



Analysis of Service Sector Development and its Determinants in Rwanda

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DEDICATIONS

Allow me to extend my dedications: To

Almighty God,

My Lovely Wife,

To my Supervisor,

And finally special dedications to all my family and relatives, Brothers and Sisters, to whom I owe opportunities to attain the MSc. Education level.

DECLARATION

I, **UWITONZE Eric**, declare that this MSc. thesis entitled “Analysis of Service Sector Development and its Determinants in Rwanda” contains my own work except where specifically acknowledged.

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Date of Submission...../...../2016.

CERTIFICATION

This is to certify that Mr. **Eric**

UWITONZE has submitted this Master’s Thesis to the University of Rwanda, College of Business and Economics (CBE) for examination with my approval as the University Supervisor;

Signed..... Date...../...../.....

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Abstract

The service sector is an avenue for economic transformation, as not all countries have a competitive edge in manufacturing. The growing literature on service sector have primarily focused on the conditions in the United States of America, Europe and Asian emerging service economies like India and China. As a result not as much of attention been paid to the role that services can play in the economic growth of African countries due to agriculture prevalence. But, with the avenues of structural adjustment and globalization features, some African countries tends to becoming service-based economies. Services are considered as an alternative to manufacturing-led development in Rwanda since the latter aims at becoming a service-based hub to serve the East African Community countries. Recently, service sector growth rate has been the most impressive in the Rwandan economy. The present study is an attempt to study in detail the services sector growth over the years in Rwanda's economy and empirically estimate the determinants of service sector growth by using econometric methodology. The empirical results are based on microdata collected during the Rwanda-Enterprise Survey 2011 and 2014 Establishment Census. The survey contains data on 241 firms and establishment. Limited dependent variable techniques is employed to investigate the factors behind the services sector growth. Logistic regression is applied to assess factors contributing to the innovation and total sales growth in the service firms. The results point out the contributing factors of the service sector growth. These factors can be used in public policy aimed to speed up the shift form low income to middle income state of the economy.

Keywords: Limited dependent variables, Services, Openness, Growth, East Africa, Rwanda.

JEL Classification Codes: C35, F13, G29, O47, O55

LIST OF SYMBOLS AND ABBREVIATIONS

AIC	: Akaike Information Criteria
ATMs	: Automatic Teller Machine
BIC	: Bayesian Information Criteria
EAC	: East African Community
EICV	: Enquête Intégrale sur les Conditions de Vie
FDI	: Foreign Direct Investment
GDP	: Gross Domestic Product
GSLI	: Global Service Location Index
HGP	: High- Growth Firms
ICT	: Information and Communication Technology
ISIC	: International Standards Industrial Classification
NISR	: National Institute of statistics of Rwanda
OECD	: Organization of Economic and cooperation for Development
TFP	: Total Factor of Production
UK	: United Kingdom
UNECA	: United Nation Economic commission for Afrac
USA	: United Sates of America
VAT	: Value Added Tax

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1. CHAPTER ONE: GENERAL INTRODUCTION

1.1. Introduction

As of 2014 Rwanda services policy review; services sector is the largest and most dynamic sector in the Rwandan economy. Though, there is a great competition among EAC countries, Rwanda is committed to becoming a service-based hub to serve the region in order to break its landlocked nature. The pace of change in globalization of services is much more rapid (Mann, 2004) and service sector is conceived as an avenue for economic transformation, as not all countries have a competitive edge in manufacturing (UNECA, 2015). Rwandan Service sector is subdivided into two broad categories such as trade and transport services. Trade and transport services include maintenance and repair of motor vehicles, wholesale and retail trade and transport service and so-called other services like hotels and restaurants, information and communication, financial services, real estate activities, professional, scientific and technical activities, administrative and support services, public administration and defense and compulsory social security, education services, human health and social work services; cultural, domestic and other services.

Many researchers in the field of economics argued that service sector growth has great implication in the growth of a country's economy. Among others Yanrui (2007), Shingal (2013 and 2014), and Singh and Kaur (2014) claimed that the India and China has recorded attractive economic growth that is closely associated with the dramatic development of the service sector.

Within the competitive global village, Rwandan economy has annually recorded 8% average GDP growth since 2001 and GDP per capita has increased more than three folds from about US\$211 per capita in 2001 to about US\$718 in 2014. The service sector spearheaded the strong economic growth journey as it has accounted for bigger share of GDP which is, by 2015, 47% of GDP compared to 33% of primary sector (agriculture, Forestry and Fishery) while the growth of service has been impressively around 9% by 2014 against 7% for industry and 4% in agriculture. The main subsectors are wholesale and trade, transportation, storage and communication services. The trade and transport services contribute greatly to the share of the services in gross domestic product from 159 billion rwf¹ in 1999 to 784 billion rwf in 2014 of which the wholesale trade and retail trade occupy 615 billion rwf in 2014 against 133 billion rwf in 1999. Other Services including hotels and restaurants, information and communication, financial services and so forth increasingly contribute to GDP from 430 billion rwf in 1999 to 1505 billion rwf in 2014. The services contribution grew up to 2,290 billion in 2014 against 563 billion rwf in 1999. The authorized loans by the central bank in the service sector increased from 1.5 billion rwf in 2010 to 12 billion rwf in 2014. All these statistics are in fixed 2011 prices and suggest an increased attention and public support for the service sectors development.

Empirically, the present study aims at analyzing the growth of service sector and its determinants in Rwanda. Thus, prime purpose of it is to carry out deep analysis of trends in services expansion and development in Rwanda and point out contributing factors driving its growth using surveys data covering various parts of the service sector. The findings will be used to initiate additional academic research and contribute to the body of knowledge

¹ USD 1 = 746 rwf on March 9, 2016.

about the role of service sector in economic growth of developing countries of which Rwanda is classified. Furthermore, it will shed light on the ambitious target of Rwanda found in its Vision 2020 as contribution to holistically understand what matters to lean on the service sector for economic growth of a country.

1.2. Statement of the problem

In Rwanda, services contribution grew up to 2,290 billion in 2014 against 563 billion rwf in 1999 as it report by the National Institute of Statistics in Rwanda. After Mauritius, Doing Business in sub-Saharan Africa in 2013-2014, Rwanda is ranked the second with the service sector received big share of foreign private investment. As a result 41.4% of foreign private investment was allocated to ICT, tourism (12.8%), while others like mining received 13.8%, manufacturing (10.8) and other sector generally received significant (21.7%) share of the private investment.

In addition, Service sector development is documented in the Rwandan Vision 2020, and believed to be the engine for Rwanda's economy with growth rate of 13.5% and contribution to gross domestic product accounting at 42%. Moreover, service sector growth rate has been the most impressive in the Rwandan economy. It is worthwhile to carry of this study due to the fact that there is no empirical study that could unveil the drivers of service sector in Rwanda.

1.3. Objectives of the study

The general objective of the study is to investigate service sector development and its determinants in Rwanda and specific objectives are:

- To analyze the contribution of the service sub sectors to the development of service sector in Rwanda,
- To unveil key factors contributing to development of service sector in Rwanda.

1.4. Study Questions

The study tries to respond the following questions:

- At which level did the service sub sectors contribute to the share of services in Gross Domestic Products (GDP) in Rwanda over the years?
- What are the determinants of the development of service sector in Rwanda?

1.5. Research hypothesis

By assuming 5% level of significance, we hypothesize the following:

Hypothesis 1: Service sector development can be investigated through the total annual sales earned by the firm. Service annual sales is effected by the employment level, loan size, ICT, firm innovation characteristics. The null hypothesis is that these factors have no effect on the total sales level, while the alternative hypothesis is they have positive effects.

Hypothesis 2: Services sector innovation is affected by internal research and development (R&D) activities, external or internal acquisition of research and development (ext. R&D), Acquisition of training, access to finance, firm characteristics in term of seize. The null hypothesis suggest that these factors do not influence service innovation, while the

alternative hypothesis suggest that they have positive effect on the service innovation of new product and services.

Hypothesis 3: Turnover in the service firm is affected by the capital used, openness conceived as buying and selling outside the country, gender of the manager, paying value added tax, paying income tax, service sub-sector. The null hypothesis suggest that these factors do not influence on the level of category of turnover in the service firms, while the alternative hypothesis suggest that there is a positive effect.

1.6. The Structure of the study

The study is organized in such way it contains five chapters where by first chapter gives general introduction, the second report on the literature review, third chapter shows the methodology of research, four chapter point out data analysis and interpretations, and last chapter delivers a Summary, Conclusion and suggestions for future academia undertaking the researches of similar nature.

2. CHAPTER TWO: LITERATURE REVIEW

In reviewing the literature throughout the academic books, journals, research papers and reports, a number of researchers and international organizations supported the role of the service sector as a key driver towards the growth of the economy for economic policies makers in both developing and developed countries. Recently, United Nations Economic Commission for Africa (UNECA) affirmed that service sector is an avenue for economic transformation, as not all countries have a competitive edge in manufacturing sector (UNECA, 2015). Service sector development is in addition an infrastructure that promotes productivity in manufacturing and agriculture.

2.1. Growth and development of service sector

Service sector economic development is the only way to promote the economic structural adjustment and accelerate the transformation of economic growth mode (Zhou, 2015). A declining agricultural employment share is the key feature in economic development (Alvarez-Cuadrado and Poschke, 2011), and structural transformation usually coincides with a growing role of industry and service in the economy (UNECA, 2015). The growing size of service sector and its impact on the other parts of the economy makes it all the more important to promote the efficiency in services provision and thereby to boost the economy-wide labor productivity as it is witnessed in the OECD member countries. The slowdown in the service sector has brought down the labor productivity in the entire economy from more than 4% in the 1976-1989 period to less than 2% from 1999-2004 (OECD, 2008).

Acharya and Patel (2015) confirmed that 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%.

Singh and Kaur (2014) discussed that main reasons behind the growth of services include rapid urbanization, the expansion of the public sector and increased demand for intermediate and final consumer services. Domestic investment and openness also affect positively to the share of services sector in GDP, and the main services sectors attracting FDI in India are Telecommunications, Construction and Hotels and Restaurants. Malin (2013) supported that service sector has become the main contributor to the GDP not only in developed economies like USA, Japan and U.K but also in developing economies like China, Indonesia, Pakistan and India. Concluding their study on determinants of the innovation capacity with empirical evidence from service firms, Silva (2015), affirmed that the greater the financial investment in the acquisition of machinery, equipment and software, in internal research and development, in acquisition of external knowledge, in marketing activities and other procedures, the greater the propensity for firms to innovate in terms of services.

According to Park and Shin (2012), there is a general wisdom that when a country industrializes, the shares of industry and service sectors in both GDP and employment rise whereas the share of agriculture falls and when the country deindustrializes and moves into the postindustrial phase, the share of services rises 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 service sector made the biggest contribution. Furthermore, the lower the per capita GDP, the greater the scope for labor productivity growth in the service sector, which implies that there is still a lot of room for services productivity growth. Thus, Buera and Kaboski (2009) argued that as productivity grows, individuals consume new services. Eventually, labor productivity increases enough which makes the absolute cost advantage of market-production smaller, and leads individuals to home produce customized versions of these services which yield higher utility.

In early 1980s, Fuchs and Victor (1981) argued that the decline of agriculture is attributable primarily to differences in income elasticity of demand but the shift from industry to service is attributable primarily to differential rates of growth of output per worker. Economic growth also contributes to the rise of service employment through an increase in female labor force participation because families with working wives tend to spend a higher proportion of their income on services consumption.

2.2. The service sector contribution to economy

The rapid expansion of service sector is a principal of contemporary global economic restructuring, proven by the fact that the rise in service sector share in the global workforce from 24% to 35% between 1965 and 1990 its share of world's domestic products increased from 50.6% to 62.4% between 1960 and 1990 (William, 1997).

Olofin, Olufolahan, and Jooda (2015) argued that in West Africa the proportion of the population is still engaged in farming (60-65%) and many are food insecure, yet. While research confirmed a positive relationship between income growth and food security whereby researchers recommended putting in place the policies and programs to ensure quality civil service. Despite that, sub-Saharan Africa, service sector is makes up to nearly 60% of gross domestic product (GDP) and is expected to grow as historical data shows that

each 15% increase in the service influence to GDP is associated with a doubling of income per capita. On the top ten African countries by service as percentage of GDP indicated in parenthesis, (UNECA, 2015) reported Seychelles (81.1%), Djibouti (77.0%), Mauritius (71.5%), Cabo Verde (70.3%), South Africa (69.1%), Botswana (61.8%), Senegal (60.1%), Eritrea (60.0%), Lesotho (60.0%) and the tenth is Gambia also having 60.0% share of service sector in gross domestic product. In European region, Maroto-Sanchez and Cuadra-Ruara (2011), confirmed that several service industries have shown dynamic productivity growth rates, contributing more than expected to productivity growth.

