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Employment in Manufacturing and Service Firms in Rwanda

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Preface

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The objective is to increase research capacity and quality, to promote research and collaboration in research, to share gained insights into important policy issues and to acquire a balanced viewpoint of economics and financial policymaking which enables us to identify the economic problems accurately and to come up with optimal and effective guidelines for decision makers. Another important aim of the series is to facilitate communication with development cooperation agencies, external research institutes, individual researchers and policymakers in the East Africa region.

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Abstract

This study analyzes employment and its determinants in the manufacturing and services sectors in Rwanda. As a growing economy in East Africa, it is very important for Rwanda to have good and quality employment in both manufacturing and services sectors as this will have an impact on its economic growth and improving welfare standards. The study also provides practitioners with a better understanding of employment in manufacturing and services sectors in Rwanda. Using the World Bank's Enterprise Survey's database for 2011, the study finds that firm size, the number of establishments that form a firm, wages and social payments and research and development are statistically significant for employment in manufacturing and service firms at the 0.05 per cent level of confidence. These factors can be used in forming public policy with the aim of using manufacturing and service firms as an engine for speeding up the shift from a low-income to a middle-income country as this is the way that the Rwandan economy is heading. The location of a firm, age square, managers' experience, females' experience, national sales and research and development have a positive but insignificant impact on employment in both manufacturing and services sectors. On the basis of these observations we make a number of policy recommendations for promoting the quality of employment.

Keywords: Formal employment, growth, development, manufacturing and services, Rwanda.

JEL Classification Codes: A10 ; D13 ; F01 ; J21 ; O12 ; O55.

1. Introduction

The informal sector refers to a sector which encompasses all jobs that are not recognized as normal or legal income sources and for which income taxes are not paid. While the formal sector encompasses all jobs with normal hours and regular wages where the jobs are recognized as income sources on which income tax must be paid. Our study investigates how this influences economic development, that is, an increase in real output per capita and reduction in poverty. There are two types of informal sector strategies: a) coping strategies (survival activities) which include causal, temporary and unpaid jobs and subsistence agriculture; and b) unofficial earning strategies (illegality in business). These unofficial business activities include tax evasion, avoidance of labor regulations and other government or institutional regulations by a company. We do not consider underground activities like crimes, corruption and activities not registered by statistical offices.

The pace of globalization is much more rapid in employment in manufacturing and service firms and employment in manufacturing and service firms is conceived as an avenue for economic transformation as not all countries have a competitive edge in manufacturing (UNECA, 2015). Employment in Rwanda is sub-divided into two categories -- formal and informal employment in manufacturing and services.

Many researchers have argued that employment in manufacturing and service firms has great implications for the growth and development of a country's economy. Among others, Singh and Kaur (2014) and Wu (2007) claim that India and China have recorded attractive economic growth that is closely associated with the dramatic development of their services sectors.

Within the competitive global village, the Rwandan economy has recorded an annual 8 per cent average GDP growth since 2001; its GDP per capita increased more than three-fold from about US$ 211 per capita in 2001 to US$ 718 in 2014. The services sector spearheaded this strong economic growth journey as it accounted for a bigger share of GDP by 2015 -- 47 per cent of GDP compared to 33 per cent by the primary sector (agriculture, forestry and fisheries) while the growth in manufacturing and service firms was impressive at around 9 per cent by 2014 against 7 per cent for industry and 4 per cent for agriculture.

The main sub-sectors in the services sector are wholesale and trade, transportation, storage and communication services. Trade and transport services contributed to the share of services in GDP at Rwf 159 billion in 1999 which increased to Rwf 784 billion in 2014 of which wholesale and retail trade had Rwf 615 billion in 2014.

Rwanda was ranked second after Mauritius in doing business in sub-Saharan African (SSA) countries in 2013-14; the services sector received a big share of foreign private investments. As a result, 41.4 per cent of foreign private investments were allocated to information and communication technology (ICT) and tourism (12.8 per cent), while others like mining received 13.8 per cent, manufacturing 10.8 per cent and other sectors received a significant 21.7 per cent share of private investments. Meanwhile, as is documented in the Rwandan Vision 2020, manufacturing and services are believed to be the engine for Rwanda's economic development with a growth rate of 13.5 per cent and a contribution of 42 per cent to GDP.

Empirically, our present study analyzes the development of employment in manufacturing and service firms and its determinants in Rwanda. Thus, the prime purpose of our study is analyzing trends in the expansion of manufacturing and service firms in Rwanda and pointing out the factors that are driving its development using survey data covering various parts of employment in manufacturing and service firms. Our findings can be used for initiating additional academic research; they also contribute to the body of knowledge about the role that employment in manufacturing and service firms plays in economic growth in developing countries of which Rwanda is classified as one. Further, our study also sheds light on Rwanda's ambitious target as listed in its Vision 2020 to holistically understand what to concentrate on while considering employment in manufacturing and service firms. Our study also contributes to a better understanding of the employment conditions in Rwanda and how different sectors of the economy contribute to national development and progress.

1.1 Problem Statement

Both formal and informal manufacturing and service firms face many similar issues that affect the end results of their operations. Despite a number of obstacles, the biggest challenge facing the manufacturing sector is lack of skilled trained labor and technology. The manufacturing sector has been beleaguered by obstacles where nearly every news outlet has covered the closing of manufacturing industries, labor disputes between manufacturing firms and their employees or reductions in labor force due to labor shifting off shore. The reputation of manufacturing firms has been marred by low wages and less than desirable working conditions.

2. Literature Review

A literature review shows that a number of researchers and international organizations have supported the role of employment in manufacturing and service firms as a key driver in the growth of an economy in both developed and developing countries. Recently, the United Nations Economic Commission for Africa (UNECA, 2015) affirmed employment in manufacturing and service firms as an avenue for economic transformation as not all countries have a competitive edge in manufacturing firms. Employment in manufacturing and service firms' development is also providing infrastructure which promotes productivity in manufacturing and agriculture sectors.

The services sector is expanding very rapidly. The extraordinary growth of this sector has brought attention to the challenges of effective management of service organizations and their operations which are vastly different from the challenges faced in the manufacturing sector. Due to rapid developments in information technology, globalization, changing customer needs and preferences and the changes in relative wealth between the developed and newly developing economies, the effective management of service systems addressing productivity and quality issues will become even more important in the coming years.

Two reviews in particular (Bryson, 2001; Knight, 1999) and four opinion-based conceptual papers (Clark and Rajaratnam, 1999; Grönroos 1999; Lovelock, 1999; Samiee, 1999) talk about the status of professional services' internationalization before the twenty-first century. Both Knight (1999) and Bryson (2001) ask for more conceptual research and theory building on services' internationalization. One major point that is evident in literature is the lack of a common services classification. Knight (1999) and Bryson (2001) stress the need for clear definitions and taxonomies to be able to discuss similarities and differences between theories and conceptualizations. Samiee (1999) points out that this absence of consensus prevents effective general theory building. One reason for this is the fact that there seems to be larger differences between service industries than between service and manufacturing in general (Nachum and Keeble, 1999).

2.1 Growth and development of the manufacturing and services sectors

The services sector's economic development is the only way of promoting economic structural adjustments and accelerating the transformation of economic growth (Zhou, 2015). A declining share of agricultural employment is a key feature in economic development (Alvarez-Cuadrado and Poschke, 2011). Structural formation usually coincides with a growing role for industry and services in an economy (UNECA, 2015). The growing size of the services sector and its impact on the other parts of the economy makes it all the more important to promote efficiency in the provision of services thereby boosting economy-wide labor productivity as witnessed in the Organization for Economic Cooperation and Development (OECD) member countries.

The slowdown in the services sector has brought down labor productivity in the entire economy from more than 4 per cent in 1976-89 to less than 2 per cent in 1999-2004 (Jones and Yoon, 2008). Acharya and Patel (2015) confirm that the services sector is the fastest growing sector in India, contributing significantly to GDP, economic growth, trade and foreign direct investment (FDI) inflows as the total share of this sector to India's GDP is around 65 per cent.

According to Park and Shin (2012), the general wisdom is that when a country industrializes, the share of industry and services sectors in both GDP and employment increases whereas the share of agriculture falls and when a country de-industrializes and moves into the post-industrial phase, the share of services increases while the shares of both industry and agriculture fall. They found that when computing the contribution of agriculture, industry and services to GDP growth, in general the services sector made the biggest contribution. Further, the lower the per capita GDP, the greater the scope for labor productivity growth in the services sector, which implies that there is still a lot of room for increased growth in the productivity of services.

