

The Nexus of Taxation for Artificial Intelligence According to the Organization of Economic Cooperation and Development and United Nations Model Tax Conventions.

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Abstract

Artificial Intelligence (AI) technology is quickly developing and is estimated to soon replace humans in specific job functions. The replacement of human jobs by AI creates two core international taxation consequences for the state in which the AI is located: (a) how artificial intelligence should be defined for tax purposes; and (b) how the income generated by AI can be taxed in the state in which the AI operates (at source). By assessing the UN (United Nations) and OECD (Organization for Economic Cooperation and Development) Model Tax Conventions, international case law and academic literature, the aim of this dissertation is to determine how states may tax AI at source. AI should be able to act independently and should be understood to be the combination of software and robotics. This dissertation aims to classify AI within the framework of the existing Model Conventions for the elimination of double taxation. The advances in technology and adoption of the new technologies exceed the pace at which national tax systems and the international tax framework can advance. Thus, seeking to fit the taxation of AI and its use within the existing framework could provide a real time solution to the tax challenges presented by the new technologies. The existing nexus for taxation is source and residency under state law, as recognised by the Model Conventions. The taxation of AI as business profits is considered under articles 7 and 5 of the Model Conventions for taxation at source. Provided states are willing to extend the current definition and provided the taxpayer controls the AI based on jurisprudence studied, it may be possible for AI to constitute a Permanent Establishment (PE). The taxation of AI for business profits does not cover the deficit in tax revenue caused by the shift of employment income to business profits, through the replacement of human employees. AI is not included in the definition of a 'person' in the Model Conventions. AI therefore cannot presently be taxed at source based on residency. To be taxed as an employee, AI would have to classify as a "person" and a "resident" according to the Model Conventions and treaties based on the models. For these definitions to be extended, AI will need to be defined and the source and residency rules in the treaty will need to be apply to AI. AI does not fit cleanly into the provisions of the current Model Conventions for taxation at source when owned by a non-resident entity. Provided the definitions or articles can be briefly extended or interpreted widely, it would be possible for AI to be taxed under the Model

Conventions and treaties based on these articles until such time as the legislation or definitions are amended.

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Chapter One: Introduction

1.1. Background, Research Problem and Objectives

In considering the historical role of technology in the workplace as technological advances are introduced to work environments, the types of jobs available and the pay associated with such jobs has changed.¹ A common concern amongst employees today is the possibility that artificial intelligence will replace human jobs.² The current basis for taxation under the United Nations (UN) and Organization of Economic Co-operation and Development (OECD) Model Tax Conventions and is residence or source.³ Although the Model Conventions are not directly binding on states and treaties can widen the nexus of taxation through agreement beyond source or residence, in most states domestic laws comply with this basis for taxation.⁴ The core basis for international taxation rights as allocated by tax treaties is therefore typically based on source and residence taxation. The aim of this dissertation will be to assess the taxation of Artificial Intelligence (AI) in the context of the definition of “resident” to determine when/how AI can be taxed in a source state in relation to the Model Tax Conventions.

Studies predict that by 2035 AI could increase the economic output of countries by between 11 and 37%, depending on the level of development of the state’s economy.⁵ A 2013 study by the Organization for Economic Cooperation and Development on automation, skill use, and training indicates that 14% of workers are at high risk of being replaced using AI, with a further 32% seeing substantial job changes as AI is

¹ Ben Vermuelen, Jan Kesselhut, Andreas Pyka and Pier Paolo Saviotti ‘The Impact of Automation on Employment: Just the Usual Structural Change?’ (2018) 10 *Sustainability* 1161 at 3.

² Ibid.

³ *OECD Model Tax Convention on Income and on Capital: Condensed Version 2017* (21 November 2017); United Nations Model Double Taxation Convention between Developed and Developing Countries 2017.

⁴ The United States and Eritrea tax on the basis of citizenship not residence; Foreign Account Tax Compliant Act, 2010; UN Human Rights Council, Report of the detailed findings of the Commission of Inquiry on Human Rights in Eritrea, 5 June 2015, <http://www.ohchr.org/EN/HRBodies/HRC/CoIEritrea/Pages/ReportCoIEritrea.aspx>, (para 440). Date accessed: 10 May 2019.

⁵ Accenture, ‘Why Artificial Intelligence is the Future of Growth,’ available at <https://www.accenture.com/futureofAI> [accessed on 16 January 2018].

introduced.⁶ It is likely that the introduction of AI will change the way business is carried out, based on the speed at which technological advances are being made. In consideration of the 2017/2018 Tax Year in South Africa 38.1% of the total revenue collected was from personal income tax (PIT).⁷ 74.3% of the PIT was derived from income from salaries, pensions, overtime, and annuities.⁸ Consequently, in one taxation year 28% of the total revenue collected by the South African Revenue Service (SARS) was derived from employment.⁹ If AI replaces employees there is a risk of decreased tax revenue as employee numbers decrease. The risk of a decreased tax base is only relevant should new jobs not be created with the introduction of AI. However, as AI has a strong software component the ownership, control and emergence of new jobs does not require a geographic tie to the location in which the employees were replaced. Therefore, if AI replaces jobs in South Africa without new jobs created in South Africa, the current source- based taxation system applicable to non-residents in South Africa¹⁰ creates the risk of a tax deficit. A deficit in tax revenue could result in less funds being available to government for public expenditure. Further, there is no consensus that if new jobs are created that the speed in which these jobs emerge will be able to keep up with technological developments and the jobs lost increasing the loss in tax revenue from income.¹¹

In 2020 the debate over the necessity of taxing robots entered the mainstream media in new and interesting ways given the economic impact of the Global Covid-19 Pandemic.¹² The so-called ‘robot tax’ is a commonly argued response to the potential job loss associated with the projected increase and development of artificial intelligence to replace human employees and the correlative decrease in taxable revenue from employment income. The debate around the taxation of robots, or AI,

⁶ L. Nedelkoska and G. Quintini "Automation, skills use and training" (2018) *OECD Social, Employment and Migration Working Papers*, No. 202, OECD Publishing. Paris, <https://doi.org/10.1787/2e2f4eea-en> at 1.

⁷ Republic of South Africa Department of National Treasury and South African Revenue Service (SARS) "2017 Tax Statistics" available at <https://www.sars.gov.za/Media/MediaReleases/Pages/20-December-2018---Tax-Statistics-2018.aspx> [Accessed on 10 February 2019].

⁸ This includes wages and other remuneration for work completed; *Ibid* at 29.

⁹ *Ibid*.

¹⁰ South African Income Tax Act 58 of 1962 at s1 ‘Gross Income’ definition.

¹¹ Ben Vermuelen et al. *op cit* note 2 at 2.

¹² S.C. Stuart, Should Robots Pay Taxes, available at <https://www.pcmag.com/news/should-robots-pay-taxes> [accessed on 30 July 2021].

has centred on whether such a tax should be levied from a policy perspective.¹³ At present little focus has been placed on the practical implications of such a tax, and the consequences that such taxes may have across borders. The OECD has further compiled a study on state policy considerations with regards to AI and at present the focus has been on ensuring access to adoption of AI across different business spheres from large corporations to small and medium sized businesses. Further to looking at assisting in a more uniform adoption of AI through policy and funding considerations with regards to the adoption of the technology, government policies have focused on providing relief and tax breaks to incentivize innovation in the field of AI.¹⁴ In early 2017, the EU outright rejected the notion of a permanent robot tax, yet the debate on whether a universal robot tax should apply or how AI should be taxed has become increasingly critical in the four years since the rejection.¹⁵ However, as advances are made in the field of AI when the AI itself creates value, there may not be an exchange of money, no taxable entities could be involved (as AI can and will be built to act autonomously) and it may become increasingly challenging to determine a physical or source nexus for the taxation of the AI. AI should and will be smart enough to adapt to find its own strategies to minimize taxation within a tax jurisdiction.¹⁶ Given these future concerns, it will be critical for tax policy to consider too not only tax robots as they exist now, but to have the flexibility to adapt to fit advances in how AI functions into existing tax frameworks to avoid loss of tax income as AI advances (as evidenced by the global developments on the digitalised economy). For this reason, by focusing on fitting AI into existing taxation frameworks, an immediate solution is provided, even in the short term, that could already build the framework for future flexibility should states and policy makers define more concrete taxation parameters for AI.

A solution to replace the loss of revenue from employment income tax could be for a state to increase the taxation of business profits where AI replaces employees. Under

¹³ Kovacev, Robert J. (2020) "A Taxing Dilemma: Robot Taxes and the Challenges of Effective Taxation of AI, Automation and Robotics in the Fourth Industrial Revolution," *The Contemporary Tax Journal*: Vol. 9: Iss 2, Article 4 at 24.

¹⁴ OECD 'National policies for Artificial Intelligence: What about diffusion?' in OECD (ed) *The Digital Transformation of SMEs, OECD Studies on SMEs and Entrepreneurship* (2021) available at <https://www.oecd-ilibrary.org/sites/cc3a9728-en/index.html?itemId=/content/component/cc3a9728-en#snotes-d7e32298> [accessed on 11 October 2021].

¹⁵ Vikram Chand, Svetislav Kostić and Ariene Reis 'Taxing Artificial Intelligence and Robots: Critical Assessment of Potential Policy Solutions and Recommendation for Alternative Approaches – Sovereign Measure: Education Taxes/Global Measure: Global Education Tax or Planetary Tax' (2020) 12 *World Tax Journal* at 711-761 at 735.

