

**A critical analysis of the implications of the Fourth Industrial Revolution  
on tax regulation: Relevance of the Robot Tax Debate in South Africa from  
a developing country perspective**

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## **Dedication**

To my dear family, for whom many thoughts and dreams I hold and a reason for my tirelessness.

To my dear mother, whose strength, determination, entrepreneurial spirit, and resilience I share.

To my late uncle Alex and granny Jessie, who with many humble exertions lit a life-long love for education, responsibility and a challenge in me, a belief that I can and that I have a purpose in this world.

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## Abstract

The world is experiencing a paradigm shift exhibited by the unprecedented convergence of the biological, physical, and technological environments. This paradigm shift, occasioned by the Fourth Industrial Revolution (4IR), is transforming the way of life, work, business, the law, and government policy across the world. The introduction of 4IR technologies such as robotization and Artificial Intelligence is threatening massive labour displacements and resultant significant erosion of the tax base. With the full extent of the 4IR yet to obtain scholars, international organisations such as the Organisation for Economic Cooperation and Development (OECD), World Economic Forum (WEF) and governments have initiated policy inquiries and debates to respond to the looming threats and to maximise on opportunities presented by the 4IR. This research falls within the broader context and out of similar concerns to the OECD Base Erosion and Profit Shifting project (BEPs) and as expressed under Action 1 which deals with the taxation of the digital economy.

Amongst the proposals to respond to robotization threats to the tax base is the imposition of a robot tax. Therefore, the robot tax debate is the *foci* of this research. So far, the robot tax debate has been restricted to developed countries and now slowly gaining momentum in developing countries. The South African president, Cyril Ramaphosa constituted the Commission on the Fourth Industrial Revolution in 2019 in response to the dawning realities of the 4IR. The commission is tasked with the mammoth task of deciphering the 4IR and diagnosing its impact across various sectors in South Africa and to report its findings and recommendations.

The establishment of the commission on 4IR underscores the imperativeness of this study whose crux is to explore the relevance of the robot tax debate in the South African context representative of developing countries. This is in cognisance of the struggle against inequality, rising unemployment, a broadening budget deficit, stagnant economic growth, and declining revenue collections against a growing demand for free education and social security. Using a doctrinal approach, this research finds that the robot tax debate is not only relevant but imperative in developing countries and that the socio-economic circumstances present in these countries aggravate the negative impact of 4IR.

## **Abbreviations**

AI – Artificial Intelligence

ASI - Artificial Super Intelligence

BEPs – Base Erosion and Profit Shifting

CIT – Corporate Income Tax

DTA – Double Tax Agreements

EU – European Union

FDI – Foreign Direct Investment

GAAR – General Anti-Avoidance Rules

IOS - The International Standards Organisation

IFR - International Federation of Robotics

IoT – Internet of Things

ITA – Income Tax Act

NDP – National Development Plan

OECD – Organisation for Economic Cooperation and Development

PAYE – Pay-As-You-Earn Tax

PIT – Personal Income Tax

4IR – Fourth Industrial Revolution

SAARs – Specific Avoidance Rules

SONA – State of the Nation Address

UN – United Nations

USA – United States of America

VAT – Value-Added Tax

WEF – World Economic Forum

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# CHAPTER 1

## INTRODUCTION

### 1.1. Background

‘While the conversation has started to shift from challenges to opportunities, there is still a long way to go before an inclusive future for all becomes broadly accepted as incremental to the success of the Fourth Industrial Revolution. A significant, committed, collaborative public-private effort is vital. Such an approach can address negative implications and unexpected consequences, such as the growing inequality between and within economies and the displacement of low-skilled workers. Likewise, it could facilitate the examination of, and adoption of, more sustainable approaches to production.’<sup>1</sup>

The quote above captures in precise terms the broader challenges of inequality and displacement of labour occasioned the Fourth Industrial Revolution (4IR). It further highlights the need for inclusivity and sustainability which this thesis tackles from a tax policy perspective. The world is undergoing a new wave of change in the form of the 4IR.<sup>2</sup> Over the past centuries, the world has experienced major transformative societal and economic changes. With each wave of change, humanity sought to exploit opportunities that arose and dealt with challenges that came with such changes. Notable of these changes are the industrial revolutions which commenced with the adoption of machinery in agriculture, transport and manufacturing causing production output to balloon.<sup>3</sup>

Despite the 4IR unfolding in our corridors for close to two decades, it remains an enigma to the common person notwithstanding its increasing effect on daily life. The 4IR is epitomised *inter alia* by Artificial Intelligence (AI), digitalisation, Internet of Things (IoT), robotization, and blockchain technology.<sup>4</sup> What sets the 4IR apart from its predecessors is the signature convergence of the digital, physical and biological environments where machines now can do tasks, that were previously the reserve of manual labour, effectively and cost-efficiently.<sup>5</sup> This hallmark of 4IR is understood to threaten job displacements thereby sparking a fierce debate across the globe on the imposition of a robot tax. It has been argued that the

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<sup>1</sup> World Economic Forum & Accenture ‘Leading through the Fourth Industrial Revolution: Putting People at the Centre’ (Jan 2019) *White Paper* at 11.

<sup>2</sup> Valentine P Vishnevsky & Viktoriia D Chekina ‘Robot vs. Tax Inspector on how the fourth industrial revolution will change the tax system: A review of problems and solutions’ (2018) *Journal of Tax Reforms* at 6.

<sup>3</sup> Bronwyn McCredie, Kerrie Sadiq & Ellie Chapple ‘Navigating the 4th Industrial Revolution: Taxing automation for fiscal sustainability’ (2019) *Australian Journal of Management*, 44(4), pp. 648-664 at 1.

<sup>4</sup> Valentine & Viktoriia op cit note 2.

<sup>5</sup> Bronwyn, Kerrie & Ellie op cit note 3 at 2.

proliferation of AI into the workplace threatens job losses with a resultant loss in government tax revenue and widening inequality gap.<sup>6</sup> There are fiercely opposing views regarding the real impact of 4IR on employment and tax revenues.<sup>7</sup> At least two world billionaires, Bill Gates and Elon Musk acknowledge the potentially devastating effects of AI on jobs and on the fiscus.<sup>8</sup>

Proposals have been put forward to counter the looming tax revenue loss, and one of these proposals is a robot tax proposal by Bill Gates, a proposal whose controversy forms the core of this research.<sup>9</sup> South Korea is currently the only country in the world to have implemented a deemed robot tax by way of reducing tax rebates claimable by automation entities.<sup>10</sup> Proposals to implement a robot tax have failed before the US Senate and the EU commission.<sup>11</sup> Notable objections to the robot tax proposal anchors on practicality, implementation and protecting against tax avoidance and evasion schemes.

Being a potential investment destination and immersed in a growing unemployment crisis, South Africa must be prepared to meet the undesirable impacts of 4IR. A more thought-provoking encounter is the realisation of the position of developing countries like South Africa regarding inequality, high unemployment, slow economic growth, and a heavy burden on revenue to fund social security all this against potential massive erosion of the tax base. Many developing countries have not fully caught up with the rest of the world on the previous industrial revolutions, and yet they are entangled in the 4IR race invariably with dilapidated infrastructure and a huge portion low-skilled labour incapable of transfer to new highly technical jobs created the 4IR.<sup>12</sup>

Numerous studies have been conducted on the nexus between robots, tax, employment, and 4IR, particularly questioning the need to tax robots for fiscal sustainability.<sup>13</sup> These studies, however, neglect the interrogation of the robot tax debate and its relevance to developing

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<sup>6</sup> Ibid.

<sup>7</sup> Joao Guerreiro, Sergio Rebelo & Pedro Teles 'Should Robots be Taxed?' (2017) *NBER Working Papers 23806, National Bureau of Economic Research, Inc.* at 1.

<sup>8</sup> French Sally 'Bill Gates says robots should be taxed like humans' *Marketwatch* 20 February 2017; Catherine Clifford 'Elon Musk: Robots will take your jobs; government will have to pay your wage' *CNBC*. 4 November 2016.

<sup>9</sup> Joao, Sergio & Pedro op cit note 7. See - French Sally op cit note 8.

<sup>10</sup> Valentine & Viktoriia op cit note 2 at 16.

<sup>11</sup> Ibid.

<sup>12</sup> Njuguna Ndung'u & Landry Signé 'Capturing the Fourth Industrial Revolution - A Regional and National Agenda: The Fourth Industrial Revolution and digitization will transform Africa into a global powerhouse' *Foresight Africa*. at 61.

[https://www.brookings.edu/wp-content/uploads/2020/01/ForesightAfrica2020\\_Chapter5\\_20200110.pdf](https://www.brookings.edu/wp-content/uploads/2020/01/ForesightAfrica2020_Chapter5_20200110.pdf)

<sup>13</sup> Bronwyn, Kerrie & Ellie op cit note 5; Valentine, Vishnevsky & Viktoriia op cit note 2; Ionescu, Luminița 'Should Governments Tax Companies' Use of Robots? Automated Workers, Technological Unemployment, and Wage Inequality,' (2019) *Economics, Management, and Financial Markets* 14(2): 64–69.

countries. This research recognises the need to distinguish between approaches adopted by developing and developed countries in countering the challenges occasioned by the 4IR. Furthermore, it questions if a robot tax is both feasible and adequate a measure to the tax base erosion dilemma given the multifaceted nature of the 4IR phenomena.

This research further elaborates on the impact of 4IR on tax regulation, explore and condense the robot tax debate currently underway across the globe and opine on some of the controversial questions around the robot tax proposal. This research will further investigate the relevance of the robot tax debate in the South African context and put to proffer tax policy positions that South Africa can adopt to counter the looming threat of job displacements and revenue loss amidst the struggle to contain unemployment and redeem the suffocating fiscus.

## 1.2. Problem statement

The robotization under the 4IR is threatening erosion of the tax base for governments across the world including governments in developing countries. Due to the potential of massive displacement of human labour by robots, governments stand to lose tax revenue in the form of payroll taxes, VAT, social security taxes and other ancillary taxes. Losses in significant tax revenue due to job displacements will incapacitate government in the provision of public goods, social security, and retraining programmes. Many scholars, governments and international institutions are grappling with this dilemma. Therefore, amongst the proposals put forward to counter this problem is the imposition of a robot tax. It is this proposal that triggers a global robot tax debate which is the focal point of this research.

The robot tax debate is intensified by the definitional controversies of the concept of a robot,<sup>14</sup> the practicality of its implementation and the fact that it disincentivises innovation and investment.<sup>15</sup> In the preliminary stages, the debate revolved around the real scope and magnitude of the threat of job displacement by automation to necessitate a robot tax.<sup>16</sup> Once all these points of conflicts have been surmounted, the ultimate question focuses on the optimal

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<sup>14</sup> Xavier Oberson *Taxing Robots: Helping the Economy to adapt to the use of Artificial Intelligence* (2019) p 4.

<sup>15</sup> Ibid at 26, 29 & 30; White Josh 'The case against the robot tax' *International Tax Review*, 2018 at 4.

<sup>16</sup> Cutmore Geoff & Rosenfeld Everett 'Bill Gates wants to tax robots, but one robot maker says that's 'as intelligent' as taxing software' *CNBC* (2017-03-18) - Robot manufacturers and international bodies advocating for the development of robots contend that robots do not displace jobs but instead create jobs. See – Arntz M, T Gregory, and U Zierahn 'The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis' (2016) *OECD Social, Employment and Migration Working Papers*, No. 189 at 4 - it is conceded that robots displace jobs however, occupations are not under threat but individual tasks hence there is an unjustified fear of perceived job displacements. It is submitted that low skilled workers are more vulnerable to displacements than their highly skilled counterparts.

tax design that causes insignificant harm while it is neither too narrow nor too broad to provoke neutrality and fairness principles that are foundational to tax.

Much of the robot tax debate has been until now restricted to developed countries such as the United States of America (USA), South Korea, and the countries of the European Union (EU) on the assumption that developed countries are well into the 4IR and are more likely to be affected. The trend is also due to the early manifestation of the potential of tax erosion in developed countries rather than in developing countries. South Korea has been the first country in the world to implement a measure that has been dubbed an indirect robot tax by limiting tax incentives accessible to automating entities.<sup>17</sup>

Indications are that the 4IR will be easier to adopt in developing countries due to the absence of systems legacy that would offer resistance.<sup>18</sup> This ease of adapting to the 4IR will facilitate the amplification harm to developing countries. Developing countries constantly battle rising unemployment,<sup>19</sup> poor government revenue, poverty and an educational system that is lagging compared to the rest of the world.

Therefore, the existence of perfect conditions for automation coupled with policies that favour Foreign Direct Investments (FDI) on one hand, along with rising unemployment, poor government revenues, and bulging social security budget, on the other hand, creates a recipe for disaster both politically and economically for South Africa. It is imperative to import the robot tax debate to developing countries like South Africa to closely interrogate its relevance and propose tailored approaches to protect the tax revenue base as well as carve an inclusive growth under the 4IR.

### 1.3 Research objectives

- To briefly unpack the Fourth Industrial Revolution phenomenon to understand its hallmarks and trends.
- To investigate the nature and extent of the impact of the Fourth Industrial Revolution on manual labour across the world and in South Africa as a representative of developing countries.

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<sup>17</sup> Cara Mcgoogan 'South Korea introduces the world's first robot tax' *The Telegraph* 9 August 2017.

<sup>18</sup> Simnikiwe Mzekandaba 'Africa can lead fourth industrial revolution, says Ramaphosa' – *ITWeb* 05 July 2019. Sentiments shared by President Ramaphosa in his keynote address while addressing the Digital Economic Summit held on the 5th of July 2019 in Midrand. Available on <https://www.itweb.co.za/content/4r1ly7RoGOVMpmda>.

<sup>19</sup> Tshegofatso Mathe 'Swings and Roundabouts of Jobs in Banks' *Mail & Guardian* 11 October 2019.

- To analyse how job displacements, if any, will consequently affect payroll taxes, Value Added Tax and other related taxes that flow from employed taxpayers.
- To unpack the robot tax debate that is underway across the world, looking at its origins, the arguments ‘against’ and ‘for’ a robot tax and ultimately to evaluate the appropriateness and adequacy of a robot tax as a response to the challenge at hand in general.
- To investigate the relevance of the robot tax debate to developing countries, particularly to South Africa taking into cognisance the current socio-economic circumstances and policy objectives as projected in the State of the Nation Address and National Budget speeches.
- To propose, after finding the inadequacy of a robot tax, an automation tax regime designed to counter the problem posed by 4IR while minimising the damage that additional taxes will have on innovation and tax avoidance.

#### 1.4. Significance of research

The significance of this research is underscored by the stance adopted by President Cyril Ramaphosa where he established the Commission on Fourth Industrial Revolution.<sup>20</sup> The commission is tasked with investigating the 4IR phenomenon and how it is affecting various sectors of the economy, that includes the legal landscape and provide recommendations that will inform policy.<sup>21</sup> The significance of this research is reinforced by the revelations from the recent 2020 National Budget of an expanding budget deficit this comes at the backdrop of the February 2020 State of the Nation Address (SONA) by President Cyril Ramaphosa, which reveals the rise in unemployment, and the urgent need to adapt towards a technological age by rolling out technology studies in primary schools and the construction of a smart city.<sup>22</sup>

The imperativeness of this research further manifests in the fact that South Africa is still ranked amongst the world’s most unequal societies<sup>23</sup> while there is consensus that 4IR

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<sup>20</sup> Department of Telecommunications and Postal Services Notice No. 764 of 2018 – Invitation to Nominate Candidates for the Presidential Commission on the Fourth Industrial Revolution. Government Gazette 4 December 2018.

<sup>21</sup> Terms of Reference for the Presidential Commission on the Fourth Industrial Revolution: Department of Telecommunications and Postal Services Notice No. 209 of 2019 – Government Gazette, 9 April 2019.

<sup>22</sup> State of the Nation Address – 07 February 2019.

<sup>23</sup> The rampant inequality in South African Society is confirmed by the National Development Plan 2030 which details the vision and policy target of the South African government up to 2030. See - The National Development Plan (NDP) 2030. <https://www.gov.za/issues/national-development-plan-2030>

deepens inequality.<sup>24</sup> By looking at the South Africa as a developing country, this research brings to the fore the ever-present challenges that developing countries face. These challenges include inequality, unemployment, poverty, and poor economic growth and these are exacerbated by involuntary premature adoption of new technological trends against a torn socio-economic foundation. Developing countries have not caught up with developed countries on many fronts, there is doubt that many African countries have fully developed through the second and third industrial revolutions.<sup>25</sup>

Ultimately, this research interrogates the robot tax debate that is underway across the world and evaluates the possibility of implementing a similar measure in South Africa to minimise the negative socio-economic impacts of 4IR being the erosion of tax revenue. Once tax revenue has been eroded due to displacement of manual labour by the adoption of AI, smart robots, and digitalisation, the fiscus will suffer and the government will face incapacitation in providing social security and other public services. This research endeavours to inform policy formulation in response to the 4IR phenomenon to find a balance between keeping abreast with global technological trends and protecting and creating employment as well as safeguarding the tax revenue base and ultimately to promote inclusive growth.

### 1.5. Research questions

To realise the stated research objectives of this study the following questions will be explored.

- What is the origin, nature, and hallmarks of the Fourth Industrial Revolution?
- What is the nature and extent of the impact of the Fourth Industrial Revolution on manual labour in developing countries and, particularly in South Africa?
- Whether a nexus exists between the extent of job displacement and losses in income tax (Pay-As-You-Earn), Value Added Tax and other related taxes that flow from employed taxpayers?
- What is the origin and essence of the robot tax debate?
- What is a robot? Is it different from AI, Automation and Digitalisation?
- To what extent is the robot tax proposal feasible, appropriate, and adequate as a response to losses in tax revenue due to robotization under the 4IR?

