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Assessing the Employment Effects of Investment in Housing in Ghana

Shereen Abbadi, Francis Arthur, Haile Abebe and Maikel Lieuw-Kie-Song



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and Maikel Lieuw-Kie-Song**

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Abbreviations

ARC	Architects Registration Council
BECE	Basic Education Certificate Education
BoQ	Bills of Quantities
BS	British Standard
EmpIA	Employment Impact Assessment
EPWP	Expanded Public Works Programme
EOR	Employment Output Ratio
EC	European Commission
EU	European Union
FTE	Full Time Equivalent
GCE	General Certificate of Education
GHS	Ghanaian Cedi
GOG	Government of Ghana
GPRS	Ghana Poverty Reduction Strategy
GSS	Ghana Statistical Service
HND	Higher National Diploma
ILO	International Labour Organization
KII	Key Informant Interviews
LI	Labour Intensity
mm	Millimetre
MSLC	Middle School Leaving Certificate
MWH	Ministry of Works and Housing
PD	Person-Day
PM	Person-Month
PSHLSB	Public Servants Housing Loan Scheme Board
PVC	Polyvinyl Chloride
RCD	Rent Control Department
SAM	Social Accounting Matrix
SHC	State Housing Corporation
SHCL	State Housing Company Limited
SHS	Senior High School
SSNIT	Social Security and National Insurance Trust
TDC	Tema Development Corporation
USD	United States Dollar

1 Executive Summary

The Government of Ghana is making considerable investment in Social Housing. The Ministry of Works and Housing (MWH) is implementing housing projects in various parts of Ghana and in 2017-18, about 5,126 housing units were under construction. The estimated cost of these current investments is about GHS 789 million (about USD181 million). Furthermore, planned investments until 2020 are estimated at GHS 5,162 million (about USD 1,186 million). The main purpose of this study is to assess the employment impact of these public investments in housing in Ghana

The study was done as part of the Strengthening the Impact on Employment of Sector and Trade Policies (STRENGTHEN) project, a global implemented jointly by the ILO and EC. The study aimed to answer the following questions:

- **How many jobs are created through the construction of social housing?**
- **What kinds of jobs are created?**
- **Who gets the jobs?**
- **How can the employment effects be further enhanced to create more and better jobs?**

In order to answer the questions above, this study reviewed the Government affordable housing in Kpone – Phase 2. The project was implemented by Tema Development Company (TDC) as a construction supervisor and was built by a independent contractors. The study team, in collaboration with TDC, identified three buildings of 8, 16 and 24 units for a detailed assessment. The project as a whole includes the construction of 24 buildings consisting of 280 units and has a value of USD 10.7 million.

Procurement was done through competitive bidding for labour only construction contracts. Under this model, the TDC supplied the materials while the contractor provided the labour for the works. Each building was contracted to a single contractor and TDC provided construction supervision services. All contractors largely utilised traditional labour-intensive technology and did not utilize subcontractors. This study estimated direct employment created by the construction of the Government affordable housing in Kpone – Phase 2 and was well as the indirect and induced employment through a simulation exercise using a Social Accounting Matrix and multiplier analysis.

The study estimated that the direct labour intensity (percentage of project costs paid in wages) of this type of social housing project was 41 %, which is quite high by national and international standards. Using the 2015 Social Accounting Matrix (SAM) for Ghana, the indirect and induced employment effects were also estimated. In order to obtain a more accurate estimate, a separate account for social housing was created in the SAM. This was done using the labour and materials inputs obtained from the on-site study. Multipliers for social housing were calculated and found to be higher than for the construction sector as a whole. Using these multipliers, the employment effects of the planned Social Housing investments of GHC 1,570 million were estimated to be 45,000 direct FTEs, 56,000 indirect FTEs and 72,000 Induced FTEs. It should be noted however that a large part of these FTEs are in agriculture and retail, which are predominant low-income and informal jobs. If these are excluded, approximately 23,000 indirect and 33,000 induced FTEs are created through these investments.

The results can also be expressed in FTE per USD million as done in the table below. This allows for comparisons with other countries.

Type of effect	Value (FTE/ million USD)	FTE/ million (excluding agriculture and retail) sectors)
Direct employment	112	112
Indirect employment	133	81
Induced employment	172	79
Total employment effect	417	272

It should be noted, that even though most of the jobs created on-site would officially be categorized as informal, the wages paid were higher than the average national wage and much higher than the official minimum wage. Considering the breakdown of the jobs created, about half the jobs were categorized as unskilled and taken up by workers with low educational attainment. This is of interest as the construction sector is thus able to absorb these low skilled workers at relatively high productivity and wages. The study also revealed that involvement of women was marginal at well below 1%. The key findings and recommendations emanating from the study are as follows:

Finding 1: The study found that through its investment in Social Housing the Ghanaian government is having an important effect on employment, creating or supporting an estimated 173,000 jobs annually across a range of sectors. About a quarter of these are direct jobs in the construction sector, and the remainder are in other sectors.

Recommendation 1: Given these significant effects, it is important that the government maintains a predictable stream of investments in social housing, and so have a stabilizing effect on employment in the construction and related sectors.

Finding 2: The social housing sector was found to be more labour-intensive than the construction sector on average. While this also implies that workers in social housing are less productive than the average construction sector worker, it should be noted that based on the productivity found for social housing, these workers still fall in the high productive sector category as defined in this report. The relatively high wages of workers in the sector are also reflective of this.

Recommendation 2: The Government should recognize that the direct employment impacts of the social housing sector and use it strategically. Because of the higher labour intensity of social housing, this sector could be used to create jobs in targeted areas especially in times of lower private sector investment in construction. It can also be used to target, relatively low skilled workers and young unemployed men.

Finding 3: There was very little direct employment for women in the project and no employment of women on-site or in low skilled jobs.

Recommendation 3: It is recommended that the relevant project owners put in place measures to promote the employment of women on government infrastructure and construction projects. Experience has shown that employment of women in administrative jobs, as well as engineers and project managers can relatively easily be promoted (ILO, 2016).

Finding 4: Social housing also has strong linkages to the rest of the economy and higher multipliers than the construction sectors as a whole. For every direct FTE created in construction, 3.5 additional FTEs are created: one in a high productivity sector, one in a medium productivity sector, and 1.5 in a low productivity sector.

Recommendation 4: The strong links of social housing to the rest of the economy are very positive for the and it is recommended that the government harnesses these indirect and induced effects by ensuring that the high share of local content is maintained. It is also

recommended that additional work is done to further refine estimates of the induced effects and also to understand what share of these effects are local (in the vicinity of the project) and what share is more national, so that these investments can also be used to stimulate local economies.

Finding 5: Even though there are concerns about much of the quality of employment created, in particular in terms of informality and social security, it is important to note that the wages in the sector were found to be relatively high, at almost three times the minimum wage. Workers with higher skill levels were more likely to have better employment conditions while there were also shortages of certain vocational skills in the sector.

Recommendation 5: The high wages in the sector can be used as an incentive to keep workers in the sector for longer periods while promoting investment in their skills development. Workers with higher skills would respond to existing skills gaps in the sector and be more likely to enter into stable employment and part of multiple projects with the same company.

Finding 6: The majority of workers on the project would be classified as informal workers according to the official definition. Except for accident insurance, they did not have access to any other benefits.

Recommendation 6: The Government of Ghana should use its influence as the biggest client in the construction sector to also demand better working conditions in the sector. Through its contract conditions it can demand adherence to minimum standards and push for measures that would improve conditions for casual workers, levels of formalization, access to health insurance and promote contributions to private savings and pension schemes.

Finding 7: The labour intensity estimated by, is higher than the labour intensity estimated based on the Bill of Quantities. Furthermore, the overall labour intensity of the project was also high compared with previous employment impact studies. If the contractors are not estimating labour correctly or are bidding at prices that are below their actual costs, risks to implementation success and quality are high and could have significant negative impacts. This could also mean that the contractors might be operating with losses which will eventually affect their sustainability.

Recommendation 7: Local stakeholders, including MWH, TDC and the contractors should identify the root causes for the variation between estimated and actual employment, to ensure that labour cost is estimated correctly and that the submitted bids are reasonable. If these discussions indicate that the contractors lack the capacity to estimate and track employment, MWH may consider measures to improve their capacity in this regard. Furthermore, project owners such as MWH and TDC, may consider making their procurement decision based on most realistic costs, and not the lowest bid.

Finding 8: There was poor record keeping, monitoring and reporting of employment on the assessed project. There was also no adequate system in place to monitor the quality of employment. As a result, despite this being a government-funded project, there was no clarity as to whether there was compliance with relevant labour standards and conditions, or how many of the workers were youth.

Recommendations 8: The Ministry of Works and Housing and other local project owners should take measures to improve the monitoring of employment created of future projects, and aggregate this data regularly. These measures could include the use of a unified labour reporting format as part of regular reports expected from the contractors. This

standardised reporting format should be made a requirement in all government-funded contracts. Proposed reporting tables have been included in the annex of this report. Using such reporting tables will allow for consistent aggregation and ensure that the number of direct jobs created can be reported. The aggregation of employment and other project data will also allow the GOG and other stakeholders to accurately estimate the employment impact of future investments in social housing.

Finding 9: This study comes at an opportune time and presents an important contribution to the call of the President and Minister of Finance to assess the employment effects of government projects. It not only provides an estimation of the employment effects of social housing sector, but also serves as an example of how employment on other government project can be assessed and quantified.

Recommendation 9: This study should serve as a contribution to systematically assessing the employment impact of government investments. Similar studies can be done for other sectors and such a continued effort would allow for collecting more data to improve the reliability and accuracy of future estimations. This in turn would allow the government to structure its investment portfolio to have optimize job creation as well as improve the planning of related activities such as skills development, improving labour productivity, access to social protection and efforts to formalize the economy.

2 Background

2.1 Study Background

Strengthening the Impact on Employment of Sector and Trade Policies (STRENGTHEN) is global project implemented jointly by the ILO and EU with the purpose of strengthening the capabilities of country partners to analyse and design sectoral and trade policies and programs that would enhance employment creation in terms of quality and quantity. Consequently, STRENGTHEN, is supporting nine countries in building capacity for assessing the impact of their respective trade and sector policies on employment through the development of robust decision tools. The project consists of two components. Component A focuses on the impact of sector-related policies on employment through conducting Employment Impact Assessments (EmpIA). Ghana is one of the partner countries participating in the project.

The projects also responds to the calls of the President of Ghana who in his 2017 State of the Nation Address called for government funded projects to have 'A deliberate, conscious assessment of their impact on jobs, and evidence for wise public spending to improve the lives of the people, communities and business'. The Minister of Finance echoed this in his 2017 Budget Speech and called for the introduction of a practice of Job Impacts Assessment so that the Government of Ghana is able report on the number of jobs it created through its projects.

The main purpose of this study is to assess the employment impact of public investments in housing in Ghana to answer the following questions:

How many jobs are created through the construction of social housing? This includes estimating the number of jobs (in FTEs) created during the construction and the number of people who actually worked on the project, as well as the numbers of indirect and induced jobs generated in the rest of the economy.

Who gets the jobs? This includes defining the characteristics of the workers receiving employment such as age, sex and level of education.

What kinds of jobs are created? This includes defining the characteristics of employment such as wage levels, benefits and duration, as well as the sectors in which indirect and induced jobs are created.

How much employment is created per USD 1 million of investment in social housing? This was done by estimating the total number of jobs created per USD 1 million invested in housing, as well as per housing unit.

See State of the Nation Address by the President of February 2017
Budget Speech by the Minister of Finance of March 2017.

2.2 Sector Background

2.2.1 Overview of Social Housing Policies

Despite the reduction in the rate of housing deficit, housing remains one of the huge challenges facing the Government of Ghana (GSS, 2014). The policies required to deal with housing challenges had been non-existent or inadequate during the colonial era. Housing initiatives under the colonial era did not consider the indigenous people. But, in 1957 when Ghana attained independence, an extensive building scheme was launched (Asabere, 1994) and the Government of Ghana (GOG) took up the challenge of providing subsidized housing for low income persons since housing was viewed as a fundamental human right of every Ghanaian. This policy, however could not be sustained.

Other initiatives were introduced during the military regime that ruled between 1966 and 1969, and the government that ruled between 1969 and 1972. These initiatives emphasized the provision of low income housing under a liberal market economy. However both initiatives had limited success. In fact, the initiative that was implemented by the government between 1969 and 1972 promoted home ownership, through government financial support, in urban centres targeting low income households. This has been unsuccessful because it left the lowest one-fifth of the population unattended (Choguill, 2007).

