



**SCHOOL OF  
ECONOMICS AND  
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**Rise of the Rwandan economy post-genocide: will this lead to catch-up growth?**

by

Romeo Ramaekers

romeo.ramaekers@gmail.com

**Abstract:** This thesis examines the concept of sustainable economic growth in post-genocide Rwanda, focusing on its structural transformation from the agricultural sector towards the service sector. This exploration essentially regards the implications for catch-up growth in light of the new notion of premature deindustrialisation. The role of Human Capital and Information and Communication technology (ICT), part of Rwanda's development agenda, are explored in light of their association with increased Labour Productivity (LP). This analysis found that although Rwanda has noted relatively large economic growth, the Labour Productivity of all three sectors have remained either stagnant or noted declines during the post-genocide period. This was similarly the case for all three sectors value added as a share of GDP. Thus, this illuminates the presence of additional driving forces, one of which regards foreign aid. Hence, a potentially unsustainable side to Rwanda's economic growth is brought to light.

**Keywords:** Economic growth, Sub-Saharan Africa, Structural Transformation, Services, Catch-up growth, Human Capital, Information and Communication Technology, Labour Productivity, Rwanda.

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## **1. Introduction:**

Regarding the topic of economic growth, Africa is not the continent that commonly gets brought forth in debate. Of large consequence is the fact that 33 least developed countries (LDCs) out of the existing 46 LDCs were located in Africa for the year 2020 (UNCTAD, n.d.). However, according to the African Development Bank (2017), Africa, already in 2000, was the world's second-fastest growing economy. Furthermore, growth rates of 6 percent and up are taking place in one-third of African nations (The World Bank, 2023a). Compared to the fact that additionally 40 percent of African nations have experienced growth rates between 4 and 6 percent annually, this is bringing forth new interest and perspectives on Africa's potential success (The World Bank, 2023a).

Of importance is the fact that Africa, historically, has experienced considerable economic growth. However, this has largely not been sustainable. One example, as stated by Collier and Gunning (1999), was that certain African countries noted periods of economic prosperity driven by the commodity booms throughout the mid-to-late 1970s. Interestingly, as early as the 1980s, the situation had already taken a turn as the majority of African economies experienced declining growth. Thus, the question for the current growth boom is: will this be sustainable?

With the onset of the 21st Century, the frequency and pace at which sectoral change is taking place amongst developing nations is on the rise. Sectoral change, also known as the theory of structural transformation, regards the shift in employment away from agriculture towards industry and the modern sector. Arthur Lewis, in his discussion of structural transformation through his labour surplus theory, argues that the industrial and modern sectors are associated with higher labour productivity (LP), which consequently drives economic growth (Lewis, 1954). However, following the 1970s, there has been a large shift away from the traditional patterns of sectoral change (Rodrik, 2016). Essentially, the traditional sectoral transformation has moved from agriculture, to manufacturing, lastly entering the service sector when LP in manufacturing starts to decline (Kuznets, 1955). Yet, the concept of deindustrialisation, where the share of manufacturing has either noted a drop in employment and/or GDP, is today occurring at earlier stages of development. In the words of Rodrik (2016), this notion is called premature deindustrialisation, the process whereby manufacturing is playing less of a role in today's developing countries, something he denotes as unsustainable growth. Hence, the importance of manufacturing in achieving catch-up growth is seemingly stressed. As stated by Das and Drine (2020), catch-up growth refers to the rapid economic progress of less developed countries that aim to narrow the gap with wealthier nations. Furthermore, successful catch-up growth depends on factors like technological capabilities, LP and human capital development (Das & Drine, 2020)

Historically, manufacturing has been closely associated with catch-up growth due to its potential in e.g. productivity gains, technological advancements, job creation and export driven strategies

(Rodrik, 2016). Consequently, if countries do not fully industrialise through manufacturing, this might affect their potential to catch up. However, this largely depends on what services countries decide to opt for. If the move in labour regards a shift towards services that are both highly productive and labour intensive, as in the case of e.g. information technology and finance, potentially this could still lead to catch up growth. Thus, this thesis will explore if this is the case for Rwanda shifting towards services. Rwanda has arguably noted considerable per capita growth following the mass genocide that took place in 1994, with limited shifts in labour towards manufacturing. Specifically, per capita GDP had jumped from roughly 190 Constant USD to around 890 Constant USD, for the years 1994 and 2021, respectively (The World Bank, 2023b).

Vision 2020, a governmental development plan enacted by the Rwandan government in 2000, listed a set of aims and objectives in order to achieve the main goal of transforming into a middle income country. This encompassed the aim of transitioning away from its reliance on primarily agriculture, which employed around 90 percent of the labour force in 1994, into an economy that would become deeply rooted in knowledge and abundant in information by the year 2020 (Rwanda ICT Strategic and Action Plan, 2015). The objectives outlined in Vision 2020, which, in accordance with existing scholarly sources foster catch-up growth in developing nations, will be examined. Specifically, the role of human capital and Information and Communication Technology (ICT) will be used for the analysis of Rwanda's potential in achieving catch-up growth. Human Capital refers to the present provision of e.g. certain skills, education, experience and information by the labour force to the economy. This is very similar to the definition of Human Resources, which is regarded as a valuable reservoir of e.g. knowledge and skills that can be harnessed and expanded as necessary. According to Kaberuka (2000), Rwanda aims to enhance its human resources in order for it to become a knowledge-based economy. The objectives involve a proactive approach in promoting e.g. ICT skills. ICTs, which regards communication devices and services, can help e.g. expand employment opportunities beyond agriculture, create middle-income jobs and stimulate growth in small to medium enterprises (Rwanda ICT Strategic and Action Plan, 2015). As stated, Rwanda's government strongly believes that ICT can enable Rwanda to skip key stages of industrialisation. Hence, as the jump in employment from agriculture to services was purposefully chosen, the topic of examining Rwanda's ability to catch-up with wealthier nations is especially interesting. This is principally the case in light of critique surrounding the sustainability of premature deindustrialisation.

## **1.2. Aim**

This study aims to explore the post-genocide economic growth in Rwanda and the structural transformation that has taken place. The structural transformation has largely regarded the move in employment figures away from agriculture and towards services. Of essence is the scale of industrialisation amongst developing countries in the 21st Century, with manufacturing

seemingly playing a smaller role in regard to the structural transformation. Specifically, given the theory of premature deindustrialisation proposed by Rodrik (2016), this study seeks to investigate whether Rwanda's recent economic growth will continue into the future. Rwanda, being a Least Developed Country (LDC) with impressive economic performances in recent decades, makes it possible to explore as a case for other LDCs.

Similarly, Rwanda has seen notable employment shifts away from agriculture and towards services, with limited movement into industry. Hence, this presents the possibility of studying the implications and challenges of such shifts in a developing country context. The period in question, that of 1995-2021, was chosen in order to explore the positive strides Rwanda was able to make following the mass genocide experienced in 1994. Because of the limited data available after 2021, the years 2022 and 2023 were excluded from the study.

### **1.3. Significance of the study**

The significance of this study lies in its contribution to the understanding of economic growth and development in post-genocide Rwanda. By examining the structural transformation that has taken place and assessing whether Rwanda's recent economic growth will be continued into the future, the study sheds light on the challenges and opportunities faced by Rwanda in its development journey.

Firstly, the study addresses the concept of premature deindustrialization, as proposed by Dani Rodrik, and applies it to the Rwandan context. This analysis provides valuable insights into the consequences of a rapid shift from agriculture to services without a significant emphasis on manufacturing. Understanding the implications of this structural transformation is crucial not only for Rwanda but also for other developing countries that may be undergoing similar processes of economic transition.

Secondly, the study contributes to the existing literature on economic development in post-conflict societies. Rwanda's experience of rebuilding its economy after the 1994 genocide, where an estimated 800 thousand Tutsi died (Magnarella, 2005), presents a unique case study. This allows for understanding the challenges and strategies involved in achieving sustainable growth amidst a tumultuous history. This regards the examination of components of Vision 2020, that of ICT and Human Capital, essential for Labour Productivity (LP). Hence, due to catch-up growth largely being determined by LP, the study may offer insights into the broader dynamics of economic development in post-conflict settings

## **1.5. Outline of the thesis**

Section Two provides a historical overview of Rwanda's background. Section Three reviews existing literature on the theoretical framework. The second section regards existing literature discussing Human Capital and ICTs, both crucial elements of Rwanda's Vision 2020. Section Four presents the data used and justifies the adoption of a mixed-method analysis. In Section Five, empirical results are presented for premature deindustrialization, ICTs, Human Capital, and Labor Productivity. The analysis combines these results with relevant scholarly literature and considers the implications for the theoretical framework; that of structural transformation theory. Section Six concludes with the main findings of the thesis.

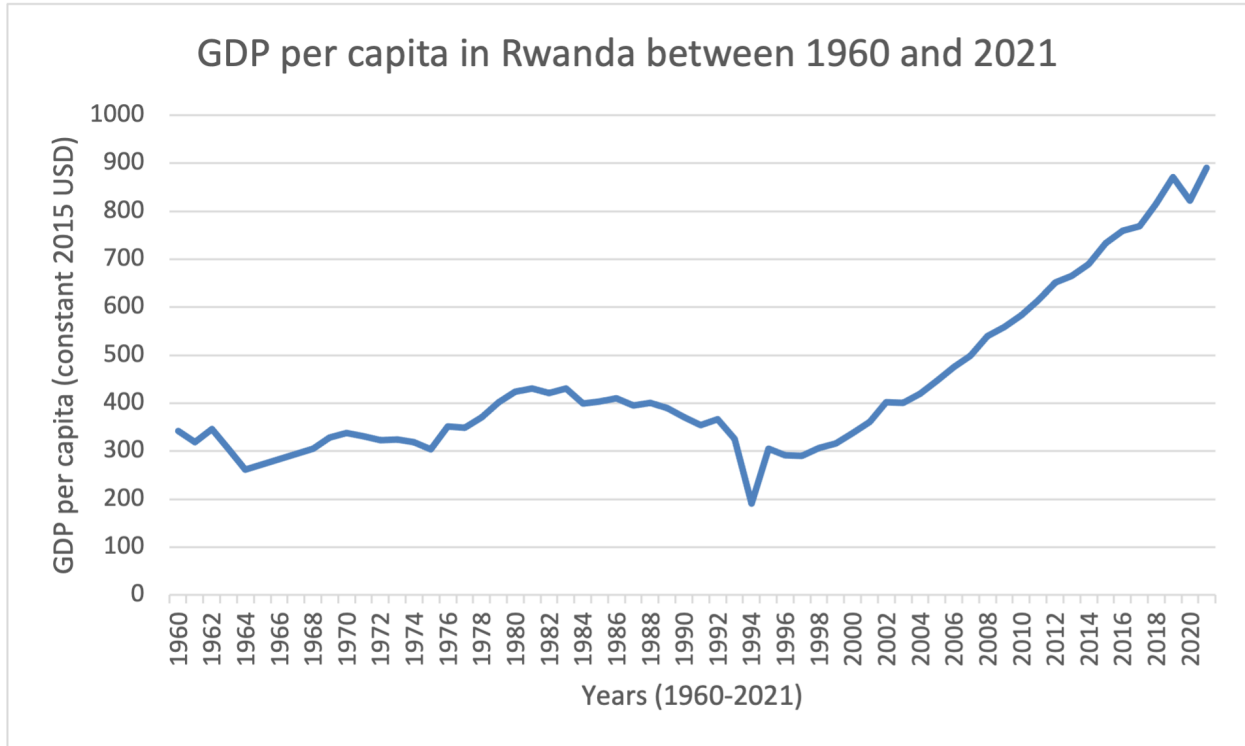
## **2. Historical context: overview of Rwanda and its economy post-genocide**

Nestled in the picturesque Great Lakes region of Sub-Saharan Africa, Rwanda is a compact and mountainous country with a unique geographical position. Bound by the Democratic Republic of the Congo, Tanzania, Uganda and Burundi, Rwanda finds itself geographically landlocked. As explored by Magnarella (2005), Rwanda is characterised as being one of Africa's smallest countries, further having the highest population density. Its total land area spans approximately 24,670 (sq. km). The decade prior to the 1994 Genocide against the Tutsi, Rwandas average annual rate of population increase was 3.7 percent, with the population increasing from 5.5 million in 1983 to 7.7 million in 1993 (Magnarella, 2005). Of importance is the fact that, despite the rapid growth in population figures, the agricultural output had not significantly increased between 1983 and 1993. For the year 1983, a staggering 95 percent of the workforce worked within agriculture (Magnarella, 2005). Hence, the consequential famine following reductions in arable land, drought, war and large population migrations became one of the factors contributing to Rwandas genocide in 1994 (Magnarella, 2005). Furthermore, after 1980 and the years leading up to Rwandas genocide, the country noted a downward sloping trend in economic growth.