Ghani et al. (2011) supported services to account for more than 75% of the global economy, of which 45% belong to the developing countries where it claimed that services contribute more to GDP growth, job creation, poverty reduction than industry. In fact services are the fastest growing sector in global trade and the share of developing countries in world service exports increased from 14% in 1990 to 21% in 2008. Moreover, Nayyar (2012) argued that the rapid increasing in the international trade service draw the explanation in the fact there are some countries which are in position to specialize and export in which they have a comparative advantage. For instance, the size of the service sector was bigger than even the average of lower-middle income countries in 2009. Indian service sector consist of the following economic activities: wholesale and retail trade, hotel and restaurant, transport services, storage services, communication services, financial services, real estate, electric and water utilities, media, communication, education, health, ownership of dwelling and renting services.

Notably, 60% of all employment created in OECD area came from the rapid employment growth in the service sector due to firstly the strong performance in certain market for services such as wholesale and retail services. Telecommunications, transport, finance, insurance and business services and secondly to the growing use of productivity enhancing technology like ICT, (OECD, 2005). Household-serving sector has identified other services such as civic and social organization, and child care (Kay, Pratt and Warner, 2007).

UNECA (2015) documented the performance of Rwanda in services whereby service export grown from \$59 million in 2000 to 395 million in 2011. The growth of more than 10% occurred in wholesale and retail trade, education, finance and insurance, and transport, storage and communications since 2007. Over the period between 2000 and 2011, ICT subsector received the investment amounting to \$552 million, export of travel were equivalent to 63% of total services exports and 29% of the merchandise and services exports in 2011. By 2012, FDI stocks in services were the biggest \$640.2 million shared as follows \$391 million in ICT, \$124.1 million in finance and \$125.1 million in insurance, against just \$90.8 million in manufacturing. Within the seven year government program, tourism is expected to grow at compound annual rate of 25% and by 2014, Rwanda received 1,137,000 visitors mostly attracted by Rwanda mountain gorilla, generating \$294 million up from \$62 million in 2000. In addition, the government is committed to increase the investment in services up to \$350 million by 2016 from \$46 million as of 2015.

Sethi and Gott (2016) published that India and China has continued to occupy the top of two spots of Global Service Location Index (GSLI). The positions are thanks to major gains in educational skills, cultural adaptability, financial attractiveness born from the increased values of renminbi over U.S. dollar, improved governance and financial

liberalization in China while India has the first overseas Research and Development center and the 4th largest smartphone vendor in the world. Surprisingly, eight of top 20 and six of top 10 comes from Asian pacific countries due to the strong performance in both financial attractiveness, and skilled people and availability. Latin America and Western Europe both have five countries in top 20 as former region showing a spike in skilled people and availability and the latter business environment. In the entire Africa, the only country that appear among the top 20 is Egypt ranking 16th due to its strong performance in financial attractiveness. Ghana is ranked 29th, Mauritius is ranked 30th. Tunisia ranked 38th, Kenya ranked 39th, Senegal ranked 45th and South Africa is ranked 48th. Among the East African Counties, only Kenya comes first at the rank of 39th as high-ranking newcomer to GSLI due to a top 10 score in financial attractiveness. It argued that many Kenyan companies have based their growth on serving customer first in Kenya and neighboring countries like Uganda and Tanzania as it can be observed in Rwanda.

2.3. Factors of service sector growth

Increasingly, contemporary literature in economic growth of the economies across countries underline factors that contribute to the remarkable growth in the service sector. These factors include but limited to the increasing foreign direct investment, openness of country 'economy, skill development expansion of quality health service, application information technology and increase in consumption expenditure.

Iashmi and Kumar (2012) and Das and Rajesh (2014) both concluded that the growth of output in the service sector came from the rapid development of skill intensive service in information technology and service segment, mostly is oriented to the external market, in addition to the implementation of the new economic policies such as reduction in government expenditure, opening of the economy to trade and foreign investment, adjustment of exchange rate from fixed rate system to flexible exchange rate system, deregulation in most market and removal of restriction on the entry, on the exit, on capacity and on pricing. Previously, Ramakrishna (2010) summarized the source of Indian service sector growth as income elastic demand, opening policies and the growth in the service like communications, business, banking and insurance and trade services.

Latha and Shanmugam (2014) claimed that the advancement of the service sector in India resulted from the expansion of both the health and education sectors where health is defined as a state of complete physical, mental, and social well-being and not just the non-existence of disease and ailment. This approach in the literature is called Salutogenic health care.

Mujahid and Alam (2014) revealed that the service sector in Pakistan is attributed to effect of its population, foreign direct investment, consumption and investment. Talking of the key industries driving service sector growth in India, Harini and Indira (2014), mentioned that India's tourism and hospitality are the most contributors because strong growth in per capita income, rising young population coupled with changing lifestyles lead to greater expenditure in leisure service.

Regarding the Korean economy, Kim, Seok and Lee (2012) concluded that the competitiveness in the service industry can be driven by the incentive system for the skilled workers and investing more in research and development in order to increase the

labor productivity in human capital. In addition, the Korean government should implement an open market policy to liberalize the labor movement and induce to a larger extent the low paid labor in the production process.

2.4. Employment and productivity growth in services

Arnold, Javorcik, Lipscomb and Aaditya (2016) demonstrated presence of link between India's policy reform in service and productivity of the manufacturing firms. They find that banking, telecommunications, insurance and transport reforms all have significant effects on the productivity in manufacturing firms where the effects on the foreign owned firms tends to be stronger.

El-said and Kattara (2013) conducted research on the application of information technology versus the human interaction services in Egyptian hotel. They find that the customers prefer to contact the employee rather than depending on a technology based self-service in the majority of service encounters. In Uganda, more than 80% of the household are employed in tourism services. Tourism employment can provide initial capital for supplementary activities, which the overall gains surpass their income in tourism employment (see also Adyia, Vanneste, Rompaey and Ahebwa, 2014).

2.5. Rwanda's service sector: development, growth, and its future prospects

The service sector is now the largest and most dynamic sector in the Rwandan economy. Main service subsectors and contributor of service growth are wholesale and retail trade, and transport, storage and communication services from 2006 to 2010 (Mashayekhi, 2014). Several other services sub-sectors are rapidly developing.

According to Rwandan Integrated Household Living Condition Survey or Enquête Intégrale sur les condition de Vie des ménages (EICV4), indicator of increase in private and business oriented mixed establishment by industry from 2011 to 2014 raised up to 24% of which the contribution of each service subsectors reveals raise and fall in the percentage change. The raise is found in the wholesale and retail trade, and repair of motor vehicles and motorcycles (21%), accommodation and food services activities (34%), transport and storage is (7%), professional, scientific and technical activities (3.9%), administrative and support services activities (23.1%), health and social work activities (33.1), art, entertainment, and recreation (31.0%), financial and insurance activities (18.4%), private form education (0.6%), other services activities (32.0%), whereas the fall is recorded in information and communication (-28.3%), and real estate activities (-76.5%).

Employment change in private and business oriented establishment by industry from 2011 to 2014 grew up to 34.5% within which, in service subsector, large increase is recorded in administrative and support activities (268.3%), financial and insurance activities (81.2%), transport and storage (54.9%), arts, entertainment and recreation (67.7%), health and social work activities (50.2%), accommodation and food service activities (37.7%), wholesale and retail trade, and repair of motor vehicles and motorcycles (28.7%)

By 2020, the contribution of services is projected to 57% of share in GDP compared to 24% of agriculture followed by 19% of industry. As of EICV4, service sector is the biggest contributor to GDP growth with 2,536 billion rwf in 2013 compared to 774 billion rwf of

industry and 1,785 billion rwf of agriculture in the same year. This reflect the transition of Rwandan economy towards the service-based economy as it evidenced by change in share of economic sectors in GDP from 1970 to 2010. In 1970 agriculture head other sectors by 55.9% of share in GDP compared to 19% share of industry and 25.0% of services; while since 2000, service sector is leading with contribution to GDP of 45.6% in 2000, 49.7% in 2010, and 53.3% in 2013.

2.5.1. Growth of service subsector by economic activity in Rwanda

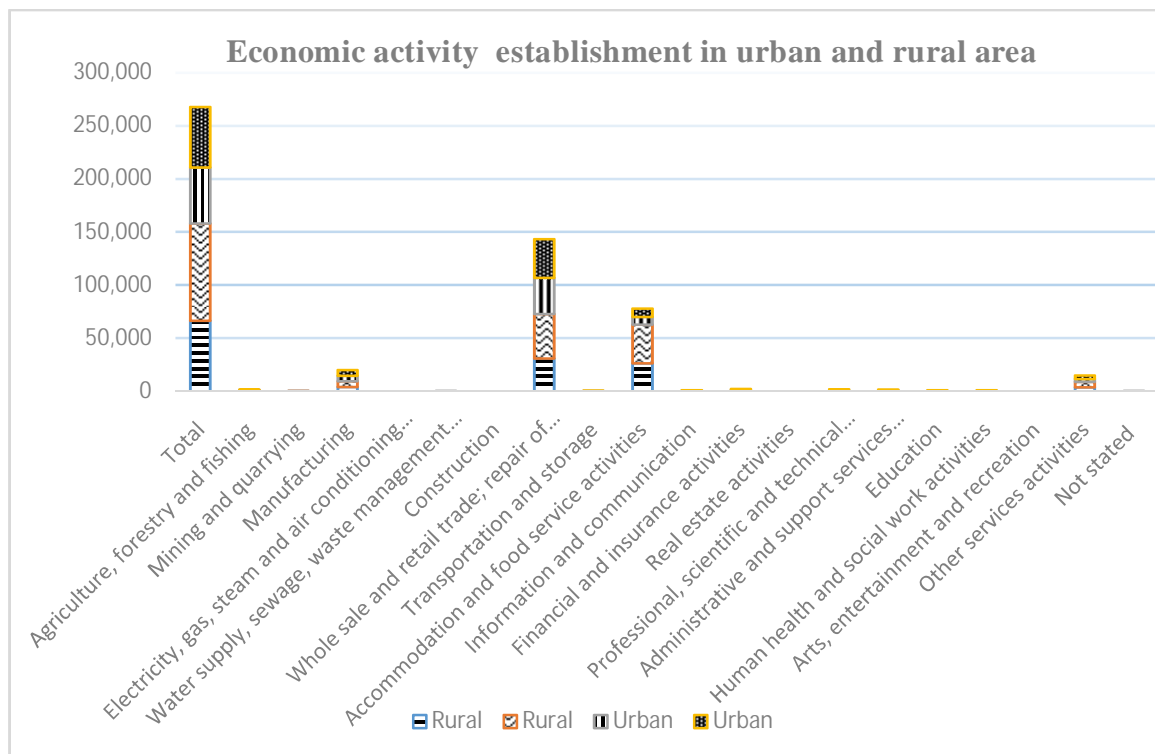
The distribution of businesses by economic activity shows that the service subsector achieved the positive growth in both rural and urban area. The main service subsector that showed more than 30% of growth include accommodation and food service, human health and social work activities; and art, entertainment and recreation activities. According to Singh and Kaur (2014) rapid urbanization is a key factors contributing to the growth of services and leads us to analyze this growth of service subsector in urban and rural area from 2011 to 2014. Accommodation and food service activities that show the greater growth in service sector registered 26,190 establishments in 2011 and 36,545 establishment in 2014 in rural area equivalent to the growth of 40% increase whereas in urban area 7,095 establishments were registered in 2011 and 8,076 establishments in 2014 corresponding to 13.8% increase. The average growth of the accommodation and food service of 34% is given by change from 2011 to 2014 of the private establishment and business oriented mixed sector by economic activity where 33,285 accommodation and food establishments were registered out of total of 119,270 in 2011 and 44,621 establishments out of total of 148,376 were registered. It is obvious that the accommodation and food service sector are growing faster in rural area than in the urban area and the growth of this service subsector contribute to the overall growth of the service sector. (See NISR, 2014).

As it has been claimed by Latha and Shanmugam (2014), advancement of the service sector is correlated with expansion of quality health services indicated by complete physical, mental, and social well-being and not just the non-existence of disease and ailment. While analyzing the service sector growth in Rwanda, it found that Human health and social work activities also demonstrated the interesting growth of 33.1%. In rural, 83 Human health and social work establishments were registered in 2011 compared to 167 registered in 2014 equivalent to 101% whereas in urban area, 261 establishment in human health and social work activities were registered compared to 291 registered in 2014 equivalent to 11.5 increase in the growth of human health and social work establishment in urban area. The growth of the establishment in human health and social work activities is 8 times higher in rural area compared the growth observed in the urban area from 2011 to 2014. Therefore, there is a great conviction that the growth of service sector is linked to the highest growth of the service subsector in the service specifically in the rural area.