During the period between 1972 and 1978, a low-cost housing scheme was developed under a five-year Development Plan (1976 – 1980) which led to the construction of 2,300 experimental low-cost houses in Accra, Kumasi and Sekondi-Takoradi by the State Housing Corporation (SHC). This was an attempt to remove the social and economic injustice prevailing in the housing sector and in recognition of housing as a social service (Agyapong, 1990). The capital base of the corporation was depleted which led to the discontinuation of the social housing programmes. But with the start of the Structural Adjustment and Economic Recovery Programmes in 1983, policy reforms were undertaken to open the housing sub-sector to competition, improve efficiency in housing finance system, and increase housing supply through commercial development, foreign investment, and self-building. This policy, although was expected to enhance the efficiency of the formal private housing market to provide affordable housing, also had limited success since it could not address the housing needs of low-income households in Accra (Sarris & Shams, 1991 Yankson 2012).

In 1995, the National Development Policy Framework, codenamed 'Ghana VISION 2020' was launched. In this policy framework, low cost housing was to be directed towards improving the shelter conditions of the urban and low-income households. However, none of the housing strategies was implemented due to lack of funds, lack of private sector participation, lack of political will and change in government that resulted in a change in policy directions (Acquaah-Harrison, 2004). Following that, 'Ghana Poverty Reduction Strategy' (GPRS) was launched in 2001 and included policies to address the provision of affordable low cost houses through labour-intensive methods. In fact, the GPRS is the first national strategy that considered the use of infrastructure as a vehicle for employment creation using labour-intensive technology.

Utilizing the lessons learnt from previous policies, a National Housing Policy was formulated in 2015 with a vision focusing on the provision of “decent and affordable housing” in addition to “job creation”. Even though job creation was mentioned in section

2.2 under 'Vision', how those jobs were to be achieved were not specifically mentioned neither was any elaboration provided for what was meant in respect of job creation. It was however indicated in section 5.9 (Private Sector Participation) of the policy document that support were to be provided to the Building and Road Research Institute to train artisans and entrepreneurs on the production and use of local building materials, notably bricks, as well as cost saving construction techniques. The Department of Rural Housing has also been active in providing training to rural communities in basic construction skills, local building materials production, wall protection as well as drainage and erosion control measures (MWRWH, 2015). The National Housing Policy includes a nationwide housing programme and projects that have been planned which are under implementation. As of 2016, the Ministry of Works and Housing (MWH) is implementing a number of housing projects in various parts of Ghana. It is expected that these projects will be completed by 2020. In fact, about 5,126 housing units are being constructed under public funding at an estimated cost of GHS789 million (about USD181 million) as indicated in Table 1. In addition to the public financing the MWH has utilized public-private partnership as another option for the provision of housing as shown in the same table below.

Table 1: Ongoing housing projects by MWH

Number.	Project	Description	Location	Start and end dates	Cost and funding source	Status of implementation
1	GoG Affordable Housing Programme	Construction of 1,030 housing units with ancillary facilities at Asokore-Mampong	Asokore Mampong, Ashanti Region	2006 - 2018	GHS275 million GOG and SSNIT	Project is currently 75% complete. Project handed over to SSNIT for completion in November 2015. Estimated completion date is December, 2018
2		Construction of 200 housing units with ancillary facilities in Tamale	Tamale, Northern Region	2006 –2018	GHS40 million GOG and a donor	Project is about 29% complete. Project stalled due to lack of funding. Ministry is currently sourcing for funding for the completion of the project.
3		Construction of 842 housing units with ancillary facilities at Koforidua	Koforidua, Eastern Region	2006 -2018	GHS131 million GOG and a donor	Project is about 25% complete. Project stalled due to lack of funding. Ministry is currently sourcing for funding for the completion of the project.
4		Construction of 144 housing units with ancillary facilities at Wa	Wa, Upper West Region	2006 -2018	GHS45 million GOG and a donor	Project is about 12% complete. Project stalled due to lack of funding. Ministry is currently sourcing for funding for the completion of the project.
5		Construction of 1,400 housing units with ancillary facilities at Kpone	Kpone, Greater Accra Region	2006 - 2018	GHS350million GOG and a donor	Project has been handed over to TDC for completion. Project is about 50% complete.
6	Affordable Housing Project	Construction of 1,502 housing units at Saglemi – Old Ningo	Saglemi, Greater Accra Region	2015 - 2018	GHS870 million GOG	1,024 out of 1,502 housing units of Phase I of the project completed. Project delayed due to non-release of tax exemption and refund.
7	Housing for Public and Civil Servants	Construction of four (4) storey 8-unit flats for Civil Servants	Roman ridge, Greater Accra Region	2015 - 2018	GHS2,5 million GOG	Project is about 68% complete. Project delayed due to the non-release of funds
8	Government Redevelopment Housing Programme	Construction of ten townhouses (Site 1)	Roman ridge, Greater Accra Region	2015 –2018	PPP Initiative	Project is 100% completed. Handing over exercise in progress
9		Construction of four townhouses (Site 2)	Roman ridge, Greater Accra Region	2015 –2018	PPP Initiative	Project is about 90% complete. Project is progressing steadily.
10		Construction of twenty townhouses and 8-unit block of flats (Site 3)	Roman ridge, Greater Accra Region	2015 –2018	PPP Initiative	Project is about 85% complete. Project is progressing steadily.
11		Construction of townhouses and 16-unit block of Flats (Site 4)	Roman ridge, Greater Accra Region	2015 –2018	PPP Initiative	Project is about 80% complete. Project is progressing steadily.
Source: all details included in this table were obtained from a similar table by MWH. <i>Note: Cost of the PPP projects was not available to the research team.</i> <i>1: Expected to completion.</i>						

Once the projects above are completed, MWH is planning to implement additional projects between 2018 and 2020 using public-private partnership as one of the main financing arrangements. In addition to public-private partnership, government will provide direct funding while at the same time soliciting assistance from donors as indicated in MWH Sector Presentation document. The regional distribution of these housing units to be completed in the future is included in Table 2. In addition 1,000 social housing units have been planned for construction nationwide for vulnerable groups including the working poor Kayaye and workers receiving minimum wage with an overall estimated cost of GHS450 million. Considering all projects planned between 2018 and 2020, as presented in table 2, it is estimated that a total investment of GHS5,162 million (About USD 1,186 million) will be invested in housing projects that will benefit about 21,500 families, and this study will aim to estimate the employment impact of these investments. The estimate will be done on an annual basis and the anticipated investment will thus be spread on an annual basis with an average of GHS 1570 million per year.

Table 2: Housing projects planned by MWH between 2018 and 2020

Number	Region	Number of units	Location(s)	Estimated cost (GHS million)	Source of funding
1	Eastern	2,000	Koforidua	550	GOG/Donor
2	Ashanti	3,000	Kumasi	660	GOG/Donor
3	Northern	2,000	Tamale	510	GOG
4	Upper West	2,000	Wa	440	GOG
5	Volta	2,000	Ho	440	GOG/Donor
6	Upper East	2,000	Bolgatanga	440	GOG/Donor
7	Brong Ahafo	2,000	Sunyani	440	GOG/Donor
8	Central	2,000	Cape Coast	440	GOG/Donor
9	Western	3,500	Sekondi- Takoradi	792	GOG/Donor
10	National	1,000	National	450	
	Totals	21,500		45112	

Source: Derived by the authors from MWH documents

2.1.2 Project Cycle

The project cycle includes four main phases: initiation, planning, execution, and closure. Each project is usually initiated by the housing subsector of the MWH in alignment with the government's overall policy framework on housing. During the planning phase, the types of housing units are defined in addition to defining the procurement approach that will be followed. The planning is carried out by the Planning Unit of MWH in collaboration with the Housing Unit. The procurement management is then undertaken by the Housing Unit including required approvals that usually depend on the financing arrangement and the project's scope. The works are normally procured through competitive bidding with the supervision of the works undertaken by either consultants or by MWH in-house teams. In some situations labour-only contracts were used as in the case of TDC projects. The projects are executed by private contractors.

Once the construction is completed, the project is closed. The construction supervisor, need to confirm the completion of works to the required specifications. Additionally, a completion report is usually prepared by the construction supervisor accordingly. Subsequently, inspection and takeover by MWH takes place.

2.1.3 Institutional Setup

Box 1: Goals of MWH

The Ministry of Works and Housing (MWH) is mandated to initiate and formulate policies for the works and housing sector, as well as coordinate, monitor and evaluate the implementation of plans, programmes, and performance of the sector for national development. The development goals of the Ministry are

Development goals of MWH:

- To sustainably manage available resources to improve access to safe, secure, decent and affordable housing to reduce the huge deficit,
- To ensure the sustainable development of infrastructure facilities in the area of flood control systems, drainage, coastal protection works and operational hydrology.

indicated in Box 1. Consequently, the works and housing sub-sectors, along with their relevant agencies fall under the jurisdictions of MWH. In the course of this study, the planning team at the MWH indicated that the implementation strategy for the housing policy is being developed, including employment related strategies.

In order to achieve these development objectives, the Ministry carries out a number of core functions including the initiation and formulation of policies, taking into account the needs and aspirations of the people; undertaking development planning in consultation with the National Development Planning Commission and coordinating, monitoring and evaluating efficiency and effectiveness of the performance of the sector.

The following departments and agencies fall under the housing sub-sector of MWH: Rent Control Department (RCD), Public Servants Housing Loan Scheme Board (PSHLSB), Architects Registration Council (ARC), State Housing Company Limited (SHCL) and TDC Development Company Limited (TDC).

Rent Control Department (RCD), works cooperatively with landlords and tenants to promote optimum peaceful coexistence through education and reconciliation while also providing advice on rent matters in compliance with the Rent Act 220. This function protects tenant from being charged excessive rents.

Public Servants' Housing Loans Scheme Board (PSHLSB) is responsible for the administration of the Public Service Housing Loan facility to assist public servants in acquiring houses.

Architects Registration Council (ARC) is the regulatory body for the architectural profession responsible for securing the highest practicable standards in the practice of architecture in Ghana and the registration of persons within the architectural profession. This ensures that the housing units being provided meet the required standards.

State Housing Company (SHC) is mandated to “increase the availability of dwelling houses in Ghana” by developing, building and managing public housing estates throughout the country.

Tema Development Company Limited is mandated with carrying out on the objects of Tema Development Corporation as per the Tema Development Corporation Instrument 1965 (LI. 469) as amended by Tema Development Corporation (Amendment), 1989 (LI. 1468). It is also to acquire land both in and outside Ghana for real estate development and management, and planning development and construction of towns and cities in and outside Ghana. They also undertake the construction of affordable housing units.

3 Study Approach

3.1 Key questions of the study

As indicated in the background section, the main purpose of this study is to assess the employment impact of public investments in housing in Ghana using a case study approach to answer four main questions as indicated below.

How many jobs are created through the construction of social housing? This includes estimating the number of jobs (in FTEs) created during the construction and the number of people who actually worked on the project, as well as the numbers of indirect and induced jobs.

Who gets the jobs? This includes defining the characteristics of the workers receiving employment such as age, gender and level of education.

What kinds of jobs are created? This includes defining the characteristics of employment such as wage levels, benefits and duration, as well as the sectors in which indirect and induced jobs are created.

How much employment is created per USD 1 million of investment in social housing? This was done by estimating the number of jobs created per USD 1 million invested in housing, as well as per housing unit.

There are three types of employment effects that are usually captured in employment impact assessment studies. The first is **direct** employment, which refers to the employment generated during the construction stage by the construction contractor, subcontractor(s), construction supervisor and project manager. The second is **indirect** employment which refers to the employment generated at the suppliers that provided materials and services to the construction. The third is **induced** employment, which refers to the employment generated elsewhere in the economy as a result of consumption of those who worked on the project directly or indirectly.

3.2 Indicators and definition of employment

All three types of employment are captured using the indicator Full Time Equivalent (FTE). In the context of Ghana what was been defined as the equivalent of 1800 hours worked. As the data obtained from the project did not track hours worked but rather person months, this definition works out to an average of 150 hours worked per month. We have also assumed a 7 hour working day, which reflects the common practice in the sector in Ghana, then this equates to an average of 21.4 days worked per month. For direct employment, other indicators could be estimated including Labour Intensity (LI) and employment per million USD of investment. LI during construction is calculated by dividing the labour wage bill by the total construction cost. While employment per million USD is calculated by dividing direct employment in FTE by the total construction cost in USD million.

3.3 Study methodology

This research used a case study approach to assess direct employment impact. It used multiple sources to capture data and estimate direct employment created accordingly. The approach was implemented in the following five stages.

1. **Defining the projects.** At this stage the consulting team worked with the Ministry of Works and Housing (MWH) to define the projects to be assessed. Two large projects which were considered typical of social housing projects in Ghana were selected for the study. The first is the Government affordable housing in Kpone – Phase 2. The project was implemented by Tema Development Company (TDC) as a construction supervisor and project manager and was built by a number of contractors. The research team, in collaboration with TDC, defined three buildings of 8, 16 and 24 units for assessment.

