is home to approximately 25 million* people. According to the World Development Indicators, the urban population growth was 3.6%* in 2015, with 80.3%* of the population living in the slums in 2014, for a total of more than 20 million people. The literacy rate is quite low at 58.8%* as of 2013.</p> <p>Mozambique is populated mostly by young people; almost 43%* of the population is younger than 15 years old. Fertility and mortality rates are high, and the country ranks among the worst in the world in terms of HIV/AIDS prevalence.</p>	<p>More than 15 million* people in Mozambique are without electricity, and only 2 million* have access to the internet.</p> <p>The majority of roadways are unpaved. As of 2013, the country only counted 21* airports and had three major seaports in Beira, Maputo, and Nacala*.</p> <p>In 2010, Mozambique spent 0.42% of its GDP on R&D (“Worldwide Governance Indicators”, 2017).</p>

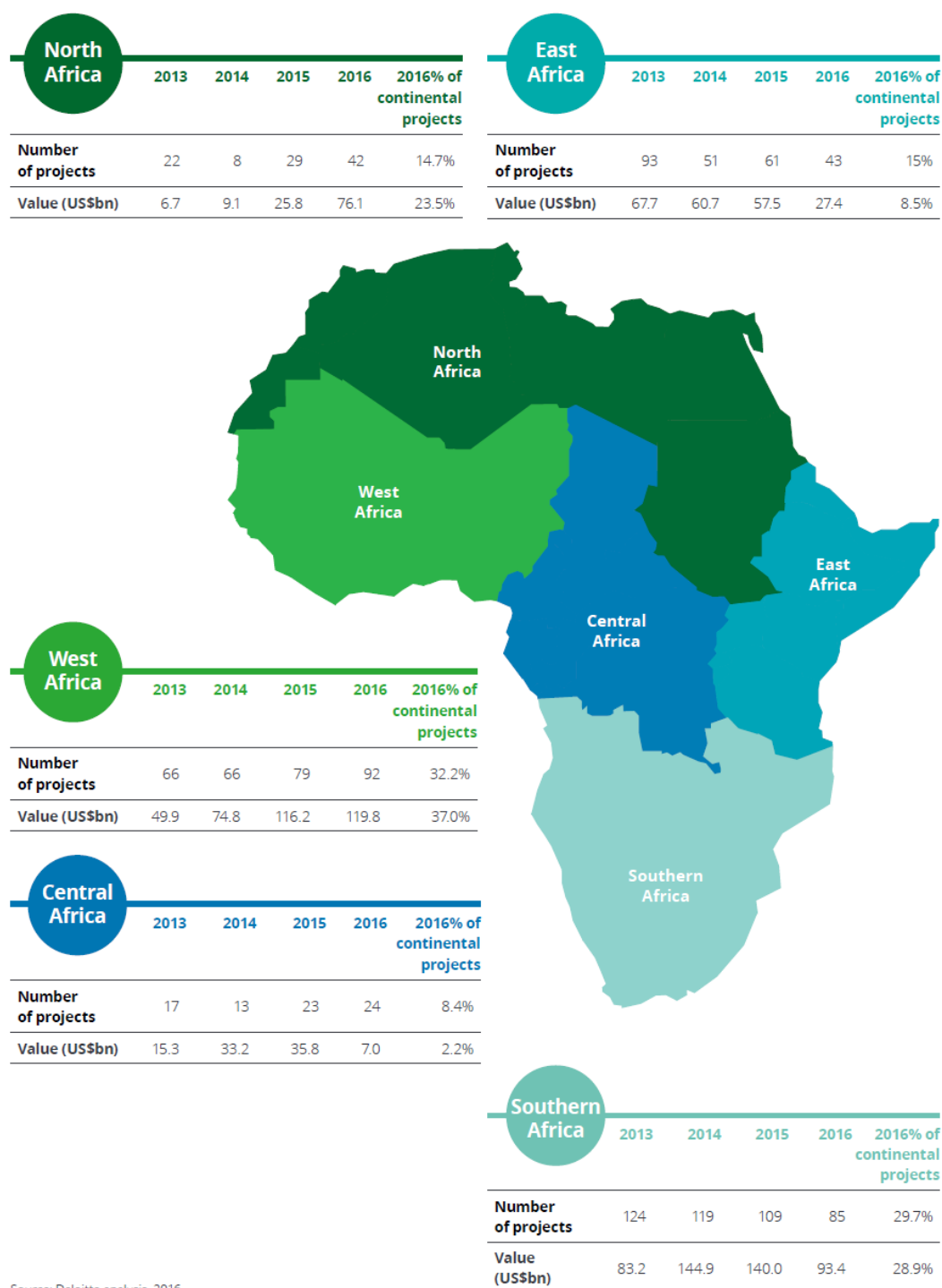
*Data source: The World Factbook: Mozambique. (n.d.). Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/geos/mz.html>.

Figure 12. Ghana PEST

Political Analysis	Economic Analysis
<p>Located in the west coast of Africa, Ghana is a presidential constitutional democracy with a president who is head of both the state and the government. Ghana gained its independence in 1957, first sub-Saharan country to become independent from European colonization, after a long British rule and several wars. There were several military and civilian governments between 1966 and 1986 until a new constitution in 1992 established a multiparty system. Since the early 2000s, the country has experienced a stable democracy and smooth power transitions which have helped it to become a regional power.</p> <p>Ghana is a member of the African Union, ECOWAS, G24, and the Commonwealth of Nations.</p>	<p>Ghana, with a GDP per capita of \$1,381*, ranks 136th out of 186 globally. It is classified as middle-income country and is relatively wealthier than other sub-Saharan countries. The country has many rich natural resources, mainly minerals, hydrocarbons, and precious metals, which boost the country's economy.</p> <p>Ghana's GDP was growing at an astonishing rate of over 9% until recent years, when growth lowered to 5.5% and is forecasted to remain at 7% and 6% in 2018 and 2019, respectively ("Republic of Ghana Ratings", 2017). The slowing growth mainly reflects technical difficulties the oil industry and power supply shortages.</p> <p>Ghana scores 58.82 in ease of doing business, above the regional sub-Saharan average of 49.51; starting a business and dealing with construction permits are the easiest tasks while resolving insolvency and trading across borders the most complicated ("Ease of Doing Business", 2017).</p>
Social Analysis	Analysis
<p>Ghana's population is 26 million*. The urban population growth rate was about 3.6%* in 2014, with 37.9%* of the population or 9 million people living in slums.</p> <p>Most of the population speaks English, the official language, however many local languages are used. Demographically, the population is relatively young with 57%* of inhabitants under the age of 25. The literacy rate is 76.6%*.</p> <p>Ghana suffers a high risk of infectious diseases. Poverty is declining, but still remains an issue in the northern part of the country which is more sensitive to droughts and floods. This region also suffers from reduced access to transportation infrastructure, markets, and industrial centers.</p>	<p>More Technological than 7 million* people in Ghana have no access to electricity, and in 2015 only 23.5%* of the population used the internet.</p> <p>Transportation is composed of 10* airports, mostly unpaved roads, and major seaports in Takoradi and Tema*.</p> <p>In 2010, Ghana spent 0.38% of its GDP on R&D ("Worldwide Governance Indicators", 2017).</p>

*Data from: The World Factbook: Ghana. (n.d.). Retrieved from <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/gh.html>.