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<sup>24</sup> Min Xu, Jeanne M David & Suk Hi Kim 'The Fourth Industrial Revolution: Opportunities & Challenges' (2018) *International Journal of Financial Research* at 94; Luminița op cit note 13; Joao, Sergio & Pedro op cit note 7.

<sup>25</sup> Kartik Akileswaran & Georgina Hutchinson 'Adopting to the 4IR: Africa's Development in the age of Automation' (4 July 2019) *Tony Blair Institute for Global Change* at 3.

- To what extent is the robot tax debate relevant to developing countries in general and South Africa taking into cognisance the current socio-economic circumstances and policy objectives?

## 1.6. Research Methodology

This research will adopt a doctrinal approach that entails a review of legislation, published literature, legal texts, policy documents, case law, textbooks, journal articles and other internet sources including news articles. This approach entails the analysis, critique, reconciliation of the existing literature.

## 1.7. Outline of Chapters

- *Chapter One*

Chapter one covers the research framework. It sets the parameters of this thesis by outlining the research questions, research objectives, and the significance of this research. Chapter one also details the ordering of the components of this research by describing what each chapter will cover and the order of arrangement of the chapters. Most importantly, this chapter gives a prelude of the entire thesis whilst demonstrating the source of inspiration for this research.

- *Chapter Two*

Chapter two is the literature review. It examines and reviews studies conducted on concepts and themes that lie at the core of this research. The chapter clarifies the position of the author regarding the approaches, observations and conclusions by various institutions and scholars on matters pertaining to this research. The literature review further lays elaborate on the stated research problem studied by this research.

- *Chapter Three*

Chapter three examines the robot tax debate. The chapter analyses the origins, national and global trends regarding the debate. An examination of the arguments for and against the robot tax and the various proposed tax designs dominate the discussion. Furthermore, the chapter encompasses a critique of the robot tax debate by examining the soundness of arguments from both sides as well as a determination on whether the robot tax is the correct approach to dealing with the 4IR-Tax dilemma.

- *Chapter Four*

This chapter considers the relevance of the robot tax debate to South Africa as representing developing countries in general. The chapter contextualises the 4IR-tax dilemma to developing countries against the impact of 4IR technologies on labour obtaining in South Africa. An examination is rendered on the divergence that exists between South Africa's policy priorities and the 4IR technologies that are displacing labour. Furthermore, an attempt is made to render a quantitative projection of potential knock-on effect on the fiscus due to adoption of 4IR technologies that displace labour.

- *Chapter Five*

Chapter five concludes the research and proffer a considered tax policy response to the 4IR-tax dilemma. To be precise, the chapter tables an automation tax regime design where one or a combination of tax designs can be implemented in South Africa. Furthermore, it examines the implementation modalities and possible implementation challenges.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter reviews the literature informing this research. This includes literature on themes including the impact of 4IR on tax regulation by way of erosion of tax revenues due to the displacement of manual labour by robots. Key concepts which are the focus of this review include the 4IR, robots and robot tax. Attention is spared for a review of the literature on the impact of 4IR in developing countries. Ultimately a summary of the literature review will be given.

Within the broader scope, this research seeks to examine the impact of 4IR on tax revenue in South Africa through the lens of a robot tax debate. This inquiry is three-fold. First, I investigate whether 4IR and its elements displace manual labour, if so to what extent and the extent to which tax revenues that would have otherwise been paid by employed taxpayers would be eroded for the fiscus.

Secondly, after establishing that 4IR and its elements displace manual labour, then examine the robot tax proposal as a countermeasure to the presumed tax revenue losses. This latter inquiry will outline the robot tax debate including the designs of the proposed robot tax and an evaluation of its adequacies.

Thirdly, to investigate the relevance of the robot tax debate. This latter investigation particularly zeros in on the necessity of implementing a robot tax in South Africa bearing in mind the extent of usage of technology and the prevailing socio-economic circumstances. And ultimately to propose a tax design which is context-specific to South Africa as a developing country.

##### 2.1.1 What is the 4IR?

The concept of the 4IR has been a buzz word of late in academic writings, the news, social and political discussions. This concept which is promoted by the WEF signifies a new industrial revolution where the world transitions from the IT-oriented 3<sup>rd</sup> Industrial Revolution.<sup>26</sup>The

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<sup>26</sup> World Economic Forum & The Fourth Industrial Revolution in South Africa (2018) *Working Paper TIPS Research Report for the Department of Trade and Industry* at 5.

Fourth Industrial Revolution is also expressed in catchphrases such as “Smart Industry” or “Industry 4.0”.<sup>27</sup>

The 4IR concept is central to the understanding of this research and it suffices to briefly elaborate on its real essence. There is no universal definition of the 4IR. However, the reading of numerous definitions by various studies captures the essence of the concept. Some of these definitions are explored below.

Klaus Schwab, founder and executive chairman of the WEF is believed to have coined the phrase “Fourth Industrial Revolution” and describes it as representing, ‘a world where individuals move between digital domains and offline reality with the use of connected technology to enable and manage their lives’.<sup>28</sup> He elaborated further that ‘the fourth industrial revolution is fundamentally different from the previous revolutions as it is characterised by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries’.<sup>29</sup>

The 4IR is believed to have started 30 years after the 3<sup>rd</sup> Industrial Revolution, this points to the period around the early 1990s as the period when the 4IR took off.<sup>30</sup> According to Schafer the 4IR ‘combines technological and human capacities in an unprecedented way through self-learning algorithms, self-driving cars, human-machine interconnection and big-data analytics’.<sup>31</sup>

According to McKinsey, Industry 4.0

‘is the next phase in the digitisation of the manufacturing sector, driven by four disruptions: the astonishing rise in data volumes, computational power, and connectivity, especially new low-power wide-area networks; the emergence of analytics and business-intelligence capabilities; new forms of human-machine interaction such as touch interfaces and augmented-reality systems; and improvements in transferring digital instructions to the physical world, such as advanced robotics and 3-D printing’.<sup>32</sup>

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<sup>27</sup> Ibid.

<sup>28</sup> Min Xu, Jeanne & Suk Hi op cit note 24 at 90.

<sup>29</sup> Ibid.

<sup>30</sup> Matthias Schafer ‘The Fourth Industrial Revolution: How the EU can lead it’ (2018) *European View* at 6.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid at 6.

Essentially, the 4IR represents the age of speedy advancement in computing power and artificial intelligence. This trend orchestrates and sustains the convergence of traditionally independent human, biological and physical environments. Other technologies featuring under the 4IR include robotization, IoT, AI, blockchain technology, 3D printing and digitalisation.<sup>33</sup>

In terms of industrial revolutions` timeline, the 4IR is the latest and the current industrial revolution. Min Xu *et al* gives a chronological outline of industrial revolutions and their respective definitive elements in a paragraph quoted below.

‘The first industrial revolution started in 1760 with the invention of the steam engine. The steam engine allowed the transition from farming and feudal society to the new manufacturing process. This transition included the use of coal as the main energy while trains were the main means of transportation. Textile and steel were the dominant industries in terms of employment, the value of output, and capital invested. The second industrial revolution began in 1900 with the invention of the internal combustion engine. This led to an era of rapid industrialization using oil and electricity to power mass production. The third industrial revolution started in 1960 and was characterized by the implementation of electronics and information technology to automate production. Under the old ways, making things involved screwing or welding lots of parts together. The fourth industrial revolution now involves computer-generated product design and three-dimensional (3D) printing, which can create solids object by building up successive layers of materials.<sup>34</sup>

Table 1 below illustrates the chronological history of the industrial revolutions up to the current 4IR. The table breaks down the progression of the industrial revolutions under headings that allow a convenient contrast between different industrial revolutions. The table shows the period associated with each industrial revolution, the transitional periods, the dominant energy source at the time, technological achievements definitive of each era, means of transport and the dominant industries of the time. It, therefore, means that major technological developments until today occurred in the past 250 years.

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<sup>33</sup> Min Xu, Jeanne & Suk Hi op cit note 24 at 90.

<sup>34</sup> Prisecaru P ‘Challenges of the Fourth Industrial Revolution’ (2016) *Knowledge Horizons. Economics*, 8(1), 57-62 in Min Xu, Jeanne & Suk Hi op cit note 17 at 90.

**Table 1.**

Period	Transition Period	Energy Resource	Main Technical Achievement	Main Developed Industries	Transport Means
I: 1760-1900	1860-1900	Coal	Steam Engine	Textile, Steel	Train
II: 1900-1960	1940-1960	Oil Electricity	Internal Combustion Engine	Metallurgy, Auto, Machine Building	Train, Car
III: 1960-2000	1980-2000	Nuclear Energy Natural Gas	Computers, Robots	Auto, Chemistry	Car, Plane
IV: 2000-	2000-2010	Green Energies	Internet, 3D Printer, Genetic Engineering	High Tech Industries	Electric Car, Ultra-Fast Train

Source: Prisecaru, P. (2016). "Challenges of the Fourth Industrial Revolution." *Knowledge Horizons. Economics*, 8(1), 57-62. Web  
<https://search-proquest-com.ezproxy.libraries.udmercy.edu:2443/docview/1793552558?accountid=28018>.

Matthias further points out the various ways in which the 4IR differs from the previous Industrial revolutions by way of a combination of factors that include: (a) integrated circuits on microchips, (b) memory units to store information, (c) networks that help to enhance communication, (d) software applications that provide a direct link to consumers' needs and (e) sensor capacity that allows artificial intelligence to analyse most things which were previously only accessible to the human mind.<sup>35</sup> However, these factors fail to capture the full scale of 4IR. Each of the previous industrial revolutions is marked by certain hallmarks or signature elements. The hallmarks of 4IR include 3D printing, the IoT, and the fusion of technologies.<sup>36</sup> The literature on the nexus between 4IR and tax regulation extrapolated the impact of 4IR on manual labour will be reviewed below.

### 2.1.2 Impact of 4IR on manual labour and tax revenue.

The 4IR is transforming spaces across sectors from business to government. There are numerous variables with which the 4IR is changing the way people live, do business and how institutions work. This new industrial revolution presents both opportunities and challenges. This research is limited to the impact of 4IR on tax revenue arising from the displacement of labour caused by the introduction of robotization. The research leaves for further studies themes such as digitalisation of revenue collections, cybercrimes of tax evasion through the medium of cryptocurrencies and the taxation of the digital economy.<sup>37</sup> Within the scope of this

<sup>35</sup> Ibid.

<sup>36</sup> Min Xu *et al* op cit 24 at 92.

<sup>37</sup> Lambert L (2017) The Four Challenges of the Fourth Industrial Revolution. Market Mogul in Min Xu, Jeanne M. David & Suk Hi Kim 'The Fourth Industrial Revolution: Opportunities & Challenges' (2018) *International Journal of Financial Research* at 93.

research, the impact of 4IR on tax regulation is intricately linked to the impact of 4IR on manual labour.

The hypothesis on which this research is built is that, as more people are displaced by the increased use of robots, as taxpayers, the displaced employees will not be able to pay income tax anymore as they cease to earn salaries and wages. This phenomenon accords with the ability-to-pay principle which maintains the nexus between tax liability and ability to pay.<sup>38</sup> The fiscus, therefore, loses income tax revenue.

In addition to the loss of income tax revenue, the fiscus loses on VAT and other kinds of taxes that would have been collected from employed taxpayers while spending their disposable income after PAYE. Therefore, the impact of 4IR is projected from the extent to which robots displace jobs. Below is an outline of views from across the spectrum on whether the robots and other 4IR technology will displace jobs.

The Organisation for Economic Cooperation and Development (OECD) position articulated its position on the impact of 4IR on labour under BEPS Action 1. It provides that,

‘As robots learn to do jobs that previously were done by humans, they can potentially generate productivity, help lower prices for customers, contribute to scaling up operations at a global level, and create innovation opportunities which will lead to the emergence of new activities that will require new skills and potentially create new jobs.’<sup>39</sup>

The World Economic Forum White Paper noted that the OECD, in a March 2018 report to G20 finance ministers, stated that “automation has so far not created massive job losses, but does lead to reallocations of employment between tasks, sectors and regions”<sup>40</sup> The WEF, however, contends that, ‘there is no doubt that various jobs will disappear, causing worker displacement across segments of the value chain. A nuanced consideration of the changes is essential – including a distinction between existing jobs subject to gradual reconfiguration and those at risk of sudden disruption’.<sup>41</sup>

Oberson explores views between two schools of thought which he termed the “*optimists*” and the “*pessimists*”.<sup>42</sup> To the *optimists*, the development of AI will improve

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<sup>38</sup> Oberson op cit note 14 at 36.

<sup>39</sup> OECD/G20 BEPS Project, Addressing the Tax challenge of the Digital Economy, Action 1 – 2015 Final Report, n. 92, p.44.

<sup>40</sup> World Economic Forum & Accenture Report op cit note 1 at 14.

<sup>41</sup> Ibid.

<sup>42</sup> Ibid at 9. Also see – Mazur Orly, Taxing the Robots, 46 *Pepperdine Law Review* 2018 at 9; Abbott Ryan/Bogenschneider Bret ‘Should Robots Pay Taxes? Tax Policy in the Age of Automation’ 12 (1028) *Harvard*

productivity, and jobs will disappear while new jobs emerge and the welfare across the globe will be improved.<sup>43</sup> Additionally, the 4IR differs not with previous industrial revolutions in that new jobs and some non-existent professions would emerge.<sup>44</sup> Oberson regards the phenomenon articulated by the optimists as being captured in the concept of “creative destruction”, a concept developed by Joseph Schumpeter.<sup>45</sup> Present in the BEPS Action 1 and the *optimists'* articulation of the problem is an untested assumption that new activities will create jobs and that the skills of displaced workers will be transferable to the new jobs created.

For the *pessimists*, each industrial revolution is distinct from the others and that the 4IR cannot be equated from any previous industrial revolution in terms of speed, scale and the manner in which it impacts on jobs.<sup>46</sup> They anticipate the disappearance of most if not all jobs as a result of the introduction of ‘smart’ autonomous robots capable of adapting and interacting with surrounding environments.<sup>47</sup>

Min Xu *et al* are of the view that ‘...Low skilled and low wage jobs will be replaced by computers and digitization. And that the higher-paid jobs requiring more skills are less likely to be replaced.’<sup>48</sup> However, the full scale and nature of job displacement are yet to unfold as it is unknown when the 4IR is likely to end, it is too early to tell. It is argued that besides manual or low-skilled activities being at risk more sophisticated middle or even high-income tasks and most if not, all professions could be affected with time.<sup>49</sup>

After careful consideration of the views by various scholars and international organisations, it must be stated that these positions are based on predictions of how a novel industrial revolution will unfold. The assessment of the impact of 4IR on labour and the consequent impact on tax revenues in developing countries like South Africa is almost moot. Almost all assessments done so far are general and more inclined to circumstances prevailing in developed countries.

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*Law Review* at 15; Schwab Klaus *The Fourth Industrial Revolution World Economic Forum*, Crown, New York 2016 at 36.

<sup>43</sup> Oberson op cit note 14 at 9. See also - World Bank Group Flagship Report – *World Development Report 2019* – ‘The Changing Nature of Work’ at 6 & 20.

<sup>44</sup> *Ibid.*

<sup>45</sup> *Ibid.*

<sup>46</sup> *Ibid* at 10.

<sup>47</sup> *Ibid.*

<sup>48</sup> Min Xu *et al* op cit 24 at 93.

<sup>49</sup> Schwab op cit note 42 at 44; Ford Martin *Rise of Robots* New York (2015) at 34.

However, what is apparent and where this research finds consensus with above-stated views is that 4IR is and will displace jobs and that there is a need to confront that reality from a policy perspective. Concrete research is needed to establish the actual displacement suffered so far to project potential displacements in future. Anecdotal evidence exists in the South African banking sector where banks are closing branches and migrating to online platforms and more digitalisation resulting in huge slashes of jobs that triggered threats of industrial action in 2019.<sup>50</sup> Below is an examination of 4IR trends and impact in South Africa as representing the developing country context.

## 2.2 4IR in developing Countries: Trends, studies & impact in South Africa

South Africa is the core context for this research as representative of developing countries. A significant contribution of this research is in the application of global discourse on the 4IR to the South African context. Additionally, value is also in the examination of the viability of proposed approaches to developing country contexts and finding a context-specific solution to the global challenge at hand. There is consensus that developing countries must avoid importation and implementation of models from developed countries without adjustments corresponding to the socio-economic context in developing countries.<sup>51</sup>

The 4IR is changing the way people live, work, do business both in developed and developing countries. Governments of developing countries are grappling with the 4IR phenomenon so as not to stay behind and to frog jump the traditional development phases like industrialisation.<sup>52</sup> A report by CSIS indicates that developing countries are simultaneously experiencing all industrial revolutions including the 4IR due to their short development periods since attaining independence.<sup>53</sup> The report states that with this convergence of revolutions which developing countries are experiencing is creating a new leapfrog growth trajectory that differs from how developed regions emerged.<sup>54</sup>

In a policy framework published by the Tony Blair Institute for global change, Tony Blair submitted that the prospects to cope with and take advantage of the 4IR are bleak for

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<sup>50</sup> Tshegofatso op cit note 19.

<sup>51</sup> M Ickson Manda, S Ben Dhaou 'Responding to the challenges and opportunities in the 4th Industrial revolution in developing countries' (2019) *In Proceedings of the 12th International Conference on Theory and Practice of Electronic Governance* (ICEGOV2019), Melbourne, VIC, Australia, April 3-5, 2019, at 252.

<sup>52</sup> Ibid at 244.