The second project identified was the Government housing in New Town-Phase 2 which was implemented by the MWH as a construction supervisor and project manager, and was constructed by a single contractor. However, the data collection exercise was abandoned as there was inadequate data available at MWH and the contractor was not willing to share additional required information.

2. **Developing the data collection tools.** The research team developed semi-structured interview guides to be used during the meetings with the contractor, sub-contractor(s), construction supervisor and project manager. The data collection tool also included tables to capture detailed data on direct employment, in addition to supplies and materials used during the construction.
3. **Data collection through interviews and document review.** The research team conducted Key Informant Interviews (KII) with the project managers/ construction supervisors and the contractors implementing the projects. The interviews were used to collect qualitative and quantitative data and were also used to explain the detailed tables related to employment and materials/supplies to the interviewees. The interviewees then worked on completing the tables and returning them to the research team.

The interviews were also supported by visits to the projects' sites, obtaining project documents such as Bills of Quantities (BoQ) and project reports, and requesting detailed data on employment generated and supplies used during the construction. Site visits supported the assessment of the quality of employment and work progress, and helped the study team visualize the size of the work, thus, correlate it to the employment data gathered through the interviews.

BoQ were used to understand the scope of each project, define the construction cost in addition to defining the supplies used during the construction. The BoQ of three buildings assessed as part of the Government affordable housing in Kpone – Phase 2 were detailed and indicating both supplies and labour required by the project. The research team, consequently, updated the original BoQ to capture actual employment and materials utilized during the construction. It is important to mention that employment generated by the contractors was provided to the research team by TDC and the contractors, partially based on memory and supported by some records.

4. **Data analysis.** Qualitative and quantitative data collected was then analysed using spreadsheets (MS Excel) by the research team and presented in this report to answer the four main questions indicated above in relation to direct employment.
5. **Estimation of indirect and induced effects.** To estimate the indirect and induced employment effects, the study relied on a combination of macro data most importantly the Social Accounting Matrix (SAM) for Ghana for 2015 and the Labour Force Survey (LFS) for 2015. This data was complemented by the project data collected as described above. The methodology used is based on deriving multipliers and is described in section 5 and Annex X.

4 Findings

4.1 Description of the project

The Government affordable housing project in Kpone – Phase 2 is located at Kpone in the Kpone-Katamanso district. Kpone is located along the coastal part of Tema in the Greater Accra Region. The topography of the area is generally flat and forms part of the coastal plains. The soil types in the area are sandy, clayey and humus soils. Some portions of the land are very rocky. Kpone lies in the coastal savannah zone of Ghana. It enjoys a dry equatorial climate with a mean annual rainfall ranging between 730 to 790mm. The vegetation zone in the project area comprise shrub and grassland.

The project consists of three different building types with two main designs for the apartments ie 1-bedroom and 2-bedroom apartments, made up of 8, 16 and 24 units. The 8 and 16 units are the 2-bedroom types with the 24 unit being the 1-bedroom type. The total number of buildings in the project is 24 divided as indicated in the table below.

Table 3: Buildings in Government affordable housing project in Kpone, Phase 2

Building type by number of units	8	16	24	Total
Number of buildings	17	3	4	24
Number of units (Apartment)	136	48	96	
Building type	2-bedroom	2-bedroom	1-bedroom	
1-bedroom Apartment				96
2-bedroom Apartment				184
Total number of units				280

The project consists of four storey buildings composed of reinforced concrete beams, columns, slabs, stairs and footings. Code Parameters used in the design of structural elements include British Standard code (BS) 8110 for Concrete design, British Standard code (BS) 8004 for Geotechnical design. Values for permanent and dead loads are also derived from British Standard code (BS) 6399 part 1.

Ceramic tiles were installed for floor and washroom finishes. Doors installed are made of hardwood while louvre blades were used for windows. PVC pipes have been installed to convey waste. There are also inspection chambers with waste pipes. All buildings have electrical accessories, cablings, fittings, consumer units, control gears and power lighting systems.

Most of the materials used in the construction were locally produced with the exception of ceramic tiles, which were imported. All materials used during the construction were bought through bulk purchase contracts/purchase orders that were made based on competitive bidding.

The construction works were procured through competitive bidding for labour only construction contracts. Under this model the project owner supplied all the materials while the contractor provided the labour for the works. Although these contracts were labour only contracts, the contractors were paid based on item of work completed regardless of the actual labour required to construct each item.

Figure 1: A general view of the project site with buildings at different stages of completion.



Figure 2: Two buildings at an advanced stage of completion.



Each building was contracted to a single contractor and Tema Development Corporation (TDC) provided construction supervision services and supplied the materials required for the construction. The contractors provided 'all risk insurance' and performance bond as part of the requirement for signing the contract. All contractors utilised traditional labour-intensive technology and used equipment only for mixing and handling of concrete. Contractors implemented the works in full and did not utilize subcontractors.

Both TDC and the contractors provided data on direct employment generated based on their memory and supported by their observations and extracts from salaries and wages records since requirements for employment tracking and reporting is not part of the construction contracts. The data collected included number of workers, the duration of their employment and the salaries they received. Data on materials utilised, their quantities and unit costs were extracted from TDC's project management records.

The table below (Table 4) summarizes project's total budget and breakdown of the construction and supervision cost per building type and for the project as a whole. The research team, in collaboration with TDC, defined three buildings of 8, 16 and 24 units as a sample for assessment. The cost breakdown below indicates the costs until project completion, and employment generation was estimated until project completion given that the buildings are at different stages of implementation.

Table 4: Cost breakdown of Government affordable housing project in Kpone, Phase 2

Building type	8 units	16 units	24 units
Planned construction period (Month)	12	14	24
Actual construction period (Month)	18	20	24
Degree of completion	100%	85%	30%
Breakdown of construction value in USD ¹ based on BoQ for each building type			
Materials	178,142	365,005	432,772
Labour ²	95,281	196,768	223,422
Equipment	12,389	20,917	19,308
All risk insurance	1,471	2,993	3,425
Performance bond	1,586	3,115	3,494
Water	1,609	4,505	4,827
Project management ³	9,976	11,939	14,545
Health and safety	1,931	4,988	9,654
Transportation	9,847	20,401	23,619
Total	312,232	630,630	735,065
Number of buildings of each type	17	3	4
Construction value in USD ¹ for all buildings within each type	5,307,944	1,891,890	2,940,260
Construction value in USD ¹ for all buildings (A)	10,140,094		
Supervision costs in USD ¹ for all buildings (B)	528,479		
Total project cost (A+B)	10,668,573		
1: Using average exchange rate of 2017 (1 USD=4.3506 GHS).			
2: This is from the BOQ which is not different from the actual amounts paid to the contractor as long as the work items in the BOQ have been executed. Labour was paid based on unit rate of work item and not the actual wages or labour utilized.			
3: Includes site office maintenance, progress photographs and other associated expenses.			

4.2 Direct Employment

As indicated in the previous section, the research team, in collaboration with TDC, defined three buildings for assessment, one of each building type (i.e. of 8, 16 and 24 units). Direct employment of supervision by TDC and construction of each of the three buildings are indicated in Table 6 below. The same table also includes the estimated direct employment generated for the project as a whole including supervision and construction of 17 buildings of 8 units apartment, 3 buildings of 16 units apartments and 4 buildings of 24 units apartment. The duration of implementation for the project as a whole was assumed to be 24 months.

Utilising the data collected from TDC, the direct employment of construction supervision for the project as a whole was found to be 929 person-month split between 62 workers. Since TDC played the role of construction supervisor, and also provided the materials required for construction, TDC's supervision staff included project management and engineering staff, but also procurement and storekeeping staff, among others.

The direct employment for the construction of the **2-bedroom 8 unit block** (8-unit building) was about 717 person-month, split among 87 workers, and reflecting a labour intensity of 71% as summarized in Table 6 below. The majority of the employment created during the construction were in the skilled and unskilled labour categories, accounting jointly for 87% of the employment as indicated in Figure 3.

The direct employment for the construction of the **2-bedroom 16 unit block** (16-unit building) was about 694 person-month, split among 98 workers, and reflecting a labour intensity of 33% as summarized in Table 6 below. Similar to the 8-unit building, the majority of the employment created during the construction were in the skilled and unskilled labour categories, accounting jointly for 83% of the employment as indicated in Figure 3.

The direct employment for the construction of the **1-bedroom 24 unit block** (24-unit building) was about 1,157 person-month, split among 119 workers, and reflecting a labour

intensity of 49% as summarized in Table 6 below. The majority of the employment created were in the skilled and unskilled labour categories, as indicated in Figure 2, accounting jointly for 85% of employment created during the construction.

Figure 1: Direct employment by category, supervision of Government affordable housing project in Kpone, Phase 2

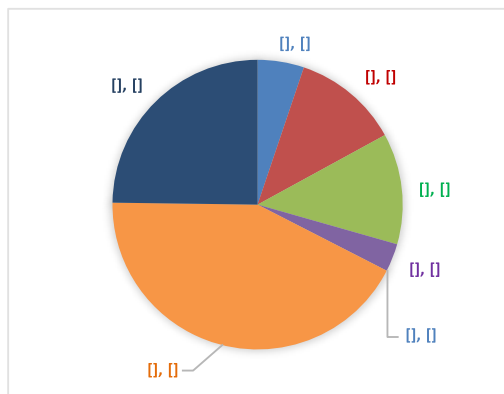


Figure 2: Direct employment by category, construction of 8 unit building, Government affordable housing project in Kpone, Phase 2

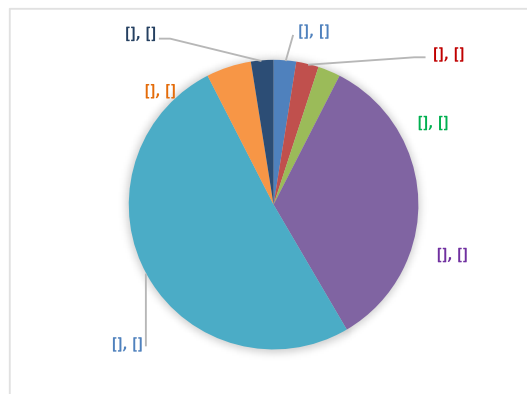


Figure 3: Direct employment by category, construction of 16 unit building, Government affordable housing project in Kpone, Phase 2

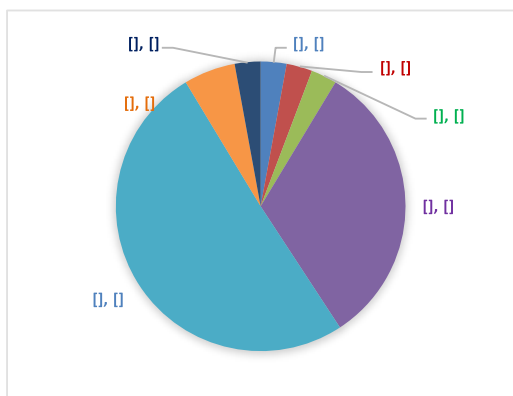
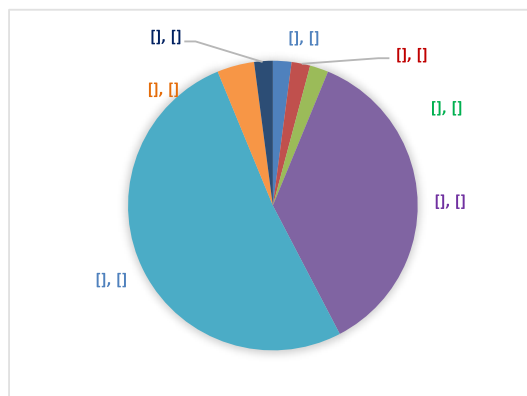


Figure 4: Direct employment by category, construction of 24 unit building, Government affordable housing project in Kpone, Phase 2



Surprisingly, the direct employment generated during the construction of the 8-unit building is higher than that of the 16-unit building. Given that the total project budget of constructing the 8-unit building is smaller, the resulting labour intensity is extremely high when compared to the two other buildings that were assessed. In fact, the labour intensity estimated by the research team for the three sample buildings, based on the employment data provided by TDC and the contractors, is higher than the labour intensity estimated based on the BoQ as indicated in Table 5 below. Implementation delays could explain the additional labour required for construction but it could also indicate that some contractors are not estimating the required labour correctly at the bidding stage and end up employing more workers than budgeted during construction.

Table 5: Comparison of estimated labour intensity with BoQ

Building type	8 units	16 units	24 units
Construction labour intensity based on BoQ	31%	31%	30%
Construction labour intensity based on employment data collected	71%	33%	49%

Given that the project was implemented using traditional techniques with limited use of machinery, it is expected that the majority of employment created was among the skilled and unskilled labour categories. As indicated above, these two labour categories accounted for more than 80% of the total employment created during the construction of all three building types. These labour categories encompass a wide range of jobs including masons, carpenters, electricians, painters, plumbers, steel benders, welders, tilers and machine operators. It is important to mention that 20% of skilled and unskilled labour hired by the contractors were foreign workers, mainly from Nigeria and Togo.