Following the genocide, population figures began to regain growth. The average growth rate between the period 1994 and 2021 has been 1.9 percent. Yet, when excluding the years 1994, 1995 and 1996, which were clear outliers given the mass genocide, the average growth rate increased to 2.3 percent (The World Bank, 2023c). For the year 2021, the population of Rwanda exceeded 13.4 million, with around 18 percent residing in urban areas (The World Bank, 2023c; The World Bank, 2023d). Similarly, the post-genocide period noted considerable economic growth (Kar, Pritchett, Raihan & Sen, 2013), with GDP per capita in 2021 standing at 890.2, in contrast to 190.2 in 1994 (The World Bank, 2023b). In accordance with their statements, the African Center for Economic Transformation (2014) found that, in the onset of the 21st century, Rwanda experienced one of the fastest economic growth rates in the world. More specifically, Rwanda ranked within the top 10 countries with the highest growth rate (African Center for Economic Transformation, 2014). Rwanda's service sector has been described as especially powerful, which regards both modern services such as finance, tourism and ICT, as well as

education and healthcare as more basic services (Behuria and Goodfellow, 2019). However, in regard to the value added by services as a percent of per capita GDP, this has seemingly not increased much, notably illustrated in *Fig2* and *Fig3*.

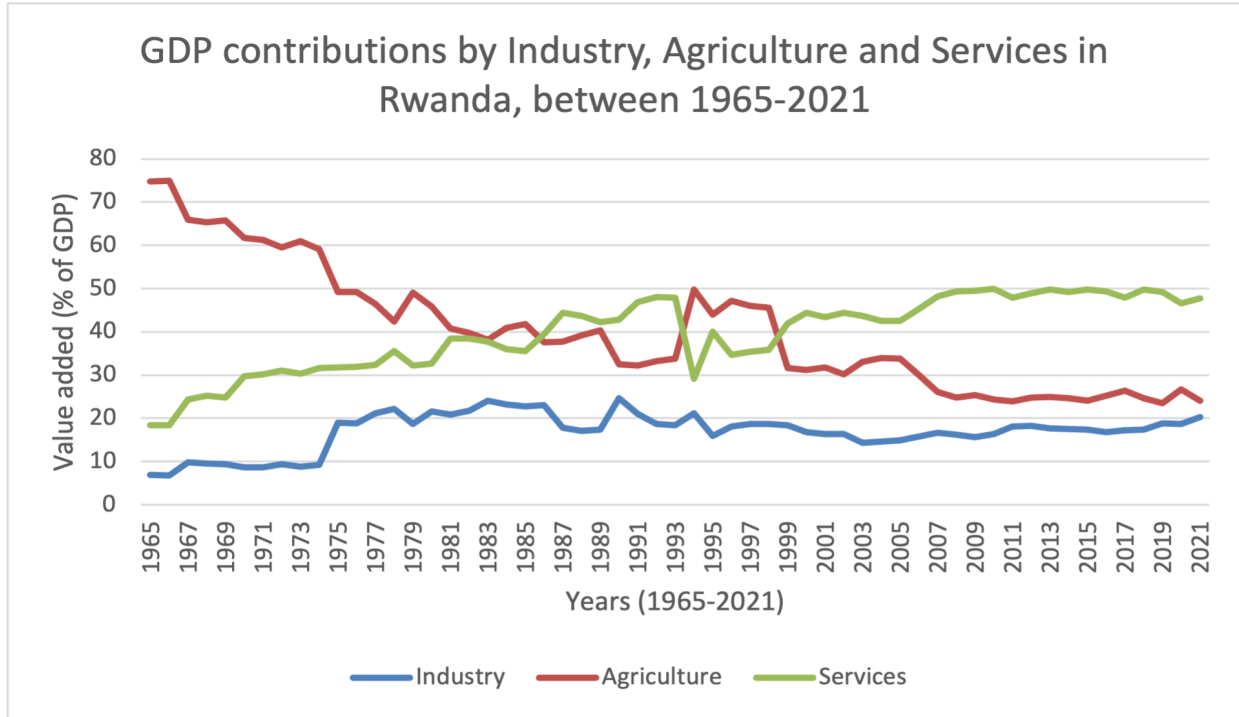
Moreover, the considerable economic growth that has taken place in Rwanda is illustrated in *Fig1*, depicting GDP per capita growth between the years 1960 and 2021. As shown, 1994, the year when the genocide took place, was clearly noted by a drop in per capita GDP from around 326 to around 190, for the years 1993 and 1994, respectively (The World Bank, 2023b). Thereafter, Rwanda has noted considerable economic growth, reaching a per capita GDP of around 337 in 2000. Henceforth Rwanda has continued to grow exponentially, with GDP growing an average of 8 percent for the years following 2001 (Uwitonze & Heshmati, 2016), surpassing a per capita GDP of 890 in 2021 (The World Bank, 2023b). As noted previously, the relatively low value added by the service sector, in relation to Rwanda's considerable economic growth, begs the question of what the driving force is. Rodrik (2016) argues that much of the contemporary growth in developing countries is foreign capital or aid driven. Hence, because Rwanda has been a so-called donor darling, receiving a lot of aid, its influence on per capita GDP is important to address. As stated by Hakizimana and Endless (2009), Rwanda attracted significant aid commitments in 1995, amounting to nearly 600 million USD. Furthermore, the cumulative foreign aid received by Rwanda from 1995 to 2006 surpassed 5 billion USD. In 2009, Rwanda's aid dependency became especially evident, with foreign assistance per capita reaching 55 USD. Hence, this placed Rwanda among the most aid-dependent nations worldwide (Hakizimana & Endless, 2009). The increased aid dependence Rwanda has gives rise to various negative consequences, essentially being unsustainable in regard to catch-up growth. One such consequence, as stated by Nadeem, Liu, Ali, Younis, Bilal and Xu (2020), is the diminished performance of a country. This in turn reduces a country's motivation to strive for self-reliance. Hence, the underperformance observed in numerous developing countries potentially lays tribute to that consequence of aid-dependency (Nadeem et al. 2020). Thus, the service sector could play a role in taking over as an engine for economic growth in Rwanda.



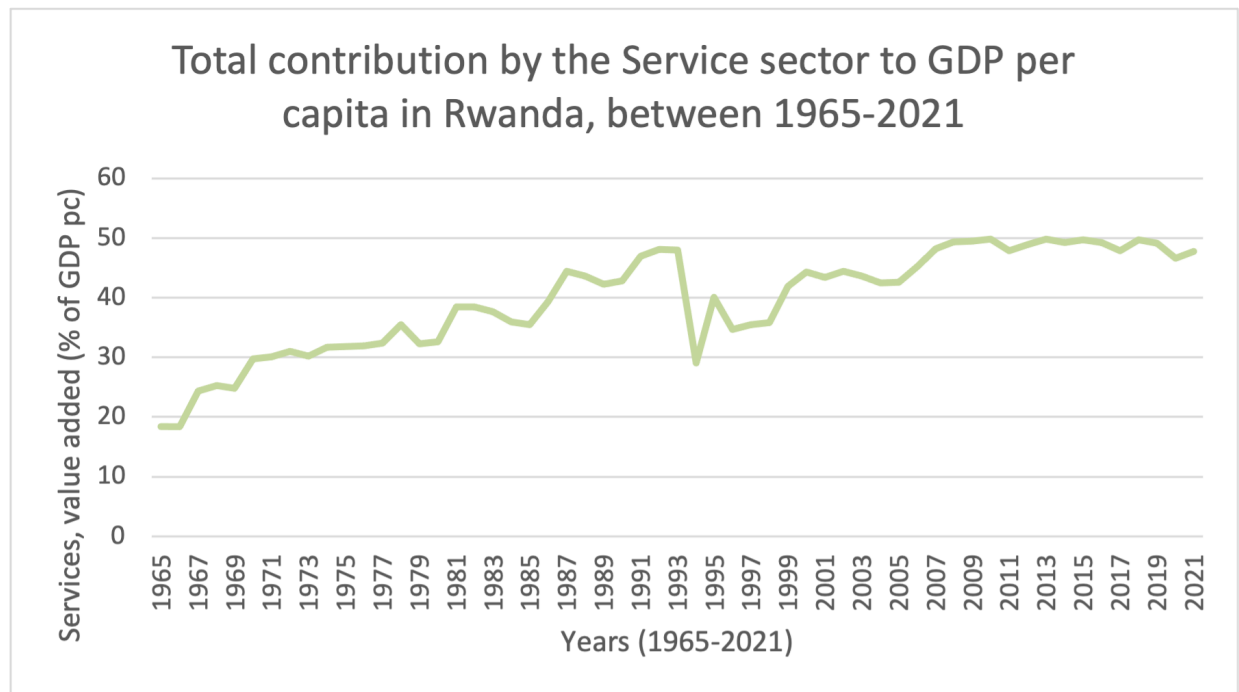
*Fig1. GDP per capita: Rwanda*  
*Source: The World Bank (2023b)*

In 2015, the service sector accounted for almost half of Rwanda's economic output. This largely surpassed the primary sector, that of agriculture, with a contribution of 33 percent. Similarly, in 2014, the service sector had expanded at a rate of around 9 percent in comparison to 7 and 4 percent for the industrial and agrarian sectors respectively (Uwitonze & Heshmati, 2016). The trends the literature describes are notable in *Fig2 and Fig3*, where the value added by industry, agriculture and services are depicted as a percentage of GDP. Notably, the contribution by the service sector to GDP increased from 44.34 percent in 2000 to 49.88 percent in 2010. Although the literature states that this is largely due to Rwanda's steadfast commitment to establish itself as a hub for services (Uwitonze & Heshmati, 2016), the value added by the service sector has only increased equal to that of pre-genocide levels. Therefore, as noted in *Fig2*, while the service sector has surpassed both agriculture and industry in terms of value added, its actual increase has been relatively modest.