¹⁶ Megan Jones and Bradford S. Cohen 'Can AI Be Taxed?' 7 May 2020 available at <https://www.withersworldwide.com/en-gb/insight/can-ai-be-taxed> [accessed on 27 August 2021].

the current framework the taxable income shifts from employment income to business income.¹⁷ The shift in revenue streams even where the source state retains the ability to tax AI will create a revenue deficit. From 2000-2018 there has been a global trend whereby corporate tax rates have been lowered by states. The global decrease in corporate tax rates is the so-called ‘race to the bottom.’ This ‘race to the bottom’ purports to encourage foreign investment and economic growth through states lowering corporate taxation rates.¹⁸ Big corporations commonly engage in avoidance schemes to ensure less corporate income tax is paid. State reforms against avoidance schemes such as the OECD’s Base Erosion and Profit Shifting (BEPS) Project¹⁹ and domestic reform are continually challenged by evolving avoidance schemes.²⁰ Corporate income is therefore commonly taxed at a lower rate than employment income. AI may be costly to implement and have ongoing operational expenses that offset the gains to corporate income growth against the loss of taxable income from the loss of employees. However, it is unlikely that the ongoing costs of AI will offset the value created by the AI functioning as an employee. In the current global crisis, a universal increase to corporate income tax may unjustifiably impact businesses that do not utilize AI. If differentiation is required for corporate income tax for AI to be taxed without creating an undue increase to overall corporate taxation, the questions related to defining AI and the nexus of AI remain relevant. Should corporate income taxes be increased to counteract the correlative loss of employment income, the risk of geographic inconsistencies in the physical location of the AI versus the employee remains a concern for taxable revenue. A further policy concern is that few policy makers are well versed in AI matters (AI literacy). AI literacy is the ability to fully understand and identify the biases inherent in the AI set up and the functions of an AI system. Without fully understanding the technology, new policy and regulations have the risk of failing to accurately address the taxation consequences arising from AI.²¹

In short, the research problem introduced by the quick development of AI technology and the following implementation is the resultant loss of jobs and the deficit in

¹⁷ RSA National Treasury and SARS Tax-Statistics op cit note 7.

¹⁸Domhnall O’Sullivan and Marie Vuilleumier ‘Corporate tax: slowing down the race to the bottom’ (2019) Available at https://www.swissinfo.ch/eng/vote-may-19--2019_corporate-tax--slowing-down-the-race-to-the-bottom/44943042; <https://stats.oecd.org/Index.aspx?lang=fr&SubSessionId=8135408e-882e-4b07-9fe7-0c018527605a&themetreeid=18> [Accessed on the 10 June 2019].

¹⁹ Ibid.

²⁰O’Sullivan and Vuilleumier op cit note 155.

²¹ S.C. Stuart, Should Robots Pay Taxes? available at <https://www.pcmag.com/news/should-robots-pay-taxes> [accessed on 30 July 2021].

taxable employment income for states. Should current legislation or tax treaties be unable to adapt to tax AI given that legislative processes tend to be adopted slower than technological progress, the question of whether AI can be taxed at source according to the current international tax system arises.²² This dissertation considers how states can tax AI at the location the AI is used to generate income and therefore what the nexus of taxation for artificial intelligence should be.

1.2. Research Question

The questions this dissertation seeks to answer are twofold. In the context of the current international taxation framework for taxation, what is AI? This allows a quick and efficient means for AI to be taxed as the technology is developed given that changes to legislation tend to be slower than the progression of innovative technology. Secondly, once AI is defined, what the taxable nexus for AI within a source state should be within the current taxation framework?²³

1.3. Scope, Limitations and Assumptions

According to Oberson, should AI be defined with a recognized legal personality to be taxed, four avenues for the taxation of AI are available.²⁴ The enterprise utilizing the AI can be taxed. The entity utilizing the AI would be taxed based on the correlative savings made in replacing employees and salary expenses with AI. The second possibility would be to levy a direct income tax on AI or 'robots.' This would require AI to have direct legal capacity to pay tax. Thirdly, Oberson postulates that the taxation of AI could be handled through Value Added Tax (VAT). AI contracts could be applied in accordance with the VAT for the class of activity that the AI performed.²⁵ The fourth possibility for Oberson would be for a set fee to be levied when AI is utilized. For this dissertation, the focus will be on the first two categories, the taxation of the entity utilizing AI or the direct taxation of AI as a recognized legal person.²⁶ The reason for this limitation is that employers would need to recognize the

²² OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

²³ Xavier Oberson 'Taxing Robots? From the Emergence of an Electronic Ability to Pay to a Tax on Robots or the Use of Robots' (May 2017) *World Tax Journal* at 2.

²⁴ Xavier Oberson, 'Taxing Robots: A Solution for the Future' TEDx Geneva, June 15 (2018) available at <https://www.youtube.com/watch?v=7P9o1WBnM3E>.

²⁵ Ibid.

²⁶ Ibid.

function of AI within the workplace as identical or like that of a human employee. Therefore, AI could be recognized in this way as a new form of employee based on the function performed.

AI is one of the fastest growing technologies in the world. Consequently, AI will have a significant impact on income distribution and the labour market.²⁷ Given the predicted income shift there are consequences for taxation. In consideration of the Model Conventions the 2017 versions will be considered.²⁸ Although little has changed with regards to the rules determining source and residence the 2017 Models were drafted and published within the context of the AI and e-commerce taxation debates.²⁹ The commentaries therefore show insight into global consensus on the taxation of recent technologies. States can use the updated commentaries to determine how long-standing treaties could be interpreted in context. The updated commentaries can thus provide useful insight into how states can interpret existing treaty terms in when no change is recorded in the text of an article.³⁰ The Global Tax Treaty Commentaries (GTTC) project carried out by the OECD has aimed at creating an authoritative and global review of tax treaty policies and how states implement the Commentaries of for both the UN and OECD Models legitimizing the use of the treaties in practice.³¹ In consideration of the articles of the Model Conventions the theories can be applicable to states that have modelled treaties from the provisions, therefore the models can provide a more universal guideline than a state specific analysis of the yet, undefined AI.

One of the core debates at present related to AI, is whether the implementation of AI will result in greater job loss than job creation.³² There is, however, consensus that AI and robotics will replace humans in particular work functions/jobs as the technology advances. Due to the nature of AI, unlike historical technological advances, the likelihood of job loss and job creation having geographic, or time synchronization is

²⁷ Ibid.

²⁸ Ibid.

²⁹ The debates centered on source taxation and value creation in E-Commerce as opposed to physical presence taxation can be a useful guideline for the taxation of AI; Multilateral Convention to Implement Tax Treaty Related Measures to Prevent Base Erosion and Profit Shifting, 2016.

³⁰ OECD Model Convention op cit note 3 at Introduction para 33-36.

³¹ IBFD 'Global Tax Treaty Commentaries (GTTC) available at <https://www.youtube.com/watch?v=BOqTNdevTuk> [visited 11 December 2021].

³² L., Nedelkoska and G. Quintini op cit note 6 at 2.

not guaranteed.³³ Given that there exists the risk of jobs being lost as AI replaces employees and the risk of geographic and timing inconsistencies with the potential creation of new jobs, the accepted assumption (and therefore limitation) within this dissertation will be that AI will emerge and replace jobs. The job replacement will result in a deficit in tax revenue due to the lost revenue from the taxation of employment income. The debates surrounding the job loss versus job creation will not be developed beyond recognising that AI will irrevocably alter the work environment and cause a change in income classification for revenue purposes.³⁴

The introduction of the Multilateral Convention to Implement Tax Treaty Measures to Prevent Base Erosion and Prevent Profit Shifting (MLI)³⁵ and the potential extension of the definition of a Permanent Establishment (PE) as stated in art. 12 and art. 13 of the MLI will not be considered.³⁶ The MLI has come into force for those nations that have ratified the instrument, however in order for the provisions to apply, contracting states must have elected the same option.³⁷ Consequently, the applicability of the MLI is not universal, and provisions will not apply where states have consented to different options. As such the changes brought by the MLI will not be considered in detail. This paper will therefore not assess the taxation of all the hypothetical combinations that states have consented to in the MLI (AI as a PE) against the potential and hypothetical changes to existing treaty provisions that may come into force with the MLI.³⁸

In determining whether AI would constitute a Permanent Establishment (PE) it is important to note that the OECD Commentary on article 5 states that the PE determination must be made independently. Where article 6 would result in AI being classified as immovable property, article 5 will not be considered as the PE consideration must be independent.³⁹ If AI is classified as immovable property in

³³ World Economic Forum with A.T. Kearney, “White Paper: Technology and Innovation for the Future of Production: Accelerating Value Creation” (2017) available at http://www3.weforum.org/docs/WEF_White_Paper_Technology_Innovation_Future_of_Production_2017.pdf [accessed on 17 September 2019] at 5.

³⁴ Xavier Oberson, *World Tax Journal* op cit note 13 at 2.

³⁵ Op cit note 29 at art. 12 and art. 13.

³⁶ *Ibid.*

³⁷ *Ibid.*

³⁸ *Ibid* at art. 23.

³⁹ Further development into case studies in this area could provide useful but for the purpose of brevity I have not included such research.

specific cases this will be factually distinct and should be determined on the specific facts of that taxpayer.

1.4. Research Method

Legal research can be split into two general methodological approaches: doctrinal and non-doctrinal studies. Doctrinal research focuses on what the law is, whilst non-doctrinal research goes further than the letter of the law.⁴⁰ The method used in this dissertation is twofold. A doctrinal approach must be taken to confirm what a taxable nexus is in the context of AI.⁴¹ Once such nexus is defined it will be necessary for a non-doctrinal approach to be taken and through a thorough assessment of nexus considerations for electronic equipment and E-Commerce performed. Such comparisons may be transplanted and applied to the taxation of AI. In applying nexus considerations for E-Commerce to AI, it is necessary to outline the similarities between the two fields. In considering the taxation consequences for AI, academic research into the methods through which e-commerce can be taxed and the relevance of taxation where value creation is derived will be evaluated.

1.5. Structure of the Dissertation

Chapter two briefly outlines the applicable international law and interpretation methods applied before considering the definition of AI. Chapter three outlines the definition of a taxable nexus and considers how AI fits within the parameters of nexus at source.⁴² Chapter four considers the Permanent Establishment (PE) definition with case law considered to determine whether income from AI can be taxed as business profits.⁴³ Chapter four considers the Model Convention definition of “person” and consideration is given to whether it can be extended to include AI allowing taxation

⁴⁰ J.M. Smits, *The Mind and Method of the Legal Academic* (2012) Edward Elgar Online at 8-11; I. Dobinson & F. Johns, *Qualitative Legal Research* in *Research methods for law* (M. McConville & W. Hong Chui eds (2017) University Press, Edinburgh at 17.

⁴¹ Consideration shall be given to the OECD and UN Model Tax Conventions in conjunction with supplementary sources as per the standard international law rules for the interpretation of law; Vienna Convention of the Law of Treaties, 1969.

⁴² In considering nexus taxation the basis for the right to tax is taken from the Model Tax Conventions due to the prevalence of the use of articles in the models in state treaty practice; OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

⁴³ Ibid at art. 5 and 7; Ibid at art. 5 and 7.

under article 15 of the Model Conventions.⁴⁴ Chapter six concludes the arguments and points out the limitations and potential relevance of the research and identifies areas of further research required or questions raised.