Estimating the overall labour intensity for the project as a whole, takes into account the construction supervision and construction of 17 buildings of 8 units, 3 buildings of 16 units and 4 buildings of 24 units, implemented simultaneously during a total implementation period of 24 months. Utilising the employment data provided to the research team, the resulting project labour intensity would be 60%. This means that 60% of the total project budget was spent on wages. But, if the labour intensity for construction was reduced to 41%, which is the average labour intensity of constructing the 16 and 24-unit buildings, then the overall project labour intensity would go significantly down to 44%. The research team, believe that this labour intensity might still be higher than what would have resulted if the projects were constructed within the planned duration. Consequently, it is of chief importance that the local stakeholders discuss these findings and assess the reasons for the significant difference in labour intensities between the three buildings, and between the labour intensities estimated based on the BoQ and those estimated based on employment data shared with the research team.

The overall direct employment created for the project as a whole, covering the construction of 17 buildings of 8 units 2-bedroom apartment, 3 buildings of 16 units 2-bedroom apartment and 4 buildings of 24 units 1-bedroom apartment and construction supervision, results in a total of 19,828 person-month split among 2,311 workers. But, if the labour intensity for construction of construction was 41%, which is the average labour intensity of constructing the 16 and 24-unit buildings, the total direct employment created by the project would be 14,365 person-months.

The estimated average of wages for construction of the three building types were very close and ranged between USD304 and USD314 per month. On the other hand, the average monthly wage of construction supervision was estimated at USD569 due to the higher wages of the construction supervision team compared to the wages paid by contractors for all job categories.

A large share of employment went to workers who aged between 23 and 30 years and were concentrated in the skilled and unskilled labour categories. The skilled workers and unskilled workers constituted about 34% and 51% of the workforce respectively. The average monthly wage for skilled labour was USD398 and that of unskilled labour was USD287. These monthly wages are 5 to 7 times the minimum wage in Ghana which was about USD60.14 in 2017. In fact, only security guards and cleaners employed by the contractors were receiving a wage that is close to the minimum wage. The average wage of all workers was found to be the equivalent of USD 322 per month or GHC 1401. This close to the average wage of GHC 1180 for the construction sector found in the 2015 LFS.

Minimum daily wage in Ghana for 2017 is GHS9.68 and the monthly salary is estimated based on 27-day month (<https://mywage.org/ghana>)

If adjusted for inflation the average 2015 wage in the construction sector would be GHC 1623. However it is not clear whether wages kept up with inflation over the period, as in both 2015 and 2016 inflation was above 17%.

Engineers and project managers were more experienced and educated than the skilled and unskilled workers and most of them were 35 years of age or older. They also had Bachelor's degrees, which are higher than the minimum education requirement for the job. Although, project managers, engineers and technicians working for the contractors are more experienced than skilled and unskilled workers and they received better benefits including social security, transportation benefits and health insurance, they received a monthly salary that is similar to the average monthly earnings of skilled workers. The wage premium for skilled and unskilled workers could be associated with the limited benefits they receive and the fact that they are mostly hired temporarily. In fact, skilled labour, unskilled labour, administrative staff, security guards and cleaners only benefited from the 'all risk insurance' provided on the construction site. Furthermore, skilled and unskilled workers were hired temporarily or casually while the workers within other categories were employed permanently over the duration of the construction.

It is evident that the construction supervision team is more experienced than the construction team. They also received higher wages and better benefits than the workers employed by the contractors did. In fact, all of the construction supervision staff were permanently employed and benefited from annual and sick leaves, health insurance, transportation allowance and annual performance bonuses.

There was hardly any employment of females on the project. With the exception of few female administrative staff working for TDC, constituting 0.1% of the employment generated, the remaining workers were all males. The majority of them had secondary or lower levels of education. Those who had university or technical education were few and were concentrated in the project management and engineers' job categories. Employment from the project area is encouraged by TDC but is not required by the contract. Neither was the employment of any other vulnerable groups.

In addition to the 'all risk insurance' covering risks on the construction site, the construction contract included special provisions on occupational safety and health. TDC's observations indicates good compliance with wearing self-protective equipment. Furthermore, only few minor accidents and injuries took place during the construction.

Table 6: Direct employment of Government affordable housing project in Kpone, Phase 2

	Direct employment					Characteristics of the workers						Employment characteristics		
	Employment category	Person-month	FTEs ¹	Wage ³ (USD/month)	Number of workers	Age (years)	Gender ³	Education level ⁴		Experience (years)	Experience (years)	Benefits ⁶	Contract type ⁷	
								required	actual					
Supervision	Project managers	48	4	1,716	3	40-45	100% M	B	B	4-24	100% G	SS, PA, PS, HI, TA, AP	100% P	
	Engineers	110	9	1,018	9	30-50	100% M	B	B	5-23	100% G	SS, PA, PS, HI, TA, AP	100% P	
	Technicians	115	10	520	12	30	100% M	B, T	B,T	4-5	100% G	SS, PA, PS, HI, TA, AP	100% P	
	Skilled Labour	29	2	463	5	30-40	100% M	S	S	3-30	100% G	SS, PA, PS, HI, TA, AP	100% P	
	Unskilled Labour	-	-	-	-	-	-	-	-	-	-	-	-	
	Administrative staff	396	33	563	21	25-30	85%M, 15%F	T, S	M, B, T, S	3-18	100% G	SS, PA, PS, HI, TA, AP	100% P	
	Security guards and cleaners	230	19	164	12	25-30	100% M	S, C	S, C	5	100% G	SS, PA, PS, HI, TA, AP	100% P	
Total		929	77	569	62	Labour intensity ⁸ (Supervision)								100%
Construction of 8 unit block	Project managers	18	2	276	1	35	100%M	T	B	5	100% G	SS, HI, TA	100% P	
	Engineers	18	2	276	1	35	100%M	T	B	4	100% G	SS, HI, TA	100% P	
	Technicians	18	2	184	1	35	100%M	S	S	5	100% G	SS, HI, TA	100% P	
	Skilled Labour	244	20	398	35	25-30	100%M	S, N	S, C, N	2-3	80%G, 20%O	RI	100% T	
	Unskilled Labour	365	30	287	46	23	100%M	N	N	0	80%G, 20%O	RI	100% C	
	Administrative staff	36	3	138	2	30	100%M	S	S	2	100% G	RI	100% P	
	Security guards and cleaners	18	2	69	1	30	100%M	N	N	0	100% G	RI	100% P	
Total		717	60	309	87									
Total wages (USD)		221,498				Labour intensity ⁸ (Construction of 8 unit building)								71%
Construction of 16 unit block	Project managers	20	2	276	1	35	100%M	T	B	5	100% G	SS, HI, TA	100% P	
	Engineers	20	2	276	1	35	100%M	T	B	4	100% G	SS, HI, TA	100% P	
	Technicians	20	2	184	1	35	100%M	S	S	5	100% G	SS, HI, TA	100% P	
	Skilled Labour	223	19	396	37	25-30	100%M	S, N	S, C, N	2-3	80%G, 20%O	RI	100% T	
	Unskilled Labour	351	29	287	55	23	100%M	N	N	0	80%G, 20%O	RI	100% C	
	Administrative staff	40	3	138	2	30	100%M	S	S	2	100% G	RI	100% P	
	Security guards and cleaners	20	3	69	1	30	100%M	N	N	0	100% G	RI	100% P	
Total		694	58	304	98									
Total wages (USD)		210,707				Labour intensity ⁸ (Construction of 16 unit building)								33%
Construction of 24 unit block	Project managers	24	2	276	1	35	100%M	T	B	5	100% G	SS, HI, TA	100% P	
	Engineers	24	2	276	1	35	100%M	T	B	4	100% G	SS, HI, TA	100% P	
	Technicians	24	2	184	1	35	100%M	S	S	5	100% G	SS, HI, TA	100% P	
	Skilled Labour	418	35	399	48	25-30	100%M	S, N	S, C, N	2-3	80%G, 20%O	RI	100% T	
	Unskilled Labour	595	50	287	65	23	100%M	N	N	0	80%G, 20%O	RI	100% C	
	Administrative staff	48	4	138	2	30	100%M	S	S	2	100% G	RI	100% P	
	Security guards and cleaners	24	2	69	1	30	100%M	N	N	0	100% G	RI	100% P	
Total		1,157	96	314	119									
Total wages (USD)		363,571				Labour intensity ⁸ (Construction of 24 unit building)								49%
Total for all based on data collected ⁹		19,828	1652	322	2,311	Labour intensity ⁸ (Construction and supervision of all buildings)								60%
Total if labour intensity for construction was 41%		14,365	1,197	326								Labour intensity ⁸	46%	

1: FTEs are obtained by multiplying person-month by 150 hours and divided by 1800 hours.

2: Weighted average of wages of each employment category. Average exchange rate for 2017 was used (1 USD=4.3506 GHS)

3: Percentage of male (M) and female (F) workers in each employment category.

4: Required or actual educational attainment within each employment category: D: Doctorate, M: Master's, B: Bachelor's, P: Professional, T: qualifications midway between secondary and bachelor's, such as agriculture colleges, HND or technical certificates from polytechnics, S: Secondary, Technical/Vocational/Commercial including SHS, GCE O and A level, technical schools, C: BECE/MSLC, N: No education

5: Percentage of each nationality within each employment category where G: Ghanaian, O: Other.

6: Benefits assessed including SS: Social security, PA: Paid annual leave, PS: Paid sick leave, HI: Health insurance, TA: Transportation provided or transportation/fuel allowance, PL: Prenatal leave, AC: Provision of accommodation or partial payment of accommodation, AP: Annual performance bonus, RI: Risk insurance

7: Percentage of each contract type within each employment category P: Permanent through the project duration, T: Temporarily, D: Casual/daily

8: Total wages divided by project cost

9: Includes supervision and construction of 17 buildings of 8 units, 3 buildings of 16 units and 4 buildings of 24 units implemented simultaneously during a total implementation period of 24 months.

10: Assuming a labour intensity for the construction for all buildings at 41% which is the average of labour intensity for the 16 and 24 unit buildings based on data collected. This labour intensity includes supervision and 17 buildings of 8 units, 3 buildings of 16 units and 4 buildings of 24 units, implemented simultaneously during a total implementation period of 24 months.

4.3 Discussion of Findings on Direct Employment

The findings of direct employment, as presented in section 4.2 of this report indicate that the labour intensity of investment in construction of housing in Ghana is significant. The three sample buildings, which were implemented by three different contractors, were part of larger project including 24 buildings and was supervised by TDC.

Unit cost analysis revealed that unit cost of 2-bedroom apartment in the 8unit block is USD 41,063 while that in the 16 unit block is USD 41,469. The unit cost of 1-bedroom apartment is USD 32,244. The average cost per floor area for the 2-bedroom apartment was USD465/sq.m and that of 1-bedroom was USD 333/sq.m. Annex 4 provides the summary of the unit cost computation.

When considering the construction activities only, the estimated labour intensity based on employment data provided by TDC and the contractors, is higher than the labour intensity estimated based on the BoQ. The labour intensity estimated based on the BoQ, as indicated in Table 5, is about 30% for all three building types. On the other hand, the labour intensity estimated by the research team is 33% for the 16-unit building, but it is as high as 49% for the 24-unit building, and as high as 71% for the 8-unit building. When considering the project as a whole, including supervision costs and the construction of 24 buildings, the estimated labour intensity is 60%.

This labour intensity appears high when compared with the labour intensity of the infrastructure sector in general, and buildings in specific. For example, the labour intensity of the infrastructure component of the Expanded Public Works Programme (EPWP) in South Africa was 16% between 2013 and 2014 (EPWP, 2014). The infrastructure works of the EPWP includes building works, electricity supply, road works, sanitation, storm water drains, waste management and water supply (ILO, 2012). The ILO assisted the EPWP in assessing the labour intensity of its infrastructure expenditures for the financial year (2010/2011) and found out that the labour intensity of building works stood at 2.6%.

In 2016, the ILO compiled a data guide for employment impact assessment indicators and considered a number of EmpIA studies. The data guide indicates that the highest labour intensity, estimated by the studies that were considered, was 39% for wastewater works under EPWP (ILO, 2016). The same exercise considered a study that assessed the employment impact of schools' construction in Madagascar and found out that the labour intensity was between 7% and 13%. More recent studies in Jordan found out that investment in routine maintenance of roads using labour-intensive methods could result in a labour intensity of 50% (The World Bank Group, Unpublished). Routine maintenance of roads tends to be labour-intensive since it includes removal, clearing and grubbing of bushes, repairing of side slopes to ensure smooth drainage of storm water, clearing existing culverts, repairing and fixing of road shoulder and filling of surface cracks. All these activities are best done by labour.