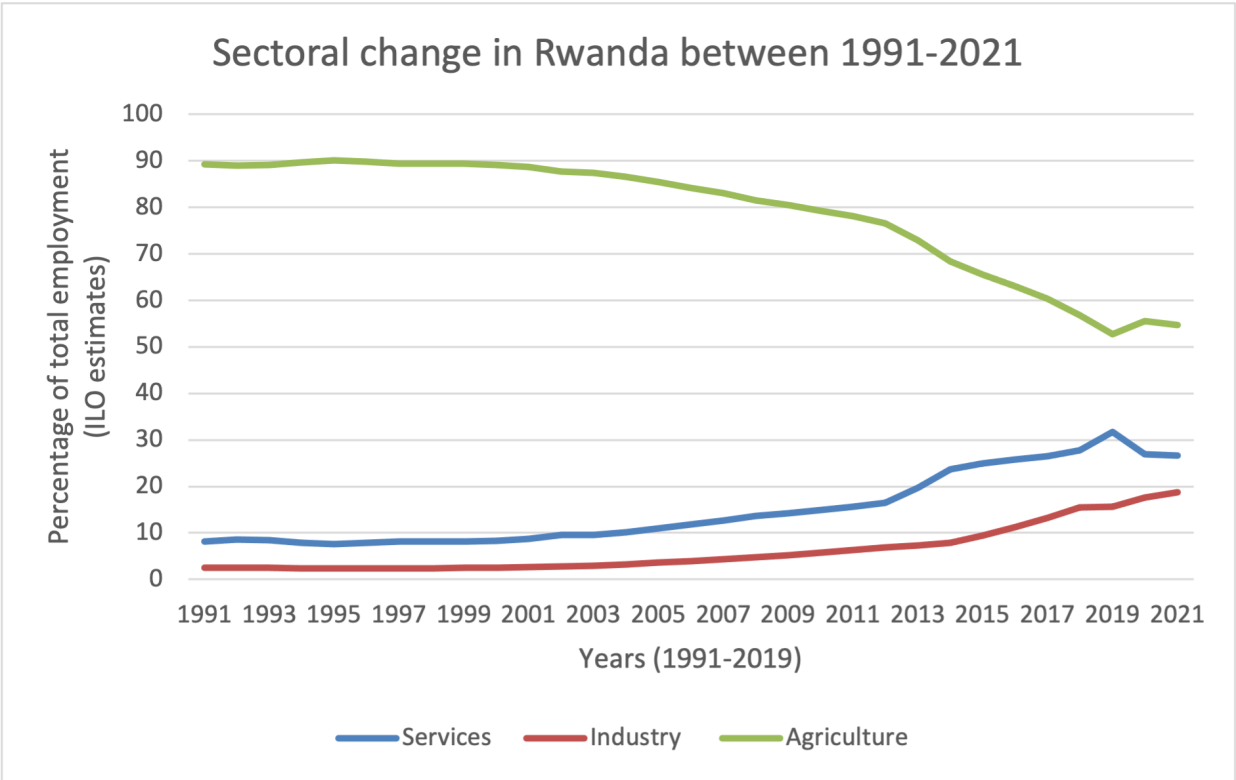


*Fig2. Value added by industry, agriculture and services*  
*Source: The World Bank (2023e; 2023f; 2023g)*



*Fig3. Value added by services*  
*Source: The World Bank (2023g)*

Moreover, in accordance with the concept of sectoral change, the increase in per capita GDP could to some extent be attributed to the shift in employment. As shown in *Fig4*, there has been a shift in employment from agriculture towards services. More specifically, employment in services increased roughly threefold between 1994 and 2021. Furthermore, the previously dominating role agriculture held in the Rwandan economy decreased, with employment figures dropping from around 90 percent to around 55 percent for the same period. Lastly, in terms of employment in industry, the corresponding figures have increased strongly from nearly 0 percent to roughly 20 percent. This explains the different sector contributions to GDP, of which has noted a similar transformation, evident in *Fig2*. As stated by Uwitonze and Heshmati (2016), agriculture commanded a substantial share of around 56 percent of GDP in 1970, whereas industry had 19 percent and services had 25 percent. Yet, in accordance with *Fig4* and Rwanda's goal of becoming a service-based economy, they found that for the years 2000, 2010 and 2013, the contribution of the service sector to GDP increased from around 46, to 50, to 53-percent respectively (Uwitonze & Heshmati, 2016). However, while there has been a notable increase in service sector employment, its relative size suggests that it alone cannot account for the entirety of the observed economic growth.



*Fig4. structural transformation: Rwanda*  
*Source: The World Bank (2023h; 2023i; 2023j)*

Regardless, the considerable change in Rwanda's employment structures, noting large sectoral change, gives credence to Rwanda's focus on service-led development. This encompasses

Rwanda's government choosing to focus on the service sector in order to drive away the economy's reliance on low-value agriculture. Hence, this still warrants an investigation into whether the shift in employment has been towards productive sectors, which would help with future sustainability. As stated by Behuria and Goodfellow (2019), the service-led development has largely been driven by growth in the tourism sector, and large success in both Meetings, Incentives, Conferences and Events (MICE), and Finance, Insurance and Real Estate (FIRE). The focus and aim surrounding service-led development became especially apparent through the erection of the Convention Centre in Rwandan capital Kigali. As stated by Behuria and Goodfellow (2019), this was one of Rwanda's attempts in making its capital city a prominent hub for international and national business, with the Convention Centre allowing for large events, conferences and summits. Hence, this has strategically leveraged Rwanda's potential to overcome constraints imposed by both its landlocked nature and limited natural resources (Uwitonze & Heshmati, 2016).

### **3. Literature Review**

This section presents the literature, previous research and theories that lay as a basis for the study. Initially, the theoretical section starts by introducing the traditional sectoral transformation theory of Kuznets and Lewis. Thereafter, the modification of Rodrik will be presented, discussing the notion of premature deindustrialisation. What is crucial is that sectoral transformation shifts employment to more productive sectors, increasing Labour Productivity (LP), which is the fundament of catch up growth. Catch-up growth refers to the economic convergence of developing countries with wealthier nations. Traditionally, labour intensive manufacturing has been driving this, which makes the notion of premature deindustrialisation problematic.

In regard to Vision 2020, introduced in 2000, the aim of Rwanda becoming a knowledge-based middle-income country is illuminated (Cyesa, Turayishimye and Nkurunziza, 2019; Okello, Adhiambo, Maritim and Ouma, 2014; Kaberuka, 2000). Hence, as a second part to the literature review, the goals of human capital and information and communication technology (ICT) are introduced. They are both vital goals part of Vision 2020, agreed upon by scholarly literature to support catch-up growth through their ability to increase LP.

### 3.1. Theoretical Backbone

#### 3.1.1. Sectoral Transformation Theory

Lewis (1954) discusses the concept of structural transformation in the context of agricultural and industrial sectors. He posits that as an economy develops, there is a shift from agriculture, characterised by low productivity and abundant labour, to the industrial or modern sector, characterised by higher LP and technological advancements. In the case of a growing economy, subsistence farming is common in initial stages of development, where a major share of the population is engaged in low-productivity agricultural activities. As the economy progresses and invests in industrialisation, new industries emerge, creating higher value jobs with increased LP. Hence, this move increases income generation, living standards and positively generates economic growth. Consequently, the role that structural transformation plays as a catalyst for economic development is prevalent in Lewis's argument. As stated, the industrial sector, with both high LP and technological advancements can both drive innovation and attract investments (Lewis, 1954).

Furthermore, Kuznets (1955) discusses structural transformation through the introduction of the so-called *Kuznets Curve*. It illustrates the relationship between per capita income and income inequality throughout the economic development of a country. The curve proposes that income inequality initially tends to increase as the economy is in early stages of development, and thereafter declines. This pattern is associated with the shift of labour away from the agricultural sector, which at early stages of development is the dominant sector. As agriculture is associated with low LP and widespread poverty, the move towards industry and the introduction of industrialisation, alongside economic development, leads to a decline in income inequality. This is largely attributed to the relationship between industrialisation and both LP and manufacturing sector growth (Kuznets, 1955). Hence, the traditional view is shared by both Lewis (1954) and Kuznets (1955) in regard to the importance of labour intensive manufacturing in sectoral transformation. This regards the shift in employment to more productive sectors, being fundamental for catch up growth.

#### 3.1.2. Premature deindustrialisation

The notion of structural transformation, and the role it plays in economic development, is apparent for today's industrialised countries. Furthermore, the pattern in which structural transformations traditionally occurred has regarded the move from agriculture, to industry, and lastly into services. However, as brought forth in the arguments by Dani Rodrik, there is a new generation of low income countries that have not followed the classical path of growth through industrialization. He addressed the concept of premature deindustrialization, where developing countries are experiencing the move towards modern services in a more compressed manner than

before (Rodrik, 2016). Although the pattern of urbanisation for developing countries is still in line with the classical way, people are entering activities that contrast the past development of already developed countries. More specifically, the share of people entering manufacturing is very small and largely constitutes informal manufacturing.

In contrast, the growth of the Asian tigers, which was largely fueled by rapid industrialisation, constitutes the so-called Asian miracle. South Korea, being one of the four prominent Asian tigers, noted miraculous economic growth and development, especially after the 1970s. According to Kim and Topel (1995), South Korea managed to turn itself into an industrial powerhouse through its focus on manufacturing and export promotion. In regard to the latter, this was largely achieved through policy implementations favouring the export sector, consequently deconstructing export-hampering macro-policies. The industrialisation in South Korea, between 1970 and 1990, was largely charged by a massive influx in LP, with their exports-to-GDP-ratio increasing fourfold. During this period, income per capita increased threefold, accompanied by a significant transformation in the labour market. This stands in line with South Korea noting a 50 percentage point drop in employment in agriculture and a significant shift of workers to manufacturing. Moreover, the skills of the workforce increased as South Korea noted a 30 percent increase in the proportion of graduates since 1972, both in the case of high school and college. By 1990, South Korea's GDP per capita had reached \$5,584, more than 5 times the amount in 1970 (Kim & Topel, 1995).

Additionally, regarding premature deindustrialisation, the move in employment to services does not necessarily ensure the move into high-value and labour productive services such as finance, insurance and IT. Instead, many are moving into the informal services of e.g. retail (Rodrik, 2016). Hence, whether this growth is sustainable is one of the main discussions brought forth by Rodrik. His perspective lies in that manufacturing has and continues to be the primary contribution to productivity growth. This regards the fact that human capital in developing countries is lacking, hindering them from creating a service sector that is not only highly productive, but consequently also able to offer larger employment opportunities. The frequency of premature deindustrialisation has become especially prevalent after the 1970s, which encompasses the catch-up growth patterns for the African continent, which includes the large majority of today's LDCs. Hence, the notion of premature deindustrialization illuminates the fact that manufacturing, as a traditionally strong source of growth, is taken away.

With the service sector, in contrast to that of manufacturing, not being able to absorb low and medium-skilled labour, it complicates the process of developing countries in reaching high-income levels (Rodrik, 2016). This absorption is especially important, in addition to that of low LP. Connecting back to that of Human Capital, growth generation is not accomplished solely through training people. It is also essential for them to have the capability to secure employment. In the case of Mexico, Cruz (2015) found a significant connection between premature

deindustrialisation and economic stagnation. He highlights the resultantly moderate economic growth and shortfalls in Mexico's potential that this process has inflicted. Additionally, he stresses the fact that premature deindustrialisation has largely contributed to an increase in unemployment rates (Cruz, 2015).

In an analysis conducted by Rodrik (2016), he found that the share of manufacturing follows an inverse-U shaped relationship with economic growth and development. In accordance with his theory surrounding premature deindustrialisation, the U-shape peaks for developing countries occur in a premature stage as they are still characterised as low-income countries. Furthermore, although the move away from manufacturing has led to relatively large economic growth in developing countries, this growth in GDP figures has largely been driven by inflow of capital and external monetary transfers (Rodrik, 2016). Thus, seemingly relevant for the case of Rwanda, Hakizimana and Endless (2009) address the large aid-dependence Rwanda has, where aid constitutes a considerable share of per capita GDP. Hence, this lays additional credence to Rodriks argument that the recent development may not be sustainable in regard to catch up growth.

Thus, whether the increased per capita GDP in developing countries who have prematurely deindustrialised will be enough for catch-up growth is of essence in this thesis, illuminating the case of Rwanda.