Though whole sale and retail trade; repair of motor vehicles and motorcycles is not mentioned among the fastest growing service subsector, it worth to make analysis of it since it has the lion share in the service sector. It the first economic activity hosting many establishment with average growth of 7.0% increase by 2014. The same as in the other service subsector, there greater growth of 37% increase is located in the rural area compared to 7% change increase in urban area. This is a result of 30,708 establishment

registered in the 2011 and 42,101 establishment registered in 2014 in rural area compared to urban areas where 33,968 establishment registered in 2011 and 36,352 of 2014. Generally the rural areas spearheads the establishment of economic activity in the service sector. The Figure 1 justifies the remarkable growth of the service subsector mainly accommodation and food activities and lion share of whole sale trade, repair of motor cycle and motor cycles in the service sector.

Figure 1. Private establishments and business oriented mixed establishments by economic activity according to urban/rural areas



Source: Establishment census, 2014 by NISR.

2.5.2. Employment growth in service sector in Rwanda

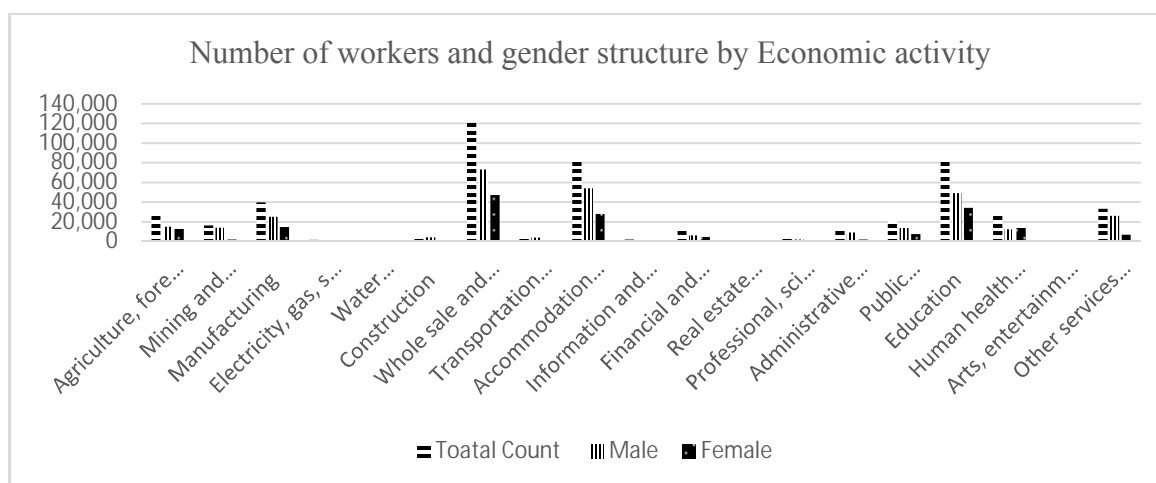
The growing body of literature supported the employment to measure the growth for instance looking at the increment of female labor participation in the services (Fechs and Victor, 1981) and measuring the growth of firm since they reflect both short-term and long term changes in a firm Isaga (2015). Thus, this section conduct descriptive analysis of the employment in the service sector in Rwanda.

According to establishment census of 2014, service sector employed 401,173 worker corresponding to 81.3% of the total workers. The biggest service subsector in terms of the people employed include the wholesale and retail trade, repair of motor cycles and motor vehicles with 120,482 employees equivalent to 24.4% of total employment, followed education employing 83,569 corresponding to 16.9% and accommodation and food services activities having 82,213 employed people equivalent to 16.7%. This support the

growth of service sector since it is providing more job in the economy compare the other economic sector

With regarding to the female participation the employment share of service sector, male are still predominant in almost service subsector except in the human health and social work activities where male workers represent 47.7% and female workers reached 52.3%. The general picture of the share of employment within the service sector depict the gender inequality problem. Only 36.8% of the total employment on the service sector are female compare to male worker who have got the lion share of the service sector employment equivalent to 63.2% of services employment. Considering the share of women in the total population in Rwanda reaching to 53% compared to men occupying 47%, there still promising fact that the service sector shall continue to growth if there is full participation in the service sector employment for women. The Figure 2 illustrate the way employment is dispatched across the economic activity.

Figure 2. Distribution of number of workers and gender structure by economic activity



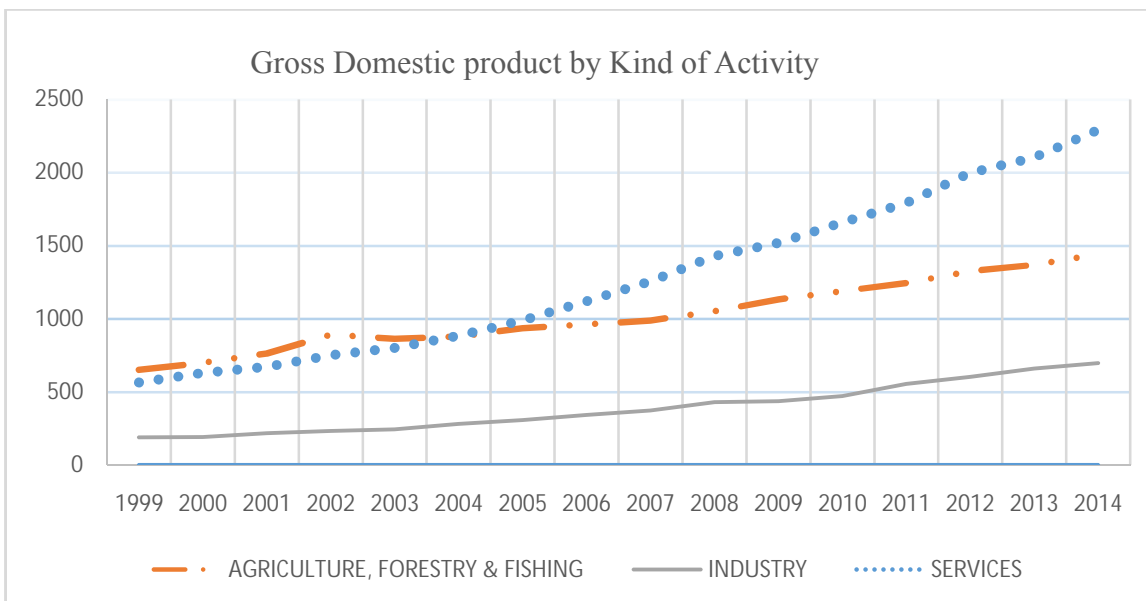
Source: Establishment census, 2014 by NISR.

2.5.3. Trend of share of service sector growth by gross domestic product

According to National Institute of Statistics of Rwanda, (2014), service sector is the biggest contributor of the GDP. The shift from the agricultural based economy to service led economy has been effective since 2004 where the annual output in agriculture was 879 billion Rwf compared to output in the services summed to 882 billion Rwf and from that time up to 2016 the service sector spearheads the contribution of economic sector to the growth of GDP in Rwanda.

The impressive growth of the service sector is documented around 9% by 2014 against 7% for industry and 4% in agriculture while the annual average of GDP was 8% by 2014. The total output in the service sector increase up to four times from 1999 to 2014. The services total output in 1999 was 563 billion Rwf which grew up to 2,290 billion Rwf in 2014.

Figure 3. Gross domestic product by kind of activity at constant 2011 prices (in billion Rwf).



Source: National Institute of Statistics of Rwanda, 2014

The service subsectors that are contributing more include whole sale and retail trade with contribution of 130 billion Rwf in 1999 and 615 billion Rwf in 2014. Though it does not show growth, the real estate activities contributed more to the share of service sector in the gross domestic product. Since 1999, the total output in the real estate activities were 283 billion Rwf which does not grow much as such it amounted to 311 billion Rwf by 2014. The tremendous growth of hotel and restaurant (accommodation and food activities) is witnessed by its contribution in GDP. In 1999, hotels and restaurant recorded 19 billion Rwf which grew up to 113 billion Rwf.

Briefly, trend of share of service sector growth by gross domestic product shows that the services are continuously growing since 1999. The effective transition of the economy happened in 2004, the time from which the service sector is at the top of all economic sectors. The key service subsectors contributing to the share of service sector growth include whole sale and retail trade, the real estate activities and hotel and restaurant.

2.6. The Conceptual Framework and Model

2.6.1. Understanding the key concepts

Services, in this study is conceptualized as non-agricultural and non-manufacturing economic activities in firms operating in the economy of Rwanda. National accounting of GDP comply with the International Standards Industrial Classification (ISIC) of all economic activities. ISIC classified services into sections from G to U as per individual

categories in such away (U) include wholesale and retail trade, repair of motor vehicles and motorcycles, (H) includes transport and storage, (I) includes accommodation and food service activities, (J) includes information and communication, (K) includes financial and insurance activities, (L) includes real estate activities, (M) includes professional, scientific and technical activities, (N) includes administrative and support service activities, (O) includes public administration and defense, compulsory social security, (P) includes education, (Q) includes human health and social work activities, (R) includes arts, entertainment and recreation, (R) includes other services activities, (T) includes activities of households as employers, undifferentiated goods and services producing activities households for own use, and the last but not least is categories (U) including activities of extraterritorial organizations and bodies (UN,2008).

Openness is conceived interaction with the outside of Rwanda service sector in terms of import and export of services, foreign direct investment firm, and acquisition of working capital externally. Yeboah, Naanwaab, Saleem and Akuffo (2012) argued that the trade effect on productivity is much greater in outwardly-oriented economy than in the inwardly-oriented nations. The relationship between trade openness and economic growth is significantly positive in developing countries (Tahir and Azid, 2015). The openness of the firm founders and the early preparation for growth determine both the extent of organizational learning and the speed at which it is developed and used (Hagen and Zucchella, 2014).

Growth is conceptualized as share increment for the service sector measured as GDP. King and Levine (1993) claimed that financial development is robustly correlated with future rate of economic growth, physical capital accumulation, and economic efficiency improvement. The foreign sale growth contribute to firm growth if there is a greater interaction among the management team members and a higher degree of joint decision making constitutes a good new for the owner and manager of small firms (Reuber and Fischer, 2002). Sustaining economic growth and raising living standards require shifting labor into both manufacturing and service sector (Eichengreen and Gupta, 2011).

Firm growth is conceived as the increase in product or service as main business, raise of sales, increase in number of new employed person, and the size of establishment in service sector. Smith, Smith and Verner (2006) found that the proportion of women in top management jobs have positive effects on the firm performance and that effect depend on the qualifications of the female top managers in Denmark. Dawkins, Feeny and Harris (2007) argued the both large firms and those highly specialized, enjoy higher profits margins, whereas the more capital intensive the firm is, the lower the lower is its profitability.

2.6.2. Empirical findings in service sector

Mujahad and Alam (2014) claimed that the increase in share of services in Pakistan's GDP are linked to the population size, and both internal and external factors. Domestic factors are conceptualized as household and government consumption, gross fixed consumption, labor participation, growth rate and literacy, while external factors are conceived as external total debts, foreign direct investments, and trade liberalization measured by imports plus exports divided by GDP. Results showed that total debts, population,

investments and GDP growth has negative effect on services, in contrast trade liberalization, labor participation, aggregate consumption and government spending has positive effect on services.

Sahu (2015) analyzed micro data on the service sector companies to test the high growth in the total factor productivity (TFP) assessing if better factor allocation has led to TFP growth. He found that the reduction in the misallocation of resource in the service sector resulted in accelerated pace of the TFP growth. Therefore, communication industry and community service industry registered the fastest growth in terms moving towards their efficient TFP levels. Acharya (2016) affirmed what accounts for exceptional TFP growth performance in some ICT using industries where productivity gains in the production of ICT are a given as answer USA and Organization of Economic Cooperation for Development (OECD). Marel and Shepherd (2013) confirmed that information and communication technology (ICT) capital and legal institutions are particularly important determinants of country's ability to successfully export services. Furthermore, the tradability indices are strongly correlated with important factors like country productivity and size, factor endowment, trade costs, and regulatory measures.