A study conducted in 2016 on Labour Intensive Public Works (LIPW) project under Ghana Social Opportunities Project revealed that construction of rural roads in 2015 recorded highest labour intensity of 64.1%. Under the same project, the highest labour intensity for dam construction was recorded at 70%. The high labour intensity under the LIPW could be explained by limited equipment used on the project (Soman Consult, 2016, unpublished).

The labour intensity of the 8-unit building appear extremely high and is very far from the labour intensities estimated for the two other buildings. Delays in implementation, usually lead to additional employment and could partially explain the findings. But given

that the 16-unit building and the 8-unit building were implemented over a period that is six months longer than planned, it would have been likely that both buildings will end up with a labour intensity that is higher than the labour intensity expected based on the BoQ. The findings, nevertheless, indicate that the labour intensity of the 16-unit building is very close to the labour intensity estimated based on the BoQ but that is not the case for the 8-unit building, as indicated in Table 5. If the 8-unit building is considered an outlier and a labour intensity of 41% was assumed, which is the average labour intensity for the 24-unit building and the 16-unit building, the overall labour intensity of the project as a whole goes down from 60% to 44%. Even at 44%, the labour intensity of the project as a whole appears high compared with other studies as indicated in the previous paragraphs. Nevertheless, the research team believe that it is an estimate that is closer to reality especially when the meetings with relevant stakeholders revealed that limited equipment was used during construction.

The research team, consequently, summarized the main findings in Table below and estimated the jobs, in person-month, that can be created as a result of additional investment in social housing based on the findings of this study. The same table includes the employment indicators if the labour intensity of all construction is reduced to 41%. This reduction has a significant impact on the number of jobs created per million USD and per unit. Nevertheless, and given the lack of other research in Ghana to compare with, the reduced figures in the table below might be more realistic.

Using the adjusted figures included in the table below, additional investment in the housing sector could generate 112 FTE of employment per million USD, and 4.3 person-year of employment per housing unit. The figure of 112 FTE per million USD will also be used as the employment output ratio for social housing in the analysis of the indirect and induced effects in Section 5.

Table 7: Summary of findings for Government affordable housing project in Kpone, Phase 2

Building type	8 units	16 units	24 units
Construction cost in USD ¹ based BoQ for each building type	312,232	630,630	735,065
Direct PM ² (Construction only)	717	694	1,157
Labour intensity (Construction only)	71%	33%	49%
Construction cost for the project as a whole ³ (USD ¹) (A)			10,140,101
Supervision cost for the project as a whole (Supervision only) (B)			528,479
Total project cost (A+B)			10,668,580
Direct PM ² (Construction and supervision)			19,828
Labour intensity (Construction and supervision)			60%
Total FTEs			1652
FTEs per million USD			155
Job (in PM ²) per million USD			1,859
Job (in PY ⁴) per million USD			155
Job (in PM ²) per unit ⁵			71
Job (in PY ⁴) per unit ⁵			6
When adjusting the labour intensity of the 8-unit block to 41%			
Direct PM ² (Construction and supervision) for the project as a whole ³			14,365
Labour intensity (Construction and supervision) for the project as a whole ³			44%
Total FTEs			1,197
FTEs per million USD			112
Job (in PM ²) per million USD			1,346
Job (in PY ⁴) per million USD			112
Average output in USD per job (PY ⁴)			,912
Ratio of average output in per job to annual wage (weighted average)			2.3
Job (in PM ²) per unit ⁵			51.3
Job (in PY ⁴) per unit ⁵			4.3

1: Using average exchange rate of 2017 (1 USD=4.3506 GHS).
2: PM stands for person-month
3: Construction of 17 buildings of 8 units, 3 buildings of 16 units and 4 buildings of 24 units
4: PY stands for person-year
5: A total of 280 units.

5 Estimating Indirect and Induced Employment

5.1 Approach used for estimating direct and indirect employment

The indirect and induced employment effects will be estimated using Input/ Output Tables/ SAM multiplier analysis. These methods are commonly used to estimate the impacts of investments on the rest of the economy. Combined with national employment data, it can be used to also estimate impacts on employment. They are commonly used as they are relatively simple and rely on data that is usually available in many countries.

In this approach indirect employment refers to the employment generated by the suppliers that provided materials and services to social housing projects. The indirect effects (backward linkages) will be estimated using the output (Type I) multipliers. Induced employment refers to the employment generated elsewhere in the economy as a result of increased consumption generated through increased income. This will be estimated using Type II multipliers which include the indirect and induced effect and are computed using the SAM. The method for computing the multipliers is presented in more detail in Annex 6.

Box: Multipliers

- The **multiplier** refers to an economic concept that shows how much or by how many times the final output of a given sector would increase if some extra investment/spending is done in other sectors. It also provides an indication of how increase in one area, leads to increases in other areas.
- **Indirect (Type I) multipliers** are computed from the intermediated demand table of the SAM and capture the direct and indirect production effects only. They estimate the impact on the supply chain resulting from a producer of a certain product increasing their output to meet additional demand. These multipliers underestimate the effect on the economy as they do not estimate the induced effects.
- **Induced multipliers (Type II)** are calculated from the whole SAM and in addition to the direct and indirect effects, they include the effects of households spending based on the income earned from the direct and indirect effects – the induced effects. SAM multipliers therefore tend to be larger than input-output multipliers because they capture both production and consumption/income linkages.

The indirect and induced effects could be estimated using the multipliers for the construction sector which includes the social housing construction activities. However, the construction sector aggregates a large variety of construction activities such as roads, ports, oil industry infrastructure and private housing. These are vastly different in terms of both labour and material inputs. Therefore using the construction sector account to estimate the impact of social housing investments is therefore bound to be limited in its accuracy. The approach taken in this study was therefore to create a social housing sector as a subsector of the construction sector. The new social housing account was created as a subaccount of the construction sector in the 2015 SAM. This implies that Social housing was assumed to have been incorporated into the construction sector account of the 2015 SAM, and so the approach was to try and disaggregate construction into social housing and rest of construction. The following assumptions were made when doing so:

- Total output of social housing account was assumed to be equal to total annual government expenditure on social housing as obtained from the Ministry of Housing.

- The technical coefficients were calculated from the inputs purchased from different sectors by social housing. This was obtained from the detailed survey of the social housing projects reviewed, and is presented in Table 7.
- The outputs of the social housing sector were allocated to the saving and investment account, in line with how the outputs of the construction sector are allocated in the SAM.
- The project data presented in Table 6 was used to estimate an employment output ratio, as well as the gender, age and skill composition of employment in social housing.
- There are limitations to this approach as it is recognized that the sample of social housing projects surveyed may not be fully representative of the social housing sector in Ghana. However as pointed out already using the construction sector account to estimate the employment effects also has its limitations as it aggregates the entire construction sector, which includes activities that are also very different from social housing. Therefore, some of the key differences found between the social housing and construction sector as a whole are also presented and discussed.
- Finally as with all methodologies there are limitations and implicit assumptions that need to be understood when applying these. For this type of analysis, the most important ones to be aware are that:
 - It is assumed that in general there are no supply constraints in the economy, and so in this case, the economy will be able to produce the additional inputs generated by the investment in social housing.
 - Related to this, it is assumed that prices are constant, and the increased demand does not lead to price increases
 - Effects are assumed to be proportional- so for example if consumption of households increases, it is assumed that only the magnitude of consumption will increase, but the composition will remain in the same proportions. (i.e. if 25% of household consumption is on food, this is assumed to remain the same if income increases).

The net effect of these limitations is that the results tend to overestimate the effects and so the results need to be interpreted with this in mind. And while these limitations are acknowledged, addressing them requires the use of much more costly and data intensive models.

Table 8 Activities and commodities accounts in the 2015 SAM

Code	Description	Code	Description	Code	Description
maiz	Maize	fore	Forestry	nmet	Non-metal minerals
sorg	Sorghum and millet	fish	Fishing	metl	Metals and metal products
rice	Rice	coal	Coal and lignite	mach	Machinery and equipment
ocer	Other cereals	coil	Crude oil	oman	Other manufacturing
puls	Pulses	ngas	Natural gas	elec	Electricity, gas and steam
gnut	Groundnuts	omin	Other mining	watr	Water supply and sewage
oils	Other oilseeds	meat	Meat, fish and dairy	shous	Social housing
cass	Cassava	fveg	Fruit and vegetable processing	cons	Construction
root	Other roots	foil	Fats and oils	trad	Wholesale and retail trade
vege	Vegetables	gmll	Grain milling	tran	Transportation and storage
sugr	Sugar cane	sref	Sugar refining	hotl	Accommodation and food services
toba	Tobacco	food	Other foods	comm	Information and communication
cott	Cotton and fibers	beve	Beverages	fsrv	Finance and insurance
frui	Fruits and nuts	ptob	Tobacco processing	real	Real estate activities
coco	Cocoa	text	Textiles	bsrv	Business services
coff	Coffee and tea	clth	Clothing	padm	Public administration
ocrp	Other crops	leat	Leather and footwear	educ	Education
catt	Cattle	wood	Wood and paper	heal	Health and social work
poul	Poultry	petr	Petroleum	osrv	Other services
oliv	Other livestock	chem	Chemicals		

5.2 An overview of the Ghanaian social accounting matrix 2015

The multipliers used in this report were derived from the latest social accounting matrix (SAM) available for Ghana, the 2015 SAM(GSS,2017). The 2015 Ghana SAM includes detailed information on 55 production sectors, 56 commodities, 13 factors of production, income and expenditures of rural and urban households by quintile, the government account, and the balance of payments. While the aggregated version of the SAM is presented in Annex 5, Table 8 presents the detailed list of activities and commodities accounts that are included in the SAM and gives a sense of the level of disaggregation. What is clear is that while for agriculture the accounts have been disaggregated to quite some detail, for other sectors like construction these have remained aggregated in a single sector.

5.3 The technical coefficient matrix of social housing and construction sector

When the social housing account of the SAM was created, its transactions and total output were subtracted from those of the construction sector. The technical coefficients were estimated from the project data collected and presented in Table 9. This table captures the materials and supplies used for the construction of each building type and for the project as a whole.

Table 9: Cost breakdown indicating material type and source for Government affordable housing roject in Kpone, Phase 2

	Building type			Material source	Total for all buildings (USD ¹)
	8 units	16 units	24 units		
Breakdown of construction value in USD ¹ based on BoQ for each building type					
<u>Materials</u>	178,142	365,005	432,772		5,854,517
Cement, sand and stones related products	52,479	116,295	120,886	Local	1,724,572
Timber products	41,818	80,103	89,327	Local	1,308,523
Steel products	26,809	55,445	85,832	Local	965,416
Glass products	2,425	4,850	4,989	Local	75,731
Ceramic related products	10,461	20,908	30,854	Imported	363,977
PVC related products	3,657	7,250	9,812	Local	123,167
Paint	8,314	15,795	16,415	Local	254,383
Electrical accessories, cablings, fittings, consumer units, control gears and power lighting systems	32,179	64,359	74,656	Local	1,038,744
<u>Labour</u>	95,281	196,768	223,422		3,103,769
<u>Equipment</u>	12,389	20,917	19,308		350,596
<u>All risk insurance</u>	1,471	2,993	3,425		47,686
<u>Performance bond</u>	1,586	3,115	3,494		50,283
<u>Water</u>	1,609	4,505	4,827		60,176
<u>Project management</u> ²	9,976	11,939	14,545		263,589
<u>Health and safety</u>	1,931	4,988	9,654		86,407
<u>Transportation</u>	9,847	20,401	23,619		323,078
Construction value in USD ¹ for all buildings (A)					10,140,101
Supervision costs in USD ¹ for all buildings (B)					528,479
Total project cost (A+B)					10,668,580
1: Using average exchange rate of 2017 (1 USD=4.3506 GHS).					
2: Includes site office maintenance, progress photographs and other associated expenses.					
Note: there are slight variation in total construction and project value between this table and the table included in section 4.1 as a result of rounding					

The material and labour inputs data of the projects as collected by the survey should then be matched to the SAM sectors in order to be able to insert the inputs into the SAM. This was done using the International Standard Industrial Classification (ISIC) guidance and in consultation with local experts. In principle, the inputs which social housing buys should be matched with and subtracted from the inputs that the construction sector buys in the SAM. This is with the assumption that the social housing investment was already incorporated in the construction sector when the SAM was constructed. The last column of Table 10 presents sectors in the SAM to which the different social housing expenditure was allocated. As indicated, material inputs such as cement, sand, stone and related products were allocated into non-metal minerals account of the SAM. Steel products and electronic accessories allocated in metal and metal related products account, timber products were also allocated into wood and paper products account of the SAM.