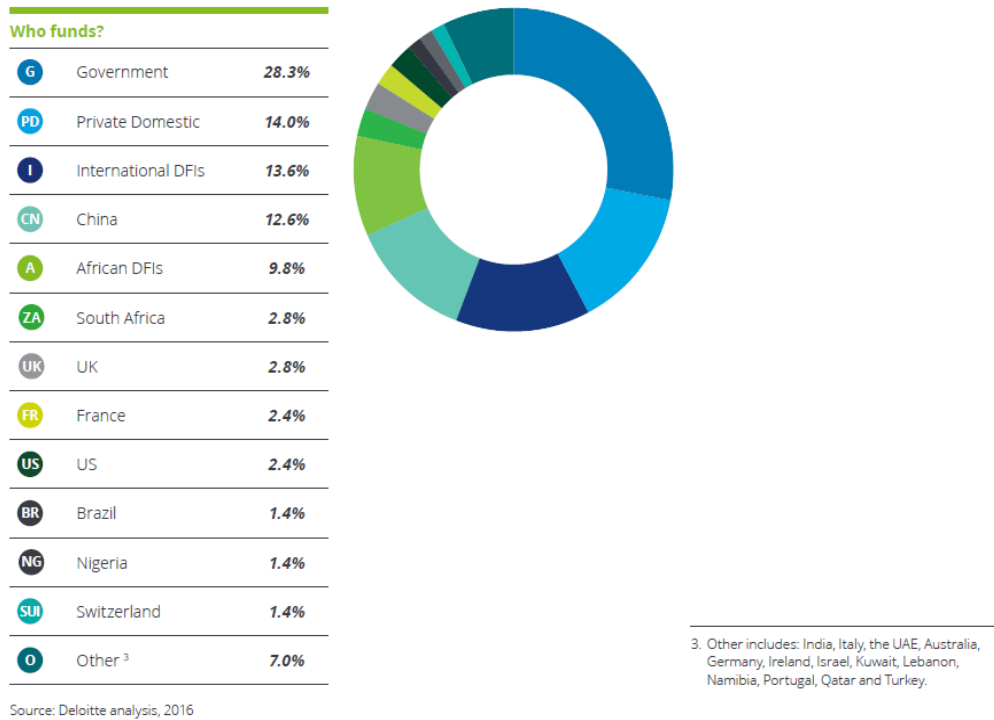
Figure 13. African construction sector, number of projects and continental share



Source: Deloitte analysis, 2016

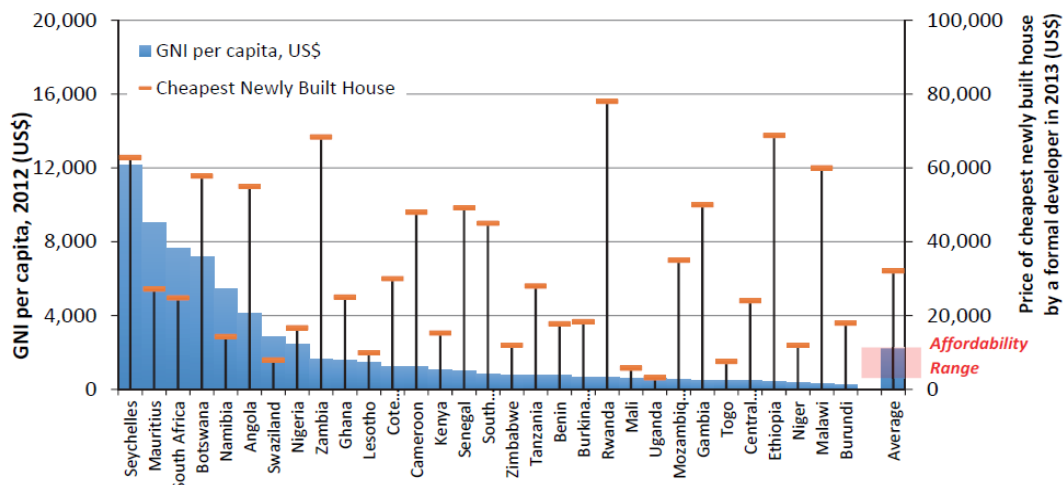
Source: Labuschagne, J. P., et al. (2016). Africa's Changing Infrastructure Landscape: Africa Construction Trends Report 2016, p. 5. Retrieved from <https://www2.deloitte.com/za/en/pages/infrastructure-and-capital-projects/articles/construction-trends-2016.html>.