<sup>53</sup> Romina Bandura *et al* 'Beyond Technology: The Fourth Industrial Revolution in the Developing World' (May 2019) *Centre for Strategic & International Studies Report* at 3.

<sup>54</sup> Ibid.

Africa and other developing countries.<sup>55</sup> This is a correct assessment of the prospects for developing countries given the historic socio-economic circumstances and the challenges they are currently facing such as a 26 % unemployment rate faced by SA in 2018.<sup>56</sup> However, situations differ across developing countries with some better positioned than others.

A study by the WEF examined the readiness of a sample of 100 countries including South Africa using a Readiness Diagnostic Model Framework.<sup>57</sup> Readiness in this context was defined as “the ability to capitalise on future production opportunities, mitigate risk and challenges and be resilient and agile in responding to unknown future shocks”.<sup>58</sup> South Africa and almost all developing countries fell into the Nascent category.<sup>59</sup>

The Nascent category represents countries with a currently limited production capacity ‘that exhibit low-level readiness for the future through weak performance across the drivers of production component’.<sup>60</sup> However, regardless of the Nascent category designation, South Africa is closer to readiness owing to an active economy which is supported by a sophisticated financial system and a government will and actively taking steps to develop 4IR-aligned policies to cope with 4IR.<sup>61</sup> It must be borne in mind that estimations leading to these categorisations ought to be approached with caution as the 4IR is still unfolding and no empirical data exists to establish accurate assessments.<sup>62</sup>

In 2019, President Cyril Ramaphosa led South Africa`s efforts towards taking advantage and dealing with the challenges arising from 4IR by constituting the Presidential Commission on Fourth Industrial Revolution.<sup>63</sup> According to the Concept Document establishing the Presidential Commission, the commission is tasked with the identification and recommendation of policies, strategies and plans needed to position South Africa as one of the leading countries in the 4IR.<sup>64</sup> The concept document emphasises that the alignment of the commission`s policy recommendations to the National Development Plan.<sup>65</sup> Central to South

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<sup>55</sup> Kartik & Georgina op cit note 25.

<sup>56</sup> M. Ickson & S. Ben op cit note 73 at 247.

<sup>57</sup> WEF TIPS Report op cit note 26 at 16.

<sup>58</sup> Ibid at 14.

<sup>59</sup> Ibid at 16.

<sup>60</sup> Ibid.

<sup>61</sup> Ibid.

<sup>62</sup> Ibid at 15.

<sup>63</sup> Department of Telecommunications and Postal Services GN 764 GG 42078 of 4 Dec 2018 – Invitation to Nominate Candidates for the Presidential Commission on the Fourth Industrial Revolution at 4.

<sup>64</sup> Ibid.

<sup>65</sup> Ibid at 10.

Africa's efforts is the need for inclusivity and redress.<sup>66</sup> These efforts will deal with directly conflicting objectives and the government has to choose its priorities carefully to avoid civil unrest and staying behind in the 4IR race.

In crafting policy directions to cope and take advantage of the 4IR, developing countries, South Africa in particular, has to negotiate through challenges specific to developing countries such as poverty, inequality, and unemployment.<sup>67</sup> These challenges are a legacy of the historical colonisation, segregation and oppression of the indigenous people who were not given education and employment opportunities. Additional challenges present themselves in the form of the scarcity of necessary technical skills in sciences and IT and poor infrastructure to support fast connectivity and provide access to the broader society.<sup>68</sup>

Amongst the studies and discourses being undertaken regarding 4IR and developing countries, very insignificant attention is given to the impact of displacement of jobs to the fiscus. This silence can be interpreted to mean a low perception of risk or mere neglect. Within developing countries, job displacements might not obtain to the extent of eroding the tax base due to the factors stated above that slows down the 4IR.<sup>69</sup> However, massive job displacements are unavoidable in the medium to long term, therefore the South African government and other developing countries ought to engage with this dilemma in advance and craft proactive policies that reduce the negative impact of the 4IR on the fiscus.

### 2.3 Conclusion

The 4IR is characterised by not only the speed in technological development but by new technologies that include AI, robots, digitalisation, automation, blockchain, big data and IoT. The new technologies will displace increasing numbers of human workers and this would bring a threefold negative effect to the government; the fiscus will lose revenue, social security will further stretch the public purse and the economy will slow down. Chapter 3 examines the possibility of an offset of the illustrated tax revenue losses with increased corporate tax emanating from increased profit.

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<sup>66</sup> Ibid.

<sup>67</sup> Ibid.

<sup>68</sup> WEF TIPS Report op cit note 26 at 16.

<sup>69</sup> Ibid at 28.

It is indisputable that 4IR technologies vary in their potential to displace jobs. Different models have been employed to study the susceptibility of jobs to automation.<sup>70</sup> The results are that the low-skilled and the low-income worker is at higher risk of displacement due to new technologies.<sup>71</sup> Also, occupations that require human interactions, judgement, empathy, creativity and emotional intelligence will remain the domain of human workers as engineers consider it highly difficult to replicate these tasks using algorithms.<sup>72</sup> All these studies are limited in that they do not represent the actual displacements but expert opinions on the automatability of human labour. This could be very far from the actual displacements. Of these studies, none was conducted in a developing country. The indicators, however, are invaluable to project displacements in a developing country such as South Africa considering the level of investment in new technologies, education, and workplace organisation.

Having established that the 4IR technologies will displace jobs to an extent hence losses in tax revenue, a *prima facie* case for a tax on these technologies is established. There is a consensus on the need to implement some form of measure that allows for compensation of the lost taxes. Proposals range from the increment in corporate tax rates, a Universal Dividend Income, robot tax, taxation of robots and automation tax.

At the earliest stage of proposing a robot tax, the proposal encounters a definitional crisis. The meaning assigned to a 'robot' as the subject of the tax varies across the board and this uncertainty spills over to questions on the adequacy of such a tax in encompassing all the 4IR technologies that are displacing jobs.

Very insignificant examination of the impact of 4IR in developing countries like South Africa has been done so far with most discussions in their preliminary stages. President Cyril Ramaphosa has constituted a Commission on Fourth Industrial Revolution 2019 to investigate opportunities and challenges arising out of the 4IR across sectors in South Africa. Developing countries share, to varying degrees, socio-economic characteristics that make this research imperative. South Africa, like many developing countries, is characterised by huge wealth inequalities, huge populations of low skilled workers, low investments in new technologies, the massive need for social security from the state and low economic growth. These factors

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<sup>70</sup> Arntz, Gregory and Zierahn op cit note 16. – two models are discussed, the Occupation-based and the task-based models.

<sup>71</sup> Ibid.

<sup>72</sup> Ibid at 9.

create the perfect case for technological unemployment at an unprecedented scale, hence the need for an immediate policy response to avert a looming socio-economic disaster.

## CHAPTER 3

### THE ROBOT TAX DEBATE

#### 3.1 Introduction

Across the world institutions, scholars and governments are debating on whether to implement a tax on robots and automation to counter unemployment and the erosion of the tax base. This debate, however, is more restricted to developed countries and only gaining momentum now in developing countries. Developing countries are slowly progressing into the 4IR and cannot afford to be left behind in the robot tax discourse.

The risks of job displacements and resultant erosion of the tax bases are more likely to be pronounced in developing countries than in developed countries. This research is an effort to further deliberations and provoke deep thoughts towards tax law reform. This chapter grapples with the definitional controversy associated with the concept of a “robot”, and briefly outline the history of the robot tax debate. Furthermore, an overview of the robot tax debate will be examined looking at the arguments for and against a robot tax. Moreover, consideration will be devoted to the various tax designs proposed under the robot tax debate. Ultimately, a brief critique of the robot tax debate will be rendered.

#### 3.2 Background to the robot tax debate

Since the introduction of machines, there have been fears that labour could be displaced.<sup>73</sup> Similar fears exist with the current 4IR.<sup>74</sup> However, many scholars argue that the fears under the 4IR are legitimate due to the nature of the existing technology that in displacing labour instead of complementing it while creating fewer jobs that require highly technical skills.<sup>75</sup> Together with the resultant shrinkage of the tax base sparked the robot tax debate where a tax on robots is conceived to be an effective tool to counter the stated challenges. However, not everyone agrees with this, both sides of the debate are explored in the discussion below.

Sentiments on imposing a tax on robots have been around for many years, however not much seriousness and attention was given to them until the world plunged into the midst of the 4IR.

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<sup>73</sup> Arntz, Gregory and Zierahn op cit note 16 at 7.

<sup>74</sup> The fears are fuelled by an underlying notion that automation and digitalisation are increasingly penetrating the domain of tasks that until recently used to be genuinely human such as reasoning, sensing, and deciding and doing it even better than humans thereby eliminating the need for labour.

<sup>75</sup> Brynjolfsson E and A McAfee *Race Against the Machines: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy* Digital Frontier Press (2011); Aghion P and P Howitt ‘Growth and Unemployment’ (1994) *The Review of Economic Studies*, 61(3), pp. 477-494; Arntz, Gregory and Zierahn op cit note 16 at 9; Valentine & Viktoriia op cit note 2 at 17.

The challenges presented by 4IR have rejuvenated robot tax proposals. The robot tax proposal was echoed in the EU Parliament Draft Report of 2016.<sup>76</sup> In 2017, the EU Parliament dismissed the introduction of a tax on robots as legally recognised electronic persons.<sup>77</sup> Bill Gates in February 2017 while appearing on QUARTZ TV fanned the debate where he said the following.

‘Right now, the human worker who does, say 50, 000 dollars` worth of work in a factory, that income is taxed, and you get income tax, social security tax, all those things. If a robot comes in to do the same thing, you`d think that we`d tax the robot at a similar level ... Exactly how you`d do it, measure it, you know, it`s interesting for people to start talking about now’.<sup>78</sup>

Furthermore, Shiller, a Nobel prize-winning economist, in support of the robot tax proposal, contended that such a measure will be justified in the interim as it allows for a smooth transition to a fully digital economy.<sup>79</sup> Currently, only South Korea has implemented a measure that one can term an indirect robot tax.<sup>80</sup> It has restricted entities using robots from accessing tax incentives. There is a growing body of research adding traction to the robot tax proposal despite being controversial. The next section examines the idea of a robot tax and explores the definitional controversies surrounding the concept of a “robot”.

#### *What is a robot tax?*

It generally refers to taxes imposed for the use of robots. Central to this research is the impact of robotization on tax regulation under the 4IR as a ripple effect of the impact of robotization on employment/manual labour. Great conflict exists on what robotization means or what it should encompass. This discrepancy arises from the nature of 4IR particularly the multiplicity of and overlap between the elements that form the hallmarks of 4IR, which are displacing jobs, that go beyond the scope of a technical meaning assignable to the concept of a robot. These 4IR technologies include AI, Automation, blockchain technologies, IoT, big data and digitalisation.<sup>81</sup>The proliferation of these technologies individually and collectively result in

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<sup>76</sup> EU Parliament, Commission on Legal Affairs, Draft Report with Recommendations on Civil Rules on Robotics, No 2015/2193 (INL), 27 May 2016.

<sup>77</sup> EU Parliament Report on Legal Affairs, Draft Report with Recommendations to the Commission on Civil Rules on Robotics, No 2015/2193 (INL), 27 January 2017. Also see - Oberson op cit note 14 at 131; Shiller Robert J ‘Robotization Without Taxation?’ *Project Syndicate* 22 March 2017 at A7 in Oberson op cit note 14 at 2-3.

<sup>78</sup> Oberson op cit note 14 at 2.

<sup>79</sup> Shiller op cit note 99.

<sup>80</sup> Yoon Sung-won ‘Korea takes the first step to introduce “robot tax”’ *Korean Times*, 7 August 2017.

<sup>81</sup> Min Xu *et al* op cit note 24 at 91-92.

job displacements. A question that remains is what does a “robot” entail over which a tax can be imposed. Conflicting definitions of a ‘robot’ will be considered below.

### 3.2.1 “Robot” definitional controversy

The effectiveness of the proposed robot tax depends greatly on the nature and scope of the definition so assigned to the concept of a “robot”. Great conflict exists on the definition to be assigned. Oberson then arrives at the position that robots are machines governed by AI and are capable of sensing, thinking, and acting.<sup>82</sup>

The International Standards Organisation (ISO) in terms of ISO 8373:2012, a standard on Robots and robotic services defines a “robot” as an “actuated mechanism programable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks.”<sup>83</sup> The International Federation of Robotics (IFR) also uses the ISO definition of a robot.<sup>84</sup>

The EU Parliament in its report defined a ‘robot’ in terms of characteristics it must possess, and these are:

- The acquisition of autonomy through sensors and/or by exchanging data with its environment (Interconnectivity) and the trading and analysis of those data:
- Self-learning from experience and by interaction optimal criterion):
- At least a minor physical support,
- The adaptation of its behaviour and actions to the environment; and
- The absence of life in the biological sense.<sup>85</sup>

Nevejans suggested that a legal definition of a ‘robot’ could be represented by six features namely,

- a. a physical machine.
- b. alimented by energy.
- c. has a capacity to act in the real world.
- d. can analyse the environment.

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<sup>82</sup> Ibid. See also – Bekey Georges. *A Autonomous Robots, From Biological Inspiration to Implementation and Control* The MIT Press (2005).

<sup>83</sup> <https://www.iso.org/obp/ui/#iso:std:iso:8373:ed-2:v1:en>

<sup>84</sup> <https://ifr.org/industrial-robots> - “The IFR’s use of the term “industrial robot” is based on the definition of the International Organization for Standardization: an “automatically controlled, reprogrammable multipurpose manipulator programable in three or more axes”, which can be either fixed in place or mobile for use in industrial automation applications”.

<sup>85</sup> EU Final Report (2017) op cit note 99 at 8.

- e. can render decisions; and
- f. can learn.<sup>86</sup>

All the definitions stated above intersect in that a robot will embody some physical structure, and the ability to learn from its environment and make decisions. Xavier points out that a distinction is necessary between weak AI, strong AI, and artificial superintelligence (ASI).<sup>87</sup>

Another crucial aspect of the definitional issue is whether the proposed tax should rather be termed ‘automation tax’ instead of “robot tax”. This is due to the limitations present in a robot tax definition in encompassing all the various AI and digitalisation driven elements of the 4IR that are displacing labour. It also remains to be seen if the concept of “robot tax” is capable of being interpreted widely to cover existing and future technologies that will displace labour. In its narrow sense, the concept will trigger “neutrality” issues with the tax system. Currently, some scholars use the phrases interchangeably which the author of this research believes is not the correct approach given the limitations inherent in the concept of a ‘robot’ to include all 4IR technologies.<sup>88</sup>

A distinction is also drawn between weak AI, strong AI and artificial superintelligence (ASI).<sup>89</sup> Weak AI being capable of repeating a single cognitive function of a human whereas the strong AI is broader and closer to human brain capacity. The third sub-category being AI that is of progressing beyond human brain capacity.<sup>90</sup> All these definitions fall short of capturing the essence of 4IR in its entirety as they leave out some elements that are causing job displacements and elements which bear a signature of automation i.e self-service till in supermarkets. Another grey area is digitalisation in service industries.

The inherent limitations in the phrase ‘robot tax’ has prompted various scholars to prefer ‘automation tax’ as representing a tax that responds to all elements of 4IR that are displacing jobs.<sup>91</sup> For legal and tax purposes a broader definition of a robot is favoured where the focus is not about the robot but the labour displacement impact of such robot.<sup>92</sup>

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<sup>86</sup> Nevejans Nathalie *Les robots: tentative de definition in: Bensamoun Alexandra* (ed), Les robots. Objects scientifiques de droits, collection des Presses Universitaires de Sceaux, (2016) p. 100.

<sup>87</sup> Oberson op cit note 14 at 13.

<sup>88</sup> Ibid at chapter 9. See also - Joao, Sergio, & Pedro op cit note 47; Bronwyn, Kerrie, & Ellie op cit note 3 at 2.

<sup>89</sup> Oberson op cit note 13 at 13.

<sup>90</sup> Ibid.

<sup>91</sup> Ibid at chapter 9. See also - Joao, Sergio, and Pedro op cit note 7 at 47; Bronwyn, Kerrie, Ellie op cit note 3 at 2.

<sup>92</sup> Oberson op cit note 14 at 16. Also see – Calo Ryan ‘Robotics and the Legal Metaphors’ (2016) 30 *Harvard Journal of Law & Technology* at 210.

### 3.3 The essence of the robot tax debate

The robot tax debate is driven by opposed views on the proposal of a robot tax to counter the erosion of the tax base. The taxes raised by the imposition of the robot tax will fund retraining costs and increased pressure on social security amongst other things.<sup>93</sup> Every new tax, including the proposed robot tax, must be compliant with the basic principles of tax which are; the ability to pay principle, neutrality, certainty, practicality and fairness.<sup>94</sup> In essence, the greater part of the robot tax debate dwells on whether the proposed tax, in its various designs, satisfies or not the foundational principles of tax. Below is an outline of the arguments for and against the proposed robot tax.

#### 3.3.1 Arguments for a robot tax

##### 3.3.1.1 Need to maintain and grow the tax base

Due to the projected replacement of human labour with machines under the 4IR the fiscus loses significantly on PAYE taxes on employees' salaries and on VAT.<sup>95</sup> The fiscus particularly in developing countries are invariably cash-strapped and battling to adequately finance public goods and infrastructure developments. There is growing unemployment in South Africa<sup>96</sup> and an explosion in the demand for social security to the old, disabled and minors.<sup>97</sup> The enactment and imposition of a robot tax allow the fiscus to regain lost taxes by maintaining and extending the tax base by causing robots to step into the shoes of displaced employees.