Literature on this is comprehensive, but Hopenhayn (1992) provides a relatively tractable formulation. In his model, firms differ only in terms of their productivity levels, each of which evolves according to an exogenous Markov process. New firms enter when the distribution from which they draw their initial productivity levels is sufficiently favorable that their expected future profit stream, net of fixed costs, will cover the costs of entry. Firms

exit when they experience a series of adverse productivity shocks, driving their expected future operating profits sufficiently low that exit is their least costly option. All firms are price takers but the prices of their inputs and outputs depend on the number of active firms and their productivity levels.

This model shares a number of implications with other representations of industrial evolution developed by Jovanovic (1982) and Ericson and Pakes (1995). At any point in time, the distribution of firms with different sizes, ages and productivity levels co-exists and simultaneous entry and exit in the norm. Young firms have not yet survived a shakedown process, so they tend to be smaller and exit more frequently. Large firms are the most efficient, on average, so their mark-ups are the largest. Nonetheless, despite all the heterogeneity, equilibria in both Jovanovic's and Hopenhayn's models maximize the net discounted value of social surplus. Thus, market interventions like artificial entry barriers, severance laws or policies that prop up dying firms generally make matters worse.

2.2 The manufacturing and services sectors' contributions to the economy

The rapid expansion of the services sector is principal to contemporary global economic restructuring. This is proven by the fact that the increase in the services sector's share in the global workforce from 24 per cent to 35 per cent between 1965 and 1990 led to its share in the world's domestic product increasing from 50.6 per cent to 62.4 per cent between 1960 and 1990 (Berentsen, 1996).

Olofin et al., (2015) argue that 60-65 per cent of the population in West Africa is still engaged in farming and many are still food insecure. Research confirms a positive relationship between income growth and food security and researchers recommend putting in place policies and programs to ensure quality civil services. However, despite this in sub-Saharan Africa the services sector makes up nearly 60 per cent of GDP and is expected to grow as historical data shows that each 15 per cent increase in services' contribution to GDP is associated with a doubling of incomes per capita. The top-ten African countries by the services sector's share in GDP as reported by UNECA (2015) are Seychelles (81.1 per cent), Djibouti (77.0 per cent), Mauritius (71.5 per cent), Cape Verde (70.3 per cent), South Africa (69.1 per cent), Botswana (61.8 per cent), Senegal (60.1 per cent), Eritrea (60.0 per cent), Lesotho (60.0 per cent) and Gambia (60.0 per cent). Maroto-Sanchez and Cuadra-Ruara (2011) confirm that in the European region, several service industries have shown dynamic productivity growth rates, contributing more than expected to productivity growth.

UNECA (2015) has documented Rwanda's performance in the services sector which shows that service exports grew from US$ 59 million in 2000 to US$ 395 million in 2011. A growth of more than 10 per cent has occurred in wholesale and retail trade, education, finance and insurance and transport, storage and communications since 2007. Over 2000 and 2011, the ICT sub-sector received investments amounting to US$ 552 million, exports of travel services were equivalent to 63 per cent of merchandise and services' exports in 2011. By 2011, FDI stocks in services were the largest at US$ 640.2 million followed by US$ 90.8 million in manufacturing. In the seven-year government program, tourism is expected to grow at a compound annual rate of 25 per cent and by 2014 Rwanda had received 1,137,000

visitors mostly attracted by the Rwanda mountain gorilla, generating US$ 294 million (up from US$ 62 million in 2000).

Employment and income distribution (increasingly, income distribution) are regarded as an essential dimension of national welfare and development (Jarvis, 1974). However, the reorientation of development strategies towards a fuller utilization of labor along the lines sketched earlier will not automatically settle problems of income distribution and will not automatically ensure that those who are able will have an opportunity to use their capacities in production. Participation in the distribution of benefits of growth does not necessarily mean participation in the production of those benefits. But the two are related and that relationship merits a brief exploration if only to ensure that neither is accepted as a proxy for the other in designing development strategies.

The manufacturing sector is often the darling of policymakers in less developed countries (LDCs). It is viewed as the leading edge of modernization and skilled job creation, as well as a fundamental source of various positive spillovers. Accordingly, although many LDCs have scaled back trade barriers over the past 20 years, their industrial sector remains relatively protected (Erzan et al., 1989; Ng, 1996; Schiff and Valdez, 1992: chapter 2). Governments also promote manufacturing with special tax concessions and relatively low tariff rates for importers of manufacturing machinery and equipment.

Chenery (1961) and Kasper (1978) found a secular view of resource allocations because of changes in income and tastes: as incomes increase the demand for primary goods fall so that the percentage of income spent on primary products falls. However, the secondary and tertiary sectors are developed at this stage at the cost of the primary sector. The structural change in Bacon-Eltis appeared because of the rapid growth of the public sector and the resources were shifted from the services sector because of the government's biasness towards services.

There is some evidence of spatial spillovers in private output growth in other countries. Pereira and Roca-Sagalés (2003) estimated a 5.5 per cent rate of return to public capital at the national level in Spain and a significantly positive return in 14 out of 17 Spanish regions. Like Munnel's (1992) findings about the US, they also found that the sum of regional estimates (based on within-region stocks on infrastructure) accounted for less than half of the total effect of public capital as estimated at the national level.

Services can be thought of as an entire industry which is not concerned with the production of manufactured goods. The service industry as a whole comprises of distinct segments such as financial services or telecommunications which are all different (Lovelock, 1983). Economists use this perspective to classify and report on activities in national statistics (Johns, 1999). From a management perspective, however, industry based classification schemes are of little help since they overlook the fact that services' operational characteristics often vary considerably within specific industries and even within organizations.

A service can be seen as an outcome, 'what the customer receives' (Mohr and Bitner, 1995: 239). It has been well documented that services' outcomes share four specific attributes, often referred to as IHIP that distinguish them from manufactured goods: intangibility,

heterogeneity (variability), inseparability of production and consumption and perishability (Sasser et al., 1978; Zeithaml et al., 1985). Although these characteristics are often regarded as the core paradigm in services marketing (Lovelock and Gummesson, 2004) their validity has been subject to heavy criticism (Johns, 1999; Lockyer, 1986; Lovelock and Gummesson, 2004; Sampson and Froehle, 2006; Vargo and Lusch, 2004).

Services can be described as a process (Fisk et al., 1993), 'the manner in which the outcome is transferred to the customer' (Mohr and Bitner, 1995: 239). Shostack (1984) claims that services are processes, 'series of interactions between participants, processes and physical elements' (Tax and Stuart, 1997: 107). As a result of the well-accepted view that manufacturing and service processes are differentiated by the extent of customer influence on the production process, it would seem that research on service operations has been biased towards service environments characterized by a high degree of customer contact (Slack et al., 2004).

2.3 Determinants of growth in the manufacturing and services sectors

Increasingly, contemporary literature on economic growth in economies underlines factors that contribute to the remarkable growth in the services sector. These factors include but are not limited to increasing foreign direct investments, openness of a country's economy, expansion of skill development, quality health services, applying information technologies and increasing consumption expenditure.

In terms of income levels and the business environment, the countries typically labeled developing are a very heterogeneous group. Nonetheless, looking across countries some distinctive features of the business environment become increasingly evident as one moves down the per capita income scale. At the risk of over simplifying, our study begins by mentioning the most striking and widely acknowledged among them.

Market size in some developing economies is quite large, while in most others it is small. Hence, in countries like Brazil, China, India and Indonesia, the size of the domestic market for manufactured products is relatively limited for the production capacity. Further, among the least developed countries, Engel effects (Tybout, 1998) favors basic subsistence needs over all but the most basic manufactured products hence. In this relation transport costs are significant and since OECD countries are distant, demand for more sophisticated manufactured goods is small.

Access to manufactured inputs includes domestically produced intermediate inputs and capital equipment which is also often limited in developing countries. Thus, producers who might easily have acquired specialized inputs if they were operating in an OECD country must either produce with imperfect substitutes or import the needed inputs at extra expense. The latter option is the dominant choice among smaller countries.

Human capital with low rates of secondary education and a scarcity of technicians and scientists also affects the mix of goods manufactured and the factor proportions used to produce them. Similarly, many argue that flexibility in production processes and the ability

to absorb new technologies are directly related to the stock of domestic human capital (for example, Evenson and Westphal, 1995; Keller, 1996; Nelson and Phelps, 1996).