Geishecker and Görg (2008) claimed that measuring both service and material offshoring is not a straightforward and is greatly limited in data availability of coherent and comparable information on such activity. Thus, trade economists usually reverts to measuring trade in intermediaries as proxy. In addition, they assessed the impact of offshoring activity in an industry on an individual wage which is conceptualized as average hourly gross labor earning including bonus, premium, and other extra payments. The explanatory variables are demographic and human capital variables which include age, age squared, dummies for presence of children and being married, job tenure, tenure squared, high-education indicator, dummies for occupation, and dummies for firm size and regional dummies. Results showed that the worker in industries with increasing level of service offshoring are likely to experience reduction in their wages. He concluded that what would have been considered as perfect case of spillovers from ICT use conventional method which is the impact of research and development and other intangible capital.

Silva, Simoes, Sousa, Moreira and Mainardes (2014) investigated the main determinants of innovation in the services in the area of innovation activities. They found the use of logit model appropriate in measurement of the direct and indirect effects of a selected set of explanatory variables of the innovation capacity of Portuguese services firms. They pointed out the existence of several factors that stimulate and limit the innovation capacity in firm such as investment in the innovation activities, firm size and sub-sector of service in the sector of the activity.

Many research findings showed the contribution of research and development activities in the economic sector growth of any country is fundamental. Jafaridehkord, Rahim and Aminiandehkord (2015) argued that firms benefit immensely from spending on their human capital because this investment adds values on their companies, if not so, as discussed by Heshmati and Kim, decrease in research and development investment results in decreasing productivity growth. Specifically in service sector, Schoonjans, Cauwenberge and Bauwhede (2013) claimed that the effect of knowledge networking on firm growth is significantly larger for service firms than for manufacturing firms since it affects positively net asset and value added growth of service firms.

According to Du and Temouri (2015), firms in both manufacturing and service sectors are likely to become high-growth firms (HGF) when they exhibit the higher TFP. TFP growth model show that openness to foreign companies and world economy, restructuring the economy through a shift of resources between sectors, and the presence of foreign companies in Malaysia is believed to be the major of TFP growth (Jajri, 2008).

2.6.3. Determinants of economic and productivity growth in service firms

2.6.3.1. Input variables in the production process of a firm

Capital, labor and knowledge-based capital are key inputs in production of goods and services, Salehi-Isfahani (2006) claimed that urban households are source of growth in human capital in Middle East and North of Africa (MENA). But households in that region face the large role of the state in economy, which distort the incentive to invest in education and labor market, and social norms regarding gender. As result, households invest in an inefficient portfolio of human capital with dire consequence for long-run growth.

The literature argued the relevance of knowledge-based capital in the firm. Yli-Renko, Autio and Sapienza (2001) found that the knowledge acquisition is positively associated with knowledge exploitation for competitive advantage through new product development, technological distinctiveness and sale cost efficiency. Corporate entrepreneurship is positively associated with knowledge based-capital (Simsek and Heavy, 2011) and business service can have an effect comparable to traditional production factor only when it applies in service sector (Drejer, 2002).

2.6.3.2. The business environment of a firm

Contemporary literature reviews suggest that regulatory, policy and institutional environments, competition in the product market, spillover and externalities, internalization and globalization are constituents of business environment affecting firms' performance.

Bouazza, Ardjouman and Abada (2015) confirmed that the key business environment factors affecting Algerian firms are unfair competition from informal sector, cumbersome and costly bureaucratic procedures, burdensome laws, policies, and regulations, an inefficient tax system, a lack of access to external financing, and low human resources capacity. The main internal factors responsible for unstable and limited growth include entrepreneurial characteristics, low managerial capacity, lack of market skills, and low technological skills. Gale, Krupkin and Reuben (2015) confirmed the existence of negative relationship with the rate of firm formation and top income tax rate by finding that a cut in top income tax generate automatically or necessary growth.

2.6.3.3. Firm dynamics underlying aggregate growth

The economic growth of a country in terms of GDP growth is determined by the real value added growth of the underlying firms. According to Pop, Stümpel and Bordean (2014), in case of economic crisis, it becomes clear that the smaller firms are often capable to respond faster, more target and flexible to global economy fluctuation, and to withstand recessionary phase.

Khan (2011) tested the important determinants of firm growth. He highlighted that firm age, education of owner, boss attitude, family business, networks, new process, major improvement, market share, on job training and know how are found to significantly and positively increase the probability of firm growth. Age of owner, foreign trade regulations, taxes, other regulation, political instability, inflation, and lacking of skilled labor adversely reduces the probability of firm growth in terms of employment opportunities. Oliveira and Fortuna (2008), Lenaerts and Merlebede, Peric and Vitezic (2016) claimed that firm growth is mainly explained by the firm age and size.

2.6.3.4. The role of ICT in business dynamics

The existing literature supports that expenditure in ICT has positive impact on export of producer service (Guerrieri and Meliceani, 2004) and ICT provide a bedrock in improving business processes, customer relations and efficient delivery of goods and services to satisfy the need of the cherished customers (Atom, 2013). According to Bethapudi (2013), ICT integration provides a powerful tool that brings advantages in promoting and strengthening tourism industry and (Mihalic, Pranicevic, and Arneric, 2015) mention that ICT is also becoming an important factor in business and competitiveness because of, as it is discussed by Borghoff (2011), influence of ICT on the three sub-processes of globalization: internationalization, global network building, and global evolutionary dynamics.

As for ICT applicability in service sector, its role is crucial in facilitating trade (Guta, 2012). According to Liu and Nath (2014), the trade-enhancing effect on ICT infrastructure or ICT capability but on its use. Internet subscription and internet host have significant positive effect on both exports and imports. ICT in transport services play a decisive role in reducing energy consumption and CO₂ emission on the road transport sector (Guta, 2012).

According to (Agwu and Carter, 2014), the use of mobile banking and Automatic Teller Machines (ATMs) have made financial services easily accessible and have reduced cost to both customers and financial service providers in Nigeria. Information technology has enabled the banks to understand and serve the customer better than their competitors, developed and improved new products for customers and further improved processes and relationships with its customers and business partners (Muro, Magutu, and Gatembe, 2013).

2.7. Summary of literature review on services sector.

The growing body of literature review on the service sector gives an interesting outlook of role that service sector plays in the economic growth of both developing and developed

countries, hence the global economy (Ghani, Goswami and Kharas, 2011). Service sector accelerate the transformation of economic growth by contributing to GDP growth (Zhou, 2015; William, 1997), raise employment due to the increment of female labor participation in the services (Fechs and Victor, 1981), boost the economy-wide labor productivity (OECD, 2008) since it makes cost advantage of market production smaller (Buera and Kaboski, 2009). Factors contributing to the growth of services include but not limited to rapid urbanization, the expansion of the public sector, increased demand for intermediate and final consumer services (Singh and Kaur, 2014), innovation capacity (Silva et al., 2015), domestic investment and openness (Malin et al., 2013), education skills, cultural adaptability, financial attractiveness, business environment (Sethi and Gott, 2016), and expansion of quality health services, application of information and technology, increase in consumption expenditure (Iashmi and Kumar, 2012). In addition, expansion of health and education sector (Latha and Shanmugan, 2014), population size (Majahid and Alam, 2014), incentive system and investing more in research and development (Kim, Soek and Lee, 2012) also contribute to the advancement and growth of the overall service sector.

It is found that transition of Rwandan economy towards the service-based economy has achieved a good record. Services are leading economy since 2004 and contribute up to 53.3% as of 2013 national account data. Innovation in the service sector is more interesting factor because it is one of the six principles of second economic development and poverty reduction strategy (EDPRS II). Knowing that Rwanda is landlocked country, openness and foreign direct investment are thought to be a break through to service sector growth. As it is found in the literature, conducive business environment and promotion of gender equality, education skills through 12 years of education towards knowledge based economy are transformative means in Rwandan economy. Except the documentation on strategy to promote the services in the national development agenda and some statistics, literature do not reveal what factors are behind the growth of service sector in Rwanda.

Descriptive analysis of service based on the establishment census 2014 shade the light on the structure of service sector. It is found that the service sector in the top employer of the entire economy up to 81% of the total employed people, the growing service subsector are accommodation and food service activities and human health and social work activities. The service subsectors like wholesale and retail trade, repair of motor vehicle and motor cycles; hotel and restaurant, and real estate activities are the top subsectors that contribute to the share of service sector in GDP. Up to now it clear that the service sector is leading the economy in Rwanda and empirical analysis shall complement descriptive analysis.

3. CHAPTER THREE: METHODOLOGY

3.1. Model

3.1.1. Structure of empirical models

In order to investigate the determinants of service sector growth, we focus on the role of the total annual sales, innovation and turnover in the service firms as dependent variables. These are commonly used measures of performance throughout the literature and are endogenous to firms in their decision making.

A number of hypothesis are formulated and tested. The first hypothesis is that service sector growth can be investigated through the total annual sales earned by the firm. In the Rwanda-enterprise survey 2011, firms were asked what establishment's total sales were in 2010 and what establishment's total annual sale were in the three previous fiscal years since the fiscal year 2008. Thus, total sales growth up to 2010 is used as the dependent variables. Variables that have effect on the total sale growth are employment cost, loan size, ICT, firm innovation characteristics. The null hypothesis is that these factors have no effect on the total sales and its growth rate, while the alternative hypothesis is they have positive effects on total sales and its growth rate.

The total annual sale are measured in terms of the amount of money the firm acquired by selling the service through domestically, direct or indirect export over three years from 2008. Labor utility is embodied in the cost incurred to the employment of service firm. Working capital is estimated using loan size approved is used to track the role of financial institution as channel of access to finance service activities. ICT application is tracked by the use of email to communicate with the clients or supplier and the use of cell phone for the operations of the establishment. The firm innovation characteristics is defined as employee development, research and development activities, internal or external trainings, new methods, new practices, new marketing strategies, and new logistics.

The model for investigating the determinant of total sales growth in service firms is constructed as follows:

- (1) Total sales growth = f (employment cost, working capital, ICT, firm innovation criteria, acquisition of fixed asset.).

The second hypothesis is that the services sector growth is reflected in its innovation that is expressed in the introduction of new products or services. In Rwanda-enterprise survey 2011, firm were asked whether there were introduction of new product or service in the last three year. The variable on the introduction of new product or service which is conceived as innovation is taken as the dependent variable. Independent variables include internal research and development (R&D) activities, external or internal acquisition of research and development (ext. R&D) as time given to employee in service firm to develop or try out a new approach or new idea about products or services, business process, firm management, or marketing, Acquisition of training, access to finance illustrated in acquisition of fixed assets, firm characteristics in term of seize. The null hypothesis suggest that these factors do not influence service innovation, while the alternative hypothesis suggest that the have positive effect on the service innovation of new product and services. The model to investigate the factor affecting the service sales is structured as follows.

- (2) Service innovation = f (R&D, ext. acquisition of R&D, acquisition of training, acquisition of fixed assets, other firms' criteria.)

The third hypothesis is that the turnover in the service firm is affected by a number of factors like the capital used, openness conceived as buying and selling outside the country, gender of the manager, paying value added tax, paying income tax, service sub-sector. Turnover in the service firm is defined as the amount of money that is received in sales. The establishment census 2014, the information collected on this variable is classified in categories where the first category include all firm with turnover worth less than 300,000

Rwf, the second category include all firms with turnover ranging from 300,000Rwf to 12 million Rwf, the third category is for all firm with turnover ranging from 12 million to 50 million Rwf and the last category includes all firm gaining turnover that is more than 50 million. It is categorical dependent variable. Categorization of the turnover lead to loss of information within the category, but instead shed light on the category differences in performance and variations in their determinants.

The first dummy variable on the openness contains the information on whether the firm sells or buys good or services abroad. The second dummy variable gender defines whether the manager of the firm is female or male. The third dummy variable on value added tax (VAT) contains the information on whether or not the firm pays the VAT. The fourth dummy variable has the information on whether or not firm pays the income tax. There is also factor variable on the service subsector where 7 stands for the Whole sale and retail trade; repair of motor vehicles and motor cycle, 8 stands for transportation and storage, 9 stands for accommodation and food service activities, 10 stands for information and communication, 10 stands for financial and insurance activities, and 12 stands for real estate activities. The other factor variable on the capital used contain the information classified in categories such a way the first category of consider the firm using less than 500,000 Rwf, the second uses 500,000 to 15 million, the third use more than 15 million to 75 million and the last category use the capital worth more than 75 million, thus this variable is categorical variable. To estimate the factor affecting the change in the turnover is constructed with the variable mentioned above and is expressed as follows.

$$(3) \text{ Turnover} = f(\text{capital used, openness, gender, taxes, service subsector,})$$

The following subsection gives the summary of all variables used in the three models (sales growth, service innovation, and turnover) mentioned above. The expected sign for each variable is mentioned to foretell what the expected effects of each determinant on the dependent variable is to be.