Figure 14. Sources of construction project funding, Africa



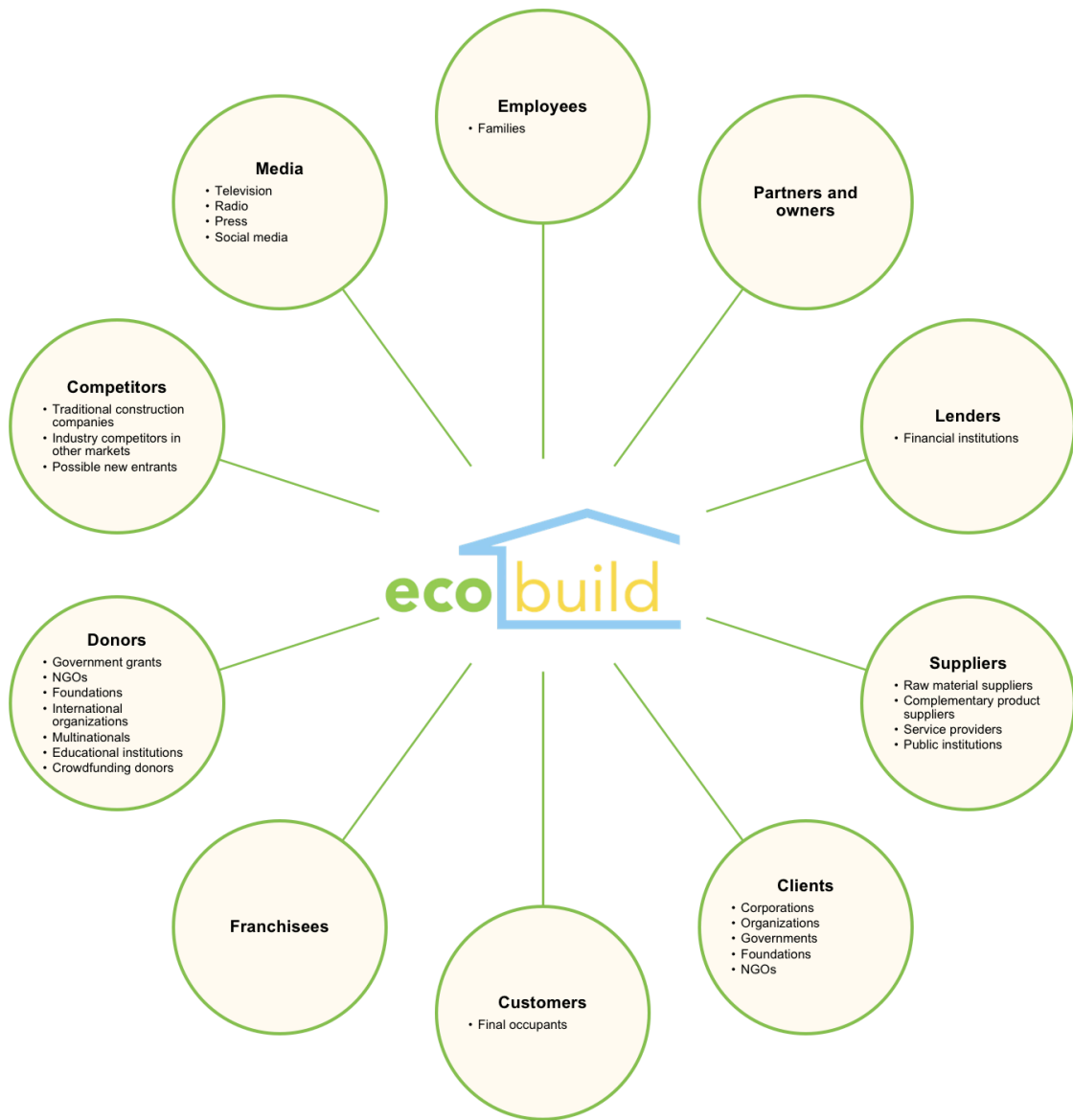
Source: Labuschagne, J. P., et al. (2016). Africa’s Changing Infrastructure Landscape: Africa Construction Trends Report 2016, p. 9. Retrieved from <https://www2.deloitte.com/za/en/pages/infrastructure-and-capital-projects/articles/construction-trends-2016.html>.

Figure 15. Relationship of Income to House Prices in SSA



Source: Parby, et al. (2015). Stocktaking of the Housing Sector in Sub-Saharan Africa, p. 11. Retrieved from <http://documents.worldbank.org/curated/en/916331468184793126/pdf/101153-v1-revised-PUBLIC.pdf>.

Figure 16. Stakeholder map



(Own elaboration)

Figure 17. Legal procedures to start a business, South Africa

Procedure	Time requirement	Cost requirement
Register the company name	1 day	50 ZAR
Register with the Companies and Intellectual Property Commission (CIPC)	10 days	125 ZAR
Open a bank account	1 day	None
Register for income tax and withholding taxes (PAYE, UIF, and SDL)	1 day	None
Register for VAT	7 days*	None
Register the company with the Unemployment Insurance Fund (UIF)	5 days*	None
Register with the Commissioner in deference to the Compensation for Occupational Injuries and Diseases Act	30 days*	None
* These procedures can be performed simultaneously.		

Data from: Ease of Doing Business in South Africa. (2017). Retrieved from <http://www.doingbusiness.org/data/exploreeconomies/south-africa>.

Figure 18. Standard brick



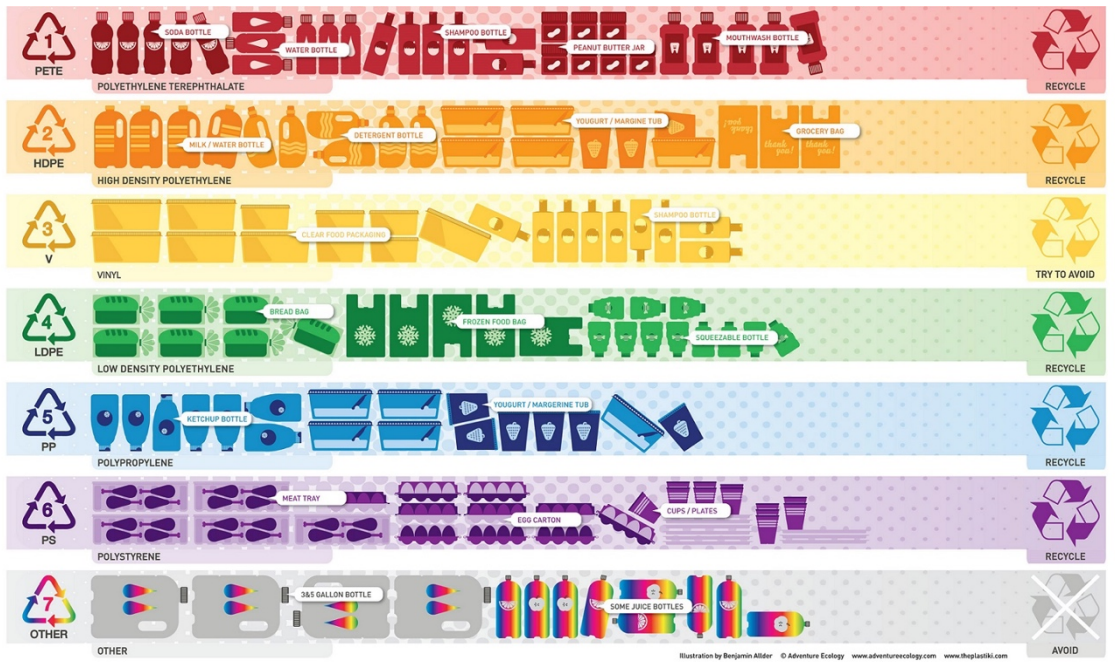
Source: Las Casas de Ladrillos de Plástico Tipo LEGO Que Podrás Construir Tu Mismo. (2016). Retrieved from <http://ecoinventos.com/casas-de-ladrillos-de-plastico/>.

Figure 19. Corner brick



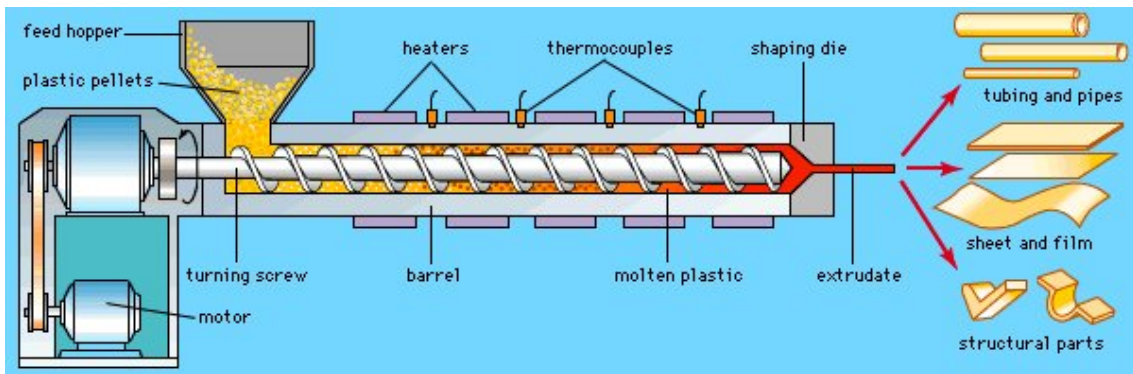
Source: Diseñan Sus Propios Bloques de LEGO Para Hacer Viviendas de Plástico. (2016). Retrieved from <http://www.obrasweb.mx/soluciones/2016/07/20/disenan-sus-propios-bloques-de-lego-para-hacer-viviendas-de-plastico>.