Infrastructure like roads, ports, airports, communication facilities and access to power and water tend to be relatively limited in LDCs. Production techniques are directly affected as are the costs of servicing distant markets. Poor transportation networks are particularly limiting in the least developed, more agrarian economies, where consumers are spread throughout the countryside. In instances where infrastructure services are missing or unreliable, some firms must produce their own power, transport and communication services.

3. Rwandan Manufacturing and Services Sectors

The Rwandan economy is based largely on the rain-fed agricultural production of small, semi-subsistence and increasingly fragmented farms. The country's population is increasing. However, this increase in population steadily weakens poor households which depend solely on agriculture for their livelihood as most Rwandans are cultivators. The manufacturing sector is growing at a high rate. The government has created special economic zones where all manufacturing industries are located. The main services sub-sectors and contributors to the growth of the services sector are tourism, transport, banking services and telecommunications.

According to a report of the Ministry of Finance and Economic Planning (MINECOFIN, 2013-14), the manufacturing sector was growing at high rate due to the facilities that were made available. This is also a priority in 2017-18. The 2017-18 budget lays the ground for key areas for infrastructure development, promotion of Made in Rwanda products and manufacturing schemes in the country.

The 1994 genocide decimated Rwanda's fragile economic base, severely impoverished the population particularly women and temporarily stalled the country's ability to attract private and external investments. However, Rwanda has made substantial progress in stabilizing and rehabilitating its economy to pre-1994 levels. GDP has rebounded with an average annual growth of 7-8 per cent since 2003 and inflation has been reduced to a single digit. Nonetheless, according to government statistics, in 2015, 39 per cent of the population lived below the poverty line as compared to 57 per cent in 2006.

Rwanda is a land-locked country that is located in East Africa and is part of the East African Community (EAC). Rwanda joined EAC by aligning its budget, trade and immigration policies with its regional partners. Through manufacturing and service firms, the Government of Rwanda is seeking to become a regional leader in information and communication technologies. The government has embraced an expansionary fiscal policy to reduce poverty by encouraging manufacturing and services sectors in different fields like education, infrastructure, foreign and direct investment and pursuing market oriented reforms. In 2012, Rwanda completed the first modern special economic zone (SEZ) in Kigali; this is an industrial zone area. The SEZ seeks to attract investments in all sectors, but specifically in agribusiness, information and communication, trade and logistics and mining and construction.

In the second quarter of 2016, Rwanda's GDP at current market prices was estimated to be Rwf 1,549 billion, up from Rwf 1,428 billion in the same quarter in 2015. The services sector contributed 48 per cent of GDP while the agriculture sector contributed 33 per cent of GDP. The industry sector contributed 13 per cent of the GDP and 6 per cent was attributed to adjustments for taxes and subsidies on products. In 2016 Q2, estimates in 2011 prices show that the GDP was 5.4 per cent higher in real terms compared to the same quarter in 2015. In this quarter, the agriculture sector grew by 3 per cent and contributed 0.9 percentage points to overall GDP growth. Activities in the industry sector decreased by 2 per cent and contributed -0.3 percentage points. The services sector increased by 9 per cent and contributed 4.4 percentage points to the overall GDP (NISR, 2016).

3.1 Development of manufacturing and services by economic activity

The distribution of businesses by economic activity in Rwanda shows that the manufacturing and services sectors achieved positive growth in both rural and urban areas. The main sub-sectors in the services sector that showed more than 30 per cent growth include accommodation and food services, human health and social work activities and art, entertainment and recreation activities. According to Singh and Kaur (2014) rapid urbanization is a key factor which contributes to the growth of manufacturing and services sectors and leads us to analyze this growth of the services sector in urban and rural areas in Rwanda in 2011-14.

According to NISR (2014) the services sector grew at a higher rate. The average growth of the services sector's sub-sector of accommodation and food was 34 per cent between 2011 and 2014 in private establishments and the business oriented mixed sector by economic activity. It is obvious that accommodation and food services as a sub-sector is growing faster in rural areas than in urban areas and the growth of this sub-sector contributed to the overall growth of the services sector.

Overall, Rwanda's economy grew at 7.5 per cent in 2010, 2 per cent higher that the East African Community's and even more than sub-Saharan Africa's. During 2010 the services and industrial sectors progressed in their growth recovery. Compared to most other African countries, manufacturing in Rwanda is small and includes firms with very different capabilities: small firms that cater to local markets and more modern large firms some of which also export. The share of manufacturing fell from 12 per cent in 1997 to 6.7 per cent in 2010. However, in 2006-09, this share was 6.8, 6.1 and 6.4 per cent respectively. In 2000-06, the share of employment in manufacturing increased from 1.7 per cent to 3.3 per cent to total employment (NISR, 2005-06).

The Rwanda Development Board's (RDB) mandate is to promote private sector development by promoting investments. To attract requisite investments, it is important to ensure that the country has the right quantity and quality of skills to support emerging and growing industries. The Human Capital and Institutional Development (HCID) Department at RDB supports the private sector by developing mechanisms to ensure that there are adequate skills available which also have the right quality. The figures from the Establishment Census show the size distribution of firms (including manufacturing,

construction and mining) across five categories of size. In all, there are 325 manufacturing firms in Rwanda with more than 10 employees.

3.2 Rwanda's GDP at current prices (in US dollars)

GDP measures the national income and output of a country's economy. GDP is equal to the total expenditure on all final goods and services produced within the country in a stipulated period of time.

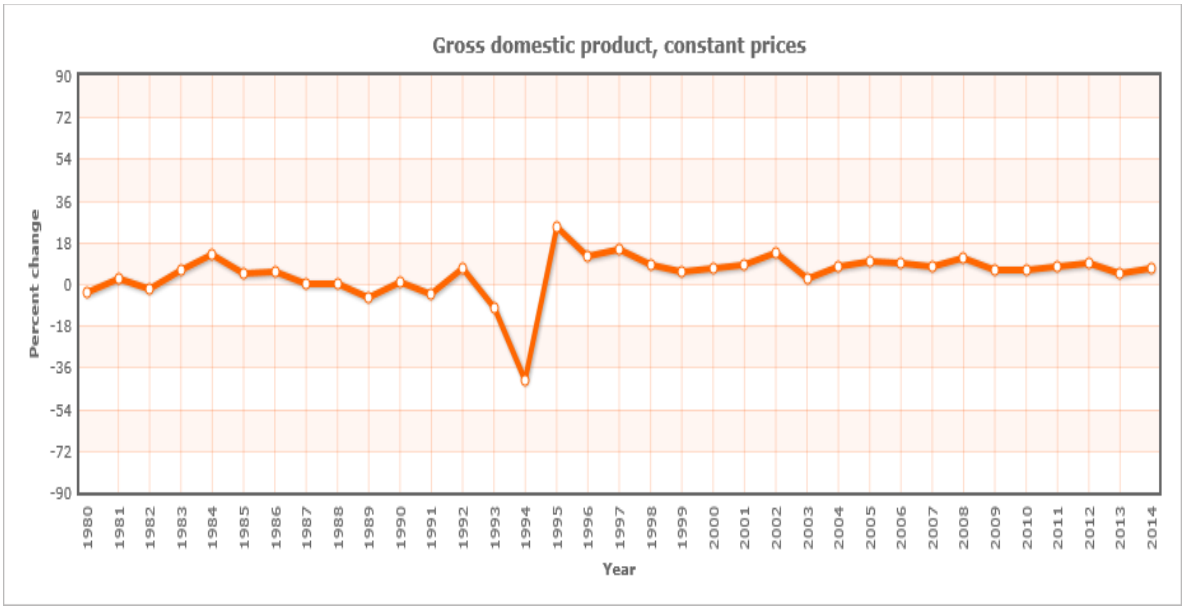
Rwanda's GDP was US$ 8.10 billion in 2015 which represented 0.01 per cent of the world economy. GDP in Rwanda averaged US$ 2.03 billion from 1960 until 2015, reaching an all-time high of US$ 8.10 billion in 2015 and a record low of US$ 0.12 billion in 1961.

In 2006-16, Rwanda's GDP in current prices (in billion USD) increased at a high rate. Since Rwanda is looking at going forward in development, the private sector which is still largely informal, will have to play a bigger role in ensuring economic growth. Poor infrastructure and lack of access to electricity are some major constraints to private investments. As Rwanda's investments rely significantly on foreign aid, stable inflows of this are critical for keeping the current high investment rate at around 25 per cent of GDP (Figure 1).