### **3.2. Vision 2020 and catch-up growth**

Vision 2020, implemented in 2000 by the Rwandan government, had the overarching goal of Rwanda becoming a middle-income knowledge-based economy. Therefore, in light of the apparent frequency at which premature deindustrialisation takes place, which is argued to induce economic stagnation and unemployment (Rodrik, 2016; Cruz, 2015), the following aims will be explored. This regards the targets of ICT and human capital, examining their potentials in ensuring catch-up growth.

#### **3.2.1. Information and Communication Technology**

There is a multitude of literature that agrees on the fact that Information and Communication Technologies (ICT) bring forth considerable economic potentials for the African continent (Albiman & Sulong, 2016; Chavula, 2013; Ponelis & Holmner, 2015). This largely regards the connectivity supplied through the internet, fixed telephone lines, mobile phones. Additionally, there is an influx of digital economies in the global south, where the inclusion of ICT is essential in order to reap the benefits. Hence, the role of education is brought forth, as Ponelis and

Homner (2015) argue that taking advantage of emerging digital economies is only possible if countries have high-skilled ICT labour. Additionally, as stated by Chavula (2013), the availability of the internet is also highly essential in ensuring that ICTs such as telephone lines and mobile phones are efficient. Lacking internet availability has, according to Chavula (2013) been associated with the hampering of ICTs contribution to economic growth. Moreover, in a study by Wamboye, Adekola and Sergi (2016), they investigated 46 countries located in Sub-Saharan Africa. They found strong evidence for improvements in significant LP growth due to the widespread adoption of fixed-telephone lines and the use of cellular mobiles. Similarly, Vaumi, Leudjou and Faha (2021), in their analysis of Sub-Saharan African countries, found a positive and significant relationship between the investment in ICTs and notable enhancements in LP and collective effectiveness.

As argued by Ponelis and Holmner (2015), ICT presents large possibilities for developing countries in contemporary society. The realm of ICT and its enabled services have the potential to unleash a wave of new employment opportunities, propelling economic growth. In their paper, they mention the contribution by a range of sectors, from call centres and back-office operations to the outsourcing of firm procedures. These sectors all contribute to a transformative landscape (Ponelis and Holmner, 2015). In accordance, Albiman and Sulong (2016) address the rising use of ICT, with developing countries representing more than half of the population who had access to the internet in 2013. This was similarly the case for both mobile penetration rates and broadband subscriptions for mobile phones (Albiman & Sulong, 2016). Furthermore, Chavula (2013) discusses the telecommunications sector which encompasses mobile telecommunications, internet and fixed telephone lines. Similarly to other scholars, he noted the considerable rise therein as for the African continent. More specifically, Africa became the second largest mobile market in 2009, with mobile phone users reaching 400 million. This is a stark increase from the 2 million users in 1998, largely attributed to the rise in investment (Chavula, 2013).

In the paper by Albiman and Sulong (2016), they illuminate the fact that African countries have recognised the importance of ICT in achieving long-run sustainable economic growth. As mentioned, back in 2015, one third of the governments that were bestowed recognition for advances in ICT services and networks were African countries. This especially regarded the recognition of ICT playing a crucial role in the success of the 2030 agenda, and the Social Development Goals (SDGs) associated with it. As argued by Ponelis and Holmner (2015), in the case of developing countries, ICT makes it possible to compensate for deficiencies in infrastructure. They state that, because of the rapidly growing consumer base amongst African countries, ICT can aid in creating novel products and services that yield to consumers.

Moreover, in the study by Chavula (2013) which involved 49 countries in Africa between 1990-2007, it was found that the existence of fixed telephone lines and the provision of services for mobile phones significantly improved living conditions. However, as argued, the usage of the internet was insignificant in its influence on economic growth. Hence, although there is a

substantial presence of both fixed telephone lines and mobile phones, their potential for facilitating internet access remains underutilised. Resultantly, the limited adoption of internet usage hampers its potential contribution to the economic growth of African nations (Chavula, 2013).

Ponelis and Holmner (2015) examine the potential behind ICT for the African continent in regard to creating jobs and driving both economic and social change. However, in light of the increased demand for specialised services and the outsourcing of knowledge-intensive processes, lacking human capital will lead to a failure in making use of ringing digital economies. Because the fusion of education and ICT hold such large potential as a force for African economic growth, the role of education and its quality is of essence in ensuring employment within ICT, ensuring LP, and consequently ensuring the long-run growth and development of Africa (Ponelis & Holmner, 2015).

As argued, Ponelis and Holmner (2015) not only bring forth arguments for development of technologies and human capital, but also specifically state the importance of increasing the scope of doctoral education on the African continent. Furthermore, as brought forth in the argumentation process by Albiman and Sulong (2016), to ensure long-run sustainable development in the region of Sub-Saharan Africa, governmental investments and expenditures on technology adoption is essential. They additionally stress the importance of investing in human capital, institutional quality and domestic investment, which act as communication channels for ICT. As argued, it is vital to ensure that e.g. mobile phones and internet services are available in a widespread manner, while also promoting liberalisation in the ICT sector through attracting foreign investment (Albiman and Sulong, 2016). Lastly, in the paper by Ponelis and Holmner (2015), they emphasise the continued development of both infrastructure and human resources in order to reap more revenue from higher-value services. This entails fostering advanced technological and inquisitive abilities among their population.

In accordance with the paper by Ponelis and Holmner (2015), Lovrić (2012) found a favourable and noteworthy impact of ICT on the growth in LP, which encompasses the ability to catch-up. This was the case for both developed and developing countries. However, the extent to which the impact of ICTs influence LP is dependent on the variable human capital. In other words, in order to achieve a growth in LP through the use of ICT, a highly educated workforce is essential, illuminating the necessity of higher education in achieving productivity (Lovrić, 2012). Additionally, continuing with the topic of ICT and its potential as a source for catch-up growth, ICT sector services can help with productivity in different sectors. This regards both e.g. services and manufacturing. As stated by Piget and Kossai (2013), small and medium-sized manufacturing enterprises in India, using the most advanced ICTs and with higher intensity, tended to have a higher level of LP and a higher growth rate than other firms. Furthermore, they mentioned a study including 14 African countries, the study concluding that the adoption of ICT strongly enhances performance and LP (Piget & Kossai, 2013).



Turning toward the case of Rwanda, through the national ICT strategy and plan (NICI), Rwanda included ICTs into Vision 2020. As stated by Rwanda ICT Strategic and Action Plan (2015), the use of ICT has huge potentials for economic growth in Rwanda, allowing Rwanda to skip major parts of industrialisation. In accordance, Okello et al. (2014) state that, through the strategic utilisation of ICT, Rwanda aimed at achieving the significant milestone of attaining middle-income status by 2020. This ambitious goal relied on the modernisation of key sectors, leading to the establishment of a vibrant society and economy that are largely knowledge driven (Okello et al. 2014).

As stated; “These plans are based on the relevant vision for Rwanda (VfR) mission strategies which in the case of ICT are to:

- Transform Rwanda into an ICT-literate nation;
- Transform the educational system using ICT with the aim of improving accessibility, quality and relevance to the development needs of Rwanda;
- Improve the human resource development capacity of Rwanda to meet the changing demands of the economy” (Okello et al. 2014, p.45).

### 3.2.2. Human Capital

As argued by The World Bank (2023k), human capital, in regard to education, is both the most effective tool in decreasing poverty and a strong force within economic development. They emphasise the strict role that investments in the education system play in regard to ending poverty. In addition, as noted by Sankay, Ismail and Shaari (2010), augmenting the competence and proficiency of the workforce results in intangible, non-monetary outcomes that are linked to the creation of innovative ideas and informed decisions. These outcomes have a substantial and positive impact on investment, innovation, and diverse opportunities for expansion. They mention the model proposed by Romer (1990) which states that the generation of new ideas is directly linked to the accumulation of human capital, represented by knowledge and skills. Consequently, investing in human capital spurs the growth of physical resources and fuels economic development (Sankay, Ismail and Shaari, 2010).

As stated by Hanushek (2013), developing countries in contemporary society have gained considerable momentum regarding educational attainment. In his words, they are slowly catching up with their developed counterparts. Additionally, it is commonly agreed upon that the economic growth and development of a developing country cant be significant enough to catch up with wealthier nations if human capital is not adequate (Sankay, Ismail & Shaari, 2010; Gyimah-Brempong, Paddison & Mitiku, 2006; Adeyemi & Ogunsola, 2016; The World Bank, 2023k). These arguments lay their basis in the fact that production is influenced by both the

amount and the quality of labour, as labour is considered a crucial factor in the production process (Sankay, Ismail & Shaari, 2010).

Moreover, addressing human capital and whether it has a significant impact on the growth rate of African countries, Gyimah-Brempong, Paddison and Mitiku (2006) analysed this for the period 1960 through 2000. They found that higher education human capital had a significant impact on the growth rate of per capita income. In an empirical investigation by Sankay, Ismail and Shaari (2010), they investigated the relationship between human capital development and economic growth for the period 1970-2008. The study shed light on the fact that long-run economic growth is significantly influenced by investments in human capital. This regarded avenues such as education and capacity building. Complementary, Adeyemi and Ogunsola (2016) also looked at the impact of human capital on long-run economic growth, for the period 1980-2013. The study discovered mixed relationships between various factors. This regarded positive relationships between e.g. secondary school enrollment and economic growth, whereas the relationship was negative for e.g. primary and tertiary education. However, none of these relationships showed to be statistically significant, except for a long-term connection between human capital development and economic growth (Adeyemi & Ogunsola, 2016). Hence, this raises the question of quality-education, and the importance thereof. In regard to LP, Baharin, Syah Aji, Yussof and Mohd Saukani (2020) found the relationship between the quality of human resources and LP to be strong. As argued, all factors relating to health as well as levels of education, including primary, secondary and tertiary education, all influenced LP positively in the short run. In the long-run, this was especially true for tertiary education, and should hence get considerable attention by governments. This regards the prioritisation of governments in developing highly skilled graduates (Baharin et al. 2020).

In regard to educational quality, Adeyemi and Ogunsola (2016) emphasise the need for effective policies to continuously improve human capital through education and training, particularly in primary and tertiary education. Hanushek (2013) additionally explores the case for developing countries in general, and the role human capital has or could play in their economic development. In his direct analysis he found that educational attainment, similarly to the findings by Adeyemi and Ogunsola (2016), had no direct influence on growth. This largely laid tribute to the inclusion of cognitive skills. More specifically, although the figures of educational attainment have been spectacular, when adjusted against the quality of education, this adds critique to what may be interpreted as progress (Hanushek, 2013). Thus, as found by Hanushek (2013), developing countries have struggled to narrow the disparities that exist with developed nations in terms of educational standards. He states that, unless there is a substantial improvement in the quality of education, these developing countries will face considerable obstacles in their efforts to enhance long-term economic performance (Hanushek, 2013).

Moreover, the employability of an educated workforce and the absorption capacity of different sectors are important and need to be discussed. As noted previously in the discussion of ICT,

Ponelis and Holmner (2015) discuss the fact that the ICT industry is essential for Africa's long-run development. Tertiary education is regarded as the education level where students gain the expertise and intellectual capital necessary for becoming knowledge economies. The issue lies in the small number of enrolled students. In the case of African countries, only 6 percent of potential students study at the tertiary level, which is seemingly trumped by the global average, being almost five times higher. The issue is furthered when looking at student subjects, illuminating that only around one in ten students actually have chosen subjects with high employability in the workforce (Ponelis & Holmner, 2015). Hence, specified education is essential in ensuring the employability of individuals, especially in regard to employment in ICT.