⁴⁴ Ibid at art. 1, 2 and 15.

Chapter Two: Defining AI in the Context of International Tax

2.1. Introduction

No official definition of Artificial Intelligence (AI) exists; therefore, this chapter will aim to find a working definition of AI for the purpose of taxation. In doing so, consideration will be given to the rules of interpretation in international tax law with recourse to academic materials. Only once a working definition of AI is determined can it be interpreted and understood within the current nexus rules.

2.2. Position of AI Internationally

In November 2016, as part of the OECD's objective in assessing developments in e-commerce and technological advancements, the first technology foresight forum on AI (Artificial Intelligence) was held.⁴⁵ Subsequent meetings of OECD Committees and external actors in 2017, 2018 and 2019 worked to introduce the OECD AI Policy Observatory to ensure policies introduced around AI would benefit states.⁴⁶ However, there is no universal global definition of artificial intelligence, nor an accepted regional definition of AI recognized by states.⁴⁷ At present there is no working definition of AI within the context of taxation in addition to a global understood definition in the wider context. In Minsky's research, AI is the science of making machines perform tasks that require human cognitive functions.⁴⁸ Without a recognized or agreed definition of AI that states can use to determine and tax AI, the challenge arises of how exclusive source or residence taxation rights introduced by tax treaties apply to AI. Therefore, before taxation, or the rights to the taxation of AI can be allocated according to a treaty, AI must be defined.⁴⁹

⁴⁵ Marvin Minsky, AI pioneer as used in the background note to define AI for the 2016 OECD Technology Foresight Forum 2016 on Artificial Intelligence [available at <http://www.oecd.org/going-digital/ai/technology-foresight-forum-2016.htm>].

⁴⁶ OECD, "Artificial Intelligence" available at <https://www.oecd.org/going-digital/ai/> [accessed on 10 February 2019] at 1.

⁴⁷ The OECD did develop a general definition of AI in 2019 but for the context of international tax it is likely further developments will be required to define AI and prevent overlaps of treaty provisions; OECD, "Recommendation of the Council on Artificial Intelligence" (2019) Available at: <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449> [accessed on 11 November 2019] at 1.

⁴⁸ Marvin Minsky op cit note 45.

⁴⁹ The core dilemma considered by the OECD is that the use of AI be used responsibly in business, and a second major debate is around the provision or lack thereof of rights to AI. As I am focusing on the

2.3. Interpretation in International Law and the Route to Defining AI

The primary sources of international law can predominantly be found in the international tax treaties, customary international law (CIL) and the general principles of law recognized by civilized nations.⁵⁰ These treaties become legally binding on the states that are party to the treaty.⁵¹ Articles 31 and 32 of The Vienna Convention of the Law of Treaties (VCLT) determine the rules for the interpretation of treaties.⁵² The VCLT is considered as CIL for the purposes of interpretation in this dissertation. The VCLT rules of the interpretation of treaties are thus accepted as binding.⁵³ Secondary sources of international tax law, although not an exhaustive list, include international tax law cases, memorandums and technical explanations to the treaties, academic commentaries and the model taxation conventions published by global organizations and the commentaries on these treaties.⁵⁴ Each of these sources of law should be considered in the process of defining AI to best define the term within the legal framework.

Primary sources of international law are binding on states while secondary sources are merely persuasive and are commonly used as interpretive aids.⁵⁵ Secondary sources of international law are therefore critical in determining a working definition for AI.⁵⁶ These persuasive sources provide the reasoning and insight into current judicial thought and trends, and this is critical in defining AI for the best future fit. The United Nations (UN) and OECD Model Tax Conventions are not binding sources of international tax law.⁵⁷ However, most states use the models as the basis for the

consequences of taxation these debates are not considered further. For further consideration in this debate Marvin Minsky considers these objectives. Ibid.

⁵⁰ United Nations, Statute of the International Court of Justice, 18 April 1946 at art. 38; Christopher Greenwood 'Sources of International Law: An Introduction' (2008) available at http://legal.un.org/avl/pdf/ls/greenwood_outline.pdf [accessed on 10 February 2019].

⁵¹ An example of a domestic law criteria is that international law must be ratified in South Africa in order for the treaty to come into effect unless the treaty is self-executing or administrative in nature; Constitution of the Republic of South Africa, 1996 at s231.

⁵² VCLT op cit note 30.

⁵³ CIL requires a combination of state practice, obligation to oblige with the practice and that a majority of states follow the practice without there being dissent from other states; the interpretation articles of the VCLT are considered CIL; *Ram Jethmalani v. Union of India* ((2011) 8 SCC 1; Christopher Greenwood op cit note 34.

⁵⁴ The Statute of the ICJ op cit note 7 at art. 38(1)(d) with reference to case law; Ibid at art. VCLT op cit note 30 at art. 32.

⁵⁵ Ibid

⁵⁶ OECD Recommendations of AI op cit note 57.

⁵⁷ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

drafting of international treaties. Consideration of the models can therefore provide an overview of international tax law as the foundation of treaty provisions for many treaties and states. The articles of UN and OECD Model Conventions are therefore considered for this dissertation as a basis for current treaty provisions. This should allow for a general overview of the potential outcome for the taxation of AI according to state treaties.⁵⁸ International case law and academic literature will be considered as additional sources of interpretation for definitional and factual interpretations in accordance with the VCLT and international standards for the interpretation of treaties.⁵⁹

2.4. How to Define Artificial Intelligence (AI) for Taxation Rights

According to art. 4(1) of the Model Conventions a resident, is “*any person*” that meets the criteria for residency.⁶⁰ The first hurdle for residency is that AI can be classed as a “person” under the model conventions to be understood to be a resident of a state. As a resident, AI would have the legal personality required for taxation rights to be allocated under a Model Convention or treaty based thereon. The OECD (Organization for Economic Cooperation and Development) Model definition of person has remained unchanged since 1963.⁶¹ Therefore, for the purposes of tax treaties modelled off the OECD and UN (United Nations) model that uses identical wording,

“The term ‘person’ includes an individual, a company and any other body of persons.”⁶²

The possible extension of the definition of a ‘person’ will be considered further in Chapter Five. The key factor that needs to be considered in defining AI for the purpose of taxation is context. As AI is not a “person”, as it is not recognised as an individual, nor a body of persons, nor as a company under the Model Conventions the

⁵⁸ Ibid.

⁵⁹ VCLT op cit note 30.

⁶⁰ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

⁶¹ The wording and order of art. 3 have changed with regards to how the definitions apply in the treaty but the wording of the definition of a ‘person’ has remained unchanged; OECD Model Convention op cit note 3.

⁶² Ibid.

definition of AI will be important in imputing taxation on AI in accordance with the ownership and control elements that apply with regards to the actions and income of recognized taxable persons and the nexus rules that govern such persons.⁶³ The taxation of AI needs to address the problem caused by the shift of income and the consequences to the labour market and tax revenue for states.⁶⁴ As such the definition needs to consider the shift in income from employment income to business profits. A broader definition should be favoured over a narrow definition to best adapt to rapid technological changes within the field of AI. A broader definition will decrease states having to revert to domestic law to define AI, should a narrow definition fail as the technology advances.⁶⁵ At present there is no set definition of a robot yet per art. 3(2) of the Model Conventions, when a term is undefined the domestic law of the contracting states must be considered.⁶⁶ However, as AI does not fit into defined treaty terms, irrespective of a domestic law definition, a tax treaty based on a model convention could limit a states' right to tax income generated by AI at source.

According to the UN and OECD Model Tax Conventions for a state to have a right to tax income, the income must be attributable to a person who is a resident of a contracting state, or the income must be from a source within a contracting state.⁶⁷ This raises two issues, whether AI can be considered a person thus a resident and taxpayer in a contracting state, or if the AI can be attributed to a source in a state. The consequences of AI and residency will be considered in Chapter 4. If AI can constitute a legal "person",⁶⁸ then such income may be taxable at source or in the state of residence of the AI depending on how the AI functions.⁶⁹ However, should the legal personality of AI not be recognized, then it is necessary for the owner of the AI to be held accountable as the taxable 'person' under the treaty.⁷⁰

⁶³ Ibid at art.1 as read with art. 2 and 3; Lucas de Lima Carvalho "The International Taxation of Autonomous Artificial Intelligence (May 28, 2019) *Brazilian Institute for Tax Law (AAD): Questions from Prof. Xavier Oberson; M. Haenlein.; and A. Kaplan "Siri, Siri, in My Hand: Who's the Fairest in the Land? On the Interpretations, Illustrations, and Implications of Artificial Intelligence.* Business Horizons, Volume 62, Issue 01. London: Elsevier, 201 at 16.

⁶⁴ Nedelkoska and G. Quintini op cit note 6.

⁶⁵ Klaus Vogel considers the definition of "context in the OECD Model Convention for interpretation purposes and given the newness of the technology recourse to interpretation of standard provisions is useful; Klaus Vogel, "Double Tax Treaties and their Interpretation" (1986) *Berkley Journal of International Law* 4(1) at 5.

⁶⁶ Ibid.

⁶⁷ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

⁶⁸ Ibid.

⁶⁹ Ibid as read with art. 2; Ibid as read with art. 2.

⁷⁰ Ibid.

The OECD guideline to defining AI states that at a minimum AI is “*a machine-based system that can, for a given set of human defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments.*”⁷¹ Although useful, the OECD definition does not outline the type of decisions that the AI must be required to make and whether AI needs to have a set level of autonomy. Control and autonomy are crucial in allocating taxation rights under the Model Conventions.⁷² The OECD definition, although a good starting point for defining AI, is not likely to be sufficient for taxation purposes. The simplicity of this definition includes items such as predictive text software on a mobile phone, the suggestive advertising on social media platforms and streaming sites, and other such simple functions that fall outside of the software itself, not generating income.⁷³ Therefore, this dissertation, and for consequences for international taxation, will look beyond the OECD general definition of AI for a tax specific definition.⁷⁴

According to the European Union (EU), AI is distinguishable from robots and other computer programs as AI has the ability to replicate, and therefore replace, human learning and decision-making functions.⁷⁵ Therefore, although no clear definition for AI has been formulated, it can be understood that the delineating factor is not the machinery, but the technology combined with the machinery that allows a robot to function in a traditional human role.⁷⁶ The preliminary factors set out by the EU to define AI are:

- i. Autonomy in that the robot can sense and or exchange data with an environment and can complete an analysis on this data.
- ii. AI can learn independently from environmental experiences.
- iii. Elements of physical presence (not merely software)
- iv. To adapt functions and actions to an environment.
- v. No biological life (AI must be a technological construct).⁷⁷

⁷¹ Ibid.