Figure 1: Rwanda's GDP in current prices (in US dollars)

Source: Trading economics/The World Bank

Figure 2: GDP, Constant prices (1990-2014)



Source: International Monetary Fund, World Economic Outlook Database (April 2015).

The annual percentages of constant GDP prices are year-on-year changes; the base year is country specific. The GDP is at constant prices, the price was changed as percentage change. In 1980-88, the prices were 18 per cent. But in 1988-92, the prices started changing slightly to below zero (0). In 1992-94, there was an economic down fall due to the 1994 genocide in Rwanda. The prices went negative (– 40) and this led the economy into difficulties. After the genocide in 1994, the economy started growing in 1994-95 from almost zero with the support of internal and external donors. In 1995-2014 there were some changes in the economy with the support of funds from different sources including the African Development Bank, the World Bank, IMF and revenues from within the country (see Figure 2).

3.3 The Rwandan labor market and regulations

This section analyzes employment outcomes in manufacturing and service firms in Rwanda and how these vary for women and men and for youth employment rates, the extent and size of employment, the skill status of employed people and the earnings of those in paid employment both in manufacturing and service firms. Using current International Labor Organization (ILO) definitions, only 4.1 per cent of working age youth (between the age of 16 to 35 years), are considered unemployed (Laterite, 2015).

Many of those who are engaged in subsistence agriculture need to work in multiple jobs to earn enough. But the most pressing challenge faced by the youth is that of unemployment as

two- third of the youth work less than 35 hours per week -- the threshold for under-employment in Rwanda. Their wages are significantly lower than adult workers and a higher share of the youth population is employed in informal jobs. However, the new program Made in Rwanda in the manufacturing sector has reduced the rate of unemployment.

The labor law of 2009 regulates labor in Rwanda. It establishes fundamental rights at work, regulates various aspects of employment, general working conditions, salaried formal sector workers, leave, occupational safety and health, organization of workers and employers, collective agreements and labor disputes. The law also established the labor inspectorate, the Ministerial Labor Directorate and the National Labor Council. According to the law workers' representatives are to be elected in firms employing at least 10 workers.

3.4 Wages in Rwandan manufacturing and service firms

The Wage Indicator Data Report (Besamusca et al., 2012) gives the results of the face-to-face wage indicator survey conducted in Rwanda in 2012. The survey's aim was measuring in detail the wages earned by Rwandan workers for which 2,074 persons were interviewed in towns in all provinces in the country. The workers lived in households with four members including themselves on average. Almost half of the workers lived with a partner and children. Some 4 per cent of the workers had no formal education; two in 10 had stopped at elementary education; 44 per cent had completed secondary education; 6 per cent had reached post-secondary education; and 26 per cent had tertiary education. On a scale of 1=dissatisfied to 10=satisfied, workers rated their satisfaction with life at 5.9 on average.

In the sample, 29 per cent of the workers were self-employed, 24 per cent were employees with permanent contracts, and 24 per cent had fixed-term contracts and 23 per cent had no contracts. On average, the workers had worked for 9.5 years. Over half of the people had worked in an organization with 10 or fewer employees, one in three had worked in an organization with 11-50 employees, 7 per cent in businesses with 51 to 100 employees and 11 per cent in businesses employing over 100 people. Up to 55 per cent of the workers in the sample reported being employed as managers (business owners including micro-enterprises), 12 per cent were service and sales workers, 11 per cent had worked in elementary occupations and 10 per cent as clerical support workers.

Over four in 10 respondents worked in trade, transport and hospitality; 27 per cent in agriculture, manufacturing and construction; 18 per cent in the public sector; and 15 per cent in commercial services. On average, the respondents worked 60 hours per week or for 5.9 days. Some 42 per cent of the workers reported working shifts, 39 per cent worked evenings, 56 per cent worked Saturdays and 36 per cent worked Sundays. Some 39 per cent stated that they were entitled to social security, whereas 46 per cent contributed to social security. Less than two in 10 workers said that they had no agreed working hours, 60 per cent had agreed working hours in writing and 22 per cent had verbally agreed working hours. Up to 82 per cent of the workers reported receiving their wages on time, 53 per cent received wages in a bank account, 46 per cent got cash in hand and 1 per cent were paid in kind. On a 5-point informality-index, ranging from 1= very informal to 5= very formal, 39 per cent of the

workers were in the lowest category in the index, whereas 18 per cent were in the highest category. (Besamusca et al., 2012, p.13).

The median net hourly wage of the total sample was 450 Rwf: 26 per cent of the workers earned less than 150 francs per hour, another 24 per cent earned between 150 and 450 francs, 29 per cent between 450 and 1,350 francs and the remaining 21 per cent earned more than 1,350 francs per hour. Employees with permanent contracts had the highest earnings by far (Rwf 1,008) whereas workers without contracts (Rwf 128) had the lowest earnings. At 565 francs, employees on fixed term contracts earned above average wages, whereas the self-employed earned far below it (Rwf 418). Managers had the highest median wages (Rwf 722). The lowest paid workers were skill service and sales workers (Rwf 128) and workers in elementary occupations (Rwf 139). The highest wages were earned in agriculture, manufacturing and construction (Rwf 667) and the lowest in commercial services (Rwf 202). At Rwf 270, workers in firms with less than 10 employees earned the lowest wages, whereas employees in firms with over 100 employees earned the highest wages (Rwf 1,210). Those on the lowest end of the informality index earned only Rwf 192 per hour, whereas those in the highest category earned 1,155 francs. Men had slightly higher wages compared to women and young workers had substantially lower wages than workers in the oldest age group. Workers with tertiary education earned Rwf 1,369, compared to Rwf 98 for workers without education (Besamusca et al., 2012: 11).

Only 49 per cent of the workers were paid on or above the poverty line of Rwf 118,000 per month. Workers without contracts were the most vulnerable: just one in 10 earned on or above the poverty line. In contrast, 79 per cent employees with permanent contracts, 57 per cent on fixed-term contracts and 44 per cent self-employed did. Workers in firms employing between 51 and 100 people were most often paid above the poverty line (86 per cent), compared to only 35 per cent workers in firms employing 10 people or less. Only 26 per cent of the most informal workers were paid on or above the poverty line compared to 84 per cent of the most formal workers. Men were slightly more likely to be paid above the poverty line than women (52 per cent versus 47 per cent). The older workers were more likely to be paid above the poverty line. Workers with tertiary education were paid on or above the poverty line in 92 per cent of the cases, compared to just 15 per cent workers without formal education. Up to 63 per cent of the managers were paid above the poverty line, whereas only 14 per cent of the workers in elementary occupations and 19 per cent service and sales workers were. Workers in commercial services were the most at risk of being paid poverty wages, while workers in agriculture, manufacturing and construction were the most likely to be paid on or above the poverty line. (Besamusca et al., 2012: 16).

Even though over the decades millions of more women have joined the workforce and made huge gains in their education attainments it is often assumed that the pay gap between them and the male workers is not evidence of discrimination, but is instead a statistical artifact of failing to adjust for factors that could drive earning differences between men and women which are often affected by gender biases. Those keen on downplaying the gender wage gap claim that women voluntarily choose lower paying jobs by disproportionately going into stereotypically female professions or by seeking out lower paid positions. However, leaving women in their current occupations and just closing the gap between women and men within

occupations (for example, if male and female civil engineers were paid the same per hour) will close 68 per cent of the gap. This means examining why waiters and waitresses, for example, with the same education and work experience do not make the same amount per hour.

4. The Conceptual Framework Model

4.1 Understanding the key concepts

We conceptualize employment in manufacturing and service firms' business activities in Rwanda. National accounting of GDP complies with the International Standard Industrial Classification (ISIC) of all economic activities. We also look at employment as people at work and persons involved in the production of goods and services. As production requires working time and human capital, firms and other organizations pay their employees providing them with a key component of their income. Low national employment rates in particular may signal a long-lasting depression and under-development.

Growth is conceptualized as formal sector growth measured as GDP. According to King and Levine (1993) financial development is robustly correlated to the future rate of economic growth, accumulation of physical capital and improvements in economic efficiency. Growth in foreign sales' contributes to a firm's growth if there is greater interaction among the management and a higher degree of joint decision making among the owners and managers of small manufacturing and service firms (Reuber and Fischer, 2002). Sustaining economic growth and improving living standards requires shifting labor into both manufacturing and service firms (Eichengreen and Gupta, 2011).