As stated by Paadi, 2014, employability pertains to an individual's ability and readiness to be sought-after in the labour market. It encompasses the individual's competencies to consistently maintain attractiveness. Hence, merely acquiring education and qualifications may not be sufficient if individuals are unable to secure suitable employment opportunities. This stands in accordance with Ponelis and Holmer (2015), stating the significance of education and its quality cannot be overstated when it comes to securing employment opportunities in the field of ICT. As previously mentioned, it plays a crucial role in driving LP (Ponelis and Holmner, 2015). Furthermore, as found by Aggrey, Eliab and Joseph (2010), companies that invest in employee training demonstrate notably higher levels of LP compared to those that neglect training initiatives. This observation aligns with the notion that training facilitates the spread of new tech, as the primary objective of training programs is often to familiarise employees with innovative practices and tools (Aggrey, Eliab & Joseph, 2010).

As for the case of Rwanda, Cyesa, Turayishimye and Nkurunziza (2019) bring forth the case of Vision 2020, a blueprint the Rwandan government implemented for its long-term development. As argued, the vision is centred around the well-being of the people, aiming to enhance human resources. Of essence is the fact that Vision 2020's ultimate goal is to transform Rwanda into a knowledge-based economy. Additionally, Cyesa, Turayishimye and Nkurunziza (2019) tie together Vision 2020 with medium-term initiatives such as the National Poverty Reduction Strategy Paper and the National Investment Strategy, where the aspirations of Vision 2020 have seemingly translated into. Hence, this largely aligns the efforts by the Rwandan government with its long-term vision.

In their paper, they examined factors as e.g. public expenditure on health and education of GDP growth. The results revealed the importance of human capital development for sustainable economic progress in Rwanda, results which emphasised the positive and significant contribution thereof. This highlighted the importance of prioritising and investing in human capital development to ensure long-run sustainable economic growth. Of large importance was the finding that investments in tertiary education had a positive correlation with economic growth. In regard to primary and secondary education, this correlation was found to be negative (Cyesa, Turayishimye & Nkurunziza, 2019). Furthermore, Gisanabagabo (2018), stressed the escalating

importance of higher education in driving catch-up growth. As found, the substantial investments made by Mauritius, Taiwan and Singapore into higher level education was the key factor behind them catching up, transitioning to middle-income status. This was largely attributed to the fact that human capital both fostered the utilisation of cutting-edge technology and the investment of specialised knowledge and skills (Gisanabagabo, 2018).

## **4. Data and Methodology:**

### **4.1. Data**

This paper uses quantitative numerical data extracted from The World Bank and Our World in Data. Furthermore regarding the analysis of data, excel has been used. In the following sections, the data used has been subdivided into the corresponding headings; ICT, Human Capital, Premature deindustrialisation and labour productivity (LP).

Constant 2015 USD instead of Current USD, for both sectoral value added and per capita GDP figures, was used in order to minimise the effect of high inflation rates.

#### **4.1.1. Information and Communication Technology (ICT)**

The analysis of ICTs makes use of two prominent variables in order to explore the extent to which ICTs have spread across the African continent. The first variable included was “*Individuals using the Internet (% of population)*” (Our World in Data, 2023a), as lacking internet availability has been linked to impeding the contribution of ICTs to economic growth (Chavula, 2013). Secondly, the variable “*Mobile cellular subscriptions (per 100 people)*” (The World Bank, 2023l) was included, as cellular subscriptions, in the case of widespread adoption, have been found to significantly increase LP (Wamboye, Adekola & Sergi, 2016).

#### **4.1.2. Human Capital**

The illustration of Human Capital regarded both educational attainment and educational quality. In regard to educational attainments, the next variables were used; “Gross enrollment ratio in tertiary education, 1971 to 2016” and “Gross enrollment ratio in secondary education, 1971 to 2015”, as visually depicted in *Fig8* and *Fig9* (Our World in Data, 2023b; Our World in Data, 2023c).

The latter two variables are expressed as a percentage of the proportion of individuals within the eligible age range for official primary and tertiary education. Furthermore, *Fig10* represents educational quality, making use of the following variables; “*Government expenditure on primary education as % of GDP (%)*” and “*Government expenditure on secondary education as % of GDP (%)*” ( Our World in Data, 2023d; Our World in Data, 2023e). The data for government expenditures on tertiary education was missing, and hence not included in the illustration of government expenditure on education in *Fig9*.

Because of the associated link between human capital, and especially education, to that of catch up growth in regard to LP, these variables were of essence to explore.

### 4.1.3. Premature deindustrialisation

In order to test whether Rwanda followed the trend of premature deindustrialisation, the variable “*Manufacturing, value added (% of GDP)*” was drawn from The World Bank database (The World Bank, 2023m). The increases and decreases of the variable, alongside time, allows for the illustration of the shifting role manufacturing plays in the economic development of Rwanda.

### 4.1.4. Labour Productivity (LP)

*Fig11*, illustrating LP in Rwanda between 1991 and 2021, represents the sector specific value added per worker in the corresponding sector. It is calculated through the division of value added by employment. *Fig12* represents the relative productivity per sector compared to the overall economy. The LP at the country level is calculated by dividing total value added with total employment. Thereafter, sectoral LP is divided by LP of the total economy, resulting in LP of services compared to economy wide LP. Hence, Rwanda's economy wide LP is equal to one. In other words, if the service sector LP is larger than one, the sector is more productive than the country average, contributing to the overall economy. Hence, this tells something about Rwanda's potential to catch up.

In regard to measuring sector specific employment and total employment, this encompassed the use of the following variables; “*Unemployment, total (% of total labor force) (modeled ILO estimate)*”, “*Labor force, total*”, “*Employment in services (% of total employment) (modeled ILO estimate)*”, “*Employment in agriculture (% of total employment) (modeled ILO estimate)*”, and “*Employment in industry (% of total employment) (modeled ILO estimate)*” (The World Bank, 2023q; 2023o; 2023i; 2023h; 2023j). In regard to sector specific value added, necessary in the measure of sectoral LP and LP of the total economy, this regards the following variables “*Services, value added (constant 2015 US\$)*”, “*Agriculture, forestry, and fishing, value added (constant 2015 US\$)*”, and “*Industry (including construction), value added (constant 2015 US\$)*” (The World Bank, 2023p; 2023q; 2023r).

## 4.2. Method choice

The choice behind a method depended on the aim, research question and its related scope. The aim of this thesis is to analyse whether Rwandas economic growth, following the 1994 genocide, will lead to catch up growth in light of Vision 2020. The reason for this exploration lies in the fact that premature deindustrialization has become ever more apparent, which is argued to hinder long-run economic growth in developing countries (Rodrik, 2016). A mixed research method was chosen to allow for a comprehensive investigation of post-genocide Rwanda. This regards the use of quantitative data derived through The World Bank and Our world in Data, as well as qualitative literature that helps explain the underlying reasons and provide a deeper understanding of the “why” behind the observed quantitative findings (Creswell, 2014). Hence, the thesis examines whether Rwanda, in light of the notion of premature deindustrialisation, will catch-up with wealthier nations. This is explored through a secondary data analysis. A secondary data analysis regards the use of existing data to explore current topics and questions. This allows for a large sample size, necessary in order to explore the extent to which Rwanda may be able to catch up, allowing for more accurate generalisations. This is additionally the case as this exploration largely builds on historical data as well as publicly available large-scale data. The latter regarding the use of e.g. GDP, employment, investments, educational attainments etc.

Initially, the thesis examines premature deindustrialisation and its prevalence in Rwanda. Following this, human capital and ICT, both aims part of Vision 2020, are introduced as variables allowing for catch-up growth. At the end, LP will be explored.

The analysis that follows is composed of four major subsections. The first out of the four parts surrounds the exploration and determination of premature deindustrialization and its prevalence in Rwanda. This regards the inspection of manufacturing value added as a share of GDP, determining whether it has followed an invested U-shape in line with the arguments by Rodrik (2016).

In the second and third parts, macroeconomic indicators associated with human capital and ICT are introduced. Essentially, these descriptive statistics (internet usage, mobile phone subscriptions, foreign direct investment, enrollment ratio in secondary and tertiary education, and expenditure on primary and secondary education) help explain the trend in Rwanda's economic development. This lays foundation for the fourth and final part of the analysis, where the variable labour productivity is explored in the case of agriculture, industry and service sector. This largely aids in the exploration of Rwanda's potential for catch-up growth.

### 4.3. Limitations

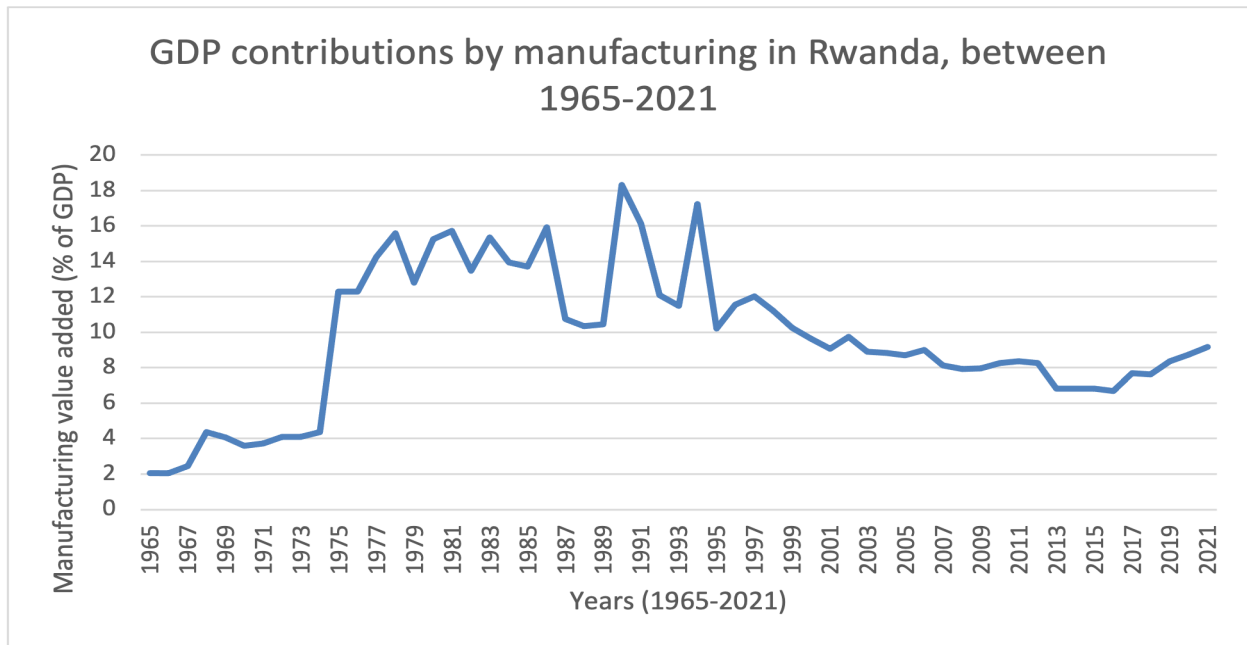
In regard to the data used, one limitation of the study is that the expenditures on education are assumed to increase educational quality, which does not necessarily have to be the case. Additionally, using variables “*labour force, total*” and “*Unemployment, total (% of total labor force) (modeled ILO estimate)*” in order to calculate the total employment in Rwanda will lead to a figure estimate. Hence, this may lead to a potentially wide standard of error.

As for the method choice, one potential limitation may be the reliance on a secondary data analysis, whereby this may lead to a lack of control over the accuracy and quality of the collected data (Creswell, 2014). Moreover, pre existing data sources may be limited in terms of data coverage.