Figure 20. Types of recyclable plastic



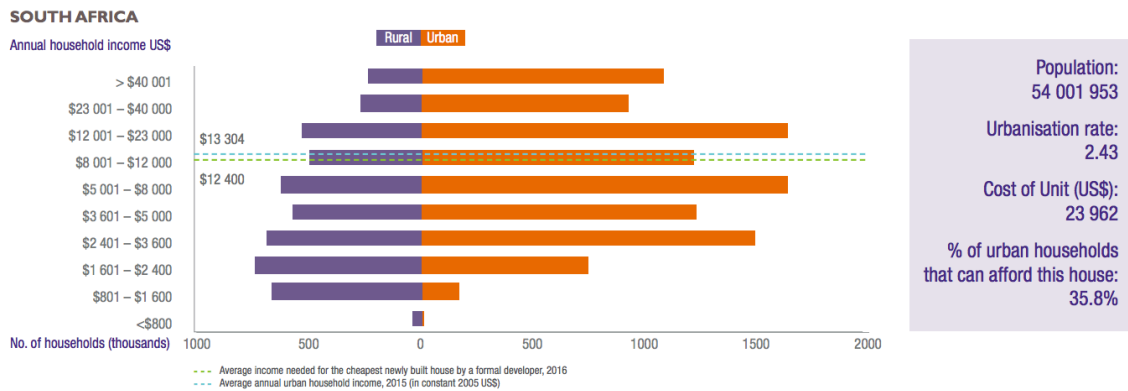
Source: Gassner, E. (2014). The Different Types of Plastic Containers. Retrieved from http://msplastics.co.za/the_different_types_of_plastic_containers_infographic_05112014/.

Figure 21. Plastic extrusion process



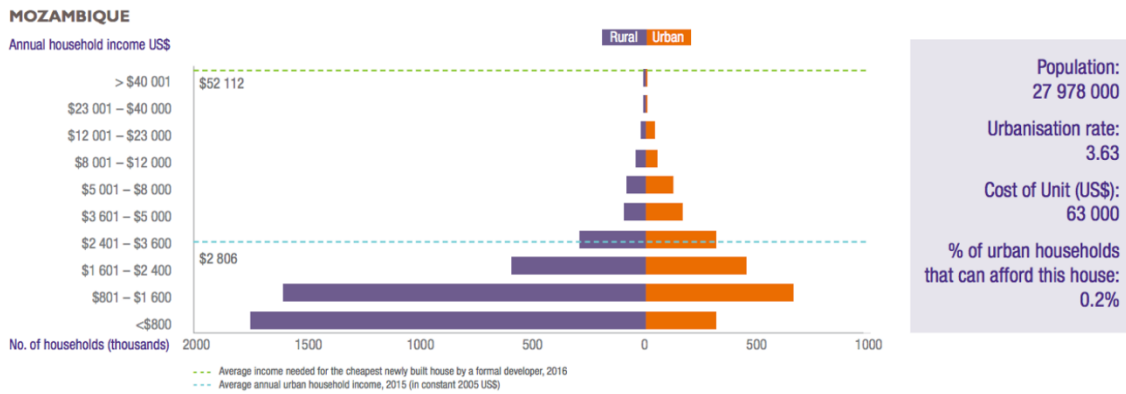
Source: Valdivia, P. (2017). Fabrication of Plastics. Retrieved from <http://www.petervaldivia.com/fabrication-of-plastics/>.

Figure 22. Housing affordability, South Africa



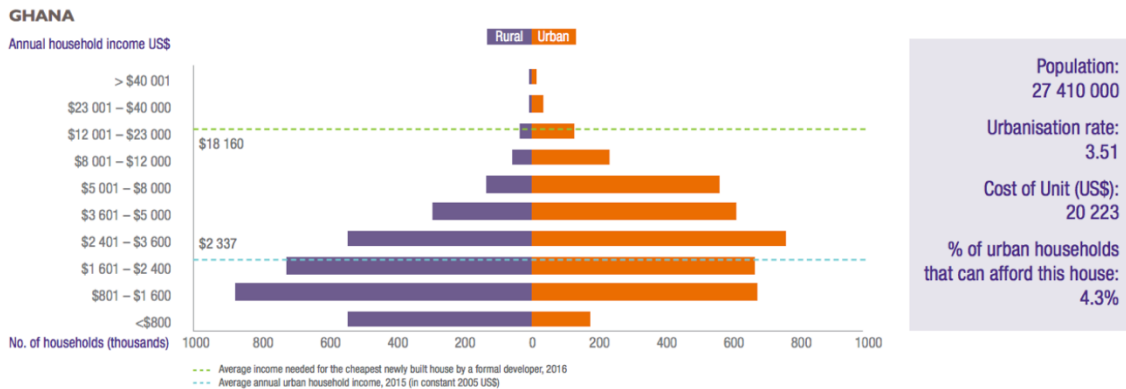
Source: Ramparsad, S. (2016). Housing Finance in Africa: A Review of Some of Africa’s Housing Finance Markets, p. 217. Retrieved from http://housingfinanceafrica.org/app/uploads/CAHF_Housing-Finance-in-Africa-Yearbook-2016.09.pdf.

Figure 23. Housing affordability, Mozambique



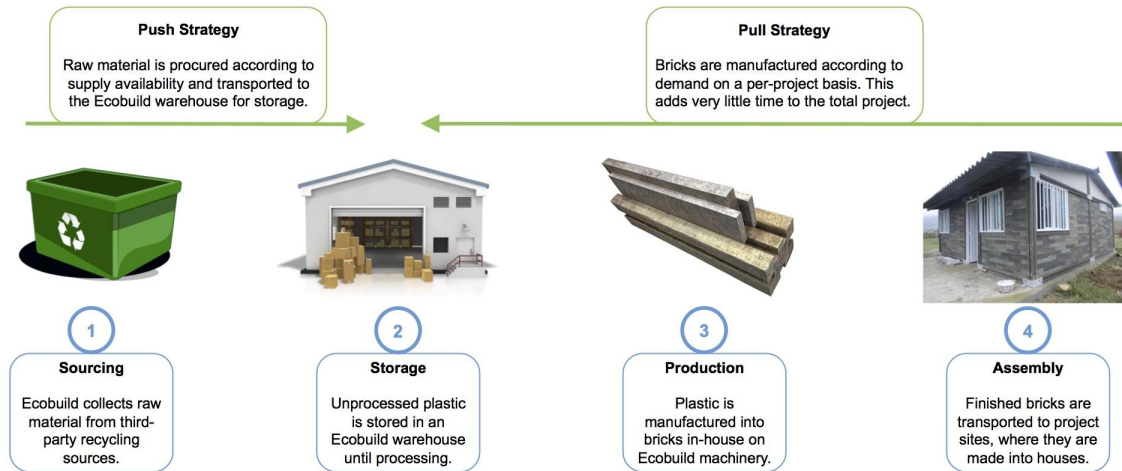
Source: Ramparsad, S. (2016). Housing Finance in Africa: A Review of Some of Africa’s Housing Finance Markets, p. 181. Retrieved from http://housingfinanceafrica.org/app/uploads/CAHF_Housing-Finance-in-Africa-Yearbook-2016.09.pdf.