Growth is seen in terms of an increase in the products or services of manufacturing and service firms as their main business. This is related to sales of the products, increase in the number of new employed persons and the size of the establishment. Smith et al., (2006) found that in Denmark the proportion of women in top management jobs had a positive effect on a firm's performance and that this effect depended on the qualifications of female top managers. Dawkins et al., (2007) argue that both large firms and those which are highly specialized enjoy higher profit margins, whereas the more capital intensive a firm the lower its profitability.

4.2 Empirical findings in employment research

The domestic factors that we consider are household and government consumption, gross fixed consumption, labor participation, growth rate and literacy while the external factors include external total debt, foreign direct investments and trade liberalization measured by imports and exports divided by GDP. Our results show that total debt, population, investments and GDP growth had a negative effect on manufacturing and services sectors. In contrast, trade liberalization, labor participation, aggregate consumption and government spending had a positive effect on manufacturing and service firms.

5. Data and Method

5.1 Description of the Data

The data used in our study is from the World Bank's Enterprise Survey (ES). The World Bank collects data from key manufacturing and services sectors in every region of the world as part of this survey. The survey uses standardized survey instruments and a uniform sampling methodology to minimize measurement errors and to yield data that is comparable across the world's economies and is thus suitable for comparative economic studies. The initial dataset consisted of 174 firm level observations in Rwanda's manufacturing and services sectors in 2011.

ES covers factors which shape the business environment and is useful for both policymakers and researchers. The survey is conducted by the Word Bank and its partners across all geographic regions and covers small, medium and large companies. The sample is consistently defined in all countries and includes all manufacturing firms, the services sector and transportation and construction. The 2011 Rwanda Enterprise Survey covered 174 firms including 55 manufacturing firms and 119 services' firms.

The model of employment in manufacturing and service firms uses employment as the dependent variable and the variations across firms are explained by a set of independent variables (Table 1). Correlation matrix of the variables is reported in Appendix 1.

Table 1. Variables and their explanations

Employment	Dependent variable
Establishment part of a large firm	The establishment of firms (both manufacturing and services)
Firm size	Establishment of the firm is categorized into three -- large, medium and small
Number of establishments that form a firm	The number of firms that were established
Age	Age is the number of years since the firm was established
Formally registered	Firms registered formally
Managers' experience	The experience of the managers
Female managers	The number of female managers in the firm
Total sales	Total sales of the firm (both national and international)
Sales (main product)	Sales of the firm's main product (as percentage)
National sales	The total national sales of both manufacturing and services (as percentage)
Competition	Competition between the firm

Innovative new products or services	If a firm has introduced a new product or service (binary)
Research and development	Creating new ideas for a firm's development and growth
Wages and social payments	Payments made to the employees of the firm
Location	Where the firm is located (city)

5.2 Estimation method: The linear regression model

We used a linear analysis to explain employment in manufacturing and service firms in Rwanda and to understand the constraints and potential of their employees. This helped us study the statistical relationship of the dependent variable in relation to more than one determined variable. The linear regression model's structure captures the dependency of the outcome of an explained variable on an independent variable as a simple function, particularly when there are several explanatory variables. It allows the identification of model parameters and provides their significance.

6. The Empirical Model's Specifications, Estimation and Testing

In this section, we present the models used to empirically assess the factors determining manufacturing and service firms' development in Rwanda by considering employment. We also track the factors influencing the dependent variables and then estimate the models, present the outputs and then conduct and explain the tests for significance of coefficients.

6.1 Empirical models and their specifications

An empirical model refers to a model where the structure is determined by the observed relationship among experimental data. We used empirical models in an analysis of employment and its development in manufacturing and service firms and its determinants in Rwanda.

The individual factors that influence employment in manufacturing and service firms include managers' experience and female managers while the factors that influence a firm include age (years of the firm's existence), location of the firm, the wages the firm pays to its employees, the firm's competitiveness and total sales. Starting with the factors that influence employment in both manufacturing and service firms (Model 1), we construct this regression model. This model is specifically constructed for manufacturing and service firms combined together.

(1) Employment in manufacturing and service firms $= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_{15} X_{15} + \varepsilon_i$

In this model, the dependent variable is 'employment in manufacturing and services' and the explanatory variables include X_1 which stands for location of the firm, X_2 stands for the establishment part of a large firm, X_3 stands for the size of the firm, X_4 stands for the number of establishments that form the firm, X_5 stands for the age of the firm which is continuous,

X_6 stands for formally registered firms, X_7 stands for managers' experience, X_8 stands for female managers, X_9 stands for total sales of the firm, X_{10} stands for sales of the main product, X_{11} stands for national sales, X_{12} stands for competition, X_{13} stands for innovations of new products or services, X_{14} stands for research development, X_{15} stands for wages and social payments and ε_i is the error term.

The coefficients are presented with the symbol β with subscripts from 0 to 15 according to the independent variables. The null hypothesis, H_0: $\beta_i = 0$ that is $\beta_1, \beta_{2,}\ldots, \beta_n = 0$. In this case no independent variable has any effect on employment in both manufacturing and service firms. The alternative hypothesis is H_1: $\beta_i : H_1 \neq 0$ which means that the independent variables result in a change in employment in both manufacturing and service firms. The positive coefficient is interpreted as having a positive effect and a negative effect on employment. The main focus is on the properties of the factors that affect this change (the signs of the effects and their consistency with our expectations and the size of the effects and their statistical significance).

We used Model 2 to assess the factors that determine employment in manufacturing firms only.

(2) Employment in manufacturing firms = $\beta 0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_{15} X_{15} + \varepsilon_i$

In this model, the dependent variable is 'employment in manufacturing firms' and the explanatory variables include X_1 which stands for location of the firm, X_2 stands for the establishment part of a large firm, X_3 stands for the size of the firm, X_4 stands for the number of establishments that form the firm, X_5 stands for age the age of the firm which is continuous, X_6 stands for formally registered firms, X_7 stands for managers' experience, X_8 stands for female managers, X_9 stands for total sales of the firm, X_{10} stands for sales of the main product, X_{11} stands for national sales, X_{12} stands for competition, X_{13} stands for innovation of new products or services, X_{14} stands for research development, X_{15} stands for wages and social payments and ε_i is the error term.

For this model, the null hypothesis is H_0: $\beta = 0$ which implies that all the independent variables do not affect employment in manufacturing firms. And the alternative hypothesis, H_1: $\beta \neq 0$, suggests that the independent variables have an effect on employment in manufacturing firms.

We used model 3 to assess the factors that determine employment in service firms only.

(3) Employment in service firms = $\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_{15} X_{15} + \varepsilon_i$

In this model, the dependent variable is 'employment in service firms' and the explanatory variables include X_1 which stands for the location of the firm, X_2 stands for the establishment part of a large firm, X_3 stands for the size of the firm, X_4 stands for the number of establishments that form the firm, X_5 stands for the age of the firm which is continuous, X_6 stands for formally registered firms, X_7 stands for managers' experience, X_8 stands for female managers, X_9 stands for total sales of the firm, X_{10} stands for the sales of the main product, X_{11} stands for national sales, X_{12} stands for competition, X_{13} stands for innovations of new products or services, X_{14} stands for research development, X_{15} stands for wages and social payments and ε_i is the error term. The null hypothesis is H_0: $\beta = 0$ which implies that

the independent variables have no effect on employment in service firms. The alternative hypothesis, H1: $\beta \neq 0$, implies that independent variables have an effect on employment in service firms.

7. Estimation and testing

7.1 Linear regression model

Linear regression is an approach for modeling a relationship between the dependent variable (Y) and one or more explanatory variables (or independent variables) denoted as (X). The magnitude and direction relation are given by a parameter (β_1), and the intercept term (β_0) captures the status of the dependent variable when the independent variable is absent. A final disturbance or error term (u) captures the amount of variation that is not predicted by the slope and intercept terms.

The results of the linear regression model for both manufacturing and service firms are presented in Table 3, where at a 5 per cent confidence level interval, the firm size, the number of establishments that form the firm, wages and social payments are statistically significant on employment. Therefore, we reject the null hypothesis of employment. The other coefficients are statistically insignificant thus we do not reject the null hypothesis of employment. Location, age, age square, formally registered, managers' experience, female managers, total sales, sales of the main product, competition, innovations in new products or services, research and development, wages and social payments do not have any effect on employment.