⁷² Control is a necessary requirement for the creation of a PE. Autonomy is taken to mean independent recognition as a person. OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

⁷³ Ibid.

⁷⁴ OECD AI Recommendations op cit note 57.

⁷⁵ Xavier Oberson op cit note 19 at 247.

⁷⁶ European Parliament ‘Report with Recommendations to the Commission on Civil Law Rules on Robotics’ Report 27.1.2017 (A8-0005/2017).

⁷⁷ Ibid.

For the purposes of taxation, to summarize the above points the important components are the requirement that there should be a physical element, the AI should be autonomous and be able to react to the environment (points i, ii, iii and iv above).⁷⁸

AI can typically be split into two categories: machine learning or neural networks. Machine learning and neural networks are distinct software types that are used to power machinery.⁷⁹ Different complex mathematical algorithms and software formats are required for the two forms of AI. It is therefore the software powered by these algorithms that creates and maintains AI as it functions with the machinery.⁸⁰ An OECD study from 2000-2015 shows that there has been a steady increase in patents related to AI software.⁸¹ Patents are considered intellectual property and income associated with the right to use a patent is considered royalty income.⁸² To reiterate, AI must therefore go beyond the bounds of software to form a distinct taxable income stream.⁸³ For this dissertation, the consideration is not the use of the underlying software that works to create AI but the right to tax the income generated by AI once used. This is extending beyond taxing the 'creator' and intellectual property owner of the AI, as AI has a distinct functionality and an autonomous output that has value. For AI to work it is necessary that the software and physical machinery be in the same place.⁸⁴ It is likely that such machinery will either be sold in conjunction with the software, such as with mobile phones and the predictive text functionality or sold/leased separately.

⁷⁸ European Parliament op cit note 168; Xavier Oberson op cit note 19; OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

⁷⁹ Machine learning requires that the AI be based on fundamental data principles and input that the program can learn from and adapt off, whereas neural networks are programs modeled off of natural neural networks able to model and process both linear and nonlinear outputs and inputs simultaneously; Alex Castrounis, "Artificial Intelligence Deep Learning, and Neural Networks Explained" 2021 available at <https://www.innoarchitech.com/blog/artificial-intelligence-deep-learning-neural-networks-explained> [accessed on the 11 of January 2019] at 1.

⁸⁰ Castrounis op cit note 63.

⁸¹ L., Nedelkoska and G. Quintini op cit note 6 at 9; OECD (2017), *OECD Science, Technology and Industry Scoreboard 2017: The digital transformation*, OECD Publishing, Paris, available at <https://doi.org/10.1787/9789264268821-en> [accessed on 2 February 2019].

⁸² OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

⁸³ Ibid.

⁸⁴ OECD Recommendations of AI op cit note 57; Carvalho op cit note 49.

Income from sales and lease income is typically attributed to the business profits of an enterprise and taxed under art. 7 of the OECD and UN Model Conventions.⁸⁵

Machinery does not constitute AI until it functions together with the controlling software. When the machinery is distinguished from AI it becomes a matter of taxing the physical and software components of AI, which could be done under the OECD and UN model.⁸⁶ This simplification of AI however does not address the tax deficit, therefore if AI can be taxed comprehensively not via its components, a more accurate and relevant tax can arise. Further, in over simplifying AI the challenge of value creation as to whether the machinery/software generates greater value given the function performed could lead to double taxation/a lack of certainty for taxpayers with regards to how AI could be taxed.

AI functioning in the marketplace at present is simplified, with such narrow intelligence parameters operating below the level of humans. This means that the software and machinery generally regarded as AI in the marketplace at present is carrying out specific tasks but cannot operate autonomously outside of the set task.⁸⁷ Once AI can begin to generalize, which is to learn and adapt independently outside of human set parameters, which is termed “Artificial General Intelligence”, AI should be able to build from neural networks to acquire knowledge and to reason as a human would.⁸⁸ However, for this dissertation in considering the taxation of AI in replacing humans, and for tax purposes the AI should be understood to be referencing autonomous artificial intelligence. This means that AI for taxation purpose needs to be operating independently by generating new parameters based on prior input data not completing tasks that must be continually set.

Autonomous Artificial Intelligence has been described as having three rules:

*“(1) it must be capable of performing tasks associated with human intelligence and beyond,
(2) it must not be directly or indirectly controlled by human beings, and*

⁸⁵ OECD Model Convention op cit note 3 at art. 7 and art. 5; UN Model Convention op cit note 3 at art. 7 and art. 5.

⁸⁶ Ibid.

⁸⁷ Carvalho op cit note 63.

⁸⁸ Ben Goertzel and Cassio Pennachin (Eds.). *Artificial General Intelligence*. (2007) Rockville: Springer at 7. A. Fumiya and R. Pfeifer, “*Embodied Artificial Intelligence: Trends and Challenges*” in IIDA, Fumiya, Y., Kuniyoshi, R. Pfeifer and L. Steels “*Embodied Artificial Intelligence*” (2004) Berlin: Springer, 2004 at 1-26.

*(3) it must have full managerial power over its own actions and resources. It represents a clear evolution from the current state of AI, given that it dispenses with human control, but it is a feature of a period before technological singularity.”*⁸⁹

As per Oberson, AI should be defined in accordance with the intended function of the robot/AI, the capacity of the AI to evolve, learn and then help and how this impacts the labour market. Therefore, AI should be able to function, to plan and to act independently.⁹⁰ As such AI would be defined in relation to the impact to tax and be taxable, provided there was a sufficient impact on the labour market and a correlative reduction in tax accrued to the state from employment income.

⁹¹ However, it is unlikely for states to reach a consensus given that no general, let alone tax specific, definition exists. Furthermore, states setting separate/distinct definitions of AI for set treaties is unlikely as it would require distinct agreements to be reached with all contracting states. However, given the far reaching and global nature of AI and the fact the technology can be easily implemented across multiple states by having distinct state and treaty specific definitions, the complexity and therefore applicability of such definitions could present challenges. The Model Conventions operate to ensure the allocation of taxation rights to the defined terms. By defining AI globally, source states would receive a universal definition under which the technology could be recognized for the allocation of taxation.

2.5. Chapter Conclusion

For this dissertation, AI is understood to have the following distinct characteristics

1. The ability to perform tasks associated with human intelligence (using machine learning or a neural network).
2. The AI acts independently with no direct human control (it must learn and thereafter be able operate distinctly).
3. There must be an element of physical presence or machinery.

⁸⁹ Carvalho op cit note 63.

⁹⁰ Xavier Oberson, TEDx cit note 14.

⁹¹ OECD Model Convention op cit note 3 at art. 3(2).

Examples of AI currently operating in the market are available although more common and advanced uses for AI are still in development. Tesla's self-driving cars and the predictive and self-analysing music analysis and recommendations from Pandora are such examples. The Google owned Nest thermostat and home control system is another innovative use of AI that is autonomous, performing a human task using machine learning. Although all these examples can have human intervention, each could also operate fully independently.⁹² This definition considers considerations from academic literature and by including the element of physical presence ensures that the source or location in which the AI operates may be taken into consideration for the purpose of taxation.

⁹² R.L. Adams, '10 Powerful Examples of Artificial Intelligence in Use Today' available at <https://www.forbes.com/sites/robertadams/2017/01/10/10-powerful-examples-of-artificial-intelligence-in-use-today/#229f4c02420d> [accessed on 20 March 2020].

Chapter Three: Nexus for the Taxation of AI

3.1. Introduction

The aim of this chapter will be to define the taxable nexus of a source state. Consideration will be given to how Artificial Intelligence (AI) fits into the definition of nexus with regard to the level of control and autonomy of the technology. In doing so, the aim is to provide a guideline for the taxation of AI at source. The focus will be on whether AI can be recognized as taxable property, failing which, consideration will be given as to whether AI can be defined as a “person” in chapter 4.

By evaluating how AI fits into the existing nexus framework, tax advisors and policy makers can creatively apply existing tax rules to apply to AI and the future developments of AI. This does not preclude the anticipation that these rules will have to be changed in the long term to meet the taxation demands of AI, but this will prevent a gap in taxation and begin the necessary framework of flexibility needed to match the taxation requirements of a technology that is designed to continually change and adapt.⁹³

3.2. Nexus for taxation at source

Source taxation is based on the premise that the state that provides the opportunity that leads to the generation of profit should have the right to tax such profit.⁹⁴ With AI the question becomes what value is created by AI, and does AI generate opportunities for profit that are sufficient to create a nexus to a state, for the state to tax that income. Defined simply, a taxable nexus is a connection between a state levying tax, and the entity that is due to pay the tax.⁹⁵ Therefore, inherent in the term ‘nexus’ is that it must be necessary to define what circumstances/facts constitute the connection to a state, that can trigger a state’s right to tax that income according to an international tax treaty based on the Model Conventions.⁹⁶

⁹³ Megan Jones and Bradford S. Cohen op cit note 16.

⁹⁴ Stjepan Gadžo, “The Principle of ‘Nexus’ or ‘Genuine Link’ as a Keystone of International Income Tax Law: A Reappraisal” *Intertax* (46) 3 at 200.

⁹⁵ Stjepan Gadžo *Nexus Requirements for Taxation of Non-Residents’ Business Income* (2018) at 4.

⁹⁶ *Ibid.*

3.3. The Nexus for AI

A contracting state can tax a person that is a resident of the state or income arising from opportunities that emerge in that state.⁹⁷ In considering the taxation of AI and the global economy it may seem logical to draw parallels to the principles considered for the taxation of e-commerce.⁹⁸ The issue with e-commerce is that a non-resident entity can conduct business activities in a state without being physically present in the state. Both the product and consumer can operate outside of the state to which the content creator or end income holder is physically present. This is done with online platforms/sales. The primary income generated from the business activity of the enterprise is made from consumers purchasing goods and/or services from the online platforms in the market state. Given the nature of these activities, there is no nexus based on residency or source for taxation in the state in which the consumers are based. Consumption is shifted from standard physical business activities to online platforms. A consumer market is traditionally not considered to add value to an entity that has recognizable taxable consequences.⁹⁹ Therefore, in the absence of residency AI must have a recognized physical presence operating in source state to be taxable.¹⁰⁰ Defining AI for taxation as having a physical presence therefore distinguishes AI from e-commerce which typically lacks physical presence.