## 5. Empirical Analysis

### 5.1. Results

#### 5.1.1. Premature deindustrialisation: Rwanda



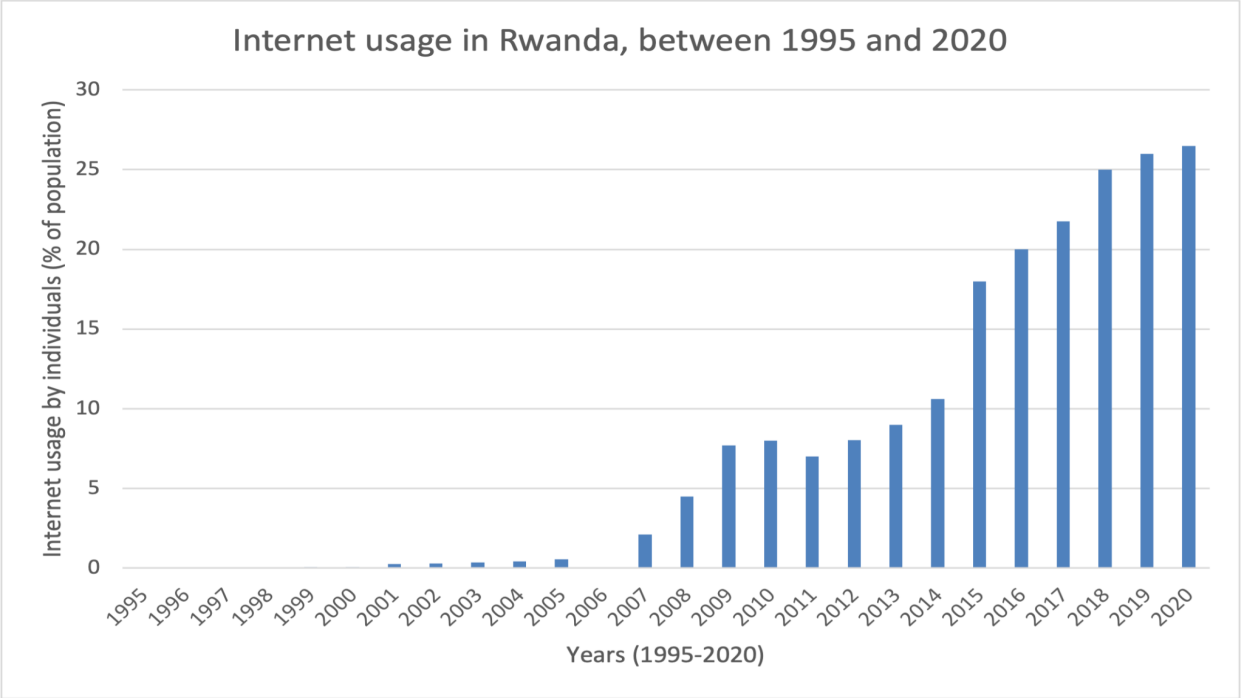
*Fig5. Deindustrialisation in Rwanda*  
*Source: The World Bank (2023m)*

*Fig5* illustrates manufacturing value added as a share of GDP between the period 1965 and 2021. As depicted, Rwanda has noted considerable declines in the contribution manufacturing has to GDP. As shown, Manufacturing Value Added (MVA) as a percentage of GDP jumped from 4.36

percent in 1974 to 12.28 percent in 1975. Thereafter, MVA figures have fluctuated dramatically. However, the final large drop was between 1994 and 1995, where MVA as a percentage of GDP dropped from 17.25 percent to 10.22 percent, respectively. Thereafter, there has been a steady decrease in MVA, decreasing from 9.63 percent of GDP in 2000 to 6.70 percent of GDP in 2016, increasing slightly up to 2021.

### 5.1.2. ICT: the case for Rwanda

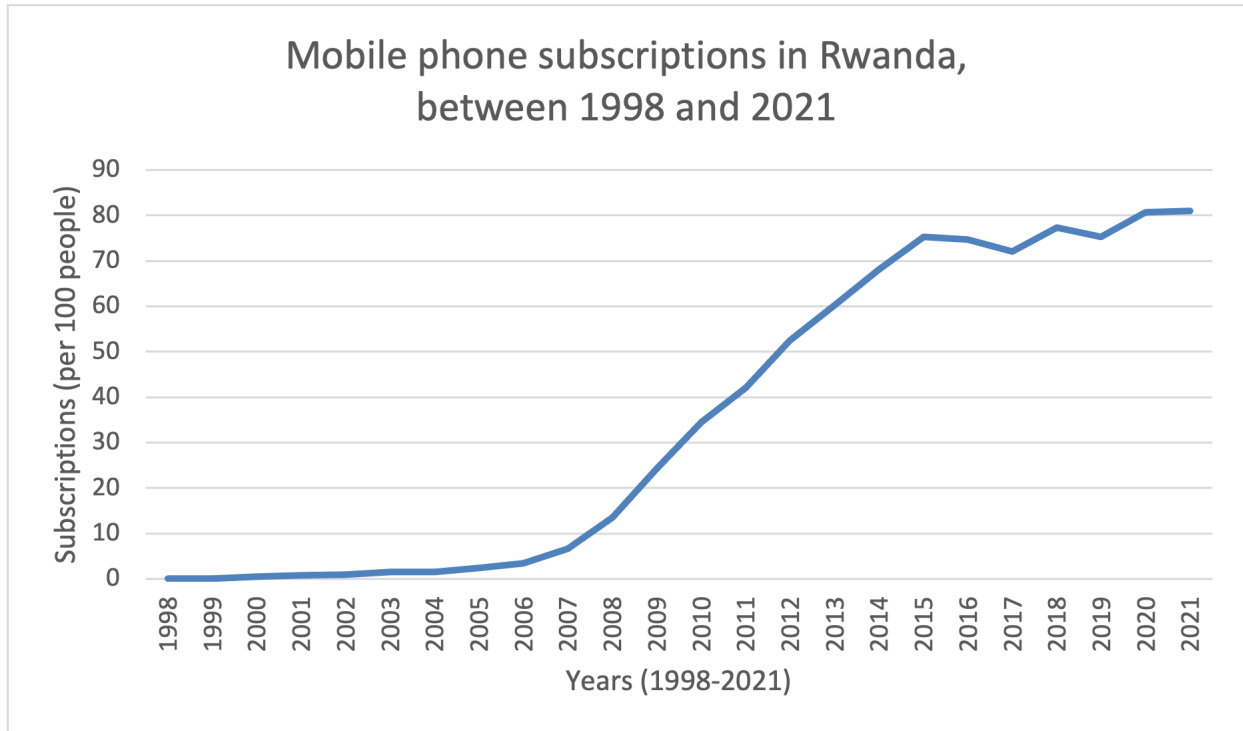
As illustrated in *Fig6*, Rwanda has noted a considerable influx in the usage of the internet. This has regarded the period 1995 through 2020, where internet usage increased from around 0.55 percent in 2005 to 26.5 percent in 2020. Although being a relatively drastic increase, with roughly one in four having access to the internet, this is still low. Important to note is the fact that prior to the 1994-genocide, there was no internet usage in Rwanda.



*Fig6. Individual internet usage: Rwanda*  
*Source: Our World in Data (2023a).*

Furthermore, in regard to the usage of cellular phones, this is shown in *Fig7*, illustrating mobile phone subscriptions in Rwanda. As shown, the usage of mobile phones seemingly moves in parallel to that of internet usage. In 2007, Rwanda began noting considerable increases in subscriptions. Thereafter, it has continued to increase drastically, with around 75 percent of the population having a mobile subscription in 2015. The years following, up until 2021, noted stagnating growth rates, reaching around 80 percent in 2021.

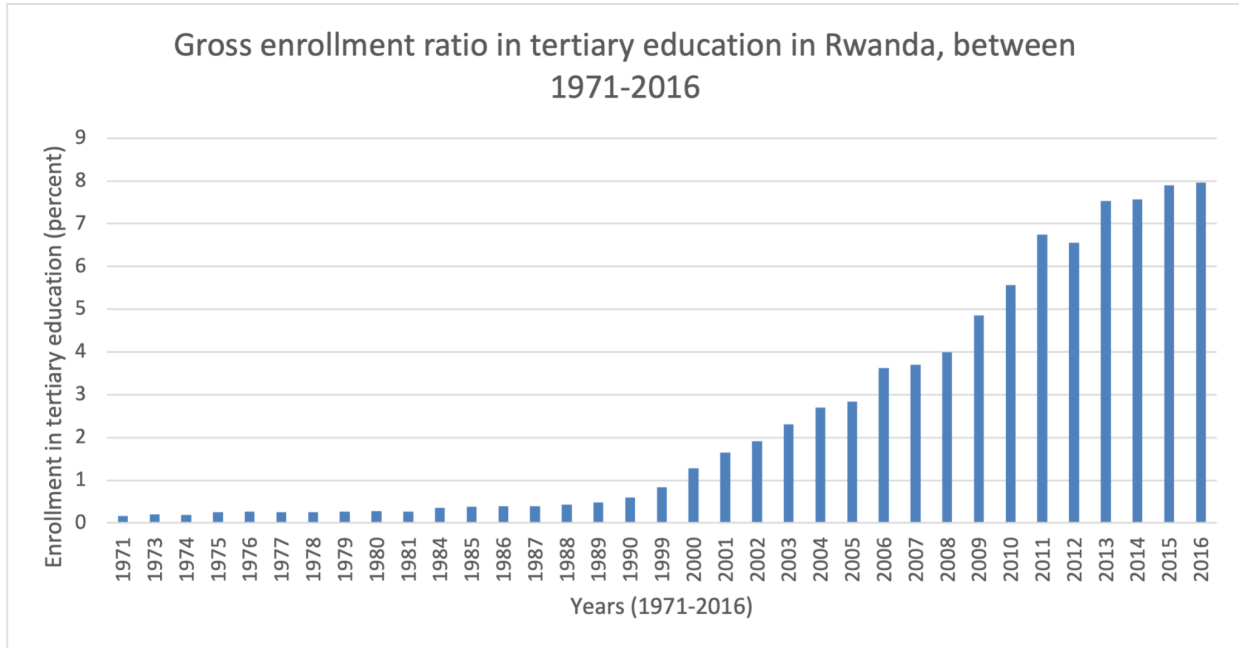




*Fig7. Mobile phone subscriptions: Rwanda*  
*Source: The World Bank (2023)*

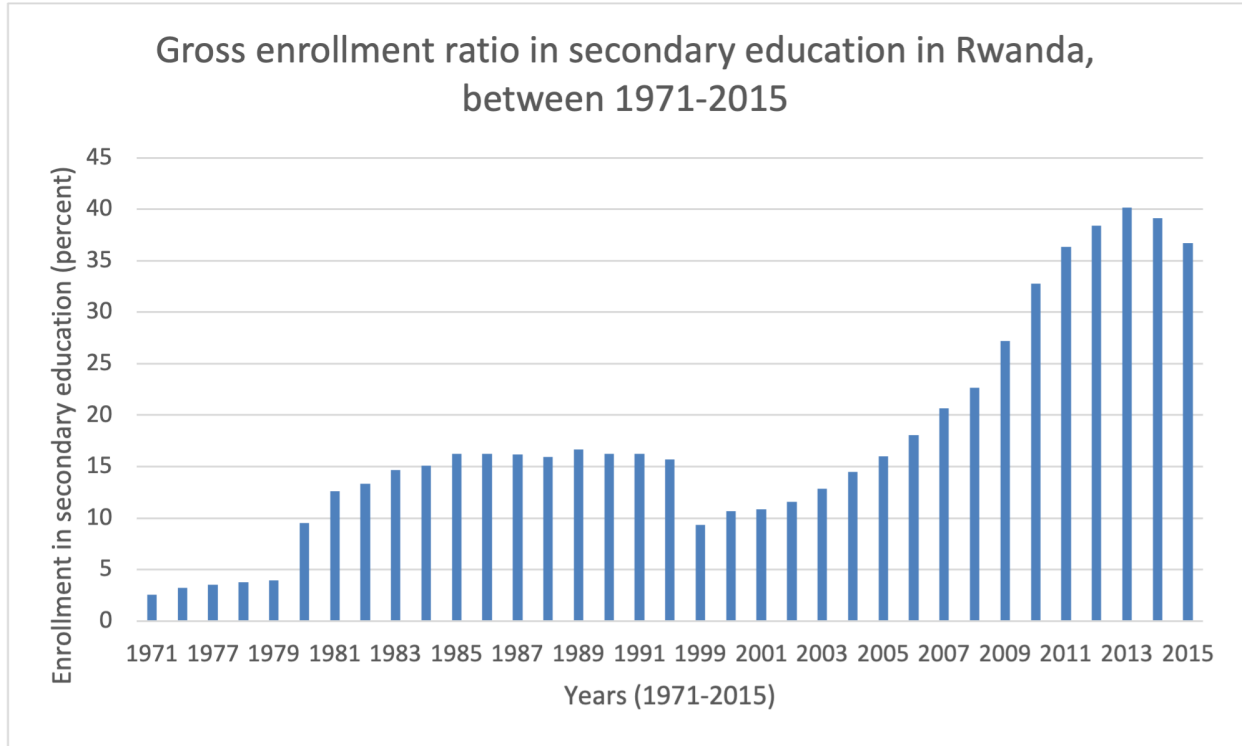
### 5.1.3. Human Capital: the case for Rwanda