The results of the linear regression model for the manufacturing sector are presented in Table 2, where at the 5 per cent confidence level of firm size (1) and firm size (2), total sales and research and development are statistically significant on employment and these leave other variables statistically insignificant meaning that they do not have any effect on employment.

The results of the regression model for the service sector is presented in Table 5, where at a 5 per cent confidence level, firm size, the number of establishments that form the firm, wages and social payments are statistically significant on employment and these leave other variables statistically insignificant meaning that they do not have any effect on employment.

Insert Table 2 about here

The Tobit model (also called a censored regression model), is designed to estimate linear relationships between variables when there is either left or right censoring in the dependent variable (also known as censoring from below and above respectively). Tobit regression coefficients are interpreted in ways similar to the interpretation of the OLS regression coefficients.

A one per cent increase in a firm's size results in a 2.2411 per cent increase in employment for both manufacturing and service firms, other things holding constant. A one per cent increase in the number of establishments that form a firm results in a 0.1588 per cent increase in employment for both manufacturing and service firms, other things holding constant. A one per cent increase in wages and social payments results in a 0.2053 per cent increase in

employment for both manufacturing and service firms, other things holding constant. All these factors are statistically significant at the 0.05 per cent level of confidence.

Insert Table 3 about here

Estimation results of the linear regression of employment in both manufacturing and service firms' model indicate that firm size can positively change the employment rate. A 1 per cent decrease in firm 1's size results in a 2.2431 per cent decrease in employment in manufacturing and service firms and 1 per cent decrease in firm 2's size results in a 0.9142 per cent decrease in employment in manufacturing and services firms, other things holding constant. It is apparent that SMEs play an important role in all OECD economies; they make up 95 per cent of enterprises and account for 60 to 70 per cent of the jobs in most of these countries. The overall share of small firms in employment and output may be even higher given that establishments or firms in the services sector are normally of smaller average size as compared to the average size of manufacturing firms. The number of establishments that form a firm determines the number of employees that it should have.

OECD (1996) reports that a knowledge-based economy is marked by increasing labor market demand for more highly skilled workers who also enjoy wage premiums. Studies in some countries show that the more rapid the introduction of knowledge-intensive means of production, such as those based on information technologies, the greater the demand for highly skilled workers. Other studies show that workers who use advanced technologies, or are employed in firms that have advanced technologies are paid higher wages. A 1 per cent increase in the number of establishments that form a firm results in a 0.1591 per cent increase in employment, holding other factors constant.

A 1 per cent change in wages and social payments results in a 0.2032 per cent change in employment in both manufacturing and services firms. When wages and social payments are increased, the production of goods and services also increase, others things holding constant. As people age and gain work experience, their earnings are expected to continue to increase or at least remain stable until retirement. However, this does not appear to be the case with traditional age earning profiles. Age earning profiles are commonly used to describe the growth of earnings over the lifecycle (Thornton et al., 1997). Since the p-value of age and age square are greater than 0.05 per cent, this means that they are statistically insignificant to employment in both manufacturing and service firms.

We consider economic integration and the location of the firm before setting out the details of intermediate goods' production and outline the framework in which the effects of demand and cost linkages with the location of a single industry are analyzed. Consider a monopolistically competitive industry in which each firm produces its own variety of differentiated products.

Insert Table 4 about here

The results presented in Table 4 of the linear regression of the manufacturing sector model indicate that the coefficients of firm size 1, firm size 2, total sales and research and development are statistically significant at the 90 per cent, 95 per cent and 99 per cent

confidence interval since their p-values are less than 0.05 per; 55 firms were estimated in the manufacturing sector.

As noted by Mazumdar (2003), the size distribution of Indian manufacturing enterprises is characterized by a missing middle whereby employment tends to be concentrated in small and large enterprises. A 1 per cent decrease in the firm size (1) results in a 2.3231 per cent decrease in employment in the manufacturing sector and a 1 per cent decrease in firm size (2) results in a 0.7839 per cent decrease in employment in the manufacturing sector, holding other factors constant.

A 1 per cent increase in total sales results in a 0.3596 increase in employment, holding other factors constant. The changes in total sales of the manufacturing sector in Rwanda are attributed to processed and finished goods that are ready to be consumed like beans, chips and juices. Employment growth is expressed by the costs incurred by a manufacturing firm on employment and employees and developing and trying a new approach or idea about products' production, business processes, management or marketing.

A 1 per cent increase in research and development results in a 0.6345 increase in employment in the manufacturing sector. The process through which research and development promotes economic prosperity is complex and multi-faceted. Employees' development and research activities are positively correlated with a change in employment in the manufacturing and services sectors, holding other factors constant. Firms gain direct benefits if they make investments in research development.

Insert Table 5 about here

The results presented in Table 5 of the linear regression of the services sector model indicate that the coefficients of firm size 1, firm size 2, number of establishments that form the firm, wages and social payments are statistically significant at the 90 per cent, 95 per cent and 99 per cent confidence interval since their p-values are less than 0.05 per; 119 firms in the services sector were estimated.

A 1 per cent decrease in the firm size (1) results in a 2.3251 decrease in employment in service firms and a 1 per cent decrease in firm size (2) results in a 0.8944 per cent decrease in employment in service firms, other things holding constant. Rosen (1982) and Kremer (1993) suggest that human capital is positively correlated with firm size. Rosen (1982) considers a hierarchical organizational structure where improved labor productivity at any given level successively filters through all the lower levels.

The services sector includes activities where people offer their knowledge and time to improve productivity, performance, potential and sustainability; this is termed as affective labor. Services are also known as intangible goods which include attention, advice, access, experience and discussion. A 1 per cent increase in the number of establishments that form a firm results in a 0.1657 per cent increase in employment in the services sector, holding other factors constant.

As per a study on wage setting systems and minimum rates of pay applicable to posted workers in accordance with directive 96/71/EC in a selected number of member states and sectors a 1 per cent increase in wages and social payments results in a 0.2391 per cent

increase in employment in the services sector. Wages differ between countries due to differences in the cost of living, productivity, the working environment and in the overall (im) balance between the supply of and the demand for labor. Sectoral minimum wages are typically the result of overall collective bargaining processes and are thus directly connected to overall wage developments. Employers' pay policies can contribute to a gender wage gap if women are less likely to work in high paying firms or if women negotiate worse wages than men.

If service firms adapt innovative new products or services they can move to more dynamic business environments including greater openness to international competition. Hence, greater uptakes of advanced technologies and fostering innovative activities should be encouraged. In OECD work on benchmarking and innovations in knowledge based economies increasingly depend on a combination of entrepreneurship, ICT, innovation and human capital. Innovative new products or services are statistically insignificant for both manufacturing and services as they have a decreasing change on employment. Innovations in the services sector are particularly important for industries.

Increase in competition in local and global markets determines the importance of service innovations as a key source which supports firms' growth and development. OECD states that the importance of service innovation is well established but many firms are seeking new ways to develop the type of service innovation necessary for success in global value chains. Many service firms use delivery time guarantees to compete for customers in the marketplace. Demand is assumed to be sensitive to both price and delivery time guarantees, and the objective of each firm is to maximize its operational profits.

Insert Table 6 about here

The models in Table 6 were estimated by ordinary least squares (OLS) with robust standard errors. The regression models were specified and estimated using STATA. These differed by the generalization of the basic model of employment between manufacturing and service firms which was used to study the impacts of various factors affecting employment in manufacturing and service firms in Rwanda at the firm level.

The problem that heteroscedasticity presents for regression models is simple. Recall that the OLS regression seeks to minimize residuals and produce the smallest possible standard errors.

The serious problem associated with heteroscedasticity is the fact that the standard errors are biases. Because the standard error is central to conducting significance tests and calculating confidence intervals, biased standard errors lead to incorrect conclusions about the significance of the regression coefficients.

8. Usefulness of the Results and policy Recommendations

The goals of this study were to carry out an analysis of how manufacturing and service firms contribute to employment in Rwanda and identifying the factors that have contributed to the growth and development of manufacturing and service firms using data collected from the

World Bank Survey (2011). Literature was reviewed to assess the similarities and dissimilarities in the findings all over the world. A descriptive analysis of the existing data and an empirical analysis of micro-data on manufacturing and service firms were used to understand the functioning of employment in Rwanda. The results are interesting and will be useful for academics and both the private and public sectors in Rwanda and other parts of the world.