Section 3.5. considers international case law to determine how courts have been considered machinery to create a physical presence thereby a PE. This could be used as a guideline for the taxation of AI. As such, analysis as to whether a taxpayer, property or activity has a sufficient connection to a state either personally or territorially is critical in determining the nexus for the taxation of AI.¹⁰¹ If the model convention definition of “resident” is extended or the domestic laws of a state recognize AI as a resident, AI could be taxable as a “person”.¹⁰² This is considered in further detail in chapter 4. For AI to be taxed in a source state, the state must have a

⁹⁷ Ibid at art. 3.

⁹⁸ Michael Lennard, “Act of creation: the OECD/G20 test of “Value Creation” as a basis for taxing rights and its relevance to developing countries” (2018) *Transnational Corporations* 25(3) 55-84 at 57-8.

⁹⁹ Anne Schäfer and Christoph Spengel, “ICT and International Taxation: Tax Attributes and Scope of Taxation” (2002) Discussion Paper no. 02-81, Centre for European Economic Research, at 11.

¹⁰⁰ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁰¹ Stjepan Gadžo op cit note 86.

¹⁰² Ibid.

recognized territorial connection to the AI according to either an existing tax treaty or the domestic law of the source state.¹⁰³

3.4. PE and Source Taxation

Where AI and machinery is utilized to carry out the business of an enterprise in a contracting state, and employees are replaced, the income generated by the AI will shift the income available to be taxed by Revenue Authorities from employment income to business profits.¹⁰⁴ Employees are compensated with a salary or other similar remuneration for the value they add to the company. The compensation to the employee is taxable as income from employment. By replacing employees and removing the expense from the income the employee received, AI increases the profit of the company. Although there may be costs for the AI as a capital asset and ongoing maintenance costs, these expenses do not have the same taxation consequences for the source state as the lost income tax. Without recognized separate legal personality AI cannot be taxed as a taxpayer for income generation and the value it will create for the company in place of an employee.¹⁰⁵ As such the person that owns or controls the AI is the taxpayer. This ties in with the taxation of property and royalties where the owner or beneficial owner of the income is taxed, not the income-generating object itself.¹⁰⁶ If the person that owns or controls the AI is not located in the source state this creates a deficit in taxation for the source state for the lost employment income. The question of nexus thus becomes crucial where AI owned by a non-resident but is operated and physically present in a state source state, as the AI would act autonomously to generate income outside of a recognized Permanent Establishment (PE), or in a manner otherwise not recognized as taxable under a treaty.¹⁰⁷ Unlike e-commerce, in defining AI to include the robotic element, AI is not a remote marketplace hosted online but machinery acting in conjunction with software to replace humans in work functions.

¹⁰³ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁰⁴ The income will move from being classified as employment income according to art. 15 of the Model Conventions to business profits under art. 7; OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁰⁵ OECD Model Convention op cit note 3 at art. 1; UN Model Convention op cit note 3 at art. 1.

¹⁰⁶ Ibid at art. 6 and art 12; Ibid at art. 6 and art 12.

¹⁰⁷ OECD Model Convention op cit note 3; UN Model Convention op cit note at art. 7 as read with art. 5.

3.5. Taxation of a Non-Resident Entity: The Permanent Establishment

The Permanent Establishment (PE) construct acts as the general proxy for income from business profits to be taxed at source. In accordance with the art.7 of the Model Conventions the taxation of business profits (income earned through AI and robotics), could be taxed in the state in which the AI is located. This applies if AI can be incorporated into the PE definition.¹⁰⁸ Simplified, a PE is a fixed place where the business of an enterprise is carried out, when such fixed place falls outside of the state of residence of the enterprise.¹⁰⁹ In considering the 2017 OECD and UN Model Conventions the wording of the PE definition is the same. The UN Model has additional art. 5(3)(b) which makes provision for a service PE. The service PE provision in the UN Model expressly relates to the activities of a “person.” Unless the treaties can extend the definition of “person” to include AI, a PE could not be created on this basis.¹¹⁰ Therefore, to determine whether AI could constitute a PE, the following chapter will consider a detailed analysis of the PE criterion according to the Model Conventions, the Commentaries to the Model Conventions and international case law, and academic literature.¹¹¹

The criteria for a PE per the Model Conventions are:

- i. There must be a fixed place
- ii. The business of the enterprise must be carried out in part (or fully) from the fixed place,
- iii. The activities carried out at the fixed place cannot be merely preparatory or auxiliary in nature to the business of the enterprise.¹¹²

In addition to the above criteria as set out in art. 5(1) and art. 5(4) the Commentaries indicate that the fixed place should be at the disposal of the enterprise and that there

¹⁰⁸ Ibid.

¹⁰⁹ Ibid at art. 5(1).

¹¹⁰ Refer to Chapter 4 for analysis on the consequences for taxation of AI should the definition of ‘person’ under the Model Conventions be extended to include AI.

¹¹¹ OECD Model Convention op cit note 3; UN Model Convention op cit note 3; additional sources are considered according to art. 32 of the VCLT op cit note 30.

¹¹² OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

must be a degree of permanency.¹¹³ Provided that there is sufficient attachment, the fixed location does not have to be owned by the taxpayer.

3.6. International Case Law: Defining a PE through technology

Although international case law is not binding, case law does provide a guide as to the jurisprudential attitude of states with regards to the taxation of new technologies.¹¹⁴ In order for AI to constitute a PE the combination of software and machinery must be able to independently form a PE.¹¹⁵ AI and its use must therefore meet the criteria set out in 3.5.¹¹⁶ In order to determine whether AI can be taxed under art. 7 on the basis of the PE definition, the cases of *Galileo International*,¹¹⁷ *Amadeus Global Travel Distribution SA (South Africa)*,¹¹⁸ *Formula One World Championships*¹¹⁹ *MasterCard Asia Pacific*¹²⁰ and *South Dakota v. Wayfair*¹²¹ will be considered.

In *Galileo*, the Indian Courts recognized that a computer could constitute a PE. This was deemed possible when the software run off computers at fixed- premises was held to form an integral part of the business activities of the enterprise. The removal of the computers from the premises would result in the cessation of the business activities of the enterprise.¹²² In 2008, *Amadeus Global Travel Distribution SA* found on factually analogous circumstances to *Galileo*, that a PE was present in India as a result of the computer, software and customer location.¹²³ In *Amadeus*, the court found that the activities of Amadeus Global, who carried out booking activities through an automated computer system in India were sufficient to constitute a PE.¹²⁴ Taken together the persuasive precedent from *Amadeus* and *Galileo* indicates that for

¹¹³ United Nations Commentary on Chapter II Definitions: Commentary on the paragraphs of Article Five at para 4.

¹¹⁴ Permanent Court of International Justice Advisory Committee of Jurists, Procès-verbaux of the proceedings of the Committee, June 16th – July 24th, 1920, with Annexes (1920), 584.

¹¹⁵ If a PE is created through other means, then the income of the AI may be attributed to that PE should the AI operated through the PE. However, where no other basis for a PE is present and AI is operating in a state, such as when AI has replaced the employees and standard office then it will be necessary for the AI itself to constitute a PE for a state to tax the income.

¹¹⁶ Attached is used here rather than owned as ownership is not a defining feature for a fixed location to be at the disposal of a taxpayer.

¹¹⁷ *Galileo International* (2008) [114 TTJ 289].

¹¹⁸ *Amadeus Global Travel Distribution SA* (2008) [113 TTJ 767].

¹¹⁹ *Formula One World Championship Ltd. v CIT* (Civil Appeal No.3849 of 2017).

¹²⁰ *MasterCard Asia Pacific Pte. Ltd* (AAR No. 1573 of 2014).

¹²¹ *South Dakota v. Wayfair, Inc.* - 138 S. Ct. 2080 (2018).

¹²² *Galileo* supra note 100.

¹²³ *Ibid, Amadeus Global Travel Distribution SA* supra note 106.

¹²⁴ *Amadeus Global Travel Distribution SA* supra note 106.

India, when a fully automated computer is used to carry out the business activities of an enterprise from a fixed location that is at the disposal of the taxpayer, then the combination of software and the computer would constitute a PE.¹²⁵ Should this precedent be followed, AI software when operated off a computer could potentially constitute a PE. The context would require the AI be owned and controlled by a non-resident operating in the source state where a double taxation treaty based on the OECD or UN Model Conventions in relation to art. 5, was in existence.¹²⁶ However, the above case law is limited to computers and only to such instances where the computer is at the disposal of the taxpayer. This negates other potential forms of technology (such as mobile phones) or simply where the software is conducted through machinery that is not at the taxpayer's disposal. For this reason, the later 2017 ruling of the Indian Authority for Advanced Ruling (AAR) and the consideration of servers in a state being sufficient for the creation of PE taxation becomes relevant.¹²⁷ In considering the taxation of AI, consideration must be given to the finding of the AAR with regards to the Mastercard Interface Processors (MIP)¹²⁸. The MIPs were not owned by the taxpayer, distinguishing the case from previous judicial considerations where the taxpayers did own the machines. Factually, the AAR (Authority for Advance Ruling) considered the substance of the functions performed by the taxpayers' machinery operating in India.¹²⁹ The Taxpayer re-structured its operations, resulting in the taxpayer only facilitating payments on machinery owned and located by third party stakeholders in India. The taxpayer had previously had distinct offices and machinery owned and operated in India that were classified as a PE. The courts analysis focused on whether the machines could constitute a PE, with a core focus on whether the machines were at the disposal of the taxpayer.¹³⁰ Ownership by the taxpayer is typically disregarded as a requirement for a location to be at the disposal of the taxpayer.¹³¹ Disposal requires that the taxpayer has the right to utilize the space to conduct its business activities, and that the taxpayer has control of the enterprise.¹³² The AAR therefore looked at whether the taxpayer had control

¹²⁵ Ibid.

¹²⁶ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹²⁷ *MasterCard* supra note 104.

¹²⁸ Ibid.

¹²⁹ VCLT op cit note 30; *Ram Jethmalani* supra note 39.

¹³⁰ *MasterCard* supra note 108 at para. 16.2.1.

¹³¹ UN Commentary op cit note 92 at para 4; OECD Commentary op cit note 93 at para 10.