##### 3.3.1.2 Funding increased social security burden and retraining costs

The displacements of labour by robots spell a disaster for the fiscus due to its double knock-on effect.<sup>98</sup> Firstly, employees income taxes will be slashed down, and VAT shrunk by reduced consumption because of a fall in disposable income. Secondly, the government will need to facilitate retraining programmes for job retainment and skills transfer to new roles and to provide unemployment grants to the displaced employees this will be demanding more revenue

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<sup>93</sup> Catherine Clifford 'Elon Musk: Robots will take your jobs; government will have to pay your wage' *CNBC*. 4 November 2016; Paul-Choudhury S 'A robot tax is only the beginning' (2017) 233 *New Scientist* pp. 25-25.

<sup>94</sup> Xavier Oberson op cit note 13 at 26.

<sup>95</sup> Valentine & Viktoriia op cit note 2 at 8; Bronwyn, Kerrie, Ellie op cit note 3 at 1 – 2.

<sup>96</sup> Londiwe Buthelezi 'More SA job losses reported in May – Survey' *News24* 21 May 2020; Nompu Siziba '22 000 Edcon given retrenchment notices' *Moneyweb* 17 June 2020; Lameez Omarjee, Covid-19 cuts SA employment figures by three million, women most affected – study' *News24* 15 July 2020.

<sup>97</sup> Jenni Evans 'Govt to pay R350 Covid-19 distress grant from mid-May: Here is who can apply' *News24* 29 April 2020.

<sup>98</sup> Bronwyn, Kerrie, Ellie op cit note 3 at 1. – the fiscus faces pressure both from displaced workers requiring support, and the fiscal purse being eroded due to a decreasing number of workers to tax.

for the government.<sup>99</sup> The imposition of a robot tax will to an extent retain some balance in the tax regulatory framework.

### 3.3.1.2 Ability to pay principle

It is an enduring principle of tax law that tax liability must match the taxpayer's ability to pay.<sup>100</sup> The principle operates both as an economic justification and a legal justification.<sup>101</sup> As the latter, a robot tax is justified in that the owner or user of a robot accrues income from using that robot an income which the human replaced by the robot would have earned.<sup>102</sup> Such income accretion is imputed income on the robot and as such, there is an ability to pay a robot tax from the imputed income.<sup>103</sup> The reference point of the proposed tax would be the tax previously chargeable on human workers in line with rules on tax rates. As the former, a robot tax would be justified in that it meets the constitutional and legislative muster that requires tax contributions to match one's ability to pay along the vertical and horizontal equality axis.<sup>104</sup>

### 3.3.1.3 Benefit Principle

A robot tax is also justified based on the benefit principle. The principle requires that a taxpayer extend a consideration for benefits derived from the state in the form of public goods and services.<sup>105</sup> Therefore, for the robot tax to be justifiable a sufficient nexus between a specific robot tax and the benefit derived should exist in given tax design. It is argued that the benefit could be the registration and supervision of the use of robots or it can be a licence fee to use robots.<sup>106</sup>

### 3.3.2 Arguments against a robot tax

Many advocates for robotization and technological oriented companies have been at the forefront to fight against the robot tax proposals. It is to be expected that parties with interests

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<sup>99</sup> Ibid.

<sup>100</sup> Ibid at 9 – “The ability to pay principle relies on vertical equity (the burden of tax is distributed according to the capacity to bear the burden of payment) and on the notion of redistribution of wealth (those on higher incomes pay more in taxes to allow for a redistribution to those on less income)”. Also see similar sentiments by the Swiss Supreme Court, ATF 122 I 103 + RDAF 1997 II, 186.

<sup>101</sup> Oberson op cit note 14 at 35.

<sup>102</sup> Oberson, X. ‘Taxing Robots? From the Emergence of an Electronic Ability to Pay to a Tax on Robots or the Use of Robots’ (2017) *World Tax Journal*, May 2017, pp. 247-261.

<sup>103</sup> Oberson op cit note 14 at 32.

<sup>104</sup> Ibid at 35. This approach accords with the South African tax system that is generally progressive and it echoes the constitutional right to equality enshrined in section 9 of the Constitution of the Republic of South Africa, 1996.

<sup>105</sup> Bronwyn, Kerrie, Ellie op cit note 3 at 8, - the principle is founded on the notion that the government, in return for protecting its citizens and basic maintenance functions, it charges tax on the benefits received from such services. Also see - Oberson op cit note 14 at 34.

<sup>106</sup> Oberson op cit note 14 at 34.

and who stand to lose if the robot tax proposals are accepted and enacted into law will invest efforts to thwart such proposals without more.

### 3.3.2.1 Definitional complexities

Antagonists to the robot tax proposal argue that the difficulty in defining a robot tax is a *prima facie* sufficient reason to disqualify the tax.<sup>107</sup> Currently, there is no consensus even amongst the protagonists of the robot tax on the appropriate scope of the meaning to be assigned to the concept of a “robot”. On the other hand, there are suggestions to assign the highly technical definition that is narrow,<sup>108</sup> and on the other hand, adopt a wide definition that encompasses both robots in the physical form and technologies such as software and other bots which would not ordinarily fit into the technical definition of a robot.<sup>109</sup> There is a counterargument that the definitional challenge is not insurmountable therefore is not a significant impediment to the implementation of a robot tax.<sup>110</sup>

### 3.3.2.2 Risk of double taxation

Another argument is that imposing a robot tax on business entities results in the double taxation of the same income in the hands of the same taxpayer.<sup>111</sup> This is because it is argued, robots constitute factors of production like other machines employed by a taxpayer and would have produced the income taxed as corporate tax.<sup>112</sup> Imposing another tax on robots specifically would amount a double tax hence unfair. In response one can argue that the targeted robots differ substantially from ordinary equipment and machines used by taxpayers due to their capability to assume roles previously performed by humans that require cognitive and decision-making abilities. As such the objective will be to restore parity between robots and human labour. It is argued that, given the tax dilemma sought to be resolved by the robot tax, where no such tax is imposed for fear of double taxation, it does not follow that corporates will pay more taxes proportionate to the increased profits after eliminating labour.<sup>113</sup>

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<sup>107</sup> Ibid at 26. Also see – Mazur op cit note 43 at 20.

<sup>108</sup> EU Final Report (2017) op cit note 99 at 8. The EU Parliament prefers a focus on “smart robots” defined in the following characteristics: “...the acquisition of autonomy through sensors and/or by exchanging data with its environment (interconnectivity) and the trading and analysis of those data; self-learning from experience and by interaction 9optimal criterion); at least a minor physical support; the adaptation of its behaviour and actions to the environment; and the absence of life in the biological sense”.

<sup>109</sup> Balkin Jack ‘Sidley Austin Distinguished Lecture on Big Data Law and Policy; The Three Laws of Robotics in the Age of Big Data’ (2017) 78 *Ohio State Law Journal* at 237; Oberson op cit note 13 at 27.

<sup>110</sup> Oberson op cit note 14 at 27.

<sup>111</sup> Ibid at 27 & 37.

<sup>112</sup> Mazur op cit note 43 at 21.

<sup>113</sup> Oberson op cit note 14 at 116. Two reasons explain the unlikelihood of corporate tax on increased profits to offset income tax losses due to displacement of labour. First, the rate of corporate tax is usually lower than income tax rates therefore only a partial compensation can obtain– in South Africa CIT is charged at 28 % while income

### 3.3.2.3 Discouragement on Innovation and Investment

Additionally, a robot tax proposal is opposed on the basis that such tax discourages much-needed investments and innovation by raising the cost of automation.<sup>114</sup> The resultant effect will be the slowing down of economic growth and a drag-down of the country's progress to alongside other countries into the 4IR to maximise on opportunities present under the 4IR. It is argued that these innovations and investments would create employment in the economy and imposing a tax would extinguish that opportunity.<sup>115</sup> In response, one can argue that the tax can be designed to provide for exemptions for certain strategic sectors and the tax rate can be optimised to avoid the potential unintended damage.

### 3.3.2.4 International Tax Competition

Oberson argues that the introduction of a robot tax may ignite another point of competition between states where after implementing a robot tax other states may move in the opposite direction.<sup>116</sup> Other states could incentivise automation thereby siphoning out investments from the country that would have implemented a robot tax.<sup>117</sup> This competition would also open up new tax avoidance avenues where a robot can be deposited in a tax haven or an online platform that is controlled from another jurisdiction.<sup>118</sup> However, as compelling as it is, this challenge can be circumvented by efforts via a multilateral system such as the OECD and the UN. A multilateral system allows for a tight system that levels the playing field and eliminates competition between states as well as prohibiting perceived harmful tax practices.

### 3.3.2.5 Implementation Challenges

Another point of the opposition of the robot tax is the issue of implementation. The antagonists argue that such a tax as the proposed robot tax would be difficult to implement for reasons that go beyond definitional complexities.<sup>119</sup> There is a need to define who the taxpayer is between

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PIT is levied at graduated rates from 18 % to 45 %. Secondly, the removal of salaries as an expense is replaced by amortization deducted on the robot's infrastructure. <https://www.sars.gov.za/Tax-Rates/Income-Tax/Pages/Rates%20of%20Tax%20for%20Individuals.aspx>; <https://www.sars.gov.za/Tax-Rates/Income-Tax/Pages/Companies-Trusts-and-Small-Business-Corporations.aspx>.

<sup>114</sup> Oberson op cit note 14 at 29. The Economist 'Why taxing robots is not a good idea' 25 February 2017. Also see – White op cit note 15 at 4.

<sup>115</sup> The Economist op cit note 139.

<sup>116</sup> Oberson op cit note 14 at 31.

<sup>117</sup> Mazur op cit note 43 at 22.

<sup>118</sup> Oberson op cit note 142.

<sup>119</sup> White op cit note 15 at 1; Mazur op cit note 43 at 23.

a business entity and a robot and attempting to assign a legal personality to a robot can prove challenging.<sup>120</sup>

Another issue is the determination of the tax rate, particularly what the reference point will be. Where indications point to imputed income to be a reference point, what proportion of the imputed income would be taxed since most potential automation replace tasks rather than entire occupations. The questions extend to whether the tax will be progressive or a flat rate and how the adopted definition would cover features unknown at the time of implementation.<sup>121</sup> It is counterargued that these questions genuine and by no means easy, however they are not unique to the proposed robot tax but common with every new tax, therefore, solutions can be found to define the parameters for the tax.<sup>122</sup>

### 3.4 Robot tax function and designs

There is broad consensus on the need for generating revenue from the tax on robots and other new technology. Not many scholars and countries are deliberating and established an acceptable design for the proposed tax. Much of the deliberations are still examining how and to what extent the elements of 4IR would affect labour and ultimately the fiscus. The design assumed by a tax will be determined by the function served by a given tax. That will determine its targeted taxpayer as well as quantum. Several tax designs discussed below echoes the rationale for which the robot tax is aimed to resolve.

The South Korean government, within the framework of the proposed revision of the tax legislation, introduced restrictions on tax incentives against any investments in the automation of production.<sup>123</sup> The restrictions aimed to compensate for the loss of income tax and providing social security to workers displaced by robots.<sup>124</sup>

Joao *et al* considered the question of whether robots should be taxed in the United States of America.<sup>125</sup> To solve the challenge of income inequality and falling wages of routine workers, they propose an increase in the marginal tax rates of the rich and to impose a tax on the use of robots.<sup>126</sup> According to them, the income raised should fund a Universal Income.<sup>127</sup>

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<sup>120</sup> Oberson op cit note 14 at 30.

<sup>121</sup> Ibid.

<sup>122</sup> Ibid.

<sup>123</sup> Yoon op cit note 102

<sup>124</sup> Ibid.

<sup>125</sup> Joao, Sergio, and Pedro op cit note 7 at 2.

<sup>126</sup> Ibid at 3.

<sup>127</sup> Ibid at 41.

Lumpsum payments would then be made as independent income from the raised income making sure that every employee has a basic income.<sup>128</sup> Joao *et al* give no clear proposal on the design their proposed tax would assume. They also use the terms “automation” and “robots” interchangeably, this further blurs the tax proposal given the definitional conflicts connected with these concepts.

Valentine and Viktoriia, while interrogating the changes on the tax system that would arise under the 4IR, put forward three approaches to the broader challenges that would arise. One of the approaches is to tax robots to counter the potential erosion of tax revenue for the fiscus.<sup>129</sup> Valentine and Viktoriia suggest *inter alia* the steepening of the existing marginal tax rates, the imposition of taxes on new products of the digital economy such as cryptocurrency and implementing a system of smart taxes using big data to improve tax administration.<sup>130</sup> The mischief of concern is the erosion of the tax base and social security, service delivery challenges that would arise which deepens inequality.<sup>131</sup> Valentine and Viktoriia propose a tax on the use of robots as opposed to taxing robots, as well as rendering robots an object for VAT.<sup>132</sup>

Probably the most in-depth investigation of proposals of the robot tax designs has been undertaken by Oberson.<sup>133</sup> The proposals discussed fall under two broad categories namely taxes charged on robots as legal entities and taxes charged for the use of robots. Amongst the designs are, for tax on the use of robots; general taxes targeting the ratio of automation, automation tax on production factors: ‘a robot box’, special automation taxes, pigouvian taxes, indirect taxes by limiting allowable capital deductions on robots, object tax ‘sin tax’ on robots, securities tax on Imputed robot income; and for robots as legal entities; a robot income or revenue tax, robot capital tax, subjecting robots to VAT.<sup>134</sup> The various robot tax designs are examined in-depth in the discussion below.

- *Robot tax designs*

To counter the 4IR-tax dilemma, many designs have been put forward. Bill Gates reignited the robot tax debate by suggesting a robot tax, however, not suggesting a concrete design for such

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<sup>128</sup> Ibid at 40.

<sup>129</sup> Valentine & Viktoriia op cit note 2 at 8.

<sup>130</sup> Ibid at 6.

<sup>131</sup> Ibid at 16.

<sup>132</sup> Ibid.

<sup>133</sup> Oberson op cit note 14.

<sup>134</sup> Oberson (2017) op cit note 124.

a tax.<sup>135</sup> In 2016, the European Parliament working report prepared by the Committee on Legal Affairs proposed taxation of robots by granting,

‘a specific legal status for robots, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons with specific rights and obligations, including that of making good any damage they may cause, and applying electronic personality to cases where robots make smart autonomous decisions or otherwise interact with third parties independently’.<sup>136</sup>

The very purpose of this research is to bring to the fore novel proposals to spark deliberations towards a sustainable policy position regarding the increasing invasion of automation in the workplace and the domino effect that ensues.

#### 3.4.1 Taxing income imputed on robots

Probably the closest and most relatable tax design is the taxation of imputed income earned out of the use of robots.<sup>137</sup> This income represents income previously earned by human workers. The entity using and owning the robot to generate income would be the taxpayer.<sup>138</sup> This design has the potential to trigger double taxation where robots, while deemed to be production equipment, are taxed on income imputed on them while the income they produce to the company is taxed as CIT.<sup>139</sup>

#### 3.4.2 Automation taxes

Amongst few scholars that dealt with tax designs, Oberson observed proposals of a group of possible automation taxes whose focus is robots.<sup>140</sup> Dr Bronwyn McCredie and colleagues examined automation taxes from the holistic perspective where all 4IR technology displacing labour is covered.<sup>141</sup> These tax designs will be outlined briefly below.

##### 3.4.2.1 General automation taxes – Using the ratio of automation as the basis.

These general automation taxes would be charged and calculated with reference to the extent of automation of the taxpayer.<sup>142</sup> The objective would be to level the playing field between

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<sup>135</sup> French op cit note 8; Cutmore & Rosenfeld op cit note 16.

<sup>136</sup> EU Parliament Report (2016) op cit note 98. EU Parliament Report on Legal Affairs, Draft Report (2017) op cit note 99. Also see - Valentine & Viktoriia op cit note 2 at 16.

<sup>137</sup> Oberson (2017) op cit note 124 at 254.

<sup>138</sup> Ibid.

<sup>139</sup> Mazur op cit note 43 at 21.

<sup>140</sup> Oberson op cit note 14 at 120. Also see – Maisel William *The Software Society* United States (2014) at 220.

<sup>141</sup> Bronwyn, Kerrie, Ellie op cit note 3.

<sup>142</sup> Maisel op cit note 166 at 221.

entities using robots and those employing humans.<sup>143</sup> This tax design is cognizant of the possibility of human workers not being displaced at once and a possibility of establishing balance where robots and employees operate side by side at an optimum point that preserves jobs. Oberson sees this design as analogous to a design of tax on computers as proposed by Maisel in 2014.<sup>144</sup>

#### 3.4.2.2 Special automation taxes

As an alternative to general automation taxes, special taxes can be imposed targeting specific sectors and entities where the extensive automation is against the prevailing policy. This could be instances where extensive adoption of automation is undesirable such as retail tills, car washes and merchandising in a country like South Africa. South Africa is battling bulging rates of unemployment against a huge proposition of low-skilled labour. An example of a tax on automation of supermarket tills is an automation tax proposed by the Socialist Party in the Swiss canton of Geneva for Parliamentary debate.<sup>145</sup> The proposal faced fierce opposition on the neutrality and equality front. An example of a special automation tax is one proposed in the USA in 2018 by a bill in the County of San Francisco authorising the taxing of driverless vehicle rides originating from the City and County of San Francisco.<sup>146</sup> The design of a special tax must deal with equality and neutrality issues by properly defining the scope of the tax.