The results of factors influencing employment in manufacturing and service firms will be useful for the government because employment is a key to improved growth and development. In public sector management, employment in both manufacturing and service firms has a positive impact on the government through payment of taxes by employees. The government could use the findings of our study to scale-up employment activities in manufacturing and service firms and shape capacity building strategies and policies with our empirical findings.

Our study can also be used by academicians for future studies; it can also be of use to graduate students. Our findings on employment can form the basis for expanding research in economic growth and development since this forms a part of Rwanda's national policies in Vision 2020 and EDPRS II which will help Rwanda become a middle-income country.

8.1 Policy Recommendations

The Government of Rwanda should emphasize on its employment policy by targeting new entrepreneurs operating in both manufacturing and services sectors. With regard to the role of employee development in promoting production and innovations in both manufacturing and service firms, it is important for the government to put in place the mechanisms that will facilitate entrepreneurs (both employees and managers of firms) in promoting innovative new products or services in both manufacturing and service firms. Incentives can be given to both manufacturing and service firms' managers who want their employees to be sent abroad for training or for hiring international consultants to train locally on manufacturing and services related skills.

The government should also make innovation policies for manufacturing and services complementary with existing employment with emphasis on employees' development and enhanced training strategies. Innovative new products or services will help implement new policies that guide the production of goods and services in manufacturing and services sectors.

As the Government of Rwanda has decided to drive its economic growth through manufacturing and service firms and its aim is to become a middle-income country our study gives recommendations that can help in speeding up the process from a low-income economy to a middle-income economy through development and pursuing sustainable goals for manufacturing and service firms for their expansion. Rwanda's manufacturing sector has been experiencing steady growth. But every success has its own factors, which in Rwanda's case can be brought around one common denominator. If the number of establishments that

form firms are formally registered this will increase the government's income through taxation.

It is also a good idea to have a positive relationship between research and development and firm productivity across all sectors but mainly in the manufacturing and services sectors as this will increase the productivity of goods and services.

National sales can be put in place for more emphasis on manufacturing and service firms that are ready to export their finished products by establishing more relationships with other countries, for example with countries in the East African Community (EAC) and COMESA to have standardized national sales that will increase revenues from outside the country leading to the development of local industries for better production.

The Government of Rwanda should continue encouraging both manufacturing and service firms that are unregistered to register themselves formally for better follow up. Registered firms get benefits for their businesses as they can benefit from legal and financial services provided by courts and commercial banks; these services are not available to unregistered firms.

Education and job training are good policies to pursue for wages and social payments. They will raise at least some workers' productivity and help increase their earnings in manufacturing and service firms. Higher minimum wage laws will provide higher wages for at least some workers. However, such policies could also increase unemployment. According to economists, this unemployment increasing effect is not huge if there is only a moderate increase in minimum wages. If the minimum wage is increased to a living wage as proposed for some activities its impact on unemployment will be much larger so a better way will be to minimize the wages for all activities in different sectors to reduce wage inequalities.

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Table 2.Tobit model Generalized (Manufacturing and service firms)

Variables	Coef.	Std. Err.	t	P>t	[95% Co	Interval]
Employment (ln)						
Location	0.6635c	0.3708	1.79	0.076	-0.0690	1.3960
Establishment part of a large firm	-0.2881	0.1954	-1.47	0.142	-0.6740	0.0977
Firm size 1	2.2411a	0.1876	11.94	0.000	1.8704	2.6118
Firm size 2	0.9126a	0.1152	7.92	0.000	0.6849	1.1402
Number of establishments that form a firm						
0.1588a		0.0461	3.44	0.001	0.0676	0.2499
Age	-0.0046	0.0157	-0.29	0.770	-0.0357	0.0265
Age2	0.0001	0.0003	0.45	0.655	-0.0005	0.0009
Formally registered	-0.0765	0.1672	-0.46	0.648	-0.4068	0.2537
Managers' experience	0.0029	0.0056	0.53	0.600	-0.0082	0.0141
Female managers	0.0022	0.1279	0.02	0.986	-0.2505	0.2550
Total sales(ln)	0.0711	0.0460	1.55	0.124	-0.0197	0.1622
Sales main product(ln)	-0.0747	0.0949	-0.79	0.433	-0.2623	0.1128
National sales(ln)	0.0088	0.1877	0.05	0.962	-0.3619	0.3796
Competition	-0.0839	0.0920	-0.91	0.363	-0.2657	0.0979
Innovative new products or services	-0.0578	0.0996	-0.58	0.562	-0.2546	0.1389
Research and Development	0.0244	0.1039	0.23	0.815	-0.1809	0.2297
Wages and social payments	0.2053a	0.0578	3.55	0.001	0.0910	0.3195
Cons	-2.8433b	1.1788	-2.41	0.017	-5.1717	-0.5147
Number of Obs	174					

Note: a significant at 1% b at 5% and c at 10% level of significance.

Table 3. Linear regression (model 1) Manufacturing and Services and its determinants

Variables	Coef.	Std. Err.	t	P>t	[95%	Interval]
Employment(ln)						
Location	0.5795	0.3813	1.52	0.131	-0.1735	1.3326
Establishment part of a large firm	-0.2882	0.2053	-1.40	0.162	-0.6937	0.1173
Firm size 1	2.2431a	0.1972	11.37	0.000	1.8535	2.6326
Firm size 2	0.9142a	0.1211	7.55	0.000	0.6750	1.1533
Number of establishments that form a firm	0.1591a	0.0485	3.28	0.001	0.0633	0.2549
Age	-0.0044	0.0165	-0.26	0.792	-0.0370	0.0283
Age2	0.0001	0.0004	0.41	0.680	-0.0006	0.0009
Formally registered	-0.0708	0.1756	-0.40	0.687	-0.4177	0.2761
Managers' experience	0.0028	0.0059	0.49	0.628	-0.0088	0.0146
Female managers	0.0051	0.1344	0.04	0.970	-0.2604	0.2706
Total sales(ln)	0.0712	0.0484	1.47	0.143	-0.0243	0.1667
Sales main product(ln)	-0.0734	0.0997	-0.74	0.463	-0.2705	0.1236
National sales(ln)	0.0094	0.1973	0.05	0.962	-0.3803	0.3991
Competition	-0.0854	0.0967	-0.88	0.379	-0.2764	0.1056
Innovative new products or services	-0.0614	0.1046	-0.59	0.558	-0.2681	0.1453
Research and Development	0.0245	0.1092	0.22	0.823	-0.1913	0.2403
Wages and social payments(ln)	0.2032a	0.0607	3.34	0.001	0.0832	0.3232
Cons	-2.7364b	1.2345	-2.22	0.028	-5.1749	-0.2979
Number of Obs 174						

Note: a significant at 1% b at 5% and c at 10% level of significance.

Table 4. Linear regression (model 2) Manufacturing sector and its determinants

Variables	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Employment(ln)						
Location	1.2535	0.7841	1.60	0.118	-0.3351	2.8422
Establishment part of a large firm	-0.2283	0.5881	-0.39	0.700	-1.4200	0.9633
Firm size 1	2.3231a	0.4529	5.13	0.000	1.4054	3.2408
Firm size 2	0.7839a	0.2956	2.65	0.012	0.1847	1.3831
Number of establishments that form firm	0.5402	0.6499	0.83	0.411	-0.7766	1.8571
Age	-0.0109	0.0331	-0.33	0.743	-0.0781	0.0562
Age2	0.0001	0.0006	0.12	0.908	-0.0013	0.0015
Formally registered	-0.3801	0.4006	-0.95	0.349	-1.1918	0.4316
Managers' experience	-0.0135	0.0141	-0.97	0.340	-0.0421	0.0148
Female managers	0.1726	0.2784	0.62	0.539	-0.3915	0.7366
Total sales(ln)	0.3596a	0.1244	2.89	0.006	0.1076	0.6117
Sales main product(ln)	0.0625	0.2276	0.27	0.785	-0.3986	0.5237
National sales(ln)	0.0485	0.2295	0.21	0.834	-0.4166	0.5136
Competition	0.1191	0.2161	0.55	0.585	-0.3187	0.5570
Innovative new products or services	-0.0930	0.2046	-0.45	0.652	-0.5076	0.3216
Research and Development	0.6345b	0.2945	2.15	0.038	0.0376	1.2314
Wages and social payments(ln)	-0.0802	0.1603	-0.50	0.620	-0.4051	0.2445
Cons	-4.7313b	2.2087	-2.14	0.039	-9.2067	-0.2559
Number of Obs	55					

Note: a significant at 1% b at 5% and c at 10% level of significance.