¹³² Where the area is access controlled or the activities are not at the control of the taxpayer but a third party it may impact when a PE is created. This may be applicable when AI could be used to subjectively replace humans in dangerous work functions but only operated as a service for third parties; *Formula One World Championship Ltd* op cit note 107.

over the business activity carried out by the MIP, not whether the taxpayer had physical control of the machinery.¹³³ The MIP machines carried out the final verification process required for the authorization of transactions. It was determined that without the verification the entire transaction process could not take place. The MIPs were therefore deemed to be controlled by the taxpayer as substantially this process formed part of the taxpayer's business.¹³⁴ As this was core to the final business function of the taxpayer the AAR rejected the taxpayer's contention that the MIPs performed an auxiliary function therefore held that they were not exempt from creating a PE according to India-Singapore Treaty.¹³⁵ Given that the agreements entered were between MasterCard Automated Point-of-Sale Program (MAP) and the customers in India the AAR found the MIP machines to be at the disposal of the taxpayer.

According to the *Mastercard* case if the functions carried out by third party owned machinery are substantial to the completion of a business function of a non-resident taxpayer, the taxpayer can be deemed to have a PE in that state.¹³⁶ The third-party banks with whom the taxpayer contracted, controlled the locations and access to the machines. The AAR held that the software and programmes that the taxpayer had control of, met the physical element for the creation of a PE as the machines were physically located in India.¹³⁷ As such, where AI is not technically controlled by the taxpayer, provided the taxpayer has control over the use of and intended result generated by the AI, the *Mastercard* case indicates that this could be sufficient to create a PE in the source state.¹³⁸ The case is currently being appealed by MasterCard with a core criticism that the ruling unduly extended the fixed place PE definition. However, as technological changes and software allows for new cross border business opportunities it can be argued that the extension is not undue but a response appropriate to the intention of the legislation. Therefore, reliance on the finality of the

¹³³ *MasterCard* supra note 104.

¹³⁴ *Ibid.*

¹³⁵ Agreement between the Government of the Republic of Singapore and the Government of the Republic of India for the Avoidance of Double Taxation and the Prevention of Fiscal Evasion with Respect to Taxes and Income, 1994.

¹³⁶ *MasterCard* supra note 104.

¹³⁷ *Ibid.*

¹³⁸ *Ibid.*

ruling and the possible extension of the PE definition must be taken as persuasive only with regards to allocating physical presence to AI.¹³⁹

South Dakota v. Wayfair was a 2018 United States Supreme Court case that held with a four to one majority that states could tax income generated virtually in another state beyond a certain threshold.¹⁴⁰ The court noted that ‘substantial virtual connections’ could not be ignored in the taxation of income given the disruption that online platforms and software has had on the existing tax framework. Reference was made to a law in the state of Massachusetts that allows for the taxation of an entity provided that an out of state purchaser uses an application downloaded on a physical device or where cookies from the entity on the device of the purchaser result in sales. This allows for software to be linked to a physical device outside of the state of residence or where no previous physical presence was recognized for taxation.¹⁴¹ The decision of the US (United States) Supreme Court shows that courts are having to acknowledge advances in technology and the intention of tax laws when interpreting and applying rules of taxation to ensure an equitable outcome for Revenue authorities. As a global power should the United States recognize the use of AI combined with physical components or presence as sufficient to create a taxable source nexus on a domestic level, the same argument could be extrapolated and applied to analogous facts across international borders.

To summarize the above case precedent, courts have held that machinery and computers, with the necessary software operating, controlled by a taxpayer, are sufficient to create a PE in a source state.¹⁴² Where a taxpayer does not control the machinery in the source state, provided the taxpayer has sufficient control over the core functions of the machinery and the functions constitute a necessary and core process of the business activities of the taxpayer, a PE can be created. Therefore, where AI is operating directly from machinery in a source state a PE could be triggered. Alternatively, where AI operates from remote servers, provided the software is used on computers or machinery in a source state to control and complete

¹³⁹ KPMG ‘Global payment solution provider company has a permanent establishment in India’ available at <http://www.in.kpmg.com/taxflashnews/KPMG-Flash-News-MasterCard-Asia-Pacific-Pte.-Ltd-5.pdf> [accessed on 2 March 2019] at 6.

¹⁴⁰ *South Dakota v. Wayfair* supra note 120.

¹⁴¹ Ibid.

¹⁴² *Amadeus Global Travel Distribution SA* supra note 106; *Galileo International* supra note 110.

a vital function of a taxpayer's business, a physical PE could be created by considering the substance of the process completed at source. However, considering the above instances where machinery and software has been accepted to create a PE it is important to note one crucial distinction between the technologies considered and AI. AI, as defined in this dissertation, has the autonomy to make decisions and operate independently as a person would.¹⁴³ As such, this distinction will depend on states' judicial mindsets as to whether the control element needed to create a PE can exist for AI. The AI would control the decision-making function and result not the taxpayer. The scope of the decision making of the AI would need to be taken into consideration. Human employees do make decisions within the scope of employment, but these decisions are not regarded as directing the decisions of the employer. The decisions made by AI for control would need to extend directing the decisions of the 'employer'. Therefore, provided the *Mastercard* case is upheld at appeal the question arises as to whether a taxpayer owning AI or the rights to AI that controls itself, further extends the limitation of the *Mastercard* precedent to AI itself. The taxpayer would retain the right to the use of the technology therefore, courts would need to consider economic substance over form as done in *Mastercard* rather than direct control in determining whether AI could constitute a physical nexus for PE creation and source taxation. If AI were to constitute a person, it may become relevant for AI to be viewed as a dependent agent that can create an agency PE in the source state.¹⁴⁴ However, consideration of AI as a person and the consequences for taxing AI are considered in chapter four.

3.7. Taxation of “Other Income”

Provided AI cannot be defined as a PE, AI could be deemed to give rise to “Other Income” with taxation rights to be determined according to art. 21 of the OECD (Organization for Economic Cooperation and Development) Model Convention as read with art. 7. The ‘Other Income’ classification applies to all income not defined for the purposes of the model conventions and treaties based thereon. Any income, other than from immovable property, is taxable exclusively in the state of residence except where such income is generated through a PE in the state of source as per the OECD model. Art. 21 of the UN Model extends this further by stating that a resident

¹⁴³ Carvalho op cit note 64; OECD, “Artificial Intelligence op cit note 55.

¹⁴⁴ OECD Model Convention op cit note 3 at art. 5(5); UN Model Convention op cit note 3 at art. 5(5).

of a contracting state performing independent personal services through a fixed base as well as a PE is taxable exclusively in the state of residence.¹⁴⁵ Should a PE exist then the income can simply be taxed in accordance with art. 7 as business profits.

Therefore, should a definition of AI not be universally accepted for interpretation within the context of tax treaties, or insertion of such a definition into model treaties fail the recognition of the functioning parts that combine to create AI and whether these parts can be amalgamated to create a PE may be critical to the source state having a right to tax AI under a treaty based on the model conventions. As such, having a working definition of AI and taking this in conjunction with international case law extending the PE creation, it is possible to consider the machinery and software when used in conjunction as “AI” as automatically creating a PE at source. The biggest challenge to the above reasoning would be whether states would accept an amended treaty interpretation in practice. It may be necessary for legal certainty for taxpayers using AI to lobby the various states to amend their treaties rather than relying exclusively on interpretational approaches to include taxation of AI. Whether or not taxpayers need to interact with states will depend on the method used by states to tax AI and the complexity for individual taxpayers.

3.7. Chapter Conclusion

Questions relating to physical presence, control and agency are all factors that the OECD and UN consider relevant for the creation of a physical PE and source taxation of business profits.¹⁴⁶ PEs may therefore be a nexus under which AI may be taxed when the taxpayer is a not a resident of the state. AI is designed to act autonomously,¹⁴⁷ thus, courts could determine that AI acts independently and the control element, necessary for a physical PE to be present, could fail. This does seem unlikely given that servers have been held to constitute sufficient physical presence for e-commerce and AI requires actual robotics and machinery to operate. However, where AI is operating from personal devices of residents of a state and not distinctly owned entities of a non-resident taxpayer, the issue of AI not having a physical nexus in a source state remains. The Pandora music system reference earlier is one such

¹⁴⁵ Ibid at art. 21.

¹⁴⁶ Ibid at art. 5(5); UN Model Convention op cit note 3 at art. 5(5).

¹⁴⁷ Carvalho op cit note 64; OECD, “Artificial Intelligence op cit note 55.

example where the AI operates through personal devices of the consumers, not through machinery owned by the taxpayer. Other such technologies could easily be developed whereby ownership of the machinery, and therefore “control” of the physical site, would not be present. Furthermore, as AI should act autonomously it will control its own functions and actions, acting akin to a person who is employed by a taxpayer. At present the Model Conventions require that a “person” acting on behalf of an enterprise in a contracting state, within the parameters set out in the treaties, can constitute a PE.¹⁴⁸ AI is not presently regarded as a legal “person” and in chapter four consideration will show how if it is possible to tax AI as a person art. 15 should be the relevant means of taxation.¹⁴⁹

AI, if operating in a contracting state, may be able to create a physical PE under the Model Conventions for a contracting state. This relies on the trend in recent Indian case law, where the machinery is operating in the source state has been held to constitute a PE.¹⁵⁰ Given this trend, it would be possible for states to tax AI at source using the machinery as the physical nexus for source taxation. However due to the difference in corporate and employment taxation rates and the proportion of total tax revenue that employment income can comprise in a state, a loss in revenue could still result.¹⁵¹ In addition to differing tax rates, for PE taxation to be levied, the source state can only tax income that can be attributed to the PE.¹⁵² Issues of value creation, like those that arise with e-commerce may impact what income is taxable for source states. AI does not fit ideally into the standard PE definition and does require a modernized interpretation as shown by India. This could be beneficial should states opt to tax income generated by AI as a source of business income particularly if employment income cannot be replaced through other means. However, as noted in the introduction, the policy considerations around the tax deficit created using AI are an issue best addressed at the executive level.

¹⁴⁸ OECD Model Convention op cit note 3 at art. 5(5); UN Model Convention op cit note 3 at art. 5(5).

¹⁴⁹ Ibid at art. 3(1)(a).

¹⁵⁰ *MasterCard* supra note 104; *Amadeus Global Travel Distribution SA* supra note 106; *Galileo* supra note 105.

¹⁵¹ As indicated in the introduction for South Africa this would be a major deficit as employment income makes up close to a third of total annual tax revenue; RSA National Treasury and SARS Tax-Statistics op cit note 7.