Figure 24. Housing affordability, Ghana



Source: Ramparsad, S. (2016). Housing Finance in Africa: A Review of Some of Africa’s Housing Finance Markets, p. 132. Retrieved from http://housingfinanceafrica.org/app/uploads/CAHF_Housing-Finance-in-Africa-Yearbook-2016.09.pdf.

Figure 25. Supply chain structure



(Own elaboration)

Figure 26. Center of gravity model

City #	Latitude	Longitude	Population	% of Urban Population Within 300 Miles
Cape Town	-33.92	18.42	3,740,026	25.54%
Durban	-29.85	31.02	3,442,361	23.51%
Johannesburg	-26.2	28.04	4,434,827	50.95%
Rustenburg	-25.65	27.25	104,612	50.90%
Pretoria	-25.74	28.22	2,921,488	50.95%

Latitude/Longitude data from: Google Maps. (2017). Retrieved from <https://www.google.com/maps>.

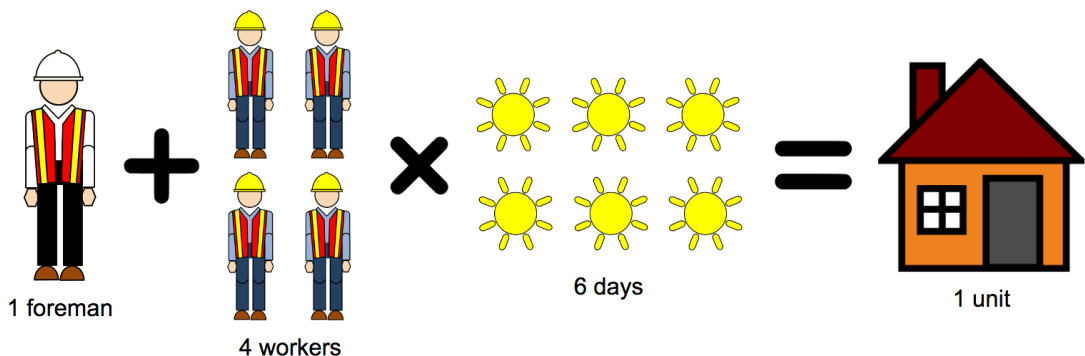
Population data from: Census 2011. (2012). Retrieved from <https://census2011.adrianfrith.com/>.

Figure 27. Major cities, roads, and ports, South Africa



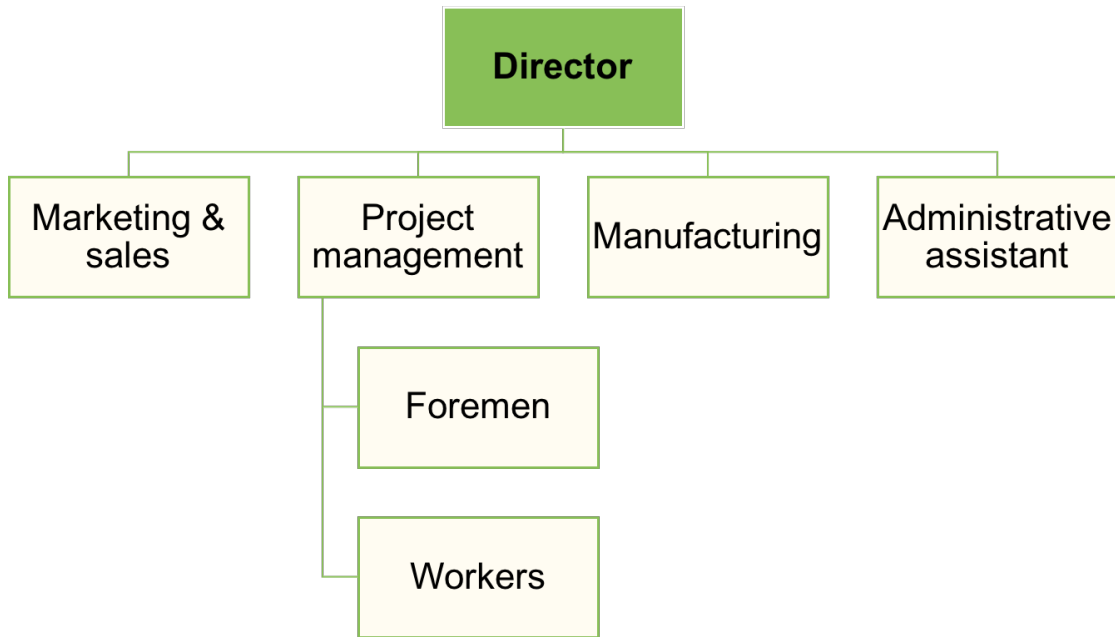
Source: South Africa Map. (2013). Retrieved from <https://www.mapsofworld.com/south-africa/>.

Figure 28. Labor and time requirement to build one unit



(Own elaboration)

Figure 29. Employee structure



(Own elaboration)

Figure 30. Sales forecast

	2018	2019	2020	2021	2022	2023	2024	TOTAL
Total sales	-	R6,636,722	R8,338,377	R10,944,120	R13,023,503	R16,087,857	R20,270,699	R75,301,278
	-	(\$500,000)	(628,200)	(\$824,513)	(\$824,513)	(\$1,212,033)	(\$1,527,162)	(\$5,673,078)
Sales growth	-	-	25.6%	31.2%	19.0%	23.5%	26.0%	25.0%
Projected # of projects	0	50	60	70	85	100	120	490
Projected value per project	-	R132,734	R138,973	R145,922	R153,218	R160,879	R168,922	
	-	(\$10,000)	(\$10,470)	(\$10,994)	(\$11,543)	(\$12,120)	(\$12,726)	
Inflation rate	5.5%	5.5%	4.7%	5.0%	5.0%	5.0%	5.0%	