Table 5. Linear regression (model 3) Services sector and its determinants

Variables	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Employment(ln)						
Location	0.6348	0.4856	1.31	0.194	-0.3286	1.5983
Establishment part of a large firm	-0.2839	0.2728	-1.04	0.300	-0.8251	0.2572
Firm size 1	2.3251a	0.2424	9.59	0.000	1.8442	2.8061
Firm size 2	0.8944a	0.1442	6.20	0.000	0.6084	1.1804
Number of establishments that form a firm	0.1657a	0.0492	3.37	0.001	0.0681	0.2634
Age	-0.0161	0.0223	-0.72	0.471	-0.0603	0.0281
Age2	0.0002	0.0006	0.41	0.680	-0.0009	0.0014
Formally registered	0.0271	0.2131	0.13	0.899	-0.3956	0.4497
Managers' experience	0.0048	0.0068	0.71	0.480	-0.0087	0.0185
Female managers	0.0185	0.1624	0.11	0.909	-0.3036	0.3406
Total sales(ln)	0.0015	0.0553	0.03	0.979	-0.1083	0.1113
Sales main product(ln)	-0.0524	0.1194	-0.44	0.662	-0.2894	0.1845
National sales(ln)	-0.2987	0.5231	-0.57	0.569	-1.3351	0.7383
Competition	-0.1068	0.1193	-0.90	0.373	-0.3434	0.1298
Innovative new products or services	0.0300	0.1259	0.24	0.812	-0.2198	0.2798
Research and Development	-0.1495	0.1303	-1.15	0.254	-0.4081	0.1089
Wages and social payments(ln)	0.2391a	0.0694	3.44	0.001	0.1014	0.3767
Cons	-0.8262	2.6658	-0.31	0.757	-6.1144	4.4621
Number of Obs	119					

Note: a significant at 1% b at 5% and c at 10% level of significance.

Table 6. Linear regression (model 3) Manufacturing and Services sectors
White Heteroscedasticity test

Variables	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
Employment(ln)						
Location	0.5795	0.4849	1.19	0.234	-0.3784	1.5375
Establishment part of a large firm	-0.2882	0.2043	-1.41	0.160	-0.6917	0.1153
Firm size 1	2.2431a	0.2552	8.79	0.000	1.7389	2.7473
Firm size 2	0.9142a	0.1217	7.51	0.000	0.6736	1.1547
Number of establishments that form a firm	0.1592b	0.0736	2.16	0.032	0.0137	0.3044
Age	-0.0043	0.0182	-0.24	0.810	-0.0402	0.0314
Age2	0.0001	0.0004	0.38	0.704	-0.0007	0.0010
Formally registered	-0.0708	0.1831	-0.39	0.699	-0.4325	0.2908
Managers' experience	0.0028	0.0053	0.54	0.591	-0.0076	0.0134
Female managers	0.0051	0.1161	0.04	0.965	-0.2242	0.2345
Total sales(ln)	0.0712c	0.0402	1.77	0.078	-0.0081	0.1505
Sales main product(ln)	-0.0734	0.0831	-0.88	0.379	-0.2376	0.0908
National sales(ln)	0.0094	0.0974	0.10	0.923	-0.1830	0.2018
Competition	-0.0854	0.0968	-0.88	0.379	-0.2767	0.1059
Innovative new products or services	-0.0614	0.0988	-0.62	0.536	-0.2567	0.1339
Research and Development	0.0245	0.1181	0.21	0.836	-0.2088	0.2578
Wages and social payments(ln)	0.2032a	0.0581	3.50	0.001	0.0883	0.3180
Cons	-2.7364	1.1200	-2.44	0.016	-4.9487	-0.5241
Number of Obs	174					

Note: a significant at 1% b at 5% and c at 10% level of significance.

Appendix 1. Correlation matrix of manufacturing and service firms (N=174)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Employment	1															
Location	-0.002	1														
Establishment	0.128	0.034	1													
Firm size	-0.587	0.006	-0.139	1												
Number of establishments	0.295	0.024	0.204	-0.188	1											
Age	0.236	-0.086	0.104	-0.272	-0.003	1										
Formally registered	-0.077	0.105	0.005	-0.077	0.004	-0.007	1									
Managers' experience	0.131	-0.161	-0.02	-0.162	-0.062	0.265	-0.059	1								
Female managers	-0.075	-0.173	0.006	0.087	-0.069	0.192	0.047	-0.088	1							
Total sales	0.196	-0.015	-0.025	-0.28	0.068	0.082	0.072	0.053	-0.034	1						
Sales main product	0.065	0.094	0.000	-0.067	0.081	-0.060	0.268	-0.103	-0.060	0.117	1					
National sales	-0.010	-0.015	0.048	0.025	0.034	-0.065	-0.026	0.016	0.052	0.005	-0.106	1				
Competition	-0.042	0.050	0.011	-0.008	0.019	0.055	-0.081	0.070	0.009	-0.048	-0.075	-0.018	1			
Innovative new products or sales	0.146	-0.007	-8E-04	-0.136	0.127	0.118	-0.086	0.131	0.027	0.017	-0.074	0.086	0.094	1		
Research and Development	0.180	0.000	-0.084	-0.130	0.000	0.117	0.027	0.096	-0.064	-0.028	-0.024	0.067	0.065	0.202	1	
Wages and social payments	0.574	-0.032	0.024	-0.523	0.054	0.252	0.005	0.160	0.000	0.477	0.082	-0.019	-0.05	0.016	0.180	1

Appendix 2. Descriptive statistics of determinants of employment

Variable	Obs	Mean	Std. Dev.	Min	Max
Employment	174	57.83264	133.5541	1	1009
Location	174	0.958506	0.1998	0	1
Establishment part of a large firm	174	0.049793	0.2179	0	1
Firm size	174	2.381743	0.6918	1	3
Number of establishments that form a firm	174	1.141079	0.8832	1	12
Age	174	11.11203	9.9595	1	52
Formally registered	174	0.875519	0.3308	0	1
Managers' experience	174	13.06639	9.0361	0	42
Female managers	174	0.19917	0.4002	0	1
Total sales	174	1.64E+09	6.73E+09	1300000	8.10E+10
Sales main product	174	68.86087	25.3762	7	100
National sales	174	98.37238	8.6563	5	100
Competition	174	0.493776	0.5010	0	1
Innovative products or services	174	0.614108	0.4878	0	1
Research and Development	174	0.307054	0.4622	0	1
Wages and social payments	174	1.49E+08	8.63E+08	96000	1.20E+10

Appendix 3. NESTED model of Manufacturing and services sectors

Variable	Coef.	Std. Err.	T	P>t	[95% Conf.	Interval]
Employment(ln)						
Location	0.5795	0.3813	1.52	0.131	-0.1734	1.3326
Establishment part of a large firm	-0.2882	0.2053	-1.40	0.162	-0.6937	0.1173
Firm size 1	2.2431a	0.1972	11.37	0.000	1.8536	2.6326
Firm size 2	0.9142a	0.1211	7.55	0.000	0.6750	1.1533
Number of establishments that form a firm	0.1591a	0.0484	3.28	0.001	0.0633	0.2549
Age	-0.0043	0.0165	-0.26	0.792	-0.0370	0.0283
Age2	0.0001	0.0004	0.41	0.680	-0.0006	0.0009
Formally registered	-0.0708	0.1756	-0.40	0.687	-0.4177	0.2761
Managers' experience	0.0028	0.0059	0.49	0.628	-0.0088	0.0146
Female managers	0.0051	0.1344	0.04	0.970	-0.2604	0.2706
Total sales(ln)	0.0712	0.0484	1.47	0.143	-0.0243	0.1667
Sales main product(ln)	-0.0734	0.0997	-0.74	0.463	-0.2705	0.1236
National sales(ln)	0.0094	0.1973	0.05	0.962	-0.3803	0.3991
Competition	-0.0854	0.0967	-0.88	0.379	-0.2764	0.1056
Innovative new products or services	-0.0614	0.1046	-0.59	0.558	-0.2681	0.1453
Research and Development	0.0245	0.1093	0.22	0.823	-0.1913	0.2403
Wages and social payment(ln)	0.2032a	0.0607	3.34	0.001	0.0832	0.3232
Cons	-2.7364	1.2345	-2.22	0.028	-5.1749	-0.2979
Number of Obs	174					

Log likelihood = -156.06396

Note: a significant at 1% b at 5% and c at 10% level of significance.