#### 3.4.2.3 Indirect automation tax – Limitation of allowable deductions.

This tax design entails the imposition of limits to tax deductions and other incentives accessible to taxpayers investing extensively in automation and displacing human labour. Within the South African context, the indirect tax would limit or extinguish the allowable capital deductions in terms of sections *inter alia* section 12B & 12C of the ITA.<sup>147</sup> A similar tax design was implemented in South Korea for the first time.<sup>148</sup> Another related design is to restrict amortization in automation. The latter would be linked to the taxpayer's level of automation such that upon reaching a stipulated threshold of the level of automation depreciation of automation would be disallowed.<sup>149</sup>

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<sup>143</sup> Oberson op cit note 14 at 120 at 121.

<sup>144</sup> Meisel op cit note 166 at 220.

<sup>145</sup> Oberson op cit note 14 at 123.

<sup>146</sup> California Legislative Information, Assembly Bill No. 1184, Chapter 644, An act to add Section 5446 to the Public Utilities Code, relating to transportation, published 21 September 2018.

<sup>147</sup> Income Tax Act 58 of 1962 – s 12B & 12C.

<sup>148</sup> Yoon op cit note 102; Cara op cit note 17. Abbott and Bogenschneider op cit note 44 at 25.

<sup>149</sup> Oberson op cit note 14 at 123. at 124-125.

### 3.4.3 Pigouvian Tax

This tax design is comparable to carbon tax and other sin taxes such as taxes on tobacco products and alcohol.<sup>150</sup> The object of this robot tax design would be to offset the negative externalities occasioned by robots by way of displacement of labour and the consequent erosion of the tax base.<sup>151</sup> It is argued that this tax design is necessary and effective in the short term as opposed to the long term.<sup>152</sup> The opponents to the pigouvian tax argue that it stifles investment by raising the cost of research and investment.<sup>153</sup>

### 3.4.5 Taxation of robots as a separate legal electronic entity.

In the event of success and approval of proposals such as the rejected proposal before the EU Parliament to assign a legal personality on robots and tax them as distinct taxpayers a number of taxes could be chargeable on robots.<sup>154</sup> Oberson proposes a tax on the revenue or income generated by the robot.<sup>155</sup> This assumes a clear delineation of the activities of the robot and that of other robots and related entities in order to prevent double taxation.<sup>156</sup> Additionally, as individual tax subjects, robots are treated as VAT taxable persons on the taxable supplies they render.<sup>157</sup> The calculation of VAT would correspond to an ordinary VAT taxable entity that is both a consumer and supplier of taxable supplies, in the case of robots the consumption and supply would extend to other robots as well.<sup>158</sup> It is interesting to note the necessity of human hands in these interactions for proper implementation of VAT legislation and supervision against hacking.

## 3.5 Critique

The robot tax proposals are the first step in the right direction to deal with the inevitable erosion of the tax base due to technologies under the 4IR. However, the adequacy of a robot tax is in

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<sup>150</sup> Ibid 125 – 26. Also see - Bronwyn, Kerrie & Ellie op cit note 3 at 10.

<sup>151</sup> The Pigouvian tax amend social costs of automation in the form of the displacement of human workers, a cost that is externalised by businesses and is not incorporated into market prices. These costs are then borne by society as governments move to support displaced workers during the unemployment phase. The imposition of a tax on automation forces businesses to internalise the costs of worker displacement through a flat tax on capital, a Pigouvian tax on investment in automation. This tax must equal the social cost of the externality occasioned by automation such as the costs to re-educate and support displaced workers.

<sup>152</sup> Shiller, R. (2017) 'Why Robots Should be Taxed if They Take People's Jobs', *The Guardian* 2017.

<https://www.theguardian.com/business/2017/mar/22/robotstax-bill-gates-income-inequality>

<sup>153</sup> Bessen J 'Bill Gates Is Wrong That Robots and Automation Are Killing Jobs' *Fortune* 2017; Floridi L 'Robots, Jobs, Taxes and Responsibilities' (2017) 30 *Philosophy & Technology* iss. 1, pp. 1-4; Patias I and Leventi N (2017), For roboethics issues like of robots taxation, should we apply "pro et contra" or SWOT analysis" (2017) 6 *American Journal of Engineering Research* pp 126-129.

<sup>154</sup> EU Parliament Report (2016) op cit note 98. EU Parliament Report (2017) op cit note 99.

<sup>155</sup> Oberson op cit note 14 at 133.

<sup>156</sup> Ibid at 27.

<sup>157</sup> Ibid at 128.

<sup>158</sup> Ibid at 135.

doubt due to the inherent definitional limitations of the word “robot”. Suggestions are that adoption of a wide meaning of a robot would solve this mischief. Once a wide definition of ‘robot’ is adopted to include technologies such as big data and other software programmes, a pandoras box would be open for tax avoidance and international competition between states. These challenges are surmountable with the adoption of strategy at the multilateral level through organizations such as the OECD and UN. In the short term, countries are hesitant to break rank due to fear of triggering a negative domino effect in the economy.

A better solution is to introduce an automation tax which is capable of being interpreted to include the majority if not all the technologies under the 4IR. Effort must be invested to avoid double taxation of income in the hands of a single taxpayer where imputed income is taxed. The taxes might raise unfairness issues where the taxpayer would have injected capital to acquire a robot and then is taxed on the income generated by the robot as if the investment has been made by a third party. It makes sense for human employees to earn salaries because they are not owned by the taxpayer and they would have invested energy and skills in generating income for the taxpayer.

There is sufficient separation between income earned by employees and the income of the corporate taxpayer. In the short term, a pigouvian tax design is most sensible, simple to implement while the society and the economy adapt to the 4IR through reskilling and creation of new employment opportunities. Another viable design is the limitation of capital deductions claimable by extensively automating taxpayers. The latter designs raise fewer policy challenges especially in a developing country like South Africa where tax rates are relatively high. In the short term, there is likely to be lesser resistance on the policy front due to the apparent need to curb unemployment and the need for more revenue. A policy review can be visited in the medium to long term to evaluate the success and necessity of continuing with the policy.

### 3.6 Conclusion

The robot tax debate is gathering momentum across the world, with governments, academics and institutions interrogating the extent of job displacements, erosion of the tax base and to weigh for the most optimal robot tax design possible. The robot tax debate straddles the foundational taxation principles of equality, neutrality, practicality, and legality. The main thrust of the protagonists` argument is the need to protect the revenue tax base to fund social security, public services and retraining programmes while recognising the impossibility of stopping the 4IR and the opportunities it presents. On the other hand, the antagonists contend

that the imposition of a robot tax will discourage investments and innovation and that the system will self-correct by creating new jobs which they argue are not an under-inflated threat as projected.

Amongst tax design proposals the robot tax is a tax on the imputed income of robots, a general tax calculated based on the ratio of automation, special taxes targeting specific sectors, an indirect tax by way of limiting allowable deductions accessible to extensively automating taxpayers and a Pigouvian tax. These will be payable by the taxpayer owning and using these robots to generate income. Additionally, where robots are assigned a legal personality taxes chargeable may include a tax on the income of the robot as well as robots becoming VAT taxable persons. All these designs raise many policy and political issues, however as every new tax solution can be found to address the challenges arising. Any design contemplated will have to match the socio-economic contexts of the tax jurisdiction and fit well within the short term, mid and long-term timelines.

## CHAPTER 4

### RELEVANCE OF THE ROBOT TAX DEBATE TO SOUTH AFRICA AS A DEVELOPING COUNTRY

#### 4.1 Introduction

The world over is absorbed in the discourse on the 4IR to leverage the opportunities and cope with the challenges it presents. This discourse has slowly found its way into the domain of developing and emerging countries such as South Africa. The snail's pace at which the discourse on 4IR is unfolding in developing and emerging economies is on account of a perceived slow progression into the 4IR hence a relaxed apprehension of the severity of any impact that can result from 4IR, at least in the short term.<sup>159</sup>

The 4IR has great catalytic potential for stragglers<sup>160</sup> while it also threatens to pull many countries in the developing world deep into the abyss<sup>161</sup> making it virtually impossible to catch up with the rest of the world. The 4IR is repositioning factors of production in a new hierarchy pitting capital against labour.<sup>162</sup> Highly developed countries are less likely to experience violent disruption as is likely to be felt by emerging economies like South Africa.<sup>163</sup> This exact reason underscores the imperative of this research.

The robot tax debate, extensively discussed in chapter 3 of this research, on the one hand, presents a pessimistic view that the adoption of 4IR will displace massive labour hence a drastic fall in tax revenue once paid by labour. On the other hand, the optimists contend that like previous industrial revolutions some jobs will be destroyed, and many new jobs will be created to offset the lost jobs hence little or no effect on the tax base. Whether or not a robot tax is necessary will depend on the impact of 4IR on labour and on the tax base in a specific country. The impact of 4IR will not be the same in developing, emerging, and developed countries. Much of the discourse on whether robots must be taxed has been Eurocentric, hence this research endeavour to apply the robot tax debate to the context of developing and emerging economies like South Africa.

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<sup>159</sup> Department of Telecommunications and Postal Services GN 764 GG 42078 of 4 Dec 2018 – Invitation to Nominate Candidates for the Presidential Commission on the Fourth Industrial Revolution at 4.

<sup>160</sup> Romina *et al* op cit note 75 at 3.

<sup>161</sup> Kartik & Georgina op cit note 77 at 3.

<sup>162</sup> Joao, Sergio, and Pedro op cit note 7. Recently, the accumulation of capital (4-5%) has far exceeded increases in income and growth (1-1.5%) - Piketty T *Capital in the Twenty First Century*, The Belknap Press of Harvard University Press, Cambridge, Massachusetts (2014).

<sup>163</sup> Arntz, Gregory, and Zierahn op cit note 16 at 19.

South Africa presents a unique case study for this. The significantly pro-capital policy against longstanding socio-economic challenges such as unemployment, poverty, inequality from apartheid-era presents the perfect conflict zone within which to conduct this study. These realities are explored to great length in the subsequent discussion. The South African President Cyril Ramaphosa, in 2019, appointed the Commission on Fourth Industrial Revolution in response to the need to align the countries policies with the new era.<sup>164</sup> With the need to report twice annually, there is no doubt that the challenges of 4IR are not as urgent and as threatening in the eyes of the government as they are. More needs to be done.

This chapter will map the way forward for South African tax policy after examining and establishing the extent of the threat of 4IR on the tax base. This will be preceded by an inquiry into the extent to which South Africa has been immersed in the 4IR and the job losses projections into the future. The entire assessment considers the socio-economic circumstances specific to developing and emerging economies and the policy goals articulated in the National Development Plan (NDP)<sup>165</sup> and state of the nation (SONA) addresses.

Ultimately, this chapter concludes by proposing an automation tax the optimal design which is tailored to the prevailing conditions in South Africa, while recognising that the 4IR cannot be stopped and at the same time it must not be ignored. The policy must shape how the 4IR progresses in the country to minimise its harm while maximising on its opportunities. Crucial is the need to enable the economy to adapt gradually into the 4IR.

#### 4.2 Relevance of robot tax debate in South Africa

The robot tax debate dealt with in chapter 3 of this research, whilst generally restricted to developed countries, is essentially an intensifying exchange on the necessity and design of a novel robot tax. The robot tax debate responds to the outcry on the negative impact that robotization under the 4IR has had by way of displacement of enormous volumes of jobs.<sup>166</sup> The erosion of jobs is understood to deepen and widen the income and wealth inequality, entrench poverty, and most crucial to this inquiry, is the erosion of the tax base.<sup>167</sup>

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<sup>164</sup> Department of Telecommunications and Postal Services GN 764 GG 42078 of 4 Dec 2018 – Invitation to Nominate Candidates for the Presidential Commission on the Fourth Industrial Revolution.

<sup>165</sup> National Development Plan – 2030.

<sup>166</sup> Bronwyn, Kerrie, Ellie op cit note 3 at 1 & 3.

<sup>167</sup> Ibid.

Tax remains a major source for government revenue and it supports public services, social security, education, health, and infrastructure.<sup>168</sup> Developed countries are alarmed by the looming erosion of the tax base because of the adoption of 4IR technologies, even with functional economies, high living standards, and developed industries pioneering in cutting edge technologies. The prospect of massive tax losses for developing and emerging economies is one that if policy misses, presents a grim future. Emerging economies like South Africa and other advanced developing countries probably face the greatest challenge. This is due to the absence of industry legacies that hinder entrance of new tech-driven corporations, huge policy appetite to attract foreign direct investments, a dominantly low-skilled workforce on the backdrop of persistent poverty, and inequality legacies.<sup>169</sup>

For South Africa, as suggested in the research conducted by Arntz *et al*, it may mean massive disruptions in the labour sector resulting from the out-rolling paradigm shift to robotization and automation in the manufacturing, banking and finance and retail sectors.<sup>170</sup> Beyond doubt, the robot tax is not only relevant, but it is imperative that South African policymakers join in the debate to shape the tax policy framework in these uncharted territories. The most immediate indication is the circumstances occasioned by the COVID-19 epidemic. Government has been forced to increase domestic and foreign debt, SARS has seen considerable shortfalls in tax collections, expenditure ballooned towards the COVID-19 response, a new social security grant for the vulnerable (at the backdrop of massive retrenchments in the public and private sector) was introduced, along with measures to rescue businesses in distress.<sup>171</sup>

The relevance of the robot tax debate cannot, however, be set out so simplistically. To comprehensively demonstrate its relevance and the tax policy urgency, several elements to this inquiry will be observed below. These will include a brief context-setting discussion on the 4IR phenomenon, in general, and in emerging economies and other developing countries. Thereafter, studies on job displacements resulting from robotization will be observed and an assessment of job displacement in South Africa and other developing countries will be proffered. Additionally, a projection of the potential tax revenue loss to the fiscus will be constructed with reference to current tax collection statistics and government budgets. In the end, a review will be given of South Africa`s seemingly conflicting priorities which at times

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<sup>168</sup> Ibid.

<sup>169</sup> National Development Plan op cit note 23.

<sup>170</sup> Arntz, Gregory, and Zierahn op cit note 16 at 19 – 20.

<sup>171</sup> Supplementary Budget Review 2020 – South African National Treasury.

are opposed to any prospect of a drop in government revenue whilst some invite perfect conditions for robotization, therefore, erosion of the tax base.

#### 4.2.1 The Impact of the 4IR on labour and taxes in South Africa

The effects of 4IR traverse the entire spectrum of human activities to varying extents depending on the socio-economic contexts of each country. Notable impacts are in the cybersecurity where the proliferation of e-commerce exposes individuals and institutions to hacking and compromising of data security to the extent of threatening national security.<sup>172</sup>

Additionally, the 4IR promises efficiency in manufacturing thereby growing profits and allowing lower prices for consumers.<sup>173</sup> Critical to this research is the displacement of manual labour and the resultant erosion of tax revenues. By displacing tax-paying manual labour 4IR deepens unemployment, widens inequality, and creates a social security crisis as government revenues become overstretched after erosion.<sup>174</sup> Great debate exists regarding the 4IR will affect jobs, the outcome of this debate directs the debate on the necessity of a robot/automation tax. Below is an in-depth interrogation of nature and extent the 4IR will displace manual labour and the impact on the fiscus.

##### 4.2.1.1 Impact on labour

This research is built on the relationship between 4IR and manual labour. The objective of a tax on the use of technology in replacement of manual labour comes after an establishment of a solid correlation between 4IR and job displacements. The extent of these displacements will also be vital to inform policymaking on the design and extent of responsive measures.

Unlike the fears of job losses projected in previous industrial revolutions, there is a great sense of fear that with the 4IR, ‘automation and digitalisation are increasingly penetrating the domain of tasks that until recently used to be genuinely human such as reasoning, sensing and deciding’.<sup>175</sup> Brynjolfsson and McAfee point to numerous examples of what they call “The Second Machine Age” that include *inter alia*; the largely autonomous smart factory, service robots or 3D printing and driverless car. These technologies are redefining what type of human capabilities machines can replicate.<sup>176</sup> Many predictions and estimations of job displacements

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<sup>172</sup> Ibid.

<sup>173</sup> Ibid at 92.

<sup>174</sup> Valentine & Viktoriia op cit note 2 at 8.

<sup>175</sup> Arntz., Gregory, and Zierahn op cit note 16 at 7.

<sup>176</sup> Brynjolfsson and McAfee op cit note 97 at 7.

because of the 4IR have been proffered without a theoretical basis to support them. Equally, many bare denials against these predictions and estimations have been advanced.

The World Economic Forum White Paper noted that the Organisation for Economic Cooperation and Development (OECD), in a March 2018 report to G20 finance ministers, stated that “automation has so far not created massive job losses, but does lead to reallocations of employment between tasks, sectors and regions.”<sup>177</sup> The WEF, however, contends that, “there is no doubt that various jobs will disappear, causing worker displacement across segments of the value chain. A nuanced consideration of the changes is essential – including a distinction between existing jobs subject to gradual reconfiguration and those at risk of sudden disruption”.<sup>178</sup>

Min Xu *et al* are of the view that “...Low skilled and low wage jobs will be replaced by computers and digitization. The higher-paid jobs requiring more skills are less likely to be replaced.” This research agrees with Min Xu on the immediate destructive impact of 4IR on low skilled and low wage jobs. However, the full scale and nature of job displacement are yet to unfold as it is unknown when the 4IR is likely to end, it is too early to tell. Oberson intimates that ‘Not only manual or low-skilled activities are now at risk but also more sophisticated middle or even high-income tasks...eventually, over time, most if not all professions could be impacted’.<sup>179</sup>

The relationship between the 4IR and job displacements has been observed in two broad theories using different approaches. The Occupational-based Approach by Frey and Osborne<sup>180</sup> focus on susceptibility of ‘occupations’ to displacement because of 4IR technologies while the Task-based Approach by various scholars including OECD Scholars focuses on the susceptibility of tasks (within occupations) to displacement.<sup>181</sup> A review of the above-stated theories is given below and focuses on the foundation, purpose, assumptions, methodology, findings and critique aspects of the approaches.