Table 10 Integrating the material and factor input of social housing into sectors in the SAM

Material and Labour inputs	Input cost for all buildings (USD)	Input cost for all buildings (GHS)	Input cost for all buildings (in millions of GHS)*	Sectors in the SAM
Cement, sand and stones related products	1,724,572	6,467,145	6.47	Non-metal minerals
Timber products	1,308,523	4,906,961	4.91	Wood and paper
Steel products	965,416	3,620,310	3.62	Metals and metal products
Glass products	75,731	283,991	0.28	Non-metal minerals
Ceramic related products	363,977	1,364,914	1.36	Non-metal minerals
PVC related products (Imported)	123,167	461,876	0.46	Non-metal minerals
Paint	254,383	953,936	0.95	Chemicals and petroleum
Electrical accessories,	1,038,744	3,895,290	3.90	Metals and metal products
Labour	3,103,769	11,639,134	11.64	Labour account
Equipment	350,596	1,314,735	1.31	Machinery and equipment
All risk insurance	47,686	178,823	0.18	Finance and insurance
Performance bond	50,283	188,561	0.19	Finance and insurance
Water	60,176	225,660	0.23	Water supply and sewage
Project management	263,589	988,459	0.99	Construction
Health and safety equipment	86,407	324,026	0.32	Machinery and equipment
Transportation	323,078	1,211,543	1.21	Transportation and storage
Project management (Supervision) costs in USD for all buildings (B)	528,479	1,981,796	1.98	Construction
Total	10,668,576	40,007,160	40.01	

Using the data provided, the technical coefficients for the social housing can be calculated. These are presented in Table 11, alongside the coefficients for the construction sector as a whole. There is a significant difference in the input spending of the construction sector as a whole compared to what was found for social housing alone. For instance, the construction sector spends only 6.5 and 5.4 per cent of its input expenditure on non-metal minerals and wood products respectively, whereas social housing spends 22 and 12 percent of its input spending on non-metal minerals and wood products respectively. Considering the factor inputs, the construction sector spends 9 percent of its input spending on labour inputs, whereas social housing spends 30 percent of its input spending on labour. The biggest difference is that the SAM also shows 63 per cent of construction spending is allocated to the factor capital inputs. This seems high, and probably reflects a common practice of allocating the residual output of the sector to the capital account. These factor payments theoretically represent profit share as well as, purchases of land by the construction sector, as well as the cost of capital associated with the high interest rates in Ghana. For the social housing, the building was done on government land which was thus free to government. Profit margins could also not be determined from the data collected.

Table 11 The technical coefficient of construction and social housing

	Technical coefficients	
	Construction	Social housing
Mining	0.012	0.000
Wood and paper	0.054	0.128
Petroleum	0.006	0.000
Chemicals	0.011	0.025
Non-metal minerals	0.065	0.224
Metals and metal products	0.116	0.197
Machinery and equipment	0.006	0.043
Construction	0.001	0.078
Transportation and storage	0.001	0.000
Labour	0.091	0.305
Capital	0.639	0.000
Total	1	1

5.4 Type I and Type II output multipliers of social housing

Using the input-output (IO) table and the SAM in which the social housing account was integrated, the Type II and Type I output multipliers for social housing were calculated and they were found to be 3.13 and 2.63 respectively. In comparison the Type II and Type I multipliers for the construction sector as a whole were found to be 2.78 and 1.66 respectively. The sectoral breakdown of the social housing output multipliers are presented in Table 12. The third column of table 12 presents the breakdown of the Type I multiplier which capture only the direct and indirect (suppliers) impacts. Most additional output would be in sectors such as non-metal minerals (0.39), chemical and petroleum (0.19), wood and paper products (0.175), metal and metal products (0.33).

The second column of Table 12 presents the Type II multipliers, and the fourth column presents the difference between the two multipliers, thus in fact showing the induced effect. The sectoral breakdown of Type II multipliers, show that the largest consumption effects are found in the agriculture, agro-processing, transportation and storage, financial services, accommodation and food services, and education have now increased significantly.

Table 12 Type I and Type II output multipliers of social housing

	Social Housing			Construction	
Sectors	Type II Multipliers	Type I Multipliers	Type II-Type I	Type II Multipliers	Type I Multipliers
Agriculture, forestry and fishing	0.23	0.12	0.11	0.23	0.05
Mining and quarrying	0.05	0.09	0.00	0.06	0.05
Agro-processing	0.14	0.01	0.13	0.17	0
Textile and clothing	0.04	0.00	0.04	0.05	0
Wood and paper	0.15	0.17	0.00	0.07	0.07
Petroleum and Chemicals	0.16	0.18	0.00	0.16	0.09
Non-metal minerals	0.27	0.39	0.00	0.08	0.11
Metals and metal products	0.23	0.33	0.00	0.14	0.18
Machinery and equipment	0.10	0.10	0.00	0.08	0.03
Other manufacturing	0.01	0.01	0.00	0.02	0.01
Electricity, gas and steam	0.05	0.05	0.00	0.06	0.02
Water supply and sewage	0.03	0.00	0.03	0.04	0
Social housing	1.00	1.00	0.00	-	-
Construction	0.08	0.08	0.00	1	1
Wholesale and retail trade	0.13	0.01	0.12	0.12	0.01
Transportation and storage	0.15	0.02	0.13	0.15	0.01
Accommodation and food services	0.07	0.00	0.07	0.09	0
Information and communication	0.04	0.01	0.03	0.05	0
Finance and insurance	0.04	0.02	0.02	0.04	0.01
Real estate activities	0.03	0.01	0.02	0.03	0
Business services	0.03	0.03	0.00	0.04	0.02
Public administration	0.01	0.00	0.01	0.01	0
Education	0.03	0.00	0.03	0.04	0
Health and social work	0.01	0.00	0.01	0.01	0
Other services	0.05	0.00	0.05	0.06	0
Total	3.13	2.63	0.50	2.78	1.66

5.5 Sectoral employment data and employment-output ratio

The sectoral employment data as presented in FTEs - used in this analysis are based on the Labour Force Survey 2015 which are discussed and presented in the 2015 Labour Force Report (GSS 2016) and the Labour Force Survey data which is available from the GSS. The sectoral output is obtained from the Ghana SAM 2015. The sectoral employment data used are hours worked by those who have their primary occupation in the sector. The total hours worked were converted into Full Time Equivalents (FTE). The definition of FTE used is that one FTE is equivalent to 1800 hours worked. Based on the sectoral employment and output data, the employment to output ratios were computed as presented in Table 13.

Table 13 Employment data and employment-output ratios

	Sectoral employment primary occupation (LFS 2015)	Average weekly hours worked (LFS report 2015)	Total weekly hours worked	FTEs	Sectoral output in million GHS (SAM 2015)	Employment - output ratios (FTEs per million GHS)
Agriculture, forestry and fishing	3,330,089	33.4	111,224,973	3,213,166	29,956	107
Mining and quarrying	74,663	26.3	1,963,637	56,727	30,803	2
Agro-processing	618,175	33.7	20,832,498	601,828	9,598	63
Other food processing	1159	33.7	39,058	1,128	892	1
Textile and clothing	56,279	33.7	1,896,602	54,791	1,155	47
Wood and paper	78,426	33.7	2,642,956	76,352	3,516	22
Petroleum and Chemicals	16,430	33.7	553,691	15,996	10,351	2
Non-metal minerals	29,511	33.7	994,521	28,731	1,205	24
Metals and metal products	21,704	33.7	731,425	21,130	1,265	17
Other manufacturing	9,730	33.7	327,901	9,473	355	27
Electricity, gas and steam	11,105	37.4	415,327	11,998	8,526	1
Water supply and sewage	29,630	33.7	998,531	28,846	4,537	6
Construction	316,368	30.8	9,744,134	281,497	28,370	10
Wholesale and retail trade	1,925,943	39.2	75,496,966	2,181,023	20,067	109
Transportation and storage	252,215	45.4	11,450,561	330,794	22,119	15
Accommodation and food services	405,658	39.3	15,942,359	460,557	11,215	41
Information and communication	46,052	37.2	1,713,134	49,491	8,179	6
Finance and insurance	71,591	42.1	3,013,981	87,071	7,890	11
Real estate activities	6,103	38.3	233,745	6,753	6,068	1
Business services	128,279	41.8	5,360,308	154,853	10,745	14
Public administration	182,442	45.7	8,337,599	240,864	14,831	16
Education	534,379	29.2	15,603,867	450,778	9,039	50
Health and social work	241,238	40.5	9,770,139	282,248	3,576	79
Other services	383,274	33.6	12,878,006	372,031	5,932	63

Note: Total weekly hours were multiplied by 52 weeks and divided by 1800 hours to get FTEs

Note that in order to compute the employment-output ratios, the structure of the sectoral employment data should be the same as the SAM in terms of sectoral classification. However, in the Ghana SAM, there are output data for detailed agricultural crops, forestry, and fishing separately, but there is only one employment dataset containing the sum of all workers in these activities. To resolve the mismatch in the aggregation levels, the output data in the SAM was aggregated up to the level of the employment data. And the implicit assumption in doing so is that, within a group of activities whose output has been aggregated up, the labour intensities of all activities in that group are the same.

It is important to note the large differences in employment output ratios between sectors, and in particular to note the low apparent productivity of the agriculture sector (107 FTEs per 1 million GH output) and wholesale and retail (109 FTEs per 1 million GH output) compared to other sectors. This low productivity in agriculture and wholesale and retail will have important implications for estimating employment effects because any increase in the output will result in a large increase in the estimated number of additional labour required.

In order to also differentiate the employment to output ratio of the social housing sector from the construction sector as a whole, the data from the projects reviewed was used to

estimate the employment to output ratio. For the project it was found that the total labour input was 1197 FTEs and the value of the total output was USD 10.886 million. This implies an employment output ratio of 112 FTEs/ USD million, which is equivalent to approximately 29 FTE / GHS million. This is substantially higher than the 10 FTE/ GHS million for construction sector as a whole as obtained from the national LFS data.

5.6 Findings on indirect employment effects

To estimate the indirect employment effects the social housing investments, first the Type I multipliers which we computed in the previous section were used to obtain the resulting changes in the output of all sectors that produce goods and services that are utilized by the social housing projects. Then these output changes were used to estimate the employment effects by applying the employment-output ratios. This was done for both the social housing project investment which is GH 40 million, as well as the social housing sector as a whole. The results for overall social housing annual expenditure in Ghana of GH 1570 million are presented in Table 14.

In order to differentiate between employment creation in the different sectors which have very different productivity, the sectors were divided into three categories based on the EO ratio. It should be remembered here that the EO ratio is the inverse of apparent productivity. So, sectors with a high EO ratio have low apparent productivity and vice versa. For ease of reference, we will use the terms low, medium and high productivity instead of EO ratios as it is more familiar. Sectors with an EO ratio above 100 FTE/ GHS million were categorised as low productivity. Those between 100 and 25 as medium productivity. And those with an EO ratio of below 25 as low productivity. While there is no hard criteria for these three categories, the main objective is to be able to differentiate from employment created in more productive sectors from that created in sectors that are less productive, generally of poor quality and thus less desirable. Using this breakdown, agriculture and wholesale and retail are high EO sectors with the lowest productivity and most likely lower wages.

The total anticipated direct (Jobs created in social housing itself) and indirect effects of investing GH 1570 million are 101,558 FTEs are created. Of this approximately 45,500 FTEs would be direct employment in social housing construction and thus the total indirect effect would be around 56,000 FTEs. For the project, 1,160 direct and 1427 indirect FTEs would be created. The number of indirect FTEs per one USD million spending on social housing is thus 133.

From a policy perspective of greater interest are the jobs in the medium and low EO ratio sectors such as non-metal minerals (14,600), wood products (5,800), and metal and metal products (3,500), transportation, business services and finance and insurance. These findings are discussed in more detail in section 5.9.