As illustrated in *Fig8* and *Fig9*, they depict the substantial strides made in Rwanda's education sector, with notable improvements in secondary and tertiary education enrollment rates over the years. More specifically, in *Fig8*, there is a clear increase of the gross enrollment in tertiary education. This surrounded an eight-fold increase between the years 1999-2016. For the year 2000, enrollment in tertiary education barely surpassed 1 percent. For the year 2016, the corresponding percentage was approximately 8 percent.



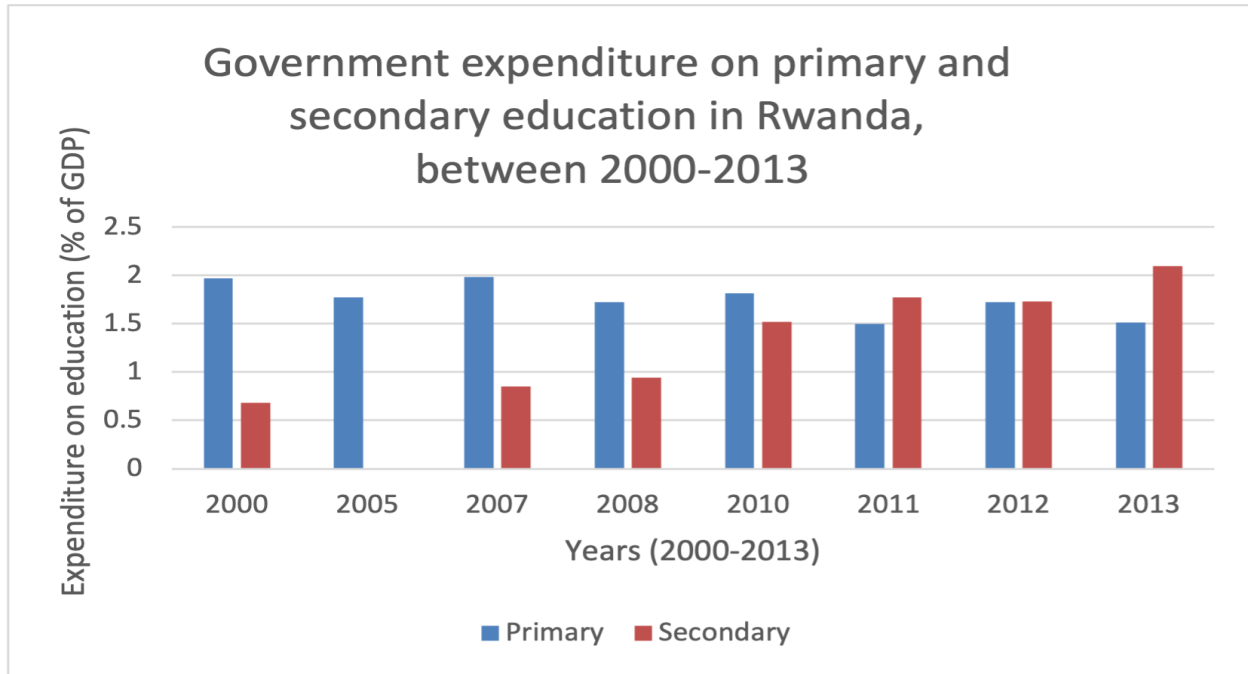
*Fig8. Enrollment in tertiary education: Rwanda*  
*Source: Our World in Data (2023b)*

Similarly to that of *Fig8*, *Fig9* illustrates the considerable increase in gross secondary education enrollment ratios. This regarded a four-fold increase between the period 2000-2013. In contrast to that of tertiary education, secondary education encompassed larger portions of the population. To be concrete, as depicted in *Fig9*, the corresponding percentage share of enrollment ratios in secondary education increased from roughly 10 percent to roughly 40 percent for the years 2000 and 2013, respectively. Noticeable is the dip between the years 1991 and 1999, largely attributed to the genocide in 1994. However, already in 2005, gross enrollment ratios in secondary education had surpassed pre-genocide levels of roughly 15 percent.



*Fig9. Enrollment in secondary education: Rwanda*  
*Source: Our World in Data (2023c)*

In regard to the governmental expenditures on education, this is illustrated in *Fig10* below. The figure illustrates the expenditure as a share of GDP on both primary and secondary education. Noteworthy is the fact that primary education expenditures fluctuated greatly for the period in question, that of 2000 through 2013, shifting between 2 percent of GDP to 1.5 percent of GDP. On the other hand, the expenditure of secondary education has steadily increased between the period. This regarded an increase from roughly 0.7 percent of GDP to over 2 percent of GDP for the years 2000 and 2013, respectively.



*Fig10. Government expenditure on education: Rwanda*  
*Source: Our World in Data (2023d; 2023e)*

#### 5.1.4. Labour productivity (LP): Rwanda

In order to test whether Rwanda will be able to achieve catch up growth, which regards an increase of per capita GDP to the level of wealthier nations, this will be explored through labour productivity (LP). Furthermore, sectoral LP relative to economy wide LP will be illustrated in order to determine whether specific sectors are actually contributing to the overall productivity of the economy.

*Fig11* below illustrates the value added per worker for the sectors of agriculture, industry and services. Noteworthy is the fact that the fluctuations in productivity for both the industrial and service sectors have occurred in a similar fashion throughout the period of 1991-2014. For the year 2015 they began to diverge, with value added per worker in services being two times that of industry in 2021. More specifically, for the year 2021, per worker value added in industry was roughly 3000 (Constant 2015 USD), whereas the corresponding service sector figure was just below 6000 (Constant 2015 USD). Important to note is the fact that this difference is attributed to a decrease in industry value added, not an increase in service value added. The latter has remained seemingly constant throughout the entirety of the period, that of 1991-2021. Moreover, in regard to agricultural value added, this has remained roughly the same. It has increased on a miniscule level, from roughly 500 (Constant 2015 USD) to just over 1000 (Constant 2015 USD) for the years 1991 and 2021, respectively. Hence, *Fig11* illuminates the same trends as noted in

the case for GDP per capita at the sector level, where the sectoral contribution has either roughly remained unchanged, or declined.

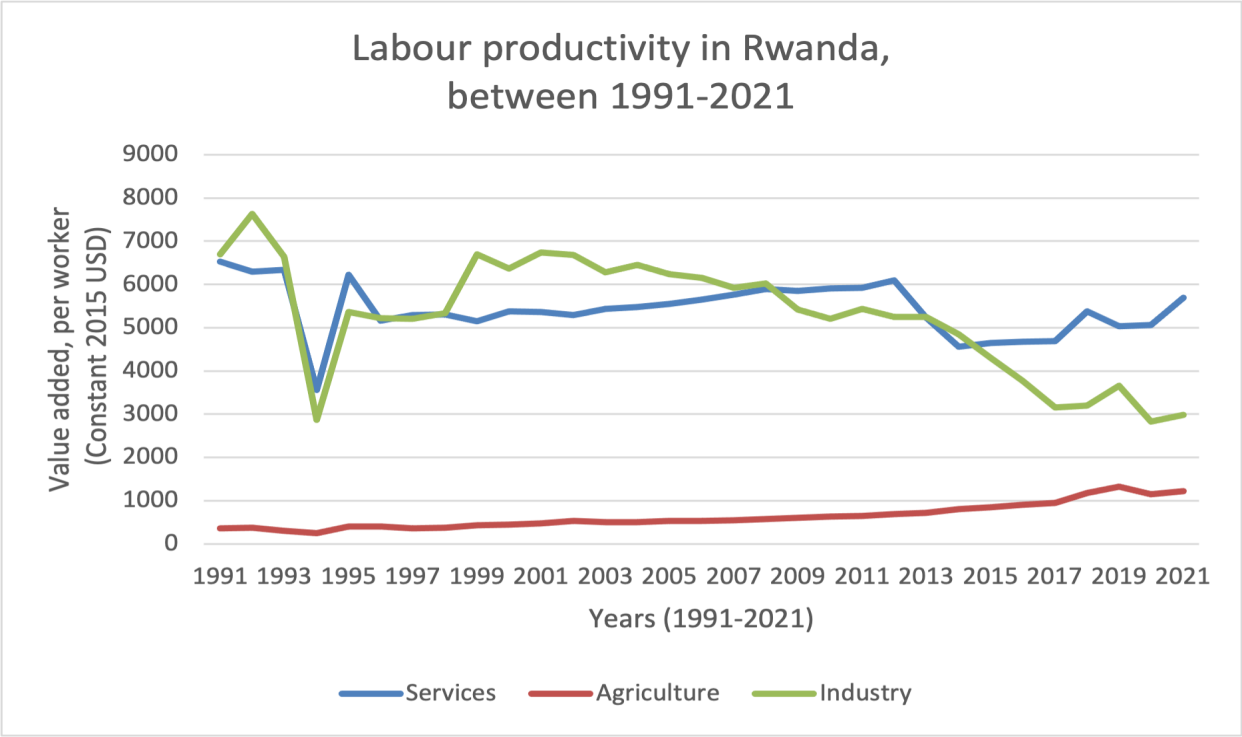


Fig11. Sectoral LP  
 Source: The World Bank (2023p; 2023q; 2023r)

In order to explore the relationship between the LP of Rwanda and the increase in GDP per capita, the exploration of the move in employment away from agriculture and towards services is of essence. In terms of averages, the value added per worker by industry, services and agriculture were 5285, 5435 and 630 (constant 2015 USD) respectively. This regarded the period of 1991-2021. At the same time, employment in the service sector rose from roughly 175 thousand in 1991 to roughly 1.1 million in 2021, an increase of around 935 thousand. Hence, through multiplying the average per worker value added in the service industry by the increase in employment through 1991-2021, the exploration behind the rise in per capita GDP is made possible. This amounted to a little over 5 Billion current USD, amounting to almost half of total GDP in Rwanda for the year 2021, which was 11.98 billion.