- Occupation-based Approach

Frey & Osborne considered the task model of Autor *et al* that considers a constant return to scale aggregate production function with two types of labour inputs: Routine tasks that are

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<sup>177</sup> World Economic Forum & Accenture Report op cit note 1 at 14.

<sup>178</sup> Ibid.

<sup>179</sup> Ibid.

<sup>180</sup> Frey, C.B. and M.A. Osborne ‘The Future of Employment: How Susceptible are Jobs to Computerization?’ (2013) *University of Oxford* in Arntz, M., T. Gregory, and U. Zierahn op cit note 83 at 9-11.

<sup>181</sup> Arntz, Gregory and Zierahn op cit note 83 at 12

technically substitutable by capital and non-routine tasks that are not substitutable. Frey and Osborne then adapted this model by redefining the domain of tasks that are susceptible to automation and those that, due to the engineering bottlenecks, are not. Frey and Osborne considered that tasks that could potentially be automated go beyond the routine tasks as defined in Autor *et al* and this reflected new advances in Machine Learning (ML) and Mobile Robotics (MR).<sup>182</sup>

In 2013, Frey and Osborne attempted to estimate the susceptibility of employment to computerisation.<sup>183</sup> They classified occupations in the US with respect to the risk of being susceptible to automation by asking experts about the technological potential for automation soon. They found that 47% of all persons employed in the US occupy jobs that could be performed by computers and algorithms within the next 10 to 20 years. In subsequent studies, using the approach proposed by Frey & Osborne, Pajarinen and Rouvinen<sup>184</sup> estimate the share of jobs that are susceptible to automation to be around 35% in Finland while Brzeski and Burk<sup>185</sup> estimate the share of jobs at risk of automation to be as high as 59% in Germany. Bowles<sup>186</sup> finds the share of jobs that are susceptible to automation in Europe to range between 45 to more than 60%, with southern European workforces facing the highest exposure to potential automation.

Using the occupation-based approach, Frey & Osborne concluded that 47% of all persons employed in the US occupy jobs that could be performed by computers and algorithms within the next 10 to 20 years.<sup>187</sup>

- Task-based Approach

Arntz *et al* provided an alternative approach to estimating the risk of automation for 21 OECD countries based on the actual task content of jobs. They transferred the automatibility as provided by Frey & Osborne to 21 OECD countries including the US using the task-based approach as opposed to the occupation-based approach adopted by Frey & Osborne.<sup>188</sup>The aim

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<sup>182</sup> Ibid at 10.

<sup>183</sup> Frey and Osborne op cit note 126.

<sup>184</sup> Pajarinen, M. and P. Rouvinen 'Computerization Threatens One Third of Finnish Employment' (2014) *ETLA Brief*, No. 22, pp. 13.

<sup>185</sup> Brzeski C and I Burk 'Die Roboter kommen. Folgen der Automatisierung für den deutschen Arbeitsmarkt [The Robots Come. Consequences of Automation for the German Labour Market]' (2015) *ING DiBa Economic Research* in Arntz., Gregory and Zierahn op cit note 83 at 7.

<sup>186</sup> Bowles J 'The Computerization of European Jobs' (2014) *Bruegel, Brussels*.

<sup>187</sup> Arntz, Gregory and Zierahn op cit note 16 at 11.

<sup>188</sup> Ibid.

of their study was to estimate the risk of automation for jobs in 21 OECD countries based on the approach by Frey and Osborne while relaxing one of their major assumptions.<sup>189</sup>

Rather than assuming that it is occupations that are displaced by machines, they argue that it is certain tasks that can be displaced.<sup>190</sup> To the extent that bundles of tasks differ across countries and within occupations, occupations at risk of being automated according to Frey and Osborne may well be less prone to automation when considering the fact that most occupations contain tasks that are difficult to substitute at least in the foreseeable future.<sup>191</sup>

The task-based approach is based on the idea that the automatibility of jobs ultimately depends on the tasks which workers perform for these jobs, and how easily these tasks can be automated. Arntz *et al* estimate the relationship between workplace tasks in the US and the automatibility by as postulated by Frey & Osborne. They use this statistical relationship to investigate the automatibility to jobs in OECD countries.

Arntz *et al* find that the share of jobs at risk of automation across OECD is 9 % on average.<sup>192</sup> They concluded that the application of a task-based approach drastically reduces the risk of automation compared to the risk projected by employing the occupation-based approach.<sup>193</sup> This is demonstrated by the comparison of the automatability of jobs in the US using the two approaches.

The occupation-based approach result is 47 % while the task-based approach is a 9 %. The apparent huge discrepancy between the two approaches is explained by the fact that even in occupations that Frey & Osborne considered being part of the high-risk category, workers at least to some extent also perform tasks that are difficult to automate such as tasks involving face-to-face interaction.<sup>194</sup> Therefore, according to Arntz *et al*, the risk for technological unemployment is much lower than as projected by Frey & Osborne. Arntz *et al* also indicated to have found heterogeneities across the investigated OECD countries. They painted these heterogeneities in the paragraph quoted below.

‘For instance, while the share of automatable jobs is 6 % in Korea, the corresponding rate is 12 % in Austria. As we show, parts of the differences across countries may reflect general

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<sup>189</sup> Ibid.

<sup>190</sup> Ibid.

<sup>191</sup> Ibid.

<sup>192</sup> Ibid at 8.

<sup>193</sup> Ibid.

<sup>194</sup> Ibid.

differences in workplace organisation, differences in previous investments into automation technologies as well as differences in the education of workers across countries.’<sup>195</sup>

Arntz *et al* compares the predicted automatibility of jobs in the US using the PIAAC data by applying both the task-based and the occupation-based approach. For the occupation-based approach, they matched all potential Frey & O-values to everyone in the US-PIAAC-data based on the 2-digit ISCO occupation.<sup>196</sup> The result strongly as shown in the graph indicates that most jobs are designated as either very high or very low on automatability with only a few jobs having a medium automatability designation.<sup>197</sup>

To the opposite, the task-based approach shows two poles of the distribution move to less extreme values of the automatibility.<sup>198</sup> This, therefore, means that fewer jobs have either very high or very low values of automatibility when considering the variation of task-structures within occupations. Arntz *et al*, as a result, find that only 9% of all individuals in the US face high automatability. This figure differs greatly with Frey & Osborne`s 47% automatability rate of US jobs.<sup>199</sup>

- *Critique of the Occupation-based and Task-based Approaches*

The study by Frey and Osborne using the occupation-based approach and its results has provoked robust debate in academia. Some scholars have exported Frey & Osborne`s approach and conducted similar studies in other countries.<sup>200</sup> Major points of disagreement with Frey & Osborne`s study is the interpretation of its results. Autor<sup>201</sup> argues that “automation usually aims at automating certain tasks of occupations rather than whole occupations”. It is argued that occupations usually consist of a bundle of tasks and that not all these tasks may easily be automated. Therefore, little chance exists for automating entire occupations as suggested by Frey & Osborne using the occupation-based approach.<sup>202</sup>

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<sup>195</sup> Ibid.

<sup>196</sup> Ibid at 14.

<sup>197</sup> Ibid.

<sup>198</sup> Ibid.

<sup>199</sup> Ibid.

<sup>200</sup> With this approach, Pajarinen and Rouvinen (2014) estimate the share of jobs that are susceptible to automation to be around 35% in Finland while Brzeski and Burk (2015) estimate the share of jobs at risk of automation to be as high as 59% in Germany. Bowles (2014) finds the share of jobs that are susceptible to automation in Europe to range between 45 to more than 60%, with southern European workforces facing the highest exposure to a potential automation.

<sup>201</sup> Autor D H ‘Polanyi’s Paradox and the Shape of Employment Growth’ (2014) *Paper prepared for Federal Reserve Bank of Kansas, Jackson Hole Conference*, August 22, 2014.

<sup>202</sup> Arntz, Gregory, and Zierahn op cit note 16 at 7.

The second critique is directed at the variables used by Frey and Osborne to measure the likely effect of computerisation on jobs that is ‘the potential for automation’ instead of ‘actual automation’.<sup>203</sup> It is argued that no direct correlation exists between the potential for automation and actual job losses in that the technical possibility to use machines rather than humans for the provision of certain tasks does not mean that machines will actually replace human workers.<sup>204</sup> Arntz *et al* further contend that even where no obstacle exists for the substitution of workers with machines, workers can still retain their occupations by adjusting to a new division of labour between machines and humans.<sup>205</sup>

The analysis and results proffered by Arntz *et al* on automatability of jobs in OECD countries based on the task-based approach improve the accuracy rate from Frey and Osborne’s results considering that occupations represent bundles of tasks that cannot always be automated in their entirety. The degrees of automatable tasks in various occupations vary across industries and countries. It is only logical to take this factor into account. However, the numbers projected using the task-based approach and occupation-based approach are limited in informing us about the potential impact of technological advances on jobs.

The numbers under both approaches are based on a potential for automatability according to expert opinions, this does not reflect the actual utilisation of such technologies hence there is a possibility to overestimate automatability of jobs.<sup>206</sup> Experts who assessed the automatability of the 70 occupations in the FO study were asked whether “[...] the tasks of this job [can] be sufficiently specified conditional on the availability of big data, to be performed by the state of the art computer-controlled equipment”<sup>207</sup> It is a shared sentiment that experts tend to overestimate the potential of new technologies.<sup>208</sup>

Additional factors that affect the projected rates of automation of jobs include the fact that in cases where new technologies are increasingly used, workplaces may adjust to a new division of labour hence keeping jobs with new structures complemented by the new technologies.<sup>209</sup> It is argued that the comparative advantage of machines over workers is often

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<sup>203</sup> Ibid.

<sup>204</sup> Ibid

<sup>205</sup> Ibid at 8.

<sup>206</sup> Ibid at 10.

<sup>207</sup> Ibid at 21; See also – Frey and Osborne op cit note 126 at 30.

<sup>208</sup> Arntz, Gregory, and Zierahn op cit note 16 at 21; Autor D H ‘Why Are There Still So Many Jobs? The History and Future of Workplace Automation (2015) *Journal of Economic Perspectives*, 29(3), p 3-30; Pfeiffer, S and A Suphan ‘The Labouring Capacity Index: Living Labouring Capacity and Experience as Resources on the Road to Industry 4.0’ (2015) *Working Paper* 2015, No. 2, University of Hohenheim.

<sup>209</sup> Arntz, Gregory and Zierahn op cit note 16 at 21.

overstated for tasks that require flexibility, power of judgement and common sense.<sup>210</sup> It is thought that most jobs are probably not sufficiently well defined to be actually substituted by machines using an algorithm.<sup>211</sup>

Pratt characterises this present dilemma as follows, “specialized robots will improve at performing well-defined tasks, but in the real world, there are far more problems yet to be solved than ways presently known to solve them.”<sup>212</sup> Furthermore, the classification of occupations or tasks into the distinct domains automatable and not-automatable is considered problematic by other scholars.<sup>213</sup> The greatest limitation of the results from these two approaches is that studies have been conducted only in developed countries. The risk of automation in developing countries such as South Africa will be higher than indicated by these studies considering factors such as education and the state of investments in new technologies.<sup>214</sup>

The OECD, WEF and other scholars have studied and are conducting further studies on the extent of automatability of jobs under the 4IR. Pessimists and optimists are opposed to this matter. The latter contend that the 4IR will destroy some of the existing jobs, however, just as with the previous industrial revolutions, new jobs will be created.<sup>215</sup> The former argue that the 4IR presents a paradigm shift from the previous revolutions on this aspect and that the next technologies are destroying jobs with little regenerative potential and that technology is now more advanced to replace even complex decision-making roles traditionally a realm of only humans.<sup>216</sup>

Regardless of the differences, jobs will be and are being destroyed and, there will be limited opportunity for skills transfer from the low-skilled and low-income labour to the new highly technical jobs likely to be created. This possibility has prompted South Korea to implement a tax measure discouraging automation and the EU Parliament, Bill Gates, Elon Musk and the USA to probe possibilities of taxing robots. However, the accuracy of current estimations of automatability of jobs remains in doubt due to the non-existence of empirical

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<sup>210</sup> Ibid.

<sup>211</sup> Ibid at 9.

<sup>212</sup> Ibid at 52.

<sup>213</sup> Ibid at 21.

<sup>214</sup> Ibid.

<sup>215</sup> Oberson op cit note 14 at 8 – 10; Arntz, Gregory, and Zierahn op cit note 16 at 10.

<sup>216</sup> Aghion and Howitt op cit note 75; Brynjolfsson and McAfee op cit note 97; Bronwyn, Kerrie & Ellie op cit note 3.

studies on the matter. The true extent of the impact of the 4IR is yet to be as the revolution unfolds.

#### 4.2.1.2 Potential tax revenue loss and the knock-on effect on the fiscus

It was indicated earlier that the robot tax debate is not only relevant for South Africa and other developing and emerging countries but that it is imperative that South African tax policymakers are conversant and at the forefront on the debate. The imperative of active engagement with the robot tax debate is furthered by the COVID-19 global epidemic that both forced governments into debt to fund COVID-19 responses and to present digitalisation, robotization and other forms of automation in a good light and as viable (?) alternatives to human contact.

The implications of COVID-19 will be a seismic shift toward even more intensive automation in manufacturing, service, tourism, transport, and education sectors among others in the post-COVID-19 era. The potential loss of tax revenue and the resultant knock-on effect on the fiscus underscores the relevance of the robot tax debate in South Africa. What is more crucial, and what this section of the discussion will focus on, is not just the effect of tax revenue loss but the degree to which the adoption of robotization is triggering job displacements and ultimately the erosion of the tax base.

To illustrate the potential tax revenue loss and the knock-on effect on the fiscus, an analysis of tax statistics for selected years will be undertaken. Therefore, the focus will be placed on the percentage contribution made to the aggregate annual tax revenue by way of payroll taxes and VAT. An attempt is then made to project reasonable estimates of the potential knock-on effect on the South African fiscus because of job displacements.

##### a) Pay-As-You-Earn Taxes and VAT tax contributions

Each year the National Treasury and SARS compile and release statistics of tax collections.<sup>217</sup> These statistics are grouped in terms of broad categories such as Corporate Income Tax, VAT, and Personal Income Tax. Other categories covered include Capital Gains Tax (CGT), Transfer Duty, Mineral and Petroleum Resources Royalty (MPRR).<sup>218</sup> These statistics show the proportional representation of each category of tax to the total annual tax revenue for the fiscus.

Two categories are of relevance (without excluding other important taxes such as contributions to the Unemployment Insurance Fund, Fuel Levy) for the purposes of the discussion in this part and these are VAT and PAYE (as part of PIT). PIT and VAT are not

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<sup>217</sup> National Treasury and the South African Revenue Service - The 12th annual edition of the Tax Statistics 2019.

<sup>218</sup> Ibid.

only important due to the direct correlation with employment but also since they represent the biggest contributors to the fiscus.<sup>219</sup> Tax statistics show in the 2018/2019 tax year of assessment figures were 38.3 % and 25.2 % respectively, and in the 2019/2020 year of assessment figures stood at 39 % and 25.6 % respectively; Corporate Income tax came third in both years in question.<sup>220</sup>

It is unfortunate that National Treasury and SARS do not breakdown PIT into its constituent elements to identify the tax contribution of PAYE. However, PwC Surveys on Total tax contribution survey of large companies in South Africa<sup>221</sup> provides this data albeit on a limited scale of a given sample of big companies that participate in their survey. Therefore, we are denied the benefit of national figures that would give a near accurate account of the dynamics.

The 2013 report covered a survey regarding the 2012 and 2013 financial years.<sup>222</sup> The Survey data in the form of tax payments were received from 35 companies (with an average response rate of 33 in each year).<sup>223</sup> In 2013, these companies have borne R48.6 billion in taxes and collected R103.3 billion, an aggregate tax contribution of R152 billion representing 17.6% of total government tax receipts for the year.<sup>224</sup> In 2012, the numbers stood at R49.9 billion in taxes borne and R93 billion in collections, an aggregate tax contribution of R143 billion representing 18.2% of total government tax receipts for the year.<sup>225</sup> Most importantly, of these tax collections for the 2012 and 2013 years, PAYE stood at 27.6% for 2013 and in 2012 at 29.4% of the total taxes collected.<sup>226</sup>

Undoubtedly, PAYE was and is a significant contributor to government revenue at about R28.119 billion 2013 about 3.1% of the total taxes for the year and at R27.342 billion in 2012 about 3.4 % of total taxes for the year. It must be borne in mind that the average percentage of 3.2 % can even be higher considering that only about 35 companies participated out of over 800 000 that are assessed at a time.<sup>227</sup>

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<sup>219</sup> Ibid. Also see - PwC 5th Total tax contribution survey of large companies in South Africa - October 2013.

<sup>220</sup> National Treasury and the South African Revenue Service - The 12th annual edition of the Tax Statistics 2019.

<sup>221</sup> PwC 5th Total tax contribution survey of large companies in South Africa - October 2013.

<sup>222</sup> Ibid at 1.

<sup>223</sup> Ibid.

<sup>224</sup> Ibid.

<sup>225</sup> Ibid at 10.

<sup>226</sup> Ibid.

<sup>227</sup> Ibid at 3.