Table 14 Indirect employment effects of social housing investment in Ghana

			Indirect employment effects (FTEs)	
Sectors	Type I Multipliers	Employment to output ratios (FTEs/ GHS 1m)	For the project (FTEs)	For all social housing expenditure in Ghana (FTEs)
Agriculture, forestry and fishing	0.12	107	515	20,208
Mining and quarrying	0.09	2	7	260
Agro-processing	0.01	63	25	984
Textile and clothing	0.00	47	0	0
Wood and paper	0.17	22	148	5,796
Petroleum and Chemicals	0.18	2	11	437
Non-metal minerals	0.39	24	372	14,599
Metals and metal products	0.33	17	220	8,654
Machinery and equipment	0.10	-	-	-
Other manufacturing	0.01	27	11	419
Electricity, gas and steam	0.05	1	3	110
Water supply and sewage	0.00	6	0	0
Social housing (direct jobs)	1.00	29	1160	45,530
Construction	0.08	10	32	1,246
Wholesale and retail trade	0.01	109	43	1,706
Transportation and storage	0.02	15	12	470
Accommodation and food services	0.00	41	0	0
Information and communication	0.01	6	2	95
Finance and insurance	0.02	11	9	347
Real estate activities	0.01	1	0	17
Business services	0.03	14	17	679
Public administration	0.00	16	0	0
Education	0.00	50	0	0
Health and social work	0.00	79	0	0
Other services	0.00	63	0	0
Total FTEs			2587	101,558
Total Indirect FTEs (without jobs in social housing)	2.63	-	1427	56028
Low EO ratio	-	-	831	32,600
Medium EO ratio			39	1,514
High EO ratio			558	21,915

5.7 Findings on induced employment effects

To estimate the induced effects the Type II multipliers were computed using the SAM, then Type I multipliers were deducted to exclude the direct and indirect effects. The multipliers which contains induced effects are presented in the second column of Table 15 and they were used with the employment to output ratios to estimate the induced employment effects at both project level and for the overall annual social housing expenditure in Ghana. At the national level it was found that around 72,000 FTEs of induced employment would be created. At the project level, the social housing investment would create up to 1,836 induced FTEs. This amounts to approximately 172 induced FTEs per million USD.

In order to differentiate between employments in different sectors, the same categories based on the EO ratios were applied. It was found that the low EO ratio jobs which are sectors with high apparent productivity constitute 6 percent of the total FTEs created, medium and high EO ratio sectors on the other hand constitute 40 and 54 percent of the total induced jobs created.

Table 15 Induced employment effects of social housing investment in Ghana

			Induced employment effects (FTEs)	
Sectors	Type I-Type II Multipliers	Employment to output ratios (FTEs/ GHS 1m)	For the project (FTEs)	For all social housing expenditure in Ghana (FTEs)
Agriculture, forestry and fishing	0.11	107	472	18,524
Mining and quarrying	0.00	2	0	0
Agro-processing	0.13	63	326	12,798
Textile and clothing	0.04	47	76	2,979
Wood and paper	0.00	22	0	0
Petroleum and Chemicals	0.00	2	0	0
Non-metal minerals	0.00	24	0	0
Metals and metal products	0.00	17	0	0
Machinery and equipment	0.00	0	0	0
Other manufacturing	0.00	27	0	0
Electricity, gas and steam	0.00	1	0	0
Water supply and sewage	0.03	6	8	299
Social housing	0.00	25	0	0
Construction	0.00	10	0	0
Wholesale and retail trade	0.12	109	522	20,477
Transportation and storage	0.13	15	78	3,052
Accommodation and food services	0.07	41	115	4,513
Information and communication	0.03	6	7	285
Finance and insurance	0.02	11	9	347
Real estate activities	0.02	1	1	35
Business services	0.00	14	0	0
Public administration	0.01	16	6	255
Education	0.03	50	60	2,349
Health and social work	0.01	79	32	1,239
Other services	0.05	63	125	4,923
Total FTEs (Induced employment)	0.50	-	1,836	72,076
Total low EO Sectors (High apparent productivity)	-	-	109	4,273
Total medium EO sectors			734	28,801
Total high EO sectors (Low prod)			994	39,001

As can be expected the sectoral breakdown for the induced employment effects looks different from the indirect effects. And so while employment is in the agriculture and wholesale and retail sectors, again feature prominently in terms of magnitude of employment creation, and important difference is a strong induced effect on employment in the medium EO ratio sectors such as agro-processing, accommodation and food services, education and health and social work sectors. Together these mostly medium EO sectors account for just half of the estimated induced employment effect. These findings and their interpretation are discussed in section 5.9.

5.8 Disaggregating employment effects by gender, age, locality, informality and skills

In addition to the employment data by economic sectors, the 2015 LFS provides detailed information on the percentage distribution of sectoral employment by gender, age, locality, informality and skills. Based on this distribution a breakdown of the indirect and induced employment effect can be estimated. The key assumption behind this is that additional employment created in these sectors will follow a similar pattern as was found in the LFS. In the short-term this assumption seems reasonable. These results were compared with national averages and are presented in tables 16 and 17. More detailed results are presented in Annex 7

Table 16: distribution of indirect and induced effects

	Indirect and Induced effects		National Averages*	
Age	Youth	Non-Youth	Youth	Non-Youth
Percentage	44	56	43	57
Gender	Male	Female	Male	Female
Percentage	53	47	47	53
Location	Urban	Rural	Urban	Rural
Percentage	55	45	53	47
Formality	Formal	Informal	Formal	Informal
Percentage	17	83	13	87

**Computed, based on hours worked data from LFS 2015*

Table 17: Indirect and induced employment for different skill levels.

	Indirect and Induced effects			National Averages*		
Skills	Level 1	Level 2	Levels 3&4	Level 1	Level 2	Levels 3&4
Percentage	5	90	5	6	83	11

** Computed, based on hours worked data from LFS 2015*

With regards to gender, the indirect and induced effects tend the slightly favour males over females, they tend to also be more urban than rural.

From these figures, it appears that the indirect and induced employment tends to be more formal and of higher skill levels than the national averages. This is a positive finding as the indirect and induced employment generated from social housing investments thus tends to be better than average employment in Ghana with respect to these aspects. These findings all seem to support each other in that urban employment is generally more formal, and that males are more likely to be employed formally than females.

With regards to the higher levels of formality in the indirect and induced employment, this is to a large extent due to the induced employment anticipated in the public service, education and health care which are sectors which display much higher levels of formality as compared to the national average.

5.9 Summary and discussion of results

Table 18 presents a summary of the findings presented above. They warrant some further discussion, as it is important that they are interpreted within the limitations of the data available and the methodology used for the analysis.

Table 18 Summary of estimated impact of annual Social Housing Expenditure on employment (FTEs)

	Sectoral Breakdown	Key Characteristics
Direct employment		
45,000	All 45,000 in Construction (High productivity)	All employment in construction sector (high productivity) Average wage USD 322/month, higher than national average and much higher than minimum wage Mostly temporary and official mostly informal (no paid leave) More than 95% male
Indirect employment		
56,000	21,915 in high productivity sectors 1,514 in medium productivity sectors 32,000 in low productivity sectors	40 % of employment in higher productivity sectors (metals and minerals, wood and wood products, transportation, construction) 58 % in low productivity (High EO ratios) informal sectors (agriculture and wholesale and retail, with income levels in wholesale and retail well below average)
Induced employment		
72,000	4,273 in high productivity sectors 28,800 in medium productivity sectors 39,000 in low productivity sectors	6 % in high productivity sectors like metals, non-metal minerals, transportation and public administration. 40 % in medium EO ratio sectors such as education, health and agro processing
Totals		
173,000	71,718 in high productivity 30,315 in medium productivity 71,600 in low productivity	

The direct employment effects were obtained directly from the study and this forms the basis for the estimates of direct employment. An important adjustment made in the macro analysis is to use the employment output ratio obtained from the projects surveyed, and not from the construction sector as a whole. This aligns the direct employment estimated obtained from the multiplier analysis with what was obtained from the survey of the projects. As the employment output ratio is much 2.5 times higher for social housing than for the construction sector as a whole, the direct effects from the IO analysis would have been much lower if the employment output ratio for the construction sector as a whole was used. Concerning the indirect and induced employment, the most important caveat relates to the large projected employment effects in the agriculture and wholesale and retail sectors, and these are discussed further below.

Interpreting employment findings in the different sectors

Indirect and induced effects in the Agriculture sector

Both the indirect and induced employment effects obtained from the analysis have shown a significant employment creation in the agriculture sector. The total indirect and induced employment effect was estimated to be 128,000 FTEs of which around 33% (38,000 FTEs) would be employment created in agriculture. One reason for this high level of projected employment creation is the low productivity in this sector, and so a small increase in agricultural output would require high additional labour input. Two points on this warrant further discussion.

The first is that in this sector one needs to be careful to translate this additional demand for labour into additional jobs. One reason for this is that besides having low levels of productivity, agricultural workers are on average underemployed. Average hours worked in agriculture are only 26.3 hours per week, and so it is likely that most additional demand for labour would lead to these workers increasing their hours worked, and not additional workers entering into the sector. For example if the additional 38,000 FTE of labour input required was provided by the existing 3.3 million workers in agriculture, it would mean that the average number of hours worked by week would increase by 0.4 hours to 26.7 hours worked. This shows that it is likely that most of the additional labour input could be supplied by existing workers, and the number of people and jobs in agriculture would probably not increase significantly.

The second point is that even if the additional demand for labour resulted in more people entering into agricultural employment, this is probably not what is desired from a policy perspective as it results in creating low productivity and (low wage) jobs. Thus, it would not make sense to emphasize this as a positive impact of social housing investments, and it is not recommended to promote social housing because of its indirect job creation effects in agriculture.

Indirect and induced effects in the Wholesale and retail sector

The other sector that shows the biggest indirect and induced impacts is wholesale and retail. Of the 128,000 FTEs, 17% (22,183) are in this sector. Again, this is partially because of the high employment output (low apparent productivity) of this sector of which is even higher than for agriculture at 109 FTE/ GHS million. This needs to be understood in a context where this sector is 91 % informal and can be described as consisting to a large degree of “roaming, hawking and small sales outlets by the side of the road”.

However an important difference in the wholesale and retail sector is that the average number of hours worked is much higher at 39.2 hours per week. This would imply that existing workers would find it more difficult to work additional hours if there was an increase in labour demand, and it is more likely that there would be more people entering the sector. However, an important question here is the extent to which increased output of the sector would require increased labour demand, or could be met by increased productivity. This is hard to ascertain however and would require further research.

Education, public services and health

Large induced employment effects were found in these sectors as the households who increase their income through additional direct and indirect employment spend a large share of their income in consuming good and services from these sectors. However, it is important to take care in the interpretation of these results because the channels through which increased demand is transmitted to the labour market is quite different for these sectors. The reason for this is that these sectors do not function as normal markets, in the way that markets for other goods and services function. For example, it is quite easy to imagine hair salons hiring additional workers quite quickly if there is an increased demand for hairdressing services. However, for a public service like health care, it may take considerably more time for government to respond by hiring additional nurses and doctors if there is an increased demand for health care services. As a result, care should be taken when interpreting these findings as resulting in additional employment in these sectors.

Effects expressed per million USD of investment

In order to compare the employment effects of investments across sectors and countries, it is common to express the results in terms of FTEs created by USD million invested. These results from this study are summarized in Table 19.

Table19 Summary of results expressed in FTE's per million.

Type of effect	Value (FTE/ million USD)	Value (excluding high EO sectors)
Direct employment	112	112
Indirect employment	133	81
Induced employment	172	79
Total employment effect	417	272

6.0 Findings and Recommendations

The findings and recommendations from this study are organized into four categories: employment creation, quality of employment, risk management and the use of Employment Impact Assessments.

6.1 Employment creation

Finding 1: The study found that through its investment in Social Housing the Ghanaian government is having an important effect on employment, creating or supporting an estimated 173,000 jobs annually across a range of sectors. About a quarter of these are direct jobs in the construction sector, and the remainder are in other sectors.

Recommendation 1: Given these significant effects, it is important that the government maintains a predictable stream of investments in social housing, and so have a stabilizing effect on employment in the construction and related sectors.

Finding 2: The social housing sector was found to be more labour-intensive than the construction sector on average. While this also implies that workers in social housing are less productive than the average construction sector worker, it should be noted that based on the productivity found for social housing, these workers still fall in the high productive sector category as defined in this report. The relatively high wages of workers in the sector are also reflective of this.

Recommendation 2: The Government should recognize that the direct employment impacts of the social housing sector and use it strategically. Because of the higher labour intensity of social housing, this sector could be used to create jobs in targeted areas especially in times of lower private sector investment in construction. It can also be used to target, relatively low skilled workers and young unemployed men.

Finding 3: There was very little direct employment for women in the project and no employment of women on-site or in low skilled jobs.

Recommendation 3: It is recommended that the relevant project owners put in place measures to promote the employment of women on government infrastructure and construction projects. Experience has shown that employment of women in administrative jobs, as well as engineers and project managers can relatively easily be promoted (ILO, 2016).

Finding 4: Social housing also has strong linkages to the rest of the economy and higher multipliers than the construction sectors as a whole. For every direct FTE created in construction, 3.5 additional FTEs are created: one in a high productivity sector, one in a medium productivity sector, and 1.5 in a low productivity sector.

Recommendation 4: The strong links of social housing to the rest of the economy are very positive for the and it is recommended that the government harnesses these indirect and induced effects by ensuring that the high share of local content is maintained. It is also recommended that additional work is done to further refine estimates of the induced effects and also to understand what share of these effects are local (in the vicinity of the project) and what share is more national, so that these investments can also be used to stimulate local economies.