Figure 31. Materials costs forecast

	2018	2019	2020	2021	2022	2023	2024
Cost per brick	R37.17	R39.20	R41.04	R43.09	R45.25	R47.51	R49.89
# bricks per unit	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Brick cost per unit	R37,165.64	R39,198.60	R41,040.94	R43,092.98	R45,247.63	R47,510.01	R49,885.52
Cost per sq m roofing	R146.01	R153.99	R161.23	R169.29	R177.76	R186.65	R195.98
# sq m roofing per project	49	49	49	49	49	49	49
Roofing cost per project	R7,154.39	R7,545.73	R7,900.38	R8,295.40	R8,710.17	R9,145.68	R9,602.96
Cost per ton concrete	R265.47	R279.99	R293.15	R307.81	R323.20	R339.36	R356.33
# tons concrete per project	10.8	10.8	10.8	10.8	10.8	10.8	10.8
Concrete cost per project	R2,867.06	R3,023.89	R3,166.02	R3,324.32	R3,490.53	R3,665.06	R3,848.31
Door cost per project	R1,327.34	R1,399.95	R1,465.75	R1,539.04	R1,615.99	R1,696.79	R1,781.63
Windows cost per project	R2,654.69	R2,799.90	R2,931.50	R3,078.07	R3,231.97	R3,393.57	R3,563.25
Materials cost per project	R51,169.12	R53,968.08	R56,504.58	R59,329.80	R62,296.29	R65,411.11	R68,681.66
Projected # of projects	0	50	60	75	85	100	120
Total materials cost	-	R2,698,404	R3,390,275	R4,449,735	R5,295,185	R6,541,111	R8,241,800

Figure 32. Salaries forecast

	2018	2019	2020	2021	2022	2023	2024
Days per project @ 4 workers	6	6	6	6	6	6	6
Project days per year	0	300	360	450	510	600	720
Worker days per year	0	1200	1440	1800	2040	2400	2880
Worker salary per day	R212.38	R223.99	R234.52	R246.25	R258.56	R271.49	R285.06
Total worker salaries per year	-	R268,790.42	R337,708.28	R443,242.12	R527,458.12	R651,565.91	R820,973.05
Foreman salary per day	R849.50	R895.97	R938.08	R984.98	R1,034.23	R1,085.94	R1,140.24
Total foreman salaries per year	-	R268,790.42	R337,708.28	R443,242.12	R527,458.12	R651,565.91	R820,973.05
Total annual labor salaries	-	R537,580.84	R675,416.56	R886,484.24	R1,054,916.24	R1,303,131.83	R1,641,946.10
Director annual salary	R477,843.97	R503,982.03	R527,669.19	R554,052.65	R581,755.28	R610,843.04	R641,385.20
Project management annual salaries	R364,754.23	R384,706.29	R805,574.96	R845,853.71	R888,146.39	R932,553.71	R979,181.40
Sales & marketing annual salaries	R302,634.51	R319,188.62	R668,380.97	R701,800.02	R736,890.02	R773,734.52	R812,421.25
Manufacturing annual salaries	R270,778.25	R285,589.82	R299,012.54	R313,963.17	R329,661.33	R346,144.39	R363,451.61
Administrative annual salaries	-	-	R132,734.44	R139,371.16	R146,339.72	R153,656.70	R161,339.54
Total annual corporate salaries	R1,416,010.96	R1,493,466.76	R2,433,372.10	R2,555,040.70	R2,682,792.74	R2,816,932.37	R2,957,778.99
Total salaries per year	R1,416,010.96	R2,031,047.59	R3,108,788.66	R3,441,524.94	R3,737,708.98	R4,120,064.20	R4,599,725.10

Figure 33. Other costs forecast

	2018	2019	2020	2021	2022	2023	2024
Production & storage space rent	R167,245.39	R176,393.71	R184,684.22	R193,918.43	R203,614.35	R213,795.07	R224,484.82
Office space rent (furnished)	R71,676.60	R75,597.30	R79,150.38	R83,107.90	R87,263.29	R91,626.46	R96,207.78
Total rent	R238,921.98	R251,991.02	R263,834.59	R277,026.32	R290,877.64	R305,421.52	R320,692.60
Other expenses	R265,468.87	R346,357.24	R489,357.31	R622,091.75	R953,927.84	R1,418,498.36	R1,776,881.34
Total other costs	R504,390.86	R598,348.25	R753,191.91	R899,118.07	R1,244,805.48	R1,723,919.88	R2,097,573.93

Figure 34. Income statement

	2018	2019	%	2020	%	2021	%	2022	%	2023	%	2024	%
Sales	-	R 6,636,722	100	R 8,338,377	100	R 10,944,120	100	R 13,023,503	100	R 16,087,857	100	R 20,270,699	100
Royalties	-	-	-	R 782,276	9.4	R 642,238	5.9	R 905,965	7.0	R 1,330,574	8.3	R 1,976,910	9.7
COGS	-	R 3,235,985	48.8	R 4,065,691	48.8	R 5,336,220	48.8	R 6,350,101	48.8	R 7,844,243	48.8	R 9,883,746	48.8
Gross profit	-	R 3,400,737	51.2	R 5,054,962	60.6	R 6,250,138	57.1	R 7,579,366	58.2	R 9,574,187	59.5	R 12,354,863	61.0
Depreciation	R 123,633	R 123,633	1.9	R 123,633	1.5	R 123,633	1.1	R 123,633	0.9	R 123,633	0.8	R 123,633	0.6
Salaries	R 1,416,011	R 1,493,467	22.5	R 2,433,372	29.2	R 2,555,041	23.3	R 2,682,793	20.6	R 2,816,932	17.5	R 2,957,779	14.6
Marketing & sales	R 862,774	R 995,508	15.0	R 1,420,258	17.0	R 1,592,813	14.6	R 2,037,474	15.6	R 2,548,501	15.8	R 3,225,447	15.9
R&D	R 398,203	R 398,203	6.0	R 530,938	6.4	R 663,672	6.1	R 663,672	5.1	R 929,141	5.8	R 929,141	4.6
Other expenses	R 504,391	R 598,348	9.0	R 753,192	9.0	R 899,118	8.2	R 1,244,805	9.6	R 1,723,920	10.7	R 2,787,793	13.8
Total operating expenses	R 3,305,012	R 3,609,159	54.4	R 5,261,393	63.1	R 5,834,277	53.3	R 6,752,377	51.8	R 8,142,127	50.6	R 10,023,792	49.4
EBIT	-R 3,305,012	-R 208,422	-3.1	-R 206,431	-2.5	R 415,862	3.8	R 826,990	6.3	R 1,432,060	8.9	R 2,331,071	11.5
Financial expenses (8%)	-	R 212,375	3.2	R 212,375	2.5	R 212,375	1.9	R 212,375	1.6	R 212,375	1.3	R 212,375	1.0
EBT	-R 3,305,012	-R 420,797	-6.3	-R 418,806	-5.0	R 203,486	1.9	R 614,615	4.7	R 1,219,685	7.6	R 2,118,696	10.5
Taxes	-	-	-	-	-	R 56,976	0.5	R 172,092	1.3	R 341,512	2.1	R 595,386	2.9
Net profit	-R 3,305,012	-R 420,797	-6.3	-R 418,806	-5.0	R 146,510	1.3	R 442,522	3.4	R 878,173	5.5	R 1,525,461	7.5