¹⁵² OECD Model Convention op cit note 3 at art. 7(1); UN Model Convention op cit note 3 at art. 7(1).

Chapter Four: Nexus via Residency: The Definition of ‘Person’ and Artificial Intelligence (AI)

4.1. Chapter Introduction

This chapter aims to look into the future considerations for the taxation of AI. Given that there is no clear definition of AI, by using the working definition set out in chapter two, in considering nexus in chapter three AI needs to be taxed through residency or through physical presence. However, it is currently unclear as to whether AI in and of itself, as defined by chapter two, would constitute a Permanent Establishment (PE). Although India has shown a trend of recognizing machinery and software as sufficient to create a PE through physical presence, this is not guaranteed.¹⁵³ AI is independent (it controls itself) and may not necessarily be fixed to one location such as self-driving cars and software that operates off personal devices. Examples of this include tax and legal advice services that could be downloaded as applications rather than traditional human agents. The chapter two definition of AI proposed falls outside of the scope of Art. 15 as AI is not defined with the scope of a legal “person” for treaty purposes. The question therefore arises as to whether the definition in chapter two could be aligned with the definition of a “person” in the context of the model conventions to nullify the PE debate.

In 2017, the Parliament of the European Union held that the taxation of robots and AI as electronic persons would not be viable. Concurrently prominent world business leaders including Bill Gates and Jaen Kim, began investigating how AI could be introduced to an enterprises’ payroll in the place of human employees. Despite support for the direct taxation of AI, amongst other objections there are arguments that AI cannot be taxed as the AI lacks the direct legal capacity necessary to be a taxpayer.¹⁵⁴ Arguments for the direct taxation of AI state that it could be used as an interim tax. The taxation of AI as employees could assist with the taxation deficit in the transition period as the new technology emerges.¹⁵⁵ The debate around whether the taxation of AI would benefit or negatively impact humans has been raised, as has

¹⁵³ *MasterCard* supra note 104; *Amadeus Global Travel Distribution SA* supra note 106; *Galileo* supra note 105.

¹⁵⁴ Xavier Oberson op cit note 50.

¹⁵⁵ *The Economist*, why taxing robots is not a good idea, 25 February 2017; Xavier Oberson ‘Taxing Robots: Helping the Economy adapt to the Use of Artificial Intelligence’ (2019) Edward Elgar Publishing at 3.

the criticism that despite being forward thinking, recognition of AI as a “person” would be far too complex and lead to competitive distortion and decreased innovation.¹⁵⁶ The one point that is not argued is that AI will have a major impact on the economy and labour market, as the technology is further developed and, consequently, the current employment tax revenue base of states will be impacted.¹⁵⁷ This chapter will aim to assess how AI could potentially be recognized as a “person” to directly tax AI for employment income.

In recognizing AI as a legal person, AI could be taxed just as individuals are taxed. Alternatively, there is also the argument that AI should be granted legal personality akin to that of a company. Companies are granted legal personality through a legal construct linked to a territorial jurisdiction.¹⁵⁸ For this chapter, consideration is given to AI as a human not a company or other corporate entity, as the problem considered is the potential loss of employment income taxation. AI can be taxed through physical presence, provided the machinery used has a sufficient physical nexus to the source state.

In granting legal personality to AI, the question as to whether AI should be granted full legal personality or merely the legal construct of personality implied for taxation has been raised.¹⁵⁹ Corporations, companies, partnerships, and other enterprises are legal fictions that were constructed to give the entities contracting power and to ensure the liability of such entities.¹⁶⁰ Once legal personality of corporations was recognized, this was then extended to liability for tax. The argument made is that as AI develops and learns, acting without human oversight, it may be worthwhile for states to recognize AI as legal persons both for the purpose of taxation and to ensure that AI can be held accountable for its actions.¹⁶¹ The focus of this paper remains on the consequence of the nexus of the taxation of AI and will now consider legal personality for tax purposes.

¹⁵⁶ Xavier Oberson, TEDx op cit note 14.

¹⁵⁷ Ben Vermuelen et al op cit note 1.

¹⁵⁸ Jiahong Cheng and Paul Burgers, “The boundaries of legal personhood: how spontaneous intelligence can problematize differences between humans, artificial intelligence, companies and animals” (2018) *Artificial Intelligence and Law* (27) 73-92 at 77.

¹⁵⁹ Xavier Oberson, TEDx op cit note 14.

¹⁶⁰ Ibid.

¹⁶¹ Xavier Oberson op cit note 66.

4.2. The case and challenges for AI and Taxation of Robots as Legal Persons

Given the global trend towards lowered corporate income tax rates, the tax received by states could be reduced if the introduction of AI shifts employment income tax to corporate income.¹⁶² This issue could be addressed at state level with policy decisions made by governments increasing corporate income tax to offset this as the technology becomes more commonly used. However, even if the discrepancy between corporate and employment taxation is not evident in a state, it may be simpler for states to recognize AI as employees. The AI is rendering an analogous service to corporations that the was rendered by human employees. Recognition of AI as taxable persons simplifies the burden on tax revenues of having to deem a Permanent Establishment through the AI, and secondly, to have to calculate what profits can be attributed to that specific PE or company using AI to tax the income generated.¹⁶³

According to art. 15 of the UN and OECD Model Conventions, a resident of a contracting state may be taxed for income earned from employment in the state of residence, unless such employment is exercised in the other contracting state.¹⁶⁴ The trigger for taxation according to art. 15 in both Model Conventions is residency.¹⁶⁵ The residency definition in both Model Conventions is contained in art. 4 and expressly states that a “person” is a resident in a contracting state when the requirements of the provision are met.¹⁶⁶ As such, to qualify as a resident of a contracting state for treaty purposes, it is necessary that the entity considered can be defined as a “person”. Based on the current wording of the Model Conventions, the basic criteria required for robots combined with AI to be taxed as ‘persons,’ would need to include the following:

- a) A set definition of a robot as combined with AI.
- b) The inclusion of robots in the definition of ‘person in tax treaties’
- c) Source and residency rules that would be applicable to the robots.¹⁶⁷

¹⁶² See statistics of South African Revenue in Chapter One: 1.2. Research Problem: National Treasury and SARS op cit note 7.

¹⁶³ This is particularly relevant given the debates that have arisen around the global economy and taxation of e-commerce when AI is utilized in this field; Organization for Economic Cooperation and Development ‘Unpacking E-Commerce: Business Models, Trends and Policies’ (2019) Available at <https://www.oecd.org/going-digital/unpacking-ecommerce.pdf> [accessed on 3 June 2019] at 3.

¹⁶⁴ The basis of art. 15 is the same in both treaties despite slight variances in the text as art. 15 in the UN Model Convention has additional text in art. 15(1); OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁶⁵ OECD Model Convention op cit note 3 at art. 4; UN Model Convention op cit note 3 at art. 4.

¹⁶⁶ OECD Model Convention op cit note 3 at art. 4; UN Model Convention op cit note 3 at art. 4.

¹⁶⁷ Ibid.

4.3. Consequences for the Designation of AI as a Taxable Person

For AI to be taxed as an employee the definition of person under the model conventions, or treaties incorporated in accordance with the models should be extended. This would require state agreement and either an amendment (protocol) or new treaty should be concluded.¹⁶⁸ Should the definition of person be extended to include AI the consequences for taxation may extend beyond art. 15. Due to AI being defined for this dissertation as having the capacity to think and act autonomously, such classification as a “person” could be sufficient for the AI to create an agency Permanent Establishment (PE) in a source state. Therefore, it will be important, should the definition of “person” be extended, for clear delineations to be made as to when AI could constitute an employee and when AI acting independently would constitute an independent agent. If AI, classified as a person, could be an employee and constitute a dependent agent, a state could tax the attributable profits made from the business activities carried out by the AI, in addition to the employment income that could be levied. States would need to determine whether AI could be both an employee and an agent (this would require a legal personality allow for both functions) and given the attribution and complications of exempting specific income, for this reason the definition of person for AI should not extend to full rights for agency. If AI can be taxed in terms of the same income more than once, the issue of deductions would need to be comprehensively addressed.¹⁶⁹ Therefore, taxation of AI as person for a taxable nexus to exist at source is quite complex.

4.4. Treaty Definition of ‘Person’ and ‘Resident’ and the outcome for taxation of AI

In considering state domestic law residency is typically determined either by domicile or the keeping of a permanent home (physical presence) in a state. At present Saudi Arabia and Japan have recognized the citizenship of a robot and a chat bot, respectively.¹⁷⁰ The recognition of such citizenship is contrary to the domestic laws of

¹⁶⁸ United Nations op cit note 44 at 38.

¹⁶⁹ OECD Model Convention op cit note 3 at art. 5(5), art. 15 and art. 23; UN Model Convention op cit note 3 at art. 5(5), art.15 and art. 23.

¹⁷⁰ A. Atabekov, O. Yastrebov ‘Legal Status of Artificial Intelligence Across Countries: Legislation on the Move’ (2018) 4 Volume XXI *European Research Studies Journal* at 776-7.

citizenship of the respective countries.¹⁷¹ As citizens these AI run robots can be classified as a resident in Saudi Arabia and Japan, respectively. Legal personality and capacity sufficient for taxation not citizenship is the focus of this paper in accordance with art. 3(2) and art. 15 of the Model Conventions.¹⁷² The fact that AI robots have been recognized as citizens does not address that fact that this does not define the term robot. This does however show the progressive stance states may take at the domestic level with regards to AI technology.

As stated in Chapter Two of this dissertation and rephrased here for clarity, “*the term ‘person’ includes an individual, a company and any other body of persons.*”¹⁷³

The OECD Commentary on article 3(1)(a) indicates that the term person is not exhaustive and should not be treated as such. At present there are very few states that include robots in the legal definition of person. A common debate surrounding AI is ethics in the use of AI and the standard of conduct that the developers, manufacturers, and end operators of the technology should be held to.¹⁷⁴ The ethical and usage debate around AI will not be considered. For taxation, a legal fiction could be created and applied to AI within set parameters for states to tax income earned through operational AI as income for employment (dependent personal services in art. 15 of the OECD Model).¹⁷⁵ The legal fiction does not need to take ethical considerations into account, as it is merely a construct for the purpose of taxation. According to Oberson should income tax be levied on robots through imputed employment taxation, such taxation should be levied on the owner or employer of the robot, dependent on future technological advances.¹⁷⁶

In considering the rules regarding residence in art. 4(1) of the OECD and UN Model Convention, this includes the term “*place of management.*”¹⁷⁷ The phrase is intended as a rule to assist in determining residency for persons other than individuals according to the Model Conventions. The focus of this chapter is the taxation of AI as a person not as a company. However, the reasoning behind POEM can be used as a

¹⁷¹ Ibid.