6.2 Quality of employment

Finding 5: Even though there are concerns about much of the quality of employment created, in particular in terms of informality and social security, it is important to note that the wages in the sector were found to be relatively high, at almost three times the minimum wage. Workers with higher skill levels were more likely to have better employment conditions while there were also shortages of certain vocational skills in the sector.

Recommendation 5: The high wages in the sector can be used as an incentive to keep workers in the sector for longer periods while promoting investment in their skills development. Workers with higher skills would respond to existing skills gaps in the sector and be more likely to enter into stable employment and part of multiple projects with the same company.

Finding 6: The majority of workers on the project would be classified as informal workers according to the official definition. Except for accident insurance, they did not have access to any other benefits.

Recommendation 6: The Government of Ghana should use its influence as the biggest client in the construction sector to also demand better working conditions in the sector. Through its contract conditions it can demand adherence to minimum standards and push for measures that would improve conditions for casual workers, levels of formalization, access to health insurance and promote contributions to private savings and pension schemes.

6.3 Risk management

Finding 7: The labour intensity estimated by, is higher than the labour intensity estimated based on the Bill of Quantities. Furthermore, the overall labour intensity of the project was also high compared with previous employment impact studies. If the contractors are not estimating labour correctly or are bidding at prices that are below their actual costs, risks to implementation success and quality are high and could have significant negative impacts. This could also mean that the contractors might be operating with losses which will eventually affect their sustainability.

Recommendation 7: Local stakeholders, including MWH, TDC and the contractors should identify the root causes for the variation between estimated and actual employment, to ensure that labour cost is estimated correctly and that the submitted bids are reasonable. If these discussions indicate that the contractors lack the capacity to estimate and track employment, MWH may consider measures to improve their capacity in this regard. Furthermore, project owners such as MWH and TDC, may consider making their procurement decision based on most realistic costs, and not the lowest bid.

6.4 Monitoring employment and the use of Employment Impact Assessments.

Finding 8: There was poor record keeping, monitoring and reporting of employment on the assessed project. There was also no adequate system in place to monitor the quality of employment. As a result, despite this being a government-funded project, there was no

clarity as to whether there was compliance with relevant labour standards and conditions, or how many of the workers were youth.

Recommendations 8: The Ministry of Works and Housing and other local project owners should take measures to improve the monitoring of employment created of future projects, and aggregate this data regularly. These measures could include the use of a unified labour reporting format as part of regular reports expected from the contractors. This standardised reporting format should be made a requirement in all government-funded contracts. Proposed reporting tables have been included in the annex of this report. Using such reporting tables will allow for consistent aggregation and ensure that the number of direct jobs created can be reported. The aggregation of employment and other project data will also allow the GOG and other stakeholders to accurately estimate the employment impact of future investments in social housing.

Finding 9: This study comes at an opportune time and presents an important contribution to the call of the President and Minister of Finance to assess the employment effects of government projects. It not only provides an estimation of the employment effects of social housing sector, but also serves as an example of how employment on other government project can be assessed and quantified.

Recommendation 9: This study should serve as a contribution to systematically assessing the employment impact of government investments. Similar studies can be done for other sectors and such a continued effort would allow for collecting more data to improve the reliability and accuracy of future estimations. This in turn would allow the government to structure its investment portfolio to have optimize job creation as well as improve the planning of related activities such as skills development, improving labour productivity, access to social protection and efforts to formalize the economy.

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Annex 1: Employment Reporting Format

For the reporting month								
Employment category 01: Project managers 02: Engineers 03: Technicians 04: Skilled labour 05: Unskilled labour 06 Administrative staff 07: Security guards and cleaners	Employment type 01: Permanent 02: Temporarily	Job	Men	Women	Work days	Youth share (%)	Locals share (%)	Daily wage

Cumulative since project start									
Employment category 01: Project managers 02: Engineers 03: Technicians 04: Skilled labour 05: Unskilled labour 06 Administrative staff 07: Security guards and cleaners	Employment type 01: Permanent 02: Temporarily	Job	Men	Women	Work days	Youth share (%)	Locals share (%)	Average daily wage	Total wages paid to date

Annex 2: Materials and Supplies Reporting Format

For the reporting month					
Material/supply description	Unit	Quantity used	Unit cost	Source 01: local 02: Imported	Total cost

Cumulative since project start					
Material/supply description	Unit	Quantity used	Average unit cost	Source 01: local 02: Imported	Total cost

Annex 3: List of Meetings

The list below include the individuals with whom meetings were conducted over the course of study for the purpose of data collection.

Name	Position	Entity
John Wardy	Head of Human Resources and Administration	Tema Development Company
Samuel Asante	General Manager/Operations	Tema Development Company
Isaac Tettey	Head-Corporate Planning	Tema Development Company
Akwasi Asare Boachie	Corporate Planning Manager	Tema Development Company
Daniel Ayaim	Internal Audit	Tema Development Company
Emmanuel Darkey	Head-Development	Tema Development Company
Patrick Obeng Asong	Ag. Project Coordinator	Tema Development Company
Hanson Odonkor	Project Manager	Tema Development Company
Dr. Theresa Tufour	Ag. Director -Housing	Ministry of Works and Housing
Rev. Stephen Yaw Osei	Director-Policy, Planning, Budgeting, Monitoring & Evaluation	Ministry of Works and Housing
Sebald Ocloo	Chief Internal Auditor	Ministry of Works and Housing
Alberta S. Kwarko	Director-Research, Statistics & Information Management (RSIM)	Ministry of Works and Housing
A. Osa-Kwao	Deputy Director- RSIM	Ministry of Works and Housing
Dan E Nuru-Hok Yussif	Assistant Programmer	Ministry of Works and Housing
Dede Tetterh-Nartey	Assistant Programmer	Ministry of Works and Housing
Paul E. Ashilekpay	Research Officer	Ministry of Works and Housing
Frederick Lomotey	Asst. Development Planning Officer	Ministry of Works and Housing
Emmanuel Darkwa	Senior Engineer	Ministry of Works and Housing

Annex 4: Summary of Unit Cost Computation

Description	units 8	units 16	units 24	Project Total Cost (USD)
No of Units	17	3	4	
Type of apartment-Bedrooms	2	2	1	
Construction Value	5,307,944	1,891,890	2,940,260	10,140,094
Supervision Cost	276,638	98,601	153,240	528,479
Total Project Cost	5,584,582	1,990,491	3,093,500	10,668,573
Unit cost per block of apartment (one block)	328,505	663,497	773,375	
Number of apartment in a block	8	16	24	
Total cost of apartments on a floor	82,126	165,874	193,344	
Number of apartment on a floor	2	4	6	
Unit cost of apartment	41,063	41,469	32,224	
Floor area (sq.m)	178	355	581	
Cost per floor area(USD/sq.m)	463	467	333	

	Activities	Commodities	Factors	Households	Government	S&I	RoW	Total
Activities	0	242429	0	6974	0	0	0	249403
Commodities	127563	44879	0	81672	22341	38504	55912	370870
Factors	121841	0	63966	0	9020	0	781	195607
Households	0	0	115016	0	1571	0	5025	121612
Government	0	15063	9927	3855	22455	0	2762	54062
S&I	0	0	3804	29111	-3053	2540	8643	41044
RoW	0	68499	2895	0	1729	0	0	73123
Total	249403	370870	195607	121612	54062	41044	73123	

Annex 5: Aggregated Ghana SAM 2015

Source: Aggregated by authors form detailed Ghana SAM 2015

Annex 6: Methodology for calculating multipliers

To compute multipliers used in this report, the study followed the Leontief multipliers analysis and the steps are presented a follow.

A simple SAM structures

	Activities	Commodities	Factors	Households	Government	S&I	RoW	Total
Activities	A11	A12	A13	A14	A15	A16	A17	X_i
Commodities	A21	A22	A23	A24	A25	A26	A27	X_i
Factors	A31	A32	A33	A34	A35	A36	A37	X_i
Households	A41	A42	A43	A44	A45	A46	A47	X_i
Government	.	.	.	.	.	.	.	
S&I	.	.	.	.	.	.	.	
RoW	.	.	.	.	.	.	.	
Total	X_j	X_j	X_j	X_j	X_j	X_j	X_j	

Each element in SAM is represented as A_{ij} , where $i = 1, 2, 3 \dots n$ is the row elements of the SAM, $j = 1, 2, 3 \dots n$ represents the column elements. For instance, in the Ghana SAM Annex X, $A_{21} = 127,563$ which is an intermediate consumption paid by commodities to activities, and $A_{45} = 22,455$ which is an income received by households from the government.

The sum of column cells represents total payment made by a given sector j which is denoted as X_j .

$$X_j = \sum_{i=1}^n A_{ij}$$

Likewise, the sum of rows represents total income received by given sector i , or in other words the total output of a given sector i , and represented as X_i .

$$X_i = \sum_{j=1}^n A_{ij}$$

As indicated earlier, in every standard SAM, the sum of the row elements of a given account or sector should be equal to the column sum of the account.

$$X_j = \sum_{i=1}^n A_{ij} = X_i = \sum_{j=1}^n A_{ij}$$

Based on these two equations, we can now compute the proportional ratio of each input used to produce the total output of a given sector j . This is often referred to as technical coefficient, which is a ratio of inputs required to generate one unit of production of a given sector j . This ratio is given by the quantity of specific inputs A_{ij} which is required for production of sector j divided by the total expenditure X_j of sector j . This proportion is represented as a_{ij} .

$$a_{ij} = \frac{A_{ij}}{X_j}$$

Since this ratio shows the proportion of input required to generate one unit of production in a given sector j , the sum of total a_{ij} should be equal to 1. This is especially should always be the case if the whole SAM is being considered in the analysis instead of the input-output table.

$$\sum_{j=1}^n a_{ij} = 1$$

In the Rwandan specific example as previously presented in table X, we will have technical coefficient matrix as follows. In most SAM and input-output based multiplier analysis this matrix is referred to as the *A matrix*.

Technical Coefficients Matrix (Matrix A)

	Activities	Commodities	Factors	Households	Government	S&I	Row
Activities	a11	a12	a13	a14	0	0	0
Commodities	a21	a21	a23	a24	0	0	0
Factors	a31	a32	a33	a34	0	0	0
Households	a41	a42	a43	a44	0	0	0
Government	a51	a52	a53	a54	0	0	0
S&I	a61	a62	a63	a64	0	0	0
Row	a71	a71	a73	a74	0	0	0
Total sum	1	1	1	1	0	0	0

To compute SAM based multiplier analysis, one or more accounts in the Technical coefficient matrix should be an exogenous account. Traditionally, the Government account, saving and investment account, and rest of the world accounts of the SAM are considered to be exogenous. This is because the expenditure from these three accounts is exogenous (Round 2003). Determining our exogenous accounts will also make the matrix invertible in order to calculate multipliers. In order to compute the Leontief inverse, identity matrix¹ we have created an identity matrix which is identical to the matrix to the technical coefficient matrix.

Identity Matrix (Matrix *I*)

	Activities	Commodities	Factors	Households	Government	S&I	Row
Activities	1	0	0	0	0	0	0
Commodities	0	1	0	0	0	0	0
Factors	0	0	1	0	0	0	0
Households	0	0	0	1	0	0	0
Government	0	0	0	0	1	0	0
S&I	0	0	0	0	0	1	0
Row	0	0	0	0	0	0	1

From these two matrixes we can now calculate the conventional Leontief inverse in order to understand compute output, GDP multipliers and income multipliers. The Leontief multipliers are presented in the table 8 below.

$$L_a x = (I - A)^{-1} * x$$

$L_a x$ = Leontief inverse SAM multipliers

$(I - A)^{-1}$ = The inverse of identity matrix (*I*) minus the technical coefficient matrix (*A*).

x = The vector of exogenous injections

Leontief inverse SAM multipliers

¹ An identity matrix is a square matrix (with same number of rows and columns) with 1 in all of its diagonal cells and zero elsewhere. It has properties identical to those of the number 1 in scalar algebra. In scalar algebra any number multiplied by 1 remains unchanged. In the same way any matrix multiplied by an identity matrix remains unchanged.

	Activities	Commodities	Factors	Households	Government	S&I	Row
Activities	L11	L12	L13	L14	0	0	0
Commodities	L21	L21	L23	L24	0	0	0
Factors	L31	L32	L33	L34	0	0	0
Households	L41	L42	L43	L44	0	0	0
Government	L51	L52	L53	L54	0	0	0
S&I	L61	L62	L63	L64	0	0	0
Row	L71	L71	L 73	L74	0	0	0

Output multiplier = L_{21} ,

GDP multiplier (Value-Added) = L_{31}

Income multiplier= L_{41}