Figure 35. Cash flow statement

	2018	2019	2020	2021	2022	2023	2024
Net earnings	-R2,379,608	-R302,974	-R301,540	R146,510	R442,522	R878,173	R1,525,461
Depreciation	R123,633	R123,633	R123,633	R123,633	R123,633	R123,633	R123,633
Working capital	-	R199,102	R250,151	R328,324	R390,705	R482,636	R608,121
Net cash flow from operations	-R2,255,976	-R378,443	-R428,059	-R58,181	+R175,450	+R519,170	+R1,046,504
Purchase of fixed assets	R865,429	-	-	-	-	-	-
Net cash from investing activities	R865,429	-	-	-	-	-	-
Equity	R3,318,361	-	-	-	-	-	-
External funding/ grants	R663,672	-	-	-	-	-	-
Loan	R2,654,689	-	-	-	-	-	-
Repayment of long term debt	-	-R442,448	-R442,448	-R442,448	-R442,448	-R442,448	-R442,448
Net cash from financing activities	+R6,636,722	-R442,448	-R442,448	-R442,448	-R442,448	-R442,448	-R442,448
Net increase/ decrease in cash	+R3,515,318	-R820,891	-R870,507	-R500,629	-R266,998	+R76,722	+R604,056
Cash at beginning of year	-	R3,515,318	R2,694,426	R1,823,919	R1,323,291	R1,056,292	R1,133,015
Cash at end of year	R3,515,318	R2,694,426	R1,823,919	R1,323,291	R1,056,292	R1,133,015	R1,737,071

Figure 36. Franchising financial analysis, Mozambique

	2020	2021	2022	2023	2024
Total sales	MT18,300,060	MT28,426,093	MT41,395,498	MT62,693,482	MT95,511,109
Sales growth	-	55.3%	45.6%	51.5%	52.3%
Projected # of projects	30	40	50	65	85
Projected value per project	MT610,002	MT710,652	MT827,910	MT964,515	MT1,123,660
Inflation rate	16.5%	16.5%	16.5%	16.5%	16.5%
Initial franchising fee	MT905,697	-	-	-	-
Estimated royalties	MT2,003,701	MT1,705,566	MT2,483,730	MT3,761,609	MT5,730,667
Money to borrow in Mozambique	MT1,645,750	MT1,400,875	MT2,040,025	MT3,089,617	MT4,706,913
Money to invest in South Africa	R362,065	R308,193	R448,805	R679,716	R1,035,521
Money to collect in South Africa	R387,410	R329,766	R480,222	R727,296	R1,108,007

Exchange rate: MT1 = R0.22

Interest rate: 21.75%

Figure 37. Franchising financial analysis, Ghana

	2020	2021	2022	2023	2024
Total sales	GH¢1,300,620	GH¢1,890,234	GH¢2,575,444	GH¢3,649,405	GH¢5,201,805
Sales growth	-	45.3%	36.3%	41.7%	42.5%
Projected # of projects	30	40	50	65	85
Projected value per project	GH¢43,354	GH¢47,256	GH¢51,509	GH¢56,145	GH¢61,198
Inflation rate	9.0%	9.0%	9.0%	9.0%	9.0%
Initial franchising fee	GH¢65,283	-	-	-	-
Estimated royalties	GH¢143,320	GH¢113,414	GH¢154,527	GH¢218,964	GH¢312,108
Money to borrow in Ghana	GH¢116,048	GH¢91,833	GH¢125,123	GH¢177,299	GH¢252,719
Money to invest in South Africa	R369,034	R292,030	R397,891	R563,811	R803,647
Money to collect in South Africa	R394,866	R312,472	R425,743	R603,278	R859,903

Exchange rate: GH¢1 = R3.18

Interest rate: 23.50%

Sources

- Achankeng, E. (2003). Globalization, Urbanization and Municipal Solid Waste Management in Africa. Retrieved from http://www.nswaienvi.nic.in/Waste_Portal/Case_Studies/CS_01.04.15/Globalization_Urbanization_and_Municipal_Solid_Waste_Management_in.pdf.
- Anand, R., Kothari, S., and Kumar, N. (2016). South Africa: Labor Market Dynamics and Inequality. Retrieved from <https://www.imf.org/external/pubs/ft/wp/2016/wp16137.pdf>.
- Annual Leave and Holidays. (2017). Retrieved from <http://www.mywage.co.za/main/decent-work/leave-and-holiday>.
- Birkinshaw, M. (2008). A Big Devil in the Shacks. Retrieved from: <https://www.pambazuka.org/governance/big-devil-shacks>.
- Census 2011. (2012). Retrieved from <https://census2011.adrianfrith.com/>.
- Chutel, L. (2016). South Africa's Jacob Zuma May Finally Have to Step Down After a Report Confirms Corruption Allegations. Retrieved from <https://qz.com/825813/south-africas-jacob-zuma-is-exposed-by-a-corruption-report-into-the-guptas-influence>.
- Compensation for Occupational Injuries and Diseases Act. (1993). Retrieved from <http://www.labour.gov.za/DOL/legislation/acts/compensation-for-occupational-injuries-and-diseases/compensation-for-occupational-injuries-and-diseases-act>.
- Construction in South Africa: Key Trends and Opportunities to 2020. Retrieved from <https://www.timetricreports.com/report/cn0270mr--construction-in-south-africa-key-trends-and-opportunities-to-2020/>.
- Cross-Border Insolvency II: A Guide to Recognition and Enforcement. (2012). Retrieved from http://www.insol.org/pdf/cross_pdfs/South%20Africa.pdf.
- Diseñan Sus Propios Bloques de LEGO Para Hacer Viviendas de Plástico. (2016). Retrieved from <http://www.obrasweb.mx/soluciones/2016/07/20/disenan-sus-proprios-bloques-de-lego-para-hacer-viviendas-de-plastico>.
- Doing Business 2017: Ghana. (2017). doi:10.1596/978-1-4648-0948-4.
- Doing Business 2017: Southern African Development Community. (2017). doi:10.1596/978-1-4648-0948-4.
- Ease of Doing Business in South Africa. (2017). Retrieved from <http://www.doingbusiness.org/data/exploreconomies/south-africa>.
- Economic Development. (2012). Retrieved from <http://www.sadc.int/themes/economic-development/>.