3.1.2. Variables and expected signs

In the Model 1, where the dependent variable is the total sales growth, the following table (Table 1) indicates both dependent and independent variables, their definitions and the attached expected sings of their coefficients.

Table 1. Summary list of the variables used in Model 1 and their expected effects on performance of firms.

Variables	Variable Name	Definition	Expected Signs
Dependent variable:	Total sales	Three years' annual total sales	
Independent Variables:	Employment	Cost paid to employment in	+
	Loan size	credit line or loan size approved	+

e-mail communication	Dummy variable on the use of e-mail to communicate with client or suppliers	-
researchdevpt	Dummy variable on research and development activities	-
Innovation	Dummy variable on introduction of new product or service	+
Training	Dummy variable on conduct of training	+
new methods	Dummy variable on new methods	+
new practices	Dummy variable on new practices	
new marketing	Dummy variable on new marketing	+
new logistics	Dummy variable on logistics	+

Source: World Bank, Rwanda enterprise survey (2011)

In the Model 2, where the dependent variable is the total sales growth, the following table (Table 2) indicates both dependent and independent variables, their definitions and the attached expected signs of their coefficients.

Table 2. Summary list of the variables used in Model 2 and their expected effects on performance of firms.

Variables	Variable name	Definition	Expect signs
Dependent variable:	Service innovativeness	New product or services introduced	N/A
Independent variables:	New methods	Dummy variable on new methods in services	+
	New logistics	Dummy variable on new logistics in services	+
	New practices	Dummy variable on new practices in services	+
	New marketing	Dummy variable on new marketing in services	+
	Research and development activities	Spending on research and development	+
	Employee	Time given to employed to develop new idea	+

	Training	Internal or External training to employee	+
	Access to finance	Acquisition of fixed asset such as machinery, vehicle, land, buildings.	-
	Loan	Dummy variable on loan or credit line	+
Control variables:	Firm size	Small: 5-19 members	+
		Medium: 20-99 members	+
		Larger: 100 and above	+

Source: World Bank, Rwanda enterprise survey (2011-2012)

3.1.3. Dependent variables

The dependent variable is service firm growth measured by several attributes such as turnover/sales, employment, assets, market shares, and profits. Rwanda enterprise survey 2011 provide us with data on the total sales for three years and 2010 fiscal year, data on the introduction of new product or service which are a measure of innovation output in the previous three years. The factors affecting the total sales, growth of employment and service innovation determine the service sector growth. The literature highlighted the key measures of firm growth as sales, employment, and innovation. Zhou and Wit (2009), Isaga (2015) used sales and employment to measure growth of firm since they reflect both short-term and long term changes in a firm.

In the model on the service innovation, the dependent variable is binary variable on the introduction new product or service in the three years past from 2010. According to Neely (1998), innovation has a direct impact on competitiveness of the firms. The values created by innovations are often manifested in new ways of doing things or new products and processes that contribute to wealth. In their studies, Arvanistis and Stucki (2012) and Silva (2014) selected firm innovation to measure the growth because it is argued that the innovation start-ups seem to be important drivers of economic growth.

The model on the turnover uses categorical dependent variable where turnover of the firms is classified into four categories as they have been describe earlier. Ordinary scale with many categories (5 or more), interval, and ratio, are usually analyzed with the traditional approaches of statistical tests (Newsom, 2013).

3.1.4. Independent variables

Independent variables to the new service development are classified into four categories such as firm characteristics, innovation characteristics, managerial characteristics, and business environment. In this study, the firm characteristics consider the firms size, gender composition, and legal status of the firm. Considering the firm size, Madeira (2014) found

the positive and increasing effect of firm size on the service firm innovation. The mediumsized firm showed greater propensity to innovate than small sized firm

Innovation characteristics include market condition; new management practices; new market methods; spending on research and development activities; service firm employee's development; firm access to finance expressed in the acquisition of fixed assets; and degree of competition. Zoltan and Audretsch (1988) and Omega (2006) claimed there is a positive relationship between the innovation and research and development activities of firms.

The managerial characteristics are pointed out with the top managers' level of education and his/her years of working experience of the top manager in the service sector. Education is measured by level of education attained classified as: no education, primary school, secondary school, vocational training, some university training, and graduate degree. Queiro (2016) has found firms that switch to more educated managers experience sharp increase in growth relative to comparable firms managed by less experienced managers. More educated managers increase the use of the incentive pay and are likely to report that their products and services are new and incorporate new technologies.

3.2. Data and Method

3.2.1. Data description

The data concerning the performance of service sector in Rwanda used in this study were provided by the national Institute of Statistics of Rwanda. The data came from two important data collection channels such as the 2010-2012 enterprise survey in Rwanda and 2014 establishment census.

The enterprise survey focuses on the many factors that shape the business environment and is useful for both policymakers and researchers. The enterprise survey is conducted by the World 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 the entire manufacturing sector, the services sector, and the transport and construction sectors. The 2011 Rwanda enterprise survey covers 241 firms including 159 in the service firm and 82 manufacturing firms. The cleaned raw database contains 148 firm observations each with 247 variables describing various aspects of the firms and their activities (World Bank, 2014).

Rwanda establishment census 2014 consisted of a completed counting of all establishments practicing a specific economic activity in Rwanda except not-for-sale government services. It covered the themes like economic activity, legal status, registration of establishment, taxation, capital employed, regular operation accounts; socio-economic characteristics of the establishments' staff, payment status and sex of employees. The dataset contains 154,236 cases with 91 variables (NISR, 2014).

3.2.2. Method: logistic, linear and ordered logistic regression models

Madeira (2015) argued that a firm's capacity to innovate is a complex phenomenon influenced by a wide range of factors. Thus, logistic regression (logit model) helps to study statistical relationship of dependent variable in relation to more than one determinant variable. Stock and Watson (2011) discussed a regression with binary dependent variable and concluded that when dependent variable Y is binary, the population regression function is the probability that $Y=1$, conditional on the regressors. The resulting predicted values are predicted probabilities, and estimated effect of a change in a regressor X is the estimated change in the probability that $Y=1$ arising from the change in X . The standard estimation in maximum likelihood method case and its estimates proceeds the same ways as it does in linear multiple regressions.

In this study, dependent variable on the service innovation conceived as the introduction of new products or services are binary variable where value of 0 translate the fact firm did not introduce a new product or service and 1 for firms that introduced new products or services. The same applies to the independent variables.

According to Verbeek (2004), who discussed the models with limited dependent variables, when dependent variable is zero for substantial part of the population but positive for the rest of the population with many different outcomes; logistic regression model are particularly suited for this type of variables. Since a violation of distribution lead to inconsistent maximum likelihood estimators, testing for misspecification is to be conducted and necessary measures undertaken.

To estimate the total sales growth in service firms, we use the multivariate regression analysis since the growth is expected to be analyzed in the three years' total annual sales on the service firm. We need to track the factors that contributed to the change in total annual sales in the service firms. In this case, the use of linear regression model is helpful.

4. CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATIONS

In this section, we present the model used to empirically assess that factors determining the service sector growth through three models on the sales, innovation and turnover. First, the models dependent and independent variables are presented and then model estimation is conducted, outputs are presented in tables and tests for significance of coefficients are conducted and explained.

4.1. The Empirical model and its specification

Empirical models for analysis of service sector growth and its determinants in Rwanda are expressed on the basis of total annual sales, service sector innovativeness and service sector turnovers to track the factors influencing those dependent variables. Starting with the factors affecting the sales in the service firms (Model 1), we can construct the multivariate regression model as follows:

$$(4) \quad Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + \beta_{10} x_{10} + \beta_{11} x_{11} + \beta_{12} x_{12} + \varepsilon$$

In this model, the dependent variable Y_i stands for the level of total sales given the values of X_i 's that are the independent or determinant variables. X_1 stands for the total annual cost of labor including wages, salaries, bonus and social security payments as the performance expression in the service firms, X_2 stands for size of most recent loan or line of credit approved as source of finance, X_3 stands for a dummy variable on the use of internet expressed by e-mail to communicate with the clients or the suppliers as an ICT application, X_4 stands for a dummy variable on the employees' development activities through new idea or approach about products or services, X_5 stands for a dummy variable on the spending on formal research and development activities to create new products or to find more efficient methods of production, X_6 stands for a dummy variable on innovation expressed as the introduction of product or services, X_7 stands for a dummy variable on the engaging in internal or external training of personnel, X_8 stands for a dummy variable on the acquisition of fixed assets such as machinery, vehicles, equipment, land or buildings, X_9 stands for a dummy variable on the new or significantly improved methods of offering services, X_{10} stands for a dummy variable on the new or significantly logistical or business support processes, X_{11} stands for a dummy variable on introduced new or significant improved marketing methods, X_{12} stands for a dummy variable on the new or significantly improved organizational structure or management practices.

The coefficients are represented with symbol β with subscript from 0 to 12 according to dependent variables. On one hand, the null hypothesis, $H_0: \beta = 0$ i.e. $\beta_0, \beta_1, \dots, \beta_{12} = 0$. In this case, no independent variable has effect on the total annual sales in the service firms, and on the other hand, the alternative hypothesis, $H_1: \beta \neq 0$ meaning that in the independent variables results changes in total annual sales of service firms. A positive coefficients is interpreted as having positive effect and a negative a negative effects on sales. Thus, the main focus is on the properties of the effects namely the sign of the effects and its consistency with our expectations, the size of the effects and their statistical significance. The model can also be specified in form of changes in sales between two years or labor productivity that is sales per employee.

The innovation model is also used to assess the determinant of service sector innovativeness which can influence growth of firms. The model of service innovation (Model 2) is specified as follows:

$$(5) \quad \Pr.(Y = 1 | Z) = \varphi_0 + \varphi_1 z_1 + \varphi_2 z_2 + \varphi_3 z_3 + \varphi_4 z_4 + \varphi_5 z_5 + \varphi_6 z_6 + \varphi_7 z_7 + \varphi_8 z_8 + \varphi_9 z_9 + \varphi_{10} z_{10} + \varphi_{11} z_{11} + \varphi_{12} z_{12} + \mu$$

The probability that the service firms introduce new product or service is portrayed with Y as binary dependent variable. The symbols z with subscript ranging from 0 to 10 stands for different independent variables or determinants of innovativeness that are thought to have effects on the extent at which the firm innovates.

As it is conceived in the equation (5), φ_0 stands for on the new or significantly improved methods of offering services, φ_1 stands on a dummy variable on the new or significantly logistical or business support processes, φ_2 stands for a dummy variable on introduced new

or significant improved marketing methods, δ stands for a dummy variable on the spending on formal research and development activities to create new products or to find more efficient methods of production, ϵ stands for a dummy variable on the employees' development activities though new idea or approach about products or services, z stands for a dummy variable on the engaging in internal or external training of personnel, η stands for a dummy variable on the acquisition of fixed assets such as machinery, vehicles, equipment, land or buildings, θ stands for a dummy variable on having a line or a loan from a financial institution, ϕ stands for factor variable on the firm size: defined as small (5-19 employees), medium (20-99 employees) and large firm (100 employees and above), μ stands for random the error term.

For this model, the null hypothesis, $H_0: \phi = 0$, implies that all the independent variable do not affect or generate the introduction of the new product or service and the alternative hypothesis, $H_1: \phi \neq 0$, suggests that the independent variables have effect on the introduction of the new products or services. Although maximum likelihood estimators have the property of being consistent, the likelihood function has to be correctly specified for this to hold. The most convenient framework to test for such test is Lagrange Multiplier framework (Verbeek, 2004).

Turnover as a measure of growth is used to assess the factor that influence it in the service subsectors. The model on the service firm turnover (Model 3) is constructed as follows:

$$(6) \quad Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \mu$$

The level of the turnover of service firm given the predictor Y in this model is represented by the letter G and coefficients are symbolized by β with subscript 1 to 6. The independent variable X_1 stands for gender of manager, X_2 stands for the openness in the service firm as selling and buying goods or service abroad, X_3 stands for the tax on the added value, X_4 stands the tax on income, X_5 stands for a categorical variable on the main service subsector, X_6 stands for a categorical variable on the capital used by the service firms and μ represent the error term. The null hypothesis, $H_0: \beta = 0$ which implies that the independent variables have no effect on the level of turnover in the service firms. The alternative hypothesis, $H_1: \beta \neq 0$ implying that independent variables have effect on the level of turnover in the service firms. The sign of the coefficient is checked to be consistent with expectations.

4.2. Relationship between sales, innovation and turnover in the service sector growth

As discussed earlier, sales are used as an indicator to measure the firm growth and the same as turnovers. In this study, sales and turnover are both used with different model specifications due to the fact that the data set used are different. Otherwise, they should have the same model specifications since they can be used interchangeably.