To illustrate the nexus of these two categories of taxes, first, PAYE is directly linked to the number of employed taxpayers, in other words, given our mischief, by displacing massive jobs robotization will proportionately erode the PAYE tax base as robots or their use thereof currently are not taxed. Secondly, VAT is linked to disposable income the latter being linked to PAYE; this chain will be triggered in the reverse direction resulting in a noticeable decline in VAT collections as the now-unemployed people are without or have little disposable income to spend on taxable supplies on which VAT is chargeable. VAT may also fall on account of decreasing social security payments as government revenues deplete in the face of a rapid increase in demand for social security arising from retrenchments occasioned by robotization and other forms of automation under the 4IR.<sup>228</sup>

b) Knock-on Effect on the Fiscus

The massive displacement of jobs by robotization and other forms of automation causes a double knock-on effect on the fiscus; first, by the erosion of the tax base thereby causing a decline in tax contributions to government and secondly, the displacement causes further strain on the public purse by further extensions of expenditure caused partly by an increase in the number of people reliant on social security. The nature and extent of tax base erosion have been observed in the previous section above. Below we shall discuss factors that are inflating the expenditure bill (in the context of the COVID-19 epidemic) thereby building demand for even more tax. This demand for more tax is the mischief meant to be resolved by the proposals raised in this research.

i. *Social security*

Social security expenditure covers a notable chunk of the government's annual consolidated expenditure. Any offloading of workers to give way for robotization will further stretch the public purse. For the 2019/2020 year, social security spending was at about 15 % of the consolidated government expenditure at R278.4 bn.<sup>229</sup> The COVID-19 pandemic has aggravated the need for social security as more people are being laid off by failing businesses.<sup>230</sup> The President announced a new COVID-19 grant in April 2020 to provide some respite to unemployed persons affected by the epidemic.<sup>231</sup> However, despite this grant being

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<sup>228</sup> Jenni op cit note 119. See – Staff writer ‘South Africa is getting a new Universal Income grant: report’ *Businessstech* 14 July 2020.

<sup>229</sup> Budget Review: South African National Treasury 20 February 2019.

<sup>230</sup> As a direct and indirect result of the COVID-19 epidemic businesses are shedding jobs, examples include EDCON that sent retrenchment notices to 20 000 employees, SABC sent notices to 6 000 employees and SAA is hanging on a threat with failing business rescue attempts.

<sup>231</sup> Jenni op cit note 119.

allocated for about 6 months, the demand for social security is likely to stay as more businesses are automating as they adjust to doing business with minimal contact. It appears that COVID-19 has been the needed catalyst for businesses that were facing resentment of their automating ambitions to stay competitive, we can, therefore, expect more people getting laid off and not being reabsorbed post-COVID-19.<sup>232</sup>

*ii. Rising debts*

The imperative of this research, which is to highlight the tax potential of automation, is further strengthened by the increasing pressure on government revenue. This pressure has been worsened by the COVID-19 epidemic where the government had to borrow more to fund COVID-19 response tuned at R500 bn.<sup>233</sup> This huge debt attracts increasing debt servicing costs that add more pressure on the fiscus.<sup>234</sup> Against the backdrop of low tax collections, the government proposed reviewing tax policy including stricter audits<sup>235</sup> and possible tax increments.<sup>236</sup> This renders the automation tax proposal in this research a crucial and timely proposition for the fiscus. If adopted, this would mean holding back on increasing the existing tax rates, which might appear to add more pressure on certain categories of taxpayers who are already paying some of the highest rates in the world. As will be discussed in-depth under recommendations in Chapter 5, enormous tax savings can be realised if downward adjustments are made to allowable deductions accessible by companies especially those that are automating.

#### 4.2.2 South Africa`s Policy Priorities

This section demonstrates the inherent conflict in the South African policy priorities as their bear upon the automation tax proposal which is the thrust of this research. It suffices to observe this conflict for more clarity on the context in which this research occurs and the circumstances which underline the imperiousness of this research. In a more succinct illustration, South African policies per the National Development Plan, SONAs, National Budget, and Fiscal

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<sup>232</sup> A good example is the banking sector where Standard Bank appear to have found a scapegoat to market their digital services after closing multiple branches in the country causing considerable job losses. This provoked the trade unions in the banking sector who threatened to strike towards the year end in 2019.

<sup>233</sup> Supplementary Budget Review 2020 – South African National Treasury.

<sup>234</sup> Ibid at 36.

<sup>235</sup> Government aims to improve tax collection and administration to achieve fiscal stabilisation. The strategy proposed include: Focusing on international taxes, particularly aggressive tax planning using transfer pricing; Increasing enforcement to eliminate syndicated fraud related to VAT refunds and import valuations; Expanding the use of third-party data to find non-compliant taxpayers; Improving the collection of debt due to the fiscus and ensuring that outstanding taxpayer returns are filed, and liabilities paid.

<sup>236</sup> Ibid at 32. The government considers increments in tax revenue necessary projecting tax increases of R5 billion in 2021/22, R10 billion in 2022/23, R10 billion in 2023/24 and R15 billion in 2024/25. These projections will be confirmed by Minister of Finance during the announcement on tax policy proposals in the February 2021 Budget.

Legislation are conflicting at times such that by pushing one policy objective it causes regression in another policy objective. This is resolved by balancing policy objectives.

In relation to the automation tax propositions, it is understood that South Africa takes the attraction of FDI seriously and President Cyril Ramaphosa in his February 2020 SONA address made strong indications that government is prioritising the timely transition with the 4IR.<sup>237</sup> On the other hand, job creation, poverty alleviation, eradicating inequality and provision of quality education remains a perennial top priority for the government as it seeks to reverse the apartheid injustice legacies.<sup>238</sup>

In the South African case, an uncontrolled opening of the economy to attract FDI and to dive into high tech race would open a pandoras box where more high-tech businesses enter the market and trigger an automation race for the traditional “brick and block” companies who would be labour intensive and carrying huge operating costs. The successes in attracting FDI would have the potential to cause massive job displacements, deepen and economic exclusion. So as much as the proposed automation tax aims mainly to protect the tax base, it has the positive unintended consequences of promoting the protection and the creation of jobs, reduces poverty and drags the rapid rising income and wealth inequality by taxing capital where it is replacing labour.

Below is a discussion of the South African policy priorities and how each aid or is aggravated by automation under the 4IR and their correlation to tax erosion thereby prompting an automation tax proposal. Three of the many national priorities will be relevant for our discussion and that is attracting FDI, job creation & education.

#### 4.2.2.1 Foreign Direct Investment (FDI)

South Africa has maintained a growing appetite for investment since 1994 with erratic trends in the investment trajectory over the years.<sup>239</sup> In the National Development Plan,<sup>240</sup> investment has been seen as one of the main anchors to promote economic growth, eradication of poverty and employment creation amongst other things.<sup>241</sup> With seasons that have seen investor confidence in South Africa decline and a consequential decline in FDI coupled with slow

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<sup>237</sup> State of the Nation Address – 13 February 2020. <https://www.parliament.gov.za/state-nation-address-president-cyril-ramaphosa-13-february-2020>

<sup>238</sup> Ibid.

<sup>239</sup> Rob Jeffrey ‘South Africa needs to attract domestic and foreign investment for economic growth’ EE Publishers 23 May 2016. To further attract investment in South Africa, parliament passed the Protection of Investment Act 22 of 2015 that came into operation on 13 July 2018.

<sup>240</sup> NDP- 2030 op cit note 23.

<sup>241</sup> Ibid at 28 – 30.

economic growth, the policy is frantically seeking to attract investment both domestic and foreign.<sup>242</sup>

Trends show that FDI is shifting from the value-addition sector such as mining and manufacturing and into the service sector mainly in the banking sector and these services sectors are getting more digitalised.<sup>243</sup> The enormous appetite for FDI renders South Africa susceptible to technologically intensive investments since no industrialisation legacies exist to act as an impediment for new investment.<sup>244</sup> That potential growing trend in intensively digitalised and robotized businesses which in the banking sector are represented by Tyme Bank, Bank Zero, Discovery Bank<sup>245</sup> triggers a paradigm shift towards automation among the existing “brick and block” businesses such as Standard Bank<sup>246</sup> and the result is massive job displacement as businesses seek to survive and outcompete by taping on efficiencies occasioned by automation.

The results of the above-stated scenario, assuming there have been considerable successes in attracting FDI, is a notable growth of the economy without a corresponding growth in employment and tax revenue. Contrary to beliefs that corporate tax, on the now increased profits after slashing the wage expense, will offset losses on PAYE because of job displacements,<sup>247</sup> such additional profits may be extinguished by deductions and allowances – subject to anti-tax avoidance mechanisms. The Report by National Treasury and SARS on Tax Statistics reveals the statistics on 814 151 companies assessed for CIT as at the end of August 2019 for the tax year 2017.<sup>248</sup> It shows that 24.3% had positive taxable income, 48.3% had taxable income equal to zero and the remaining 27.4% reported an assessed loss.<sup>249</sup> These indications show that more of these companies claimed assessed losses than those who paid tax and almost 50% had no taxable income.

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<sup>242</sup> Rob op cit note 272; NDP – 2030 op cit note 23 at 21.

<sup>243</sup> Rob op cit note 272.

<sup>244</sup> WEF TIPS Report op cit note 26 at 16. Also see - Arntz, Gregory, and Zierahn op cit note 16 at 18.

<sup>245</sup> Yolandi Groenewald ‘New shots fired in banking wars’ Mail & Guardian 24 May 2019. Also see – Londiwe Buthelezi ‘SA’s banks: what to watch out for in 2020 as digital rivalries ramp up’ *Fin24* 27 Dec 2019.

<sup>246</sup> Staff writer ‘Standard Bank on closing branches: We can’t stop the progress of technology’ *Bussinesstech* 30 January 2020 - in 2019, Standard bank close more than 100 branches in South Africa and retrenched hundreds of its employees in a drive to digitalise. Standard Bank Group Chief Executive Sim Tshabalala responding to allegations that Standard Bank must preserve jobs responded by saying that businesses should not resist technological progression and that by keeping the closed branches open it would be a waste of resources as many of the banks customers rarely visit the branches.

<sup>247</sup> Oberson op cit note 14 at 29.

<sup>248</sup> National Treasury – Tax Statistics op cit note 250.

<sup>249</sup> Ibid.

Therefore, the massive potential for utilising assessed losses to minimise tax liability will prevent the offset of tax losses on PAYE. Whether there is a direct correlation between the growth of profits and CIT is a subject for further inquiry. However, the analysis so far shows that the motives for displacing labour with automation points to the reduction of tax liability. Since the policy is less likely to stop the 4IR, tax policy must contemplate adaptations in the new environment to tax automation either directly or indirectly.<sup>250</sup>

#### 4.2.2.2 Job Creation

Another of South Africa's governance policy priorities as expressed in the NDP is employment creation.<sup>251</sup> According to the NDP projections, South Africa aims to increase employment from 13 million in 2010 to 24 million in 2030.<sup>252</sup> This objective, however, seems to be slipping away in light of the COVID-19 epidemic that led to massive offloading on jobs as businesses fall deep into distress.<sup>253</sup> Also within the sphere of this research, the job creation target is under threat from robotization and other forms of automation under the 4IR wave.

In 2019, the banking sector went into digitalisation overdrive with the entrance of high-tech banks like Tyme Bank.<sup>254</sup> This prompted the traditional "brick and block" banks like Standard bank to close a sizeable number of branches countrywide thereby laying off many employees inviting threats of industrial action.<sup>255</sup> In 2020, Edcon served retrenchment notices to 20 000 employees,<sup>256</sup> this is just but one of the numerous cases of massive job displacements occasioned by contributions by COVID-19 and digitalisation pressure.

The above illustration of the grim prospects of attaining 2030 job creation targets points to the imperative of a measured approach towards intensively automated FDI in the country and alternatively the urgency in adjusting the tax regime to tax automation as proposed in this research and other cited studies.<sup>257</sup> The latter approach is more favourable, cognisant of the fact that the 4IR cannot be stopped but can be shaped. Therefore, instead of sieving FDI to be attracted and allowed rather South Africa must open doors to FDI targeting high-tech initiatives with a corresponding framework of taxing such automation. This would be done

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<sup>250</sup> Oberson op cit note 14 at 112 & 124.

<sup>251</sup> NDP – 2030 op cit note 23 at 15, 17-18.

<sup>252</sup> Ibid at 24.

<sup>253</sup> Lameez op cit note 118. Londiwe op cit note 118.

<sup>254</sup> Yolandi op cit note 278; Also see – Londiwe op cit note 279.

<sup>255</sup> Staff writer 'Standard Bank on closing branches: We can't stop the progress of technology' *Bussinesstech* 30 January 2020

<sup>256</sup> Nompu op cit note 118.

<sup>257</sup> Oberson Taxing Robots op cit note 14 at chapter 9. Also see - Joao, Sergio, and Pedro op cit note 7 and Valentine & Viktoriia op cit note 2.

with a view to providing retraining programmes and funding education in high-tech sectors to enable absorption of its workforce in the medium and long-term.

Job creation is not the main theme in this study; however, it is intricately linked to the automation tax proposal in that with high employment the fiscus enjoys increased tax revenue on VAT and PAYE and the pressure on social security is lower. Any displacement of jobs creates a reverse scenario thereby necessitating proposals such as this automation tax proposal in attempts to fill up the gap in tax revenue collectable that no increment in CIT will offset.

#### 4.2.2.3 Education

Education is a very important factor in our inquiry and remains on the top priority list of the South African government's transformation and development agenda as spelt out in the NDP.<sup>258</sup> In connection to this inquiry, Arntz *et al* found in their study that countries with a huge proportion of low-skilled, low income and less-educated workers are likely to experience relatively higher disruptions in the labour market from automation.<sup>259</sup>

Preliminary studies show that routine jobs done by low-skilled who are invariably the low-income earners are highly automatable than tasks that are usually done by highly qualified labour which invariably includes some creative, artistic, technological tasks.<sup>260</sup> Having observed this, South Africa is known to have a predominantly low-skilled workforce and significant shortages of skills in the high-tech, scientific and business sectors.<sup>261</sup> These skill shortages prompted the government to court relevant skills through the immigration critical skills policy.<sup>262</sup>

Two points are crucial to this research; first, that South Africa is likely to experience seismic displacements in the labour sector due to automation owing to its predominantly low-skilled workforce thereby creating a risk of massive losses in PAYE. Secondly, more than before South Africa must contend with the imperative of reskilling the laid-off and to provide high-quality education in critical skills areas, particularly, in technology equipping a new breed of a workforce that is compatible with the new world of work emerging under the 4IR. Both scenarios impose a strain on the fiscus, the former erodes tax revenue by way of PAYE and the latter stretches government expenditure. This double negative phenomenon underscores the

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<sup>258</sup> NDP – 2030 op cit note 23 at 17 – 19.

<sup>259</sup> Arntz, Gregory, and Zierahn op cit note 16 at 25.

<sup>260</sup> Ibid at 25. Also see - Joao, Sergio, and Pedro op cit note 7 at 1; Valentine & Viktoriia op cit note 2 at 15.

<sup>261</sup> The South African Migration Project 'Losing our minds: Skills Migration and the South African Braindrain' – *Migration Policy Series 18* 2000 at 9 and 14.

<sup>262</sup> Ibid at 54.

importance of the automation tax proposal stated herein. Capital is emerging over labour and tax policy must catch up in its taxing of capital.<sup>263</sup>

#### 4.3 Conclusion

After a comprehensive analysis in this Chapter, it is without a doubt that the robot tax debate is relevant and crucial to emerging economies like South Africa and other developing countries. The debate falls within the broader scheme of the OECD BEPs theme and emerging economies and developing countries ought to stay abreast with these developing trends. Until recently, the robot tax debate has been confined to developed countries with developing countries warming up to the broader engagement on the 4IR phenomenon albeit at a worryingly very slow pace. This lack of a sense of urgency is out of sync with the socio-economic circumstances of emerging economies like South Africa.

It has been established that South Africa and other emerging economies are at greater risk of massive job displacements and resultant distortions on the government revenue and spending. This is owing to a predominantly low-skilled workforce (that is doing highly automatable tasks), relatively low investment in technology and absence of previous industrial revolution legacies, and a high appetite for FDI.

These three conditions create a perfect ecosystem for automation and massive job displacements. However, the highlight underlining the imperative of tax policy readjustment towards the proposed automation tax lies in the growing need for revenue occasioned by the COVID-19 pandemic, growing social security demand by the displaced employees, and an astronomical budget needed to facilitate reskilling and education in fields and skills most aligned to the 4IR for long term sustainability.

In the Supplementary Budget of 2020, the government identified tax policy as a core function in its strategy to deal with the COVID-19 pandemic, South Africa's poor economic growth and debt woes. Therefore, in addition to the identified tax policy strategies, taxing automation is a sustainable solution for both the medium term and long term. The automation tax proposal scores on many policy objectives including the inclusivity and transformation agenda by protecting the previously disadvantaged groups who after having gained constitutionalism within 3 decades face the risk of economic obliteration as capital sweeps in. Automation tax is a constitutional imperative.

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<sup>263</sup> Joao, Sergio, and Pedro op cit note 7 at 33 & 39.

## CHAPTER 5

### RECOMMENDATIONS AND CONCLUSION

#### 5.1 Introduction

An attempt was made from chapter 1 to chapter 4 to interrogate the core questions and related issues arising from the stated research topic for this thesis. Chapter 1 laid down the framework of this endeavour and stated the delimitations of this study. This chapter 5 is a consolidation and condensation of all the issues explored and the findings thereof, and a statement of recommendations pointing the way forward for South Africa and in the ultimate, to draw a succinct but comprehensive conclusion of the study. These components will be dealt with below.

#### 5.2 Findings

The findings outlined under the headings below are responses to the research questions stated in chapter 1 of this thesis. In summary, the questions include the following: what is the impact of the 4IR on labour and on taxes; is the robot tax viable and adequately solve the 4IR-tax dilemma? whether the robot tax debate is relevant to South Africa as a developing country? What tax policy response should South Africa mount to counter the negative impact of the 4IR? The findings below answer to one or more research question under a broad heading in cases where the questions are inextricably connected.