- Free Trade Area. (2012). Retrieved from <http://www.sadc.int/about-sadc/integration-milestones/free-trade-area/>.
- Gassner, E. (2014). The Different Types of Plastic Containers. Retrieved from http://msplastics.co.za/the_different_types_of_plastic_containers_infographic_05112014/.
- GDP: Africa. (2017). Retrieved from <https://tradingeconomics.com/country-list/gdp?continent=africa>.
- GDP Growth. (2017). Retrieved from <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>.
- GDP Per Capita: Africa. (2017). Retrieved from <https://tradingeconomics.com/country-list/gdp-per-capita?continent=africa>.
- GEM 2015/16 Global Report. (2016). Retrieved from <http://www.gemconsortium.org/report/49480>.
- Ghana GDP. (2017). Retrieved from <https://tradingeconomics.com/ghana/gdp>.
- Green Planet Recycling. (2017). Retrieved from <http://www.gprecycling.co.za/>.
- Gross Spending on R&D. (2017). Retrieved from <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>.
- Growth in South Africa's Construction Industry to be Driven by Infrastructure Development. (2016). Retrieved from <http://www.airport-technology.com/news/newsreport-growth-in-south-africas-construction-industry-to-be-driven-by-infrastructure-development-4911010>.
- Haig, S., Morrish, L., Morton, R., and Wilkinson, S. (2012). Film Reprocessing Techniques and Collection Schemes. Retrieved from <http://www.wrap.org.uk/sites/files/wrap/Film%20reprocessing%20technologies%20and%20collection%20schemes.pdf>.
- History and Treaty. (2012). Retrieved from <http://www.sadc.int/about-sadc/overview/history-and-treaty/>.
- Housing. (2017). Retrieved from <http://www.gov.za/about-sa/housing%20>.
- ICT and Electronics in South Africa. (2013). Retrieved from <https://www.brandsouthafrica.com/investments-immigration/business/economy/sectors/icte-overview#.WD1aubLhDIU#ixzz4ROTTuJTM>.
- Khumalo, K. (2016). New Housing Finance Bank Set to Open Doors in a Year. Retrieved from <https://www.pressreader.com/south-africa/cape-times/20161118/281938837503179>.

- Key Trends in the South African Economy. (2017). Retrieved from https://www.idc.co.za/images/2017/IDC_RI_publication_Key-trends-in-SA-economy_31-March-2017.pdf.
- Las Casas de Ladrillos de Plástico Tipo LEGO Que Podrás Construir Tu Mismo. (2016). Retrieved from <http://ecoinventos.com/casas-de-ladrillos-de-plastico/>.
- Labuschagne, J. P., et al. (2016). Africa's Changing Infrastructure Landscape: Africa Construction Trends Report 2016. Retrieved from <https://www2.deloitte.com/za/en/pages/infrastructure-and-capital-projects/articles/construction-trends-2016.html>.
- Manuel, T., et al. (2011). National Development Plan: Vision for 2030. Retrieved from <http://www.gov.za/documents/national-development-plan-vision-2030>.
- Mavée, N., Perrelli, R., & Schimmelpfennig, A. (2016). Surprise, Surprise: What Drives the Rand / U.S. Dollar Exchange Rate Volatility? Retrieved from <http://www.imf.org/external/pubs/ft/wp/2016/wp16205.pdf>.
- Mozambique Foreign Currency Ratings Affirmed At 'SD/D'; Local Currency Ratings Affirmed At 'B-/B' With Stable Outlook. (2017). Retrieved from https://www.standardandpoors.com/en_US/web/guest/article/%C2%AD/view/type/HTML/id/1795362.
- Naidoo, D., et al. (2016). SA Construction, 4th Edition. Retrieved from <https://www.pwc.co.za/en/assets/pdf/sa-construction-2016.pdf>.
- A National Minimum Wage for South Africa. (2016). Retrieved from <http://www.treasury.gov.za/publications/other/NMW%20Report%20Draft%20oP%20FINAL.PDF>.
- OANDA Currency Tools. (2017). Retrieved from <https://www.oanda.com/currency/>.
- OECD Data: South Africa. (2016). Retrieved from <https://data.oecd.org/south-Africa.htm>.
- Parby, J. I., et al. (2015). Stocktaking of the Housing Sector in Sub-Saharan Africa. Retrieved from <http://documents.worldbank.org/curated/en/916331468184793126/pdf/101153-v1-revised-PUBLIC.pdf>.
- Ramparsad, S. (2016). Housing Finance in Africa: A Review of Some of Africa's Housing Finance Markets. Retrieved from http://housingfinanceafrica.org/app/uploads/CAHF_Housing-Finance-in-Africa-Yearbook-2016.09.pdf.
- Republic of Ghana Ratings Affirmed At 'B-/B'; Outlook Stable. (2017). Retrieved from https://www.standardandpoors.com/en_US/web/guest/article/%C2%AD/view/type/HTML/id/1828680.
- SADC Overview. (2012). Retrieved from <http://www.sadc.int/about-sadc/overview/>.

- South Africa Long-Term Foreign Currency Rating Cut To 'BB+' On Political And Institutional Uncertainty; Outlook Negative. (2017). Retrieved from http://www.standardandpoors.com/en_US/web/guest/article/-/view/type/HTML/id/1825424.
- South Africa Map. (2013). Retrieved from <https://www.mapsofworld.com/south-africa/>.
- South Africa Population. (2017). Retrieved from <https://tradingeconomics.com/south-africa/population>.
- South Africa Turning the Corner on R&D Spending. (2014). Retrieved from <https://www.brandsouthafrica.com/investments-immigration/science-technology/research-110414#.WD3a3LLhDIU#ixzz4RQgmna>.
- South African Salaries in 2015: What People Earn. (2015). Retrieved from <https://businesstech.co.za/news/general/84863/south-african-salaries-in-2015-what-people-earn/>.
- Tessier, K. (1995). The Challenge of Immigration Policy in the New South Africa. Retrieved from <http://www.repository.law.indiana.edu/cgi/viewcontent.cgi?article=1067&context=ijgls>.
- Tibane, E. (2016). Pocket Guide to South Africa 2015/2016. Retrieved from <http://www.gcis.gov.za/sites/www.gcis.gov.za/files/docs/resourcecentre/pocketguide/PocketGuide15-16new.pdf>.
- Top Industrial Locations in Gauteng. (2014). Retrieved from <https://www.property24.com/articles/top-industrial-locations-in-gauteng/19388>.
- Valdivia, P. (2017). Fabrication of Plastics. Retrieved from <http://www.petervaldivia.com/fabrication-of-plastics/>.
- Waste Management. (2012). Retrieved from <http://www.sadc.int/issues/environment-sustainable-development/waste-management/>.
- The World Factbook: Ghana. (n.d.). Retrieved from <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/gh.html>.
- The World Factbook: Mozambique. (n.d.). Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/geos/mz.html>.
- The World Factbook: South Africa. (n.d.). Retrieved from <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/sf.html>.
- World Urbanization Prospects. (2014). Retrieved from <https://esa.un.org/unpd/wup/publications/files/wup2014-highlights.Pdf>.
- Worldwide Governance Indicators. (2017). Retrieved from <http://info.worldbank.org/governance/WGI/#reports>.