Model on the sales of service sector firms is constructed with the variables used in the collection of data during the 2011 Rwanda Enterprise Survey by National Institute of Statistics of Rwanda in partnership with World Bank. Because this database contained more missing values, we constructed a model on turnover with the variable used to collect

information in the establishment census 2014 by National Institute of Statistic of Rwanda. This is done in order to track main factors affecting sale or turnovers as many as possible.

For the innovation model, we use the same data base as the sales model because the 2011 enterprise survey attached more interest on the innovation factor in the performance of firms. Only the predictors of innovation model can appear in the sale model in order to prove the contribution of the innovation in the growth of sales of the service firms.

4.3. Estimation and testing

4.3.1. Linear regression of service sales model

Multivariate linear regression of service sales model (Model 1) came up with the results presented in the Table 3. At 5% confidence interval, variable on employment coefficient, loan size, employee's development and internet use are statistically significant with positive effect to the growth of sales except the employee's development. Therefore, we reject the null hypothesis. Other coefficient are statistically insignificant, thus, we fail to reject null hypothesis. The innovation, training, acquisition of fixes assets, new methods, new practices, new marketing and new logistics do not have the effect on the total annual sales. The R^2 is 0.84, meaning that the independent variables explain variations in the sales of the service firms at 84%.

Table 3. Linear regression of service sales model

Source	SS	df	MS	Number of obs =	48
Model	152.521668	12	12.710139	F(12, 35) =	15.80
Residual	28.1634417	35	.804669764	Prob > F =	0.0000
Total	180.68511	47	3.84436403	R-squared =	0.8441
				Adj R-squared =	0.7907
				Root MSE =	.89703

Logtotalsales	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Logemploycost	0.7220	0.1079	6.689	0.0000	0.5029	0.9412
Logloansize	0.2361	0.0852	2.771	0.0089	0.0631	0.4090
1.Internetuse	1.2684	0.5292	2.397	0.0220	0.1940	2.3428
1.Employeeedvt	-1.0810	0.4163	-2.596	0.0137	-1.9262	-0.2358
1.Researchdevpt	-0.9456	0.3223	-2.934	0.0059	-1.5999	-0.2914
1.innovation	0.1124	0.4208	0.267	0.7910	-0.7419	0.9668
1.Trainings	-0.1875	0.4509	-0.416	0.6801	-1.1028	0.7278
1.Fixasset	-0.2912	0.3970	-0.733	0.4681	-1.0970	0.5147
1.Newmethods	-0.6576	0.4593	-1.432	0.1611	-1.5901	0.2749
1.Newpractices	0.1796	0.4846	0.371	0.7132	-0.8043	1.1634
2.Newmarketing	-0.6149	0.3739	-1.645	0.1090	-1.3740	0.1442
1.Newlogistics	0.7042	0.5023	1.402	0.1697	-0.3155	1.7239
_cons	3.4132	1.5283	2.233	0.0320	0.3105	6.5159

4.3.2. Heteroskedastic testing for sales model

We conduct test for heteroscedasticity, deviation from constant variance of the residuals. The test results in form of fitted residuals are presented in Figure 4 and Figure 5 and Table 4.

Figure 4. Graph to test heteroskedastic by residual values fitted

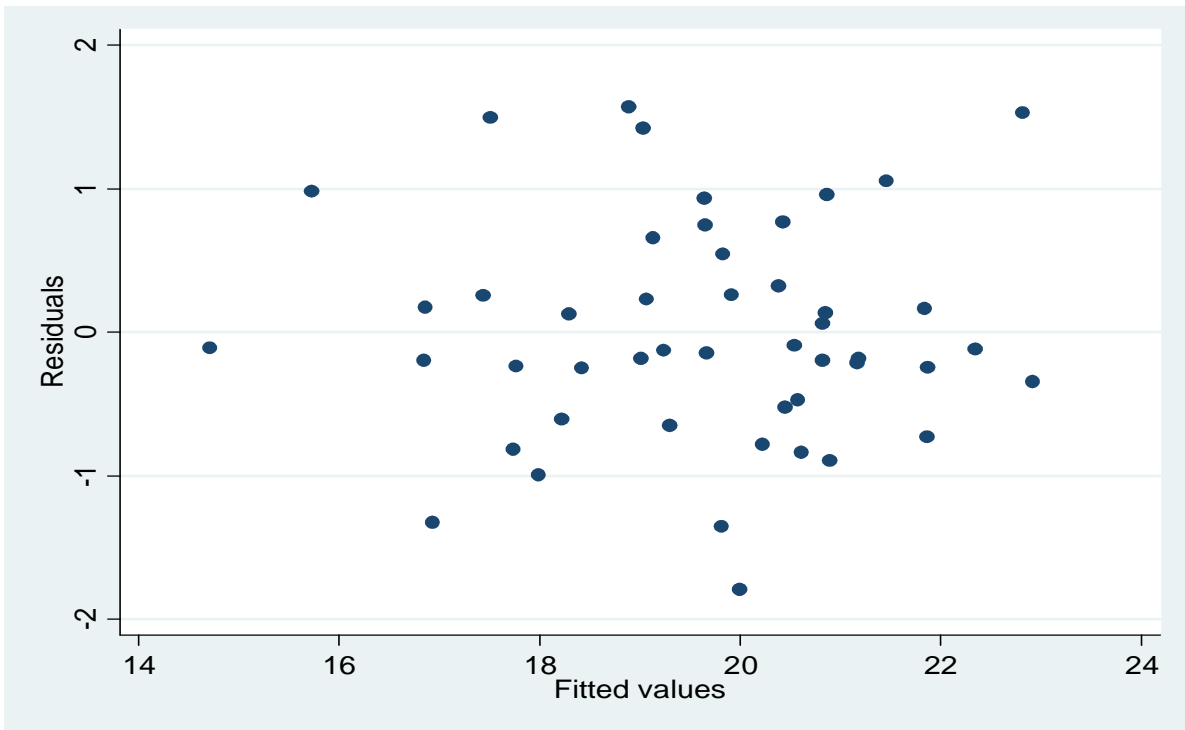


Figure 5. Graph to test heteroskedastic by residual values fitted with linear plot

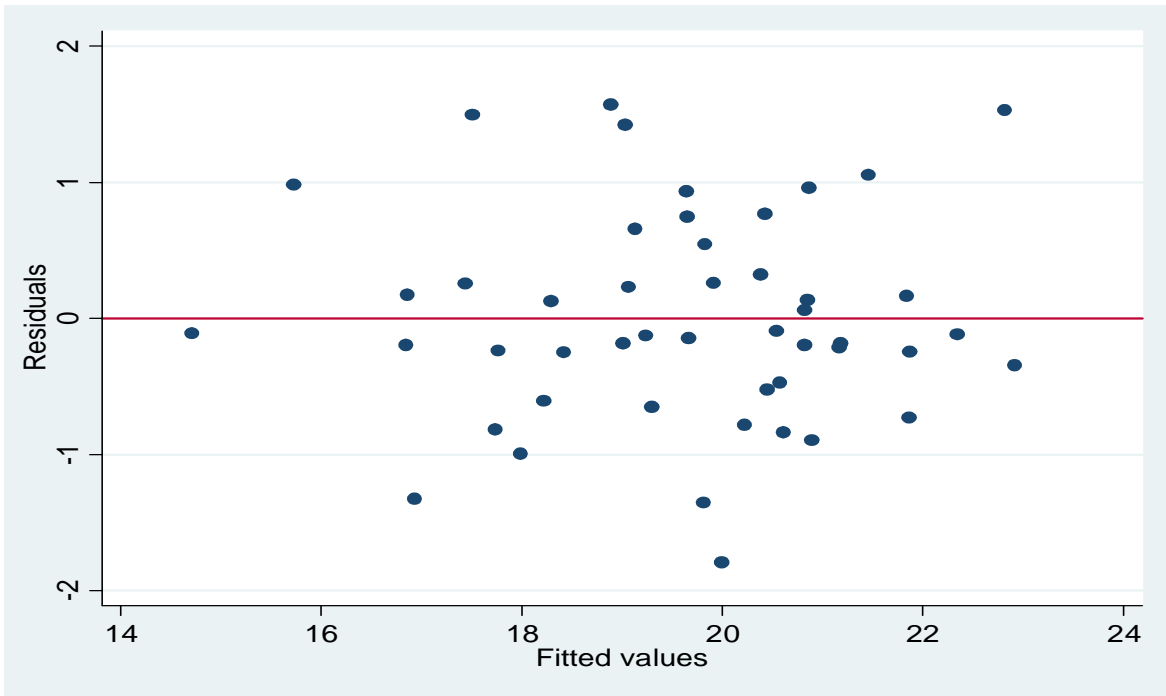


Table 4: Summary of Stata outputs on testing for heteroskedastic in the Model1 using white test method

White's test for H_0 : homoskedasticity
 against H_a : unrestricted heteroskedasticity

chi2(42) = 44.98
 Prob > chi2 = 0.3482

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	44.98	42	0.3482
Skewness	12.78	12	0.3851
Kurtosis	0.24	1	0.6212
Total	58.01	55	0.3651

Considering the results of both Figures 4 and 5 and the Table 4 used for careful analysis, there is no evidence for omitted variables, heteroscedasticity, and non-normal skewness since the p value is greater than 0.05. So, we fail to reject null hypothesis on the existence of homoscedasticity.

4.3.3. Logistic regression of service innovation model

Logistic regression of service innovation model (Model 2) result in the output presented in the Table 5. The results for the innovation model shows that independent variable on new or improved methods of offering service, engaging in internal or external training and acquisition of fixed assets are statistically significant at 5%, i.e. they have effect on the service firms' innovation. Thus, we reject null hypothesis. Other variable in the model are statistically insignificant interpreted as they have no effect on the innovativeness of the service sector.

To test the goodness of fit of the model, we find that the AIC is lower than BIC which implies that our model is well fit (see Table 6). Logistic model of innovation is correctly classified at 76.58%. The log likelihood ratio test is recommended with inference at -80.4422 with $\chi^2(1) = 1.63$ and $\text{Prob} > \chi^2 = 0.2015$ at 5%, implying that the model is fully fitted as it portrayed in the Appendix 2. According to Scott (1997), the LR test assesses the constraint by comparing the likelihood of the unconstrained model to the log likelihood of the constrained model. If the constraint significantly reduces the likelihood, then the null hypothesis is rejected.

Table 5: Summary list of the variables used in Model 2 and their expected effects on innovation performance of firms.

```

Logistic regression                               Number of obs   =       158
                                                    LR chi2(12)    =       46.28
                                                    Prob > chi2    =       0.0000
Log likelihood = -81.257932                       Pseudo R2      =       0.2217
    
```

Innovation	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Newmethods	1.0971	0.4907	2.236	0.0254	0.1354	2.0587
Newlogistics	0.2143	0.5451	0.393	0.6943	-0.8542	1.2827
Newpractices	-0.1162	0.5654	-0.205	0.8372	-1.2243	0.9920
Newmarketing	-0.2969	0.4911	-0.605	0.5454	-1.2595	0.6656
Researchdvpt	0.2238	0.4919	0.455	0.6491	-0.7402	1.1878
Employeedvpt	0.8771	0.4861	1.804	0.0712	-0.0757	1.8299
Training	0.9657	0.4720	2.046	0.0408	0.0406	1.8909
Fixasset	-1.1771	0.4449	-2.646	0.0082	-2.0491	-0.3051
Loan	0.6215	0.4092	1.519	0.1288	-0.1805	1.4234
Firmsize						
1	-0.4398	1.0077	-0.436	0.6625	-2.4148	1.5352
2	0.0959	1.0425	0.092	0.9267	-1.9473	2.1391
3	1.0922	1.2691	0.861	0.3895	-1.3952	3.5797
_cons	-0.8578	1.0347	-0.829	0.4071	-2.8858	1.1702

Table 6: Summary of post estimation of Akaike's information criteria (AIC)

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	158	.	-80.44222	14	188.8844	231.7608

4.3.4. Ordered Logistic regression of service turnover model

In order to estimate service turnover model, we used ordered logistic regression due to the fact that turnover is dependent variable defined as categorical variable. If the primary interest is in the understanding how the explanatory variable affect the conceptual dimension represented by ordinal variable, ordinal variable are appropriate. The results of an ordinal logistic model are the same as for a traditional logistic model with the exception that there is a cut point instead of a constant (Powers, 1999)

The results presented in Table 7 indicate that the coefficient of gender, openness, value added tax, income tax, capital used, and service sub-sector 8, 9 and 11 are statistically significant. Meaning that, they have influence on the level of turnover of service firm. Other are statistically insignificant which implies that they have no effect on the change in the level of turnover.