##### 5.2.1 The 4IR in South Africa and other developing countries

One of the questions that were to be answered is on origin, nature and hallmarks of the Fourth Industrial Revolution and the status of its progression in South Africa and in other developing countries. The analyses in chapter 2 and chapter 4 show that the 4IR represents the convergence of technologies at a very rapid pace and combining the physical, biological, and technological spheres of life. It manifests in technologies such as IoT, AI, robotization, 3D printing, big data and blockchain technologies that are collectively captured by the concept of “automation”.

In the short term, developing countries are generally not prepared to be a significant player in the 4IR race. However, emerging economies like South Africa are better positioned as they boast relatively established financial systems, investment culture, and political stability. This, however, exposes South Africa to some of the greatest risks and distortions arising from 4IR. A common denominator amongst developing countries is the negative socio-economic context occasioned by a colonial past that act as an impediment to progression through all the

4 industrial revolutions. Owing to poor economic performances, deep poverty, widening inequality, high unemployment, a predominantly low-skilled and low-educated workforce developing countries are experiencing virtually all previous and the current industrial revolution simultaneously.

The establishment of the commission on Fourth Industrial revolution by President Cyril Ramaphosa in 2019 is a positive and critical move to secure and propel South Africa into the 4IR with a policy framework that is conscious and measured towards the 4IR technological externalities. However, more need to be done, a more intense programme in the commission beyond the current bi-annual meeting setup which fails to capture the policy urgency to the looming crisis.

#### 5.2.2 Job displacements under the 4IR

Under this heading, the question that stood to be answered is on the nature and extent of the impact of the Fourth Industrial Revolution on manual labour in South Africa and other developing countries. The analyses proffered in chapter 2 and 4 dispels any doubts that 4IR technologies are displacing labour. Readily available evidence relating to the South African labour sector has been provided to support this finding. Estimates are that 35 per cent of all jobs in South Africa are currently at risk of total automation.

However, the extent of job displacements emanating from automation differs with per country depending on the extent of its progression into the 4IR. What is apparent is that emerging economies like South Africa will experience the greatest disruption from 4IR in the labour sector owing to a litany of factors such as the absence of extensive technological legacies, investment policy on the offensive, predominantly low-skilled and low-educated workforce.

These projections are exacerbated by the COVID-19 pandemic that is catalysing migration into automation such that the creative destructive potential of the 4IR is seriously impaired. The full extent of job displacement potential of the 4IR is yet to be seen with the progression of the 4IR. Numerous studies on the subject rely on assumptions and predictions in the absence of empirical data. The numbers can vary with time in either direction but as things stand now policy cannot wait for the crisis to explode unchecked. Even the employment creation targets spelt out in the NDP are far from reach with the current trajectory of job displacements.

### 5.2.3 Erosion of the tax base

Another research question raised in chapter 1 is whether a nexus exists between the extent of job displacement and losses in PAYE, Value Added Tax and other related taxes that flow from employed taxpayers. There is no doubt to the existence of a nexus between these variables once actual and potential job displacements have been proven. The outstanding question is on the magnitude of such tax losses and whether it warrants policy intervention.

The current projections of job displacements as discussed in chapter 4 are quite significant and will be detrimental to the fiscus due to the erosion of considerable tax base by way of PAYE, VAT, and other taxes payable by labour as PIT or transactional or consumption taxes.

The challenge of base erosion is real and global as would be seen in efforts of the OECD in its BEPs Action 1 plan on taxing the digital economy. Automation is instrumental to facilitate BEPs as many automating companies in developing countries are invariably foreign and multinational corporations. It is, therefore, crucial to protect the tax base domestically as well.

The pressure on the South African fiscus is apparent in tax policy hints spelt out in the 2020 Supplementary budget. The government proposed a spate of tax adjustments including the increase of tax rates to fund the COVID-19 response, service debts and provide social security whose demand rose abruptly. In addition to these tax policy adjustments, and in line with the broader theme of the OECD BEPs Action 1, the South African government must align fiscal legislation to this new era by subjecting automation to tax. This will be a sustainable solution to the 4IR – tax dilemma and associated government expenditure demands.

### 5.2.4 Robot tax debate

Three questions stood out for an exploration in relation to the robot tax debate. The first relates to the essence of the robot tax. The second question is on the extent to which the robot tax proposal is feasible, appropriate, and adequate as a response to the erosion of the tax base because of the 4IR. The third question focus on the definitional controversy associated with the concept of a ‘robot’ as it relates to AI, automation, and digitalisation amongst other 4IR technologies.

On the first question, the robot tax debate essentially revolves around the idea of taxing robots since they are taking jobs thereby eliminating taxes that would have been paid had the

displaced people continued to be employed. On the other hand, opponents to the robot tax idea argue that such a tax discourage innovation and that new jobs will be created thereby restoring balance in the labour sector. The latter assertion is not necessarily true as the nature of 4IR diminishes its creative destructive potential compared to previous revolutions.

To the second question, I find that the robot tax proposals is a positive step towards taxing destructive technology, it is practical but inadequate. The inadequacy arises from the limited scope of the concept of a 'robot'. A quick observation of the causes for job displacements shows that numerous 4IR technologies are the cause and robots are but just one cause. Therefore, for a holistic solution, a broader 'automation' tax is more appropriate and can be designed to match up with varied technologies.

Lastly, the concepts of 'robot', 'automation', 'digitalisation' and 'AI' are not synonyms. This position is reaffirmed by the findings on the second question where limitations of the meaning attributable to the concept of a 'robot' render a robot tax proposal inadequate. the concept of 'automation' is broader to encompass virtually all 4IR technologies while AI as a component of software would need to be embodied in a physical object to constitute a robot. Digitalisation also involves the use of technology which at times does not amount to artificial intelligence in the true sense of the word.

#### 5.2.5 Distortion of policy objectives

This thesis is anchored on the inquiry on the relevance of robot tax debate to developing countries, in particular South Africa taking into cognisance the current socio-economic circumstances and policy objectives. The extensive analysis undertaken in chapter 4 shows that the robot tax debate is not only relevant but is imperative for developing countries like South Africa. This relevance and urgency arise from the distortions currently being felt in the labour sector and by the fiscus.

The robot tax debate focuses tax policy to the potential of the 4IR technologies to erode tax revenue despite its inherent limitations in scope. Developing countries desperately need ever-increasing tax revenue to fund government expenditure, so is the case with South Africa. The demand for more tax revenue is aggravated by the COVID-19 pandemic where the government is battling to mount a proper response to the loss of lives across the country and to

provide social security. Like many other developing countries, South Africa took a significant debt which added servicing costs to the expenditure bill.

As observed in chapter 4, the South African government, as reflected in the NDP, various SONAs and Budgets, is grappling with the attainment of policy goals that include provision of housing, education, health, social security grants, employment creation and reskilling workers. To respond to the tax revenue shortfalls, the government announced in the 2020 Supplementary Budget of considerations to increase tax rates. And this is partly due to job displacements caused by automation and catalysed by COVID-19. Attempts to raise tax rates which are already high will worsen the emigration of investment the country is experiencing thereby further causing harm to the economy and society. An automation tax will resolve the tax revenue shortfalls by maintaining and extending the tax base as well as avoiding raising of tax rates that are already amongst some of the highest in the world.

### 5.3 The way forward for South Africa.

While recognizing the relevance and imperative of the robot tax debate as a burning splint to ignite tax policy reform, this research considers more appropriate a broader debate in the form of an automation tax debate. The potential for massive job displacement and consequential erosion of a significant portion of the tax base cannot be overstated in South Africa. It has been illustrated that job displacements are not only a result of robotization but are a collective effect of many 4IR technologies hence a more holistic ‘automation tax’ approach is preferred.

This study is one of the first, in a developing country context, to attempt a truly comprehensive automation tax regime design that will canvass technologies including digitalisation, robotization, 3D printing, AI and IoT. The proposed automation tax regime design also addresses the implementation and other critical policy issues connected therewith. This proposal is a step forward to provoke policy debate and is by no means decisive as many variables come into play in considering the feasibility of each measure. Below is an outline of the proposed automation tax design and its constituent elements.

#### 5.3.1 Automation tax regime design

Only a few scholars have attempted to examine and explore tax designs to counter the 4IR- tax dilemma. Of those who have done so, the focus is restricted to the robot – tax interaction or a limited focus on automation. Here, the author, for the first time presents a holistic automation

tax regime design proposal which the South African government may consider. The designs discussed below can be considered separately or in composition.

#### 5.3.1.1 Tax on imputed income on robots

This automation tax is imposed on companies using robots. The tax is calculated as a percentage of income imputed on robots with reference to income that would have been earned had manual labour been employed to do a task now done by a robot. This design is easy to apply where distinct units of robots are identifiable, and income can be attributed to each. However, income can be imputed in the collective sense where 3D printing or digitalisation has displaced labour the income which could have been earned by labour can still be attributed to the new technology despite the absence of distinct units or a physical form. A tax can be charged on that collective imputed income to replace lost taxes.

#### 5.3.1.2 Custom duty

This tax design envisages the imposition of a duty in terms of the Customs Duty Act 30 of 2014<sup>264</sup> on the importation of robots and related components into South Africa. This will act as both a way of raising revenue and to slow down the progression of the 4IR in the country while creating space for local industries to explore the manufacturing of robots that can be used in the country thereby creating employment and reabsorbing labour. An optimal tax rate must be favoured depending on the elasticities of demand of each imported item so as to maximise on tax revenue while avoiding an unintended embargo. This design applies to physical objects that would pass through entry points and payable by the importer.

#### 5.3.1.3 Pigouvian tax/Sin tax/excise duty

This tax is imposed to discourage negative externalities resulting from technology. These externalities come in the form of massive displacements of jobs in a country like South Africa plagued by socio-economic challenges occasioned by an oppressive historical past that economically disempowered the indigenous people. Due to the immorality attached to actions that sacrifice labour for greater profit gains, without violating any law and while it is equally impossible to stop such technologies, a sin tax is imposed on the manufacturer of such technologies be it software units, robots, or AI-driven systems and or on the final user of such technologies. This tax will not likely discourage innovation as technology is as critical to businesses as cigarettes are to smokers and as alcohol is to drinkers.

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<sup>264</sup> Customs Duty Act 30 of 2014.

#### 5.3.1.4 Registration levies

Another way to raise revenue is to create registration requirements, that include a fee. The registration requirements will target selected technologies including software to maintain a database that will provide real-time information on the extent, nature, and distribution of technologies across sectors. In addition to raising revenue, a secondary function is to inform policy with the provision of accurate data on automation coverage for a point in time.

#### 5.3.1.5 Limitation of deductions and allowances

This indirect automation tax measure entails the limitation of deductions and allowances afforded to taxpayers on expenditure incurred in acquiring technologies and or robots that will be used in trade. The South African Income Tax Act (ITA) allows taxpayers to deduct, in terms of section 12B & 12C, an expenditure actually incurred be it in the acquisition of assets that may include AI software in a specific sector.<sup>265</sup> The sectors that would be affected by these limitations include manufacturing, packaging of agricultural products, farming, storage, and renewable energy sectors. However, as will be discussed in the next section, certain exemptions will apply in consideration of policy objectives.

#### 5.3.1.6 VAT on digital products

A tax design such as this already exists in South African fiscal legislation under section 14 of the VAT Act.<sup>266</sup> The measure imposes VAT on imported digital products. Currently, the burden to report and pay VAT lies with the recipient of the imported taxable supplies. This is rather a strange arrangement with infinite avoidance and evasion opportunities such that from the insertion of the proviso virtually everyone who engages in online shopping is unintentionally a tax evader. This design echoes the call for foreign suppliers of taxable supplies to register as VAT vendors.<sup>267</sup> In the alternative, the South African government may appoint banks and payment platforms through which international payments are made to collect VAT. Such a move will save up on significant VAT losses as online shopping is threatening a huge tear into the clothing, electronic gadgets, and electrical appliances market.

#### 5.3.1.7 Taxing robots as separate taxable subjects

This design requires a policy appetite for a paradigm shift in the treatment of robots from mere production equipment to affording robots a separate legal persona for the purposes of tax. This

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<sup>265</sup> Income Tax Act 58 of 1962 – section 12B and 12C.

<sup>266</sup> Value-Added Tax Act 89 of 1991 – section 14 – Tax on imported services.

<sup>267</sup> Foreign Electronic Service Entities were required to register for VAT in SA where the total value of electronic services supplied in SA exceeded R50 000 (compulsory registration, effective for the period 1 June 2014 to 31 March 2019) in terms of section 23(1A) of the VAT Act.

manoeuvre is analogous to the affording of personality status done to companies, trusts, and deceased estates. Once the status controversy is dealt with a tax will then be imposed on robots as both earners of income and as consumers of taxable supplies and producers of taxable supplies. Therefore, VAT and normal tax can be charged. The owner or person using the robot will assume the role of the representative taxpayer.<sup>268</sup> It suffices to note that such a design is incompatible with technologies without a physical embodiment therefore its implementation would raise neutrality and equity issues.

### 5.3.2 Implementation considerations

Several policy considerations must deal with in the implementation of the above-stated automation tax designs. By affecting the implementation modalities discussed below, unintended negative effects are minimised. These modalities further shed more clarity on the mechanics of the proposed tax designs.

#### 5.3.2.1 Exemptions and Deductions

Various insertions will need to be made to provide for exemptions across the designs proposed from custom duty, excise duty, normal tax, and VAT. These exemptions can mirror the exemptions currently provided for example allowances on education, research and development, and critical sectors such as mining and farming.

#### 5.3.2.2 Turnover threshold system

The use of turnover as a base for thresholds is not foreign to South Africa. Small businesses whose turnover is below a stipulated amount are afforded lenient tax treatment.<sup>269</sup> In this context, a turnover system is used to indicate on which taxpayers a given tax and a particular rate applies, more like the PIT graduated tax rates. In our case, since the object is either to protect taxpaying labour or collect a tax on automation where labour has been displaced, taxpayers in the same sector and of approximately the same size will be taxed depending on the number of employees they maintain at given levels of turnover thresholds. The mischief being dealt with is that of vertical and horizontal equity and neutrality. It is unfair to impose the same tax rate to a labour-intensive ‘brick and block’ taxpayer and an automation-intensive taxpayer and between such taxpayers with the smallest turnover and another with a significant

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<sup>268</sup> The owner of the owner of the Robot will assume a representative taxpayer capacity adding to the list of representative taxpayers as defined in section 1 of the ITA.

<sup>269</sup> Sixth Schedule – ITA.

turnover. Such attempts to maintain balance in the economy adds complexity to technical fiscal legislation, however, it is necessary.

### 5.3.3 Critical issues

#### 5.2.3.1 Tax avoidance

The introduction of new taxes and changes to tax regimes comes with the potential for tax avoidance and evasion as taxpayers seek to shield themselves from increasing tax liability. The existing GAAR in the ITA will apply to the proposed regime and new SAARs may apply to specific tax designs. The introduction of this new regime may trigger the need to negotiate and conclude Protocols to a wide network of DTAs that South Africa has with other countries on the avoidance of double taxation, double non-taxation, and tax avoidance.

#### 5.3.3.2 International tax competition

In a world fiercely competing to gain an edge in the global economic arena, the introduction of a new tax regime, especially one that appears to increase the tax burden, triggers competition. Other countries may see an opportunity to attract foreign direct investment and to attract corporates to either move their headquarters or place of effective management into those jurisdictions to appropriate taxing rights. For the proposed regime to work with minimal risk from international tax competition, South Africa must, together with other developing countries, advocate for the tabling and consideration of this regime at a multilateral forum like the UN and the OECD. This way, countries will agree on how such a regime should be implemented and what assistance and cooperation other countries may offer with minimum risk of disruptive unilateralism.

### 5.4 Conclusion

The impact of the 4IR on labour and on tax regulation can no longer be ignored, equally the relevance of the robot tax debate in South Africa and other developing countries cannot be overstated. The age of the 4IR, coupled with a globalised world where top contenders in business are multinational corporations tax resident in tax havens and other developed countries, is threatening to erode the tax base significantly in developing countries. The 4IR has also added complications to tax regimes and implementations thereof where the digital economy spans across national boundaries. This trend increases the need for a multilateral approach spearheaded by forums like the OECD and the UN where initiatives such as the BEPs project and a network of DTAs allows states to track account for their tax base.

The threat of erosion of the tax base due to the displacement of labour by the adoption of various 4IR technologies is magnified in emerging economies like South Africa. This is due to the existence of a predominantly low-skilled workforce, absence of extensive technological legacies, a sophisticated financial system, and a policy appetite to attract and foreign direct investment. The looming crisis becomes apparent in South Africa due to growing unemployment, poverty, growing inequality, and mounting pressure on the fiscus to provide social security. The COVID-19 pandemic has exacerbated the crisis by crippling businesses and forcing the government to borrow extensive loans to fund the health response.

The robot tax debate is drawing the attention of policymakers and scholars to the 4IR-tax dilemma and laid a foundation for an automation tax debate advanced which is advanced by this study. The latter debate addresses the same problem as under the former but with a broader scope. The criticality of tax policy focus on the 4IR-tax dilemma is underscored generally by the establishment of the Commission on Fourth Industrial Revolution by President Cyril Ramaphosa in 2019 and, by the tone expressed in the 2020 Supplementary Budget.

In an era where the economy is contracting, tax collections are shrinking and the expenditure bill rapidly expanding, the government hinted on a spate of tax interventions that include a hike on tax rates. The government should implement tax policy that will slow down outward migration of investments. This study presents a more sustainable solution to the tax revenue challenge by proposing an automation tax regime design with many elements as discussed above.

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