Furthermore, the comparison of LP in industry, agriculture and service to that of economy wide LP is illustrated in Fig12. Because the values are found through the division of sectoral LP and LP of the total economy, this indicates if the sector is more productive or less productive than the country average. This comparison provides insights into the sector's contribution to the overall economy. If the sector's LP is higher than the country's average, it indicates that the sector is more productive and likely making a positive contribution to the overall economy.

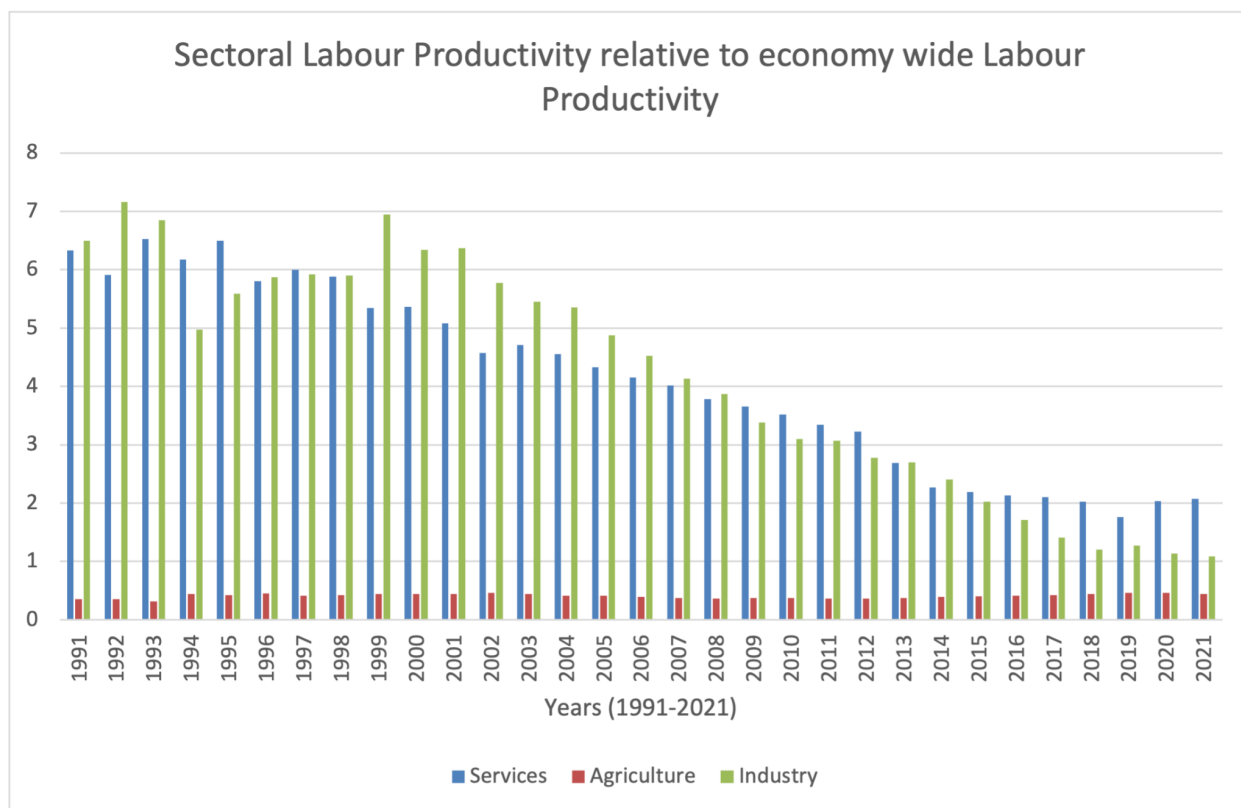


Fig12. Relative LP of Services, Agriculture and Industry compared to economy wide LP  
 Source: The World Bank (2023n; 2023r; 2023i; 2023h; 2023j)

In Fig12, the LP at the country level, encompassing the sum of per worker value added for all sectors, has almost tripled during the period. In particular, it increased from 1030 to 2747 (constant 2015 USD), for the years 1991 and 2021 respectively. At the same time, the relative contribution of the service and industrial sectors to Rwanda's total LP has decreased dramatically. This has regarded a shift from being between 5-7 times that of Rwanda's country wide LP to between 1-2. In the case of agriculture, throughout 1991-2021, it has remained below 0.5, meaning that labour is less than half as productive than Rwanda's average. As for industry, it has in recent years remained just above that of Rwanda's average. This has most prominently been the case for the years 2018-2021. Consequently, with services remaining at twice that of Rwanda's average, 2019 being the only year where LP dropped below 2, service sector productivity is seemingly the driver of Rwanda's country wide productivity.

## 5.2. Discussion:

The following section strives to explore the aim of the thesis, which encompasses the exploration of whether Rwanda's recent economic growth in per capita GDP will lead to catch-up growth. The importance thereof lies in the fact that Africa has experienced economic growth before, but

that it has historically been unsustainable. Hence, this raises the question of whether the present economic growth in Rwanda will be sustainable, addressed through the factor of Labour Productivity (LP). Furthermore, the latter part of this section discusses the results concerning the theoretical framework, that of structural transformation theory (Kuznets, 1955; Lewis, 1954) and the modification by Rodrik (2016).

Based on the literature review and the results obtained, it is important to assess whether Rwanda's recent growth will lead to catch-up growth. The concept of catch-up growth refers to the ability of a country to narrow the income gap with more developed countries over time. In this case, catch-up growth would imply that Rwanda can achieve sustained economic development through increased LP.

This regards the exploration of the following research question; “*Rise of the Rwandan economy post-genocide: will this lead to catch-up growth?*”.

### 5.2.1. Discussion of results

As proposed by the literature, developing countries in the 21st Century have noted compressed forms of deindustrialisation (Rodrik, 2016; Cruz, 2015). This regards the move away from manufacturing and towards services whilst the scale of industrialisation is minimal. As illustrated in the results, Rwanda noted increased GDP figures alongside an increase in Manufacturing Value Added (MVA) as a share of GDP. This potentially stands in line with the role industrialisation has played in the historical development of already developed countries. Similarly, Rwanda noted considerably large increases in GDP figures although MVA decreased considerably following the 1994 genocide, continuing to remain low at around 10 percent of GDP. This illuminates the fact that other, more productive sectors, are noting a rise in demand and employment, which is noted in the case of value added in services. The latter, in contrast to MVA, increased after the genocide. Yet, this has only regarded an increase to pre-genocide levels, that of roughly 50 percent of GDP. Hence, in accordance with Rodrik (2016), the share of manufacturing has followed an inverse-U-shaped relationship with development.

Concerning the service sector's contribution to GDP, it is much higher than all other sectors. This is because the service sector accounts for around 30 percent of employment in 2021 (*Fig4*) and has the highest value added (*Fig2*). Furthermore, the service sector LP, as noted in *Fig11*, is twice that of the average of Rwanda's economy. Similarly, the service sector value added per worker was 6000 (constant 2015 USD) for the year 2021, twice that of the industry sector. Hence, it appears that the productivity of the service sector plays a crucial role in driving overall productivity across Rwanda. The extent to which this may be addressed as successful, concerning continued growth in GDP and LP, largely depends on ICT and Human Capital, part of Vision 2020.

As noted in the results, the spread of ICTs in regard to mobile phone subscriptions has been rapid, constituting roughly 80 percent of Rwanda's population. Similarly, internet usage has also drastically increased from 0 percent in the 90s to over 25 percent in 2020. This stands in line with the goals set by Vision 2020 (Kaberuka, 2000). The focus thereof by the Rwandan government lies in the fact that cellular subscriptions can significantly increase LP (Wamboye, Adekola & Sergi, 2016). Similarly, the availability of phones and internet services were found to be vital components in ensuring long-run economic development (Albin & Sulong, 2016).

However, one common thread in the literature is the importance of combining ICTs and human capital. As argued, ICTs were found to significantly impact LP growth only when there was a presence of well-educated labour. Consequently, higher education levels contribute significantly to the maximising of benefits from ICT on LP (Lovrić, 2012). This depends on the fact that education is agreed upon by the literature as essential for long-run growth (Sankay, Ismail & Shaari, 2010; Adeyemi & Ogunsola, 2016).

In the long run, the influence tertiary education had on LP and catch-up growth was especially true (Baharin et al. 2020). This, therefore, sheds a positive light on Rwanda's achievements, as tertiary education enrollment has dramatically increased. However, at roughly 8 percent of the age group for tertiary education, this is still relatively low. Looking at the case for secondary education enrollments, this is comparably higher, at around 40 percent. This largely regards the increased focus on education by the Rwandan government, in regard to both expenditures and quality (Kaberuka, 2000). More specifically, Rwanda's government increased expenditures from around 0.7 to 2.1 percent of GDP between the years 2000-2013. Hence, if the focus on human capital continues, concerning education, this may illuminate great potential for the Rwandan economy, as there is large untapped potential in regard to an educated labour force.

Yet, as previously mentioned, service sector value added as a percentage of GDP has only reached the same level as for the years prior to the 1994 genocide, remaining rather constant. Therefore, given the fact that per capita GDP has grown to drastically higher levels than before, there are seemingly additional forces that influence per capita growth. Within the literature, this has largely regarded Rwanda being a so-called donor darling (Hakizimana & Endless, 2009; Nadeem et al. 2020).

### 5.2.2. Implications for the theoretical framework

As for Rwanda's development path, with both LP and value added being the highest in the service sector, this stands in contrast to the traditional theories on structural transformation. Of essence is that Rwanda's focus lies in services, with ICT and Human capital being major components of Vision 2020, the main aim for Rwanda in achieving middle-income status. Hence, Rwanda skips the investment in industrialisation, which Lewis argues is a crucial component in



structural transformation, and manufacturing sector growth, which Kuznets argues is essential for decreased income inequality. Instead, Rwanda has largely followed the patterns in the modified version proposed by Rodrik. In line with his arguments, Rwanda, having gone through premature deindustrialisation, has not noted considerable increases in LP. In his words, this is because manufacturing is essential for developing countries to increase LP and consequently catch up.

## **6. Conclusion**

In conclusion, this thesis has explored the dynamics of economic growth and structural transformation in the context of post-genocide Rwanda. Through the examination of Rwanda's experience of shifting employment patterns away from agriculture and largely towards the service sector, this study has shed light on the implications of such transformation for Rwanda's overall productivity and potential surrounding catch-up growth. Although the findings do suggest that Rwanda has noted considerable economic growth following the genocide of 1994, the sustainability of this growth trajectory should remain under close observation. With Rwanda's strategic focus on developing human capital and harnessing information and communication technology (ICT), this has driven the increase in service sector Labour Productivity (LP). Additionally, both ICT and LP have facilitated the transition towards a knowledge-based economy, notably the aim of Vision 2020. However, LP and Value added by the service sector have roughly remained constant throughout 1995-2021. At the same time, the results showed that the service sector, in regard to both LP and Value added, is the leading and driving sector. Therefore, considering the remarkable rise of GDP per capita by around 800% during the period from 1994 to 2021, it suggests that the sustainability of this growth for achieving catch-up growth may be questionable. This observation is further supported by Rwanda's reliance on aid, which could be a contributing factor to its current economic growth but might hinder the country's potential for catching up with more developed nations.

### **6.1. Implications**

The implications of this thesis highlight the importance of human capital development, ICT adoption, and sustainable service sector development for Rwanda's economic growth and catch-up potential. The findings also contribute to theoretical discussions on industrialisation patterns which challenges traditional notions of industrialisation and highlights the phenomenon of premature deindustrialisation in developing countries. The findings suggest that the structural transformation towards services, rather than manufacturing, can still contribute to catch-up growth under certain conditions. Additionally, the findings further contribute to discussing the role of human capital and ICT, and provide valuable lessons for other developing countries seeking to achieve sustainable and inclusive economic development.

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