Table 7. Ordered Logistic regression of service turnover model

Ordered logistic regression	Number of obs	=	35575
	LR chi2(12)	=	17932.95
	Prob > chi2	=	0.0000
Log likelihood = -21409.823	Pseudo R2	=	0.2952

Turnover	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
1.Gendermenager	-0.0624	0.0280	-2.224	0.0262	-0.1174 -0.0074
1.Openess	0.7192	0.0891	8.075	0.0000	0.5447 0.8938
1.Valueaddedtax	1.8273	0.0816	22.380	0.0000	1.6672 1.9873
1.Incometax	0.2105	0.0479	4.394	0.0000	0.1166 0.3043
Ssubsectors					
8	0.7318	0.2213	3.306	0.0009	0.2980 1.1656
9	-0.3654	0.0277	-13.193	0.0000	-0.4197 -0.3111
10	-0.0246	0.2351	-0.105	0.9166	-0.4854 0.4361
11	1.9284	0.1207	15.983	0.0000	1.6920 2.1649
12	-0.4586	1.1115	-0.413	0.6799	-2.6371 1.7200
Capital					
2	2.7719	0.0334	82.892	0.0000	2.7063 2.8374
3	5.3948	0.1121	48.128	0.0000	5.1751 5.6145
4	6.4496	0.1464	44.058	0.0000	6.1626 6.7365

4.4. Analysis of the Empirical Results

This section contains the interpretation and analysis of the results for the three models specified and estimated earlier. It is from here, we can gain an advanced knowledge on the constituents of service sector and the determinants contributing to the growth of this sector. The service sector growth is measured by considering key measures of firm performance and growth like innovation, sales and turnover and they are taken to be dependent variables for models formulation and estimations. The growth of the sales in the service firm contribute to the growth of service sector share in the gross domestic product of Rwanda. Innovation brings in the new products or services which in turn push the growth of the services. The factors influencing growth of sales, service innovativeness, and turnover are used to conclude on drivers of service sector growth. These determinants shall be taken into consideration in shaping and sustaining the service led economy path as it is a national strategy for economic growth.

4.4.1. Factors affecting total sales growth in the service firms

Estimation results of the linear regression on sales model indicate that the employment cost, size of the approved loan, and use of internet affect positively the change in the sales of the service firms for three years from 2008 to 2010. The growth of employment is a good indicator of the firm performance whereby the cost of employment for three years is positively reflected in the total sales. A 1% change in the cost attributed to employment result in 0.72% change in the sales in the service firms, other things hold constant.

UNECA, 2015 reported that financial services are the oil of transaction and provide access to credit for investments to most other business. This is proven by the fact that in our model on sales, the size of most recent loan or line of credit approved is positively correlated with the change in the total sales of the service firms. Other things hold constant, a 1% change in the size of loan result in 0.236% of change in the total annual sales of the service firms.

Liu and Nath (2014) argued that the trade enhancing effect on ICT infrastructure or ICT capability is on its use. Internet subscription and internet host have significant positive effect on both exports and imports. In our model on sales, the use of use of e-mail to communicate to the client or supplier expressed as internet use is has positive relationship with the total sales as it has been found in previous studies. Holding other things constant, a 1% change in the use of internet brings in 1.268% change in the sales of service firms.

Both employee's development and research and development activities are negatively correlated with the change in the sales generated in the service firms. Holding other this constant, a 1% change decrease in the employee's development result in 0.108% decrease in the total sales of the service sales. A 1% change decrease in the spending on the research and development activities induces 0.94% decrease in the total sales, other things held constant.

The change in the total sales in the service firms in Rwanda is attributed to the financial service itself through access to credit, ICT application in the service provision principally

via email operationalization, employment growth expressed by the cost incurred by the service firm for employment, employees' development as a trial of a new approach or new idea about product or services, business process, firm management or marketing. The last but not the least is the expenditure incurred on the research and development activities. These variables are explained in the model at 84% as measured by R^2 and all are statistically significant taking consideration of their t-statistic being greater than 1.96 and p-values with less than 0.05 values.

4.4.2. Contributing factors of service sectors innovativeness

The logistic regression of service innovation model (Model 2) tends to find out the factors contributing to Rwanda's service firm innovation. In the summary of results Table 5, the number of observations shows that 158 firms are included in the estimation. The significance test of the likelihood ratio indicating whether the predictors in the model together account for significant variation in the dependent variable is 46.28 where the probability chi-square test is 0.000. This implies that the independent variables have influence to the dependent variable. The variables like new methods, training and acquisition of fixed assets are statistically significant as 95% confidence interval since their p-values are less than 0.05 and their z values in absolute value are greater than 1.96. The approximate amount of variance accounted for by the independent variables in this model is expressed by Pseudo R^2 which is 0.22. The log likelihood is -81.2579.

A 1% increase in the use of new methods like new or significantly improved technology, equipment and software for production, finishing, packaging, or quality control result in 1.097% increase in the innovativeness of the service firms, holding other things constant.

A 1% increase in the level of acquisition of internal or external training results in the 0.965% increase in the level of introducing the new product or services in the firm, holding other things constant. This result is straightly consistent with prior literature on the importance of training in the performance of the firm. In his study on the effect of training on the employee performance with evidence from Uganda; Aidah (2013) reported that training and development have an impact on the performance of employees with regards to their jobs. Training develops skills, competency, and ability and ultimately improves employee performance and organizational productivity (Amir and Amen, 2013).

A 1% decrease of the acquisition of fixed asset such as machinery, vehicle, land and buildings results in 1.17% decrease in the introduction of new products or services, holding other things constant. This indicates acquisition of fixed asset is a key factor for the innovation process in the service firms. It is clear that, lack of fixed asset do not only hempen the service innovation but also affect the existing service provision which is bad to the entire economy of the country. Silva (2015) found that the greater financial investment in acquisition of machinery, equipment and software, the greater the propensity for firms to innovate in the services.

By concluding, the service firms' innovation in Rwanda is attributed to the new methods applied, acquisition of internal or external training and acquisition of fixed asset. These factors affect the service sectors performance and growth through enabling the introduction of new products or service.

4.4.3. Factor determining level and variations in turnover of service firms

Turnovers of the service firm are conceived as the amount of money taken by a business in particular period. The estimation of ordered logistic regression model on the turnover in the service revealed that gender of the manager, openness, taxes are statistically significant and have influence on the turnover of service firm at 95% confidence interval. This implies that the p-value of the mentioned independent variable is less than 0.05. The control variable on the level of capital used is positive and statistically significant at 95% confidence interval due to the fact that their p-values are less than 0.05. The service subsector of transport and storage (8), accommodation and food service activities represented (9), and financial and insurance activities (11) are statistically significant because their p-values are less than 0.05 at 95% confidence interval. In accordance with our estimated model on turnover, these three service subsectors have influence in the variation of the turnover of the service firm in Rwanda which impact the service sector at large. The estimation results are presented in Table 7.

Table 7 shows that gender of manager is found statistically significant and negatively correlated to the turnover of the service firms. In this study, being a male manager rather than female negatively influence that turnover in the service firm at level of 6%. Meanwhile, Goril and Richard (2005), reported that consistent statistically significant differences in financial performance and business growth do not exist between female and male owner-managed concerns once appropriate demographic and other relevant controlling influences are taken into account. According to Watson (2003), female managers are just as effective (as males) in using resources, however, females (on average) invest fewer resources in their ventures and also seem to get involved in less risky enterprises. Their overall performances are likely to be the same as for males, provided appropriate measures of performance are used such as sales or profit. With consideration of the prior research findings, the negative relationship found in this study does not imply the difference in female and male manager terms of performance, rather it is possible to view this in terms of risk associated with the business and this is subject to subsequent studies for more clarification.

Openness that is conceived as interaction with the outside of Rwandan service sector in terms of import and export of services. In this study, the interaction is assessed through buying and selling services abroad and estimation results showed that there is a statistical significance and positive relationship between turnover and openness in the service firms. A 1% change in the level of openness, increases the level of turnover to 0.71%. Singh and Kaur (2014) claimed that openness affect positively the share of services sector in gross domestic product. According to Halpern, Koren, and Szeidl (2015) importing all input varieties would increase a firm's revenue productivity by 0.22%, about one-half of which is due to imperfect substitution between foreign and domestic inputs. They argued that the productivity gain from a tariff cut is larger when the economy has many importers and many foreign firms.

The assessment of the determinants of service sector growth looked at the role of the Rwanda's taxation system to boost the service sector. The estimation of ordered logistic regression of turnover to values added tax and income tax showed that there is statistical

significant positive relationship at 95% confidence level. This mean that the tax system in Rwanda affect positively the growth of service sector. A 1% change in payment of the value added tax results in the 1.82% change in the growth of turnover in the services and 1% change in the payment of income tax increases the turnover of the service sector up to 0.21% holding other things constant. Stoilova and Patonov (2012) claimed the existence of a clear and strongly expressed impact of the direct taxes on economy growth. In addition, they argued that the tax structure based on direct taxes is more efficient in terms of supporting the economy growth. In China, Wenfeng, Chonfeng, Chunyang, and Jun (2012) argued that private firms with politically connected managers enjoy tax benefits. Chude, Izuchukuru, and Nkuru (2015) concluded that the positive and significant relation between the profitability and the taxation explanatory variables indicates that policymakers should expand tax revenue through more effective tax administration will impact positively on growing the company's profitability.

Capital is used as the control variable since the capital used in the service firm are categorized firm capability. Estimation results showed that the capital used at all level is significantly positive. Holding other things constant, for the service firm using capital ranged between 500,000 to 15 million, 1% change in the level on the capital used result in the increase of turnover up to 2.77%. Firm using capital ranged between 15 million and 75 million, 1% increase of capital used result in 5.40% increase in the turnover of that firm, holding other thing constant. Last category include firms use more than 75 million for which estimation results indicated that 1% change of capital used result in 6.44% of turnover, holding other things constant. Briefly the more capital used, the turnover in the service firm. Thus, capital is another factor contributing to the service sector growth since it has been revealed that the increase in the capital used result in the increase in the turnover of the service firm.

Ordered regression of the service turnover to different service sub sectors; the estimation indicate that the transport and storage, accommodation and food service activities, and financial and insurance activities have significant positive effect on the turnover of the service firm. Holding other things constant, 1% change increase in the level of transport and storage in the service firm result in 0.76% increase in the turnover. A 1% change decrease in the level of accommodation and food service activities in Rwandan service firm results in 0.36% decrease in turnover, holding other things constant. Lastly, a 1% change increase in financial and insurance activities brings in 1.94% change increase in turnover, holding other things constant.

5. CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Usefulness of Results and Policy Recommendations

Ultimate goal of this study is to carry out deep analysis of trends in services sectors development in Rwanda and identify contributing factors driving its performance and growth using surveys data covering various parts of the service sector. Literature of the previous research have been reviewed to assess the similarities and dissimilarities in findings all over the world , descriptive analysis of existing data and empirical analysis of microdata on service sector have been used to bring about an advanced understanding of

the functioning of the service sector in Rwanda and other parts of the world. The results founds are very interesting and have a wide range of usefulness for academics and both public and private sector arena.

5.2. Adoption and scale up of innovation activities in service sector firms

The results on the factor influencing the innovation in the service sector are very useful to the government because it is a key to the economic growth and development. In the public sector management, innovation is the priority of all nation in the world because the current wealthy nations are those who have got a wide range of innovations in the various discipline of the knowledge. In our study, innovation as standalone variable is not influencing the change in total sales; though some of variable characterizing innovation are statistically significant namely new methods and trainings. Therefore, the government could use these findings to scale up innovation activities in the service sector performance, shape the capacity building strategies and policy with these empirical facts. Innovation would be a prime contributor to the sales growth and need to be geared up to sustain service sector growth as a way-out for economic growth.

For the private sector, it is a good news to know what works better to boost their business. As the question that was asked regarded the introduction of new product or service whose response was yes or no. In order to sustain the innovation in the services, those who responded yes, they need to be aware of the factors behind the ability to innovate and the outcome attached to it. Those who did not innovate, they could get use of these finds by understanding their loopholes so that they resort to adopting input that could lead them to innovation capability.

In academics arena, this study is an asset to the subsequent studies by researchers and graduate students. The findings on services innovation are basis to the expansion on the research in the economic growth since it is the national policy to achieve the Rwanda vision 2020 for becoming in the middle income country. Thus, it is the responsibility of the academia to support the government by providing facts to monitor the implementation of government policy for earlier evidence based interventions and decision making.

5.3. Diversification of source of service sector growth

The result of the linear regression on the sales model are very useful in assess the role of economic integration. One of the objective of the economic integration is to operate in the large market where the nationals buy and sell their products and service. Having openness as significant variable to changes turnovers indicator that economic agents in the services sector should take advantages of this information in order to increase the return of their business. The private sector use this information to exploit unused channel and make a study of the regional market to expand their business since it is so long from when the government signed off the agreement to be a member of East African countries (EAC) and other regional economic integration cooperation.

Focus on ICT benefits is found to be another sources of better performance in the service sector. Daily use of internet as communication channel must be looked as a strategy to be

widely adopted by competitive managers of the service firms. This fits well in the national commitment of becoming ICT regional hub and ICT connected country.

For the academic research purpose, this information is crucial since it opens up the ground for the further empirical study to assess how the government is benefiting from the regional economic integration in terms of economic growth and development. Furthermore, it is very interesting to conduct an empirical study on the ICT applicability and economic performance in Rwanda.

5.4. Provide the insight on the turnovers of the service firm

Any firm in the economy aims at increasing turnover as its profit-based entity. The results from the model on the services turnovers give the information on the role of interacting with the foreign market by either buying or selling product or service. The more the capital used, the more the turnover increased, which could inform the investors attracted by service-related economic activities like transport and storage, accommodation and food services. The latter service subsectors are found to be more profitable in the overall service sector. The spillover effect of taxes is marked in the turnovers of the services. This could be used to back the importance of paying taxes by the service sector tax payers. Looking at value added tax, actually paid by the consumer, gives us the right to conclude that the service sector growth is demand elastic because the more the consumer pays the VAT, the more the turnovers are generated. Income tax normally is paid depending on the income earned by the firm through the year. The correlation of income tax and the growth of turnover implies good performance in the service sector. Generally, taxes support the economy at large and it is very crucial to know how it affects the service sectors in particular.

5.5. Promote access to finance to sustain service firm performance

As access to finance is one of the most needed inputs for good performance of the service firms and is provided by financial institutions like banks. Our investigation of determinants of service sector growth qualifies it to be more appropriate for service firms performance as it is indicated by acquisition of fixed asset, loan size and capital used. The government should take note of this in steering monetary policy and encourage the financial institution to facilitate service sector operators in accessing the funds.

5.6. Policy recommendations on service sector in Rwanda

As the government of Rwanda opted to drive its economic growth through the service sector and aims at becoming the middle income country, this study came up with recommendations that could help speed up the shift from low income to middle income state of the economy through service sector growth and expansion.

The government of Rwanda should put more emphasis in the employment policy by targeting the entrepreneurs operating in the service sector. With regards to the role played by employee development and training in promoting the innovation of service firms, it is very important to advise the government to put in place mechanisms that facilitate both

managers and employees promoting innovation. This could be the incentives given to the service firm managers who want to send their employees in training abroad or hiring the international consultant to train them locally on the unique services related skills. There would be the awarding mechanism to the employees with impactful innovation and firm with strategic plans promoting innovation as motivation. Simply, this could be found in the service innovation policy.

Considering that correlation of the employment cost to turnovers and descriptive analysis revealing that service sector provide the employment to only 36.8% are females workers compared to 63.2% of male workers, government of Rwanda through the ministry of gender and family promotion should put review the gender equality policy in a way that provide room for women to participate equitably in the service sector. The female population represent 53% of the total population.

Due to the fact that the acquisition of fixed asset like machinery, vehicle, equipment, land or buildings has a multiple effect on the innovation, the government should facilitate the import of the necessary fixed assets purchased in order to be used in the service firm. This could be the tax exemption for instance and incentives depending upon the value of the imported fixed asset. Furthermore, since the acquisition of the fixed is proxy indicator to the access to finance for the firms; the government should regulate finance in a way that facilitate the firms to easily have access to finance from financial institution like working on the interest rate charged the firm when they want to purchase fixed asset.

From the fact that the size of the loan approved influences the turnover of the service firms; government should put in place a mechanism encouraging the financial institutions to provide impactful loan. That could be done through setting a reasonable collateral value and the extended time for paying back the loan approved by giving a sufficient grace period.

The key recommendations proposed from the analysis of service sector growth and its determinants in Rwanda can be summarized in the following lines:

- Put in place services innovation policy complementing existing employment with emphasis on the employees development and enhanced training strategies;
- Develop gender sensitive employment policy to ensure full participation of women in economic sector especially in the service sector;
- Facilitate private sector operators in purchasing fixed asset like by tax exemption or subsidizing some strategic assets for service sector expansion;
- Expand ICT application to becoming service mobile based by targeting country side population;
- Regulate the monetary policy in the way that financial institutions can provide loan to service sector's operators; and
- Putting in place the foreign trade policy with emphasis to service export in its all forms to benefit from existing economic integration.

5.7. Summary, Conclusion and Suggestions for Future Data and Research

5.7.1. Summary of the study on service sector in Rwanda

The study on the analysis of service sector and its determinants of performance and growth provides a detailed analysis of the services sector growth over the recent years in Rwandan economy and empirically estimates the determinants of service sector growth by using econometric methodology. The measures of firm growth used included innovation, sales and turnovers. The estimation is enabled by using microdata collected by the National Institute of Statistics of Rwanda namely the 2011 Rwanda Enterprise Survey and 2014 Establishment Census.

The literature review on service sector supported that services contribute more to the economic growth. Ghani, Goswami and Kharas, (2011), Zhou (2015), and William (1997) claimed that service sector accelerate the transformation of economic growth, raise employment, boost the economy-wide labor productivity. The key factors that contribute to the growth of service sector include rapid urbanization, the expansion of the public sector; increased demand for intermediate and final consumer services, domestic investment and openness, education skills, cultural adaptability, financial attractiveness, business environment; expansion of quality health services, application of information and technology, increase in consumption expenditure, and incentive system and investing more in research and development. For the case of Rwanda, these service sector is dominated by the wholesale and retail trade, repair motorcycle and motor vehicle repairs; accommodation and food services activities and human health and social work activities.

The limitation to this study is that the analysis of each service subsector requires more time and specific data. To overcome this challenge, the study used two data sets to cross check the findings.

5.7.2. Conclusion and suggestions for future data collection and research

After having the models on sales, innovation and turnovers in service firm estimated, the results showed that the service sector growth in Rwanda is driven by access to finance, increased labor force, training personnel, ICT application, embryonic innovation and the tax system.

Access to finance enabled the services sector to grow over the past years in Rwanda. It is proven by the fact that the size of the loan approved from the financial institution like banks and cooperatives has a positive effect on the three years total annual sales, capital used by the service firms which is also positively impactful to the turnovers of service firms; and lastly the acquisition of fixed asset is positively influencing service innovativeness as indicator of finance. Briefly, there a causal relationship between the role of access to finance in the service sector and FinScope Rwanda (2016) revealed the 89% of adult population have access to finance

Increased labor participation in services, employee development, and training of personnel boosted service sector in Rwanda. As it has been explored through the literature, the service sector growth can be attributed to its employment. Our study supported that reality

where by the cost allocated to the employment of services is positively correlated with total sales generated over three years and descriptive analysis confirmed that service sector is at the top in employing many people, even though there is gender inequality issue. In spite of lack of influence of innovation in changes of sales, some variable characterizing innovation are inducing service innovativeness like both internal and external training. Furthermore, research and development and employment developments found to be influencing sales over the three studied years. This draws attention for future research to assess the innovation propensity in the service sector.

Openness and ICT application definitely contributed to the growth of service sector in Rwanda. Benefiting from access a wider market was national aspiration when Rwanda signed off regional economic integration agreement. Our study indicated that we are on track whereby openness have positive effect to turnovers of service sector. In addition to that we have seen government of Rwanda putting more effort in extending optic fiber across the country that influenced largely the serves as it supported by our study finds where the communication via email during the business have influence on the sales generated over three year for 2008.

Taxes collection typically VAT and income taxes impacted service sector growth in Rwanda. As the previous findings illustrated positive relationship between taxes and economic growth. Our study also reaffirmed it by finding that the values added tax and income tax have positive effect on the turnovers of services in Rwanda. Before closing this snap shot, we have also seen that the key service sub sector include accommodation and food service activities (hotels and restaurants), transport and storage, financial and insurance activities and human health and social works activities and financial services.

I suggest that data should be collected on service subsectors mentioned above to deeply understand why some service firms are growing faster than others in the same sector. The study open up the number of research to be conducted in the future line an empirical study on the contribution of regional economic integration to service sector growth in Rwanda, analysis of the ICT applicability and contribution to the service sector growth in Rwanda, empirical analysis of gender equality in service subsector growth in Rwanda.

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APPENDICES

Appendix 1: Logistic model for innovation

+	87	25	112
-	12	34	46
Total	99	59	158

Classified + if predicted $\Pr(D) \geq .5$

True D defined as Innovation $\neq 0$

Sensitivity	$\Pr(+ D)$	87.88%
Specificity	$\Pr(- \sim D)$	57.63%
Positive predictive value	$\Pr(D +)$	77.68%
Negative predictive value	$\Pr(\sim D -)$	73.91%
False + rate for true $\sim D$	$\Pr(+ \sim D)$	42.37%
False - rate for true D	$\Pr(- D)$	12.12%
False + rate for classified +	$\Pr(\sim D +)$	22.32%
False - rate for classified -	$\Pr(D -)$	26.09%
Correctly classified		76.58%

Appendix 2.

Skewed logistic regression Number of obs = 158
 Zero outcomes = 59
 Log likelihood = -80.44222 Nonzero outcomes = 99

Innovation	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Newmethods	0.7162	0.3399	2.107	0.0351	0.0499 1.3824	
Newlogistics	0.1210	0.3527	0.343	0.7316	-0.5703 0.8123	
Newpractices	-0.0990	0.3551	-0.279	0.7804	-0.7950 0.5970	
Newmarketing	-0.1649	0.3152	-0.523	0.6009	-0.7827 0.4529	
Researchdvpt	0.2385	0.2765	0.862	0.3885	-0.3035 0.7804	
Employeedvpt	0.6093	0.3223	1.891	0.0587	-0.0224 1.2410	
Training	0.5703	0.2875	1.984	0.0473	0.0068 1.1339	
Fixasset	-0.6896	0.2680	-2.573	0.0101	-1.2149 -0.1643	
Loan	0.4360	0.2527	1.725	0.0845	-0.0593 0.9313	
Firmsize						
1	-0.3431	0.6728	-0.510	0.6101	-1.6617 0.9756	
2	0.0838	0.6807	0.123	0.9021	-1.2504 1.4180	
3	0.5803	0.7563	0.767	0.4429	-0.9020 2.0626	
_cons	-15.5998	1523.5291	-0.010	0.9918	-3.00e+03 2970.4623	
/lnalpha	14.5702	1523.5288	0.010	0.9924	-2.97e+03 3000.6318	
alpha	2.13e+06	3.24e+09			0.0000 .	

Appendix 3: Summary of the covariance

	Newmethods	Newlogis~s	Newpract~s	Newmarke~g	Research~t	Employee~t	Training	Fixasset
Newmethods	0.2407							
Newlogistics	-0.0909	0.2972						
Newpractices	-0.0117	-0.0840	0.3197					
Newmarketing	-0.0513	-0.0224	-0.0104	0.2412				
Researchdvpt	-0.0092	-0.0172	-0.0262	-0.0136	0.2419			
Employeeedvpt	-0.0128	0.0054	-0.0699	-0.0381	0.0028	0.2363		
Training	-0.0039	-0.0356	-0.0186	-0.0480	-0.0563	-0.0295	0.2228	
Fixasset	0.0138	-0.0328	-0.0245	-0.0226	-0.0131	-0.0298	-0.0101	0.1980
Loan	-0.0066	-0.0255	-0.0073	0.0047	-0.0119	0.0210	0.0332	-0.0172
1.Firmsize	0.0115	-0.0644	0.0660	-0.0040	0.0435	-0.0713	0.0018	-0.0214
2.Firmsize	-0.0148	-0.0355	0.0630	0.0282	0.0304	-0.0624	-0.0236	-0.0742
3.Firmsize	0.0049	-0.0589	0.0078	0.0174	0.0028	-0.0327	0.0099	-0.0623
_cons	-0.0485	0.0358	-0.1518	-0.0462	-0.0102	0.0072	-0.0161	0.0229

	Loan	1. Firmsize	2. Firmsize	3. Firmsize	_cons
Loan	0.1674				
1.Firmsize	-0.0165	1.0154			
2.Firmsize	-0.0221	0.9493	1.0868		
3.Firmsize	-0.0684	0.9390	0.9593	1.6107	
_cons	-0.0518	-0.9038	-0.8926	-0.8474	1.0707