¹⁷² OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁷³ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁷⁴ European Parliament op cit note 167.

¹⁷⁵ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁷⁶ Xavier Oberson op cit note 13 at 247.

¹⁷⁷ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

guideline for determining when/how AI is operating at a level sufficient to be a "person." The Commentary notes that another common phrase used is the "Place of Effective Management" (POEM). Determining POEM is a complex and often unclear process. Guidelines for defining POEM have been set out in the Commentaries given the complexity. Using the POEM for AI could result in AI being resident automatically in the state in which the technology operates, where such technology operates independently. However, where human oversight has ultimate control over the AI using the POEM, this may not resolve the issue. This will depend on whether AI can be considered truly independent or whether the fact that humans can opt to use the technology or not is sufficient for control. Alternatively, it is argued that AI should be classified as a company to qualify as a person under the treaty definitions.¹⁷⁸ However, if AI is recognized as a company, then the taxation remains corporate income tax and article 7 and the PE determination for source taxation would apply.¹⁷⁹ It is clear then that the most standard means for defining AI as a 'person' for the purposes of tax treaties will include doing so by recognizing AI as an individual as opposed to a form of corporate entity.¹⁸⁰

It may be possible for the definition of "person" under the Model Conventions to be extended to include AI. In recognizing AI as a person, the difference in the tax rates between employment income and business income would not arise. However, doing so would involve changes to the Model Conventions. The changes are significantly more complex than taxation under art. 7 with AI being classified as a PE. It will be at the discretion of states and the treaties entered by states to determine which, if either of these means of taxation, may be used to tax income generated by AI.¹⁸¹ The risk of mobility and simply shifting the location of the AI to a so called "tax haven" and bypassing source taxation according to the above taxation practices exists. This is akin to the difficulties faced in the taxation of the digital economy.¹⁸² The OECD has proposed taxation not based on physical presence, but by an allocation of profits to

¹⁷⁸ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁷⁹ Ibid at art. 7 as read with art. 5.

¹⁸⁰ By defining AI as a "person" not as a distinct corporate entity, AI can fit within the confines of the current Model Conventions more succinctly as evidenced by the allocation of taxation rights considered throughout this thesis; Ibid.

¹⁸¹ The Model Conventions regulate taxation rules, they do not levy tax, Ibid.

¹⁸² BDO Global "Articles: Taxation of the Digital Economy - Rethinking the world tax system" available at <https://www.bdo.global/en-gb/insights/tax/international-tax/taxation-of-the-digital-economy-rethinking-the-world-tax-system> [accessed on 15 December 2020].

the states in which a taxable entity derives value and completes sales.¹⁸³ However, at present the states forming the Inclusive Framework to determine how the digital economy and value creation should be taxed have not set a period for implementation. Further to no implementation date, the OECD has continued to extend the due date for when the proposal on the reallocation of taxation rights will be finalized. Further to the delays and challenges in drafting such proposals, the publication of the proposal will be subject to review and once finalized due to state sovereignty there is no guarantee that such rules would be implemented at all.¹⁸⁴ Therefore, should AI be recognized as a “person” the possibility for the creators/owners of the AI to conduct “treaty shopping” in choosing the location of residency for the AI presents a challenge to how AI can be taxed. At the very least, should AI be classified as a person, a source state could tax AI as a dependent agent. Due to the challenges faced in finalizing and implementing taxation of value creation and the comparative speed with which AI technology is developing, determining a means to tax AI under the current taxation framework remains critical. Similar challenges exist with creating an entirely new tax for AI as the creation and implementation of such a tax would not keep up with the development of the technology looking at the time taken for past amendments and additions to the international taxation models and corresponding adoptions by states. Although this may allow for states to treaty shop with regards to residence, linking in an extended PE definition will provide means for the immediate taxation of AI. Revisions may be introduced to align the taxation of AI to that of the digital economy once the process is finalized.

4.5. Challenges to Taxation of AI as a person

The proportional and mathematical procedures for determining the ‘salary’ or ‘remuneration’ for AI may be problematic. Over time, as AI becomes more common it may also be difficult to distinguish the true value of AI, versus reliable counterparts. Where AI is taxed for the role that an employee plays, there needs to be a correlative income level for which the AI can be taxed. This raises interesting comparisons to transfer pricing and the use of comparatives in determining market pricing and further

¹⁸³ BDO Global “Taxation of the Digital Economy and pushing fiscal boundaries” available at <https://www.bdo.global/en-gb/services/tax/taxation-of-the-digital-economy> [accessed on 10 January 2021].

¹⁸⁴ Ibid.

research would be beneficial.¹⁸⁵ As AI replaces humans in job functions and it becomes economically prudent to have AI completing a task rather than human employees, the comparative may fall away. Once the comparative for income tax falls away it may be difficult for states and taxpayers to fairly determine values for employment taxation of AI.¹⁸⁶ Furthermore, as the AI itself is not being taxed, or should the AI be taxed, the question as to whether AI can earn income or hold capital and whether that accrues to the AI or the entity owning the AI, may become relevant.¹⁸⁷

4.6. Chapter Conclusion and Challenges

Ultimately recognizing AI as a legal person capable of being taxed at source should be straightforward as outlined in this chapter. It is the challenges facing the consequences and scope of recognizing AI as a person that make doing so a challenge to the certainty and clarity for taxation rights at source. In recognizing AI as a “person,” the AI is granted legal personality and becomes a taxable entity. Consequently, source state can tax the income generated by the AI operating within its borders as it would an employee. Although requiring amendments to existing treaties and state acceptance of such amendment's recognition of AI as an “person” this could provide a simpler and clearer resolution to the taxation of the technology as it advances than attempting to tax AI as a Permanent Establishment.

¹⁸⁵ OECD ‘Glossary of Statistical Terms’ *Transfer Pricing*. Available at <https://stats.oecd.org/glossary/detail.asp?ID=2757> [accessed on 10 November 2019]; OECD *Comparability* (2010) available at <https://www.oecd.org/tax/transfer-pricing/45765363.pdf> accessed on 29 September 2018] at 6.

¹⁸⁶ As jobs are no longer performed by humans, the comparative salary paid to a human employee may fall away. Alternatively, the introduction of AI may inflate or decrease salaries in industries therefore raising challenges as to what a fair market salary may be for the taxation of AI performing the same task.

¹⁸⁷ As confirmed earlier these moral dilemmas are not considered in this dissertation but the challenges here are important to note even in passing; OECD Recommendations of AI op cit note 56.

Chapter Five: Conclusion of Arguments, additional points and questions raised

5.1. Additional Considerations and some Further Considerations

For the allocation of taxation rights with regards to AI to be successful on an international scale, the method of taxation introduced will need to coordinate with the current global system. To coordinate the method of tax would best succeed if it could fit into the current framework. Given that debates are still ongoing as to how best to tax the digital economy and e-commerce, it is unlikely that a new form of taxation will be agreed on to address the technology as it becomes more common. In order of the successful universal taxation of AI as stated in chapter two of this thesis, a universally accepted definition of AI will be critical. As Model Conventions have been used as a global normative standard for tax treaty provisions, in bypassing policy or international debates on how/why AI should be taxed, source states can proceed with the replacement of lost income. Therefore, extending the Model Convention definition of a PE or “person” could be a simpler and immediate solution as opposed to a new form of taxation.¹⁸⁸ To successfully extend the definitions a universal acceptance as to what AI is and how this technology can fit within the existing framework will be important for maintaining legal certainty for states and taxpayers. be as states are not bound by interpretational amendments, as seen by objections to the commentaries, this would not be an ideal or universally accepted resolution for the taxation of AI. It would also be necessary, or at least beneficial, for a coordinated global definition of AI at the OECD and UN level to be introduced to ensure legal consistency. However, the above challenges to the speed at which a global definition could be agreed still emerge.

Should convincing precedent be generated in international case law to use a definition supported by academic reasoning such as the definition purported in this thesis, a global understanding of AI could be reached for the present taxation of AI. The definition used in this dissertation combines considerations of the EU, OECD, and academic literature to create a working definition of AI for the purpose of taxation. This definition shows how a unified global definition would be beneficial for

¹⁸⁸ Xavier Oberson op cit note 13 at 246.

certainty under the rule of law and as it would provide the basis for a taxable nexus at source for income generated by AI.¹⁸⁹ However, depending on how a global definition is derived, the uniform and successful implementation by states will prove interesting, given the autonomy of states and the difference in how states adapt to and make use of AI technology.¹⁹⁰

However, it is demonstrated in this dissertation that AI can be defined and taxed within the confines of the current articles of the model conventions, provided the interpretation of the provisions can be extended or amended to accommodate the new technology. The definition discussed in chapter two or some such globally accepted definition of AI will be critical to the successful cross border taxation of the technology. The consequence of such an approach is that many states' international treaties, by protecting against double taxation, will ensure that AI can be taxed at source by allocating taxation rights based on the recognized value of AI. As can be seen from this dissertation, AI may be taxable according to articles 7 and 15 of the Model Conventions for states that have entered treaties drafted based on these articles.

Notwithstanding, it could be possible for AI to be affixed to a property and potentially constitute immovable property; for AI to have associated income from interest or royalties, or capital gains and capital and therefore be taxable under articles 6, 11, 12, 13, and 22 of the Model Conventions. The individual facts of each use of AI will impact whether these provisions can be applied to tax AI at source and, where AI is taxable under these provisions, there are no dilemmas raised as to how the technology should be taxed as the activity will be covered by the Model Conventions. However, the above articles do not focus on when an entity autonomously acts to generate income as a distinct entity as is the case with art. 5, art. 7 and art. 15 with regards to business profits and employees. Where AI can be incorporated within an existing treaty provision without amendments, the simplest action would be for states to levy tax in accordance with that provision. This dissertation has aimed to focus on the taxation of AI within the parameters of existing treaty framework.

¹⁸⁹ Xavier Oberson, TEDx cit note 14.

¹⁹⁰ State budgets and levels of development will ensure that even as AI technology develops and replaces human jobs the adoption of the technology will be uniform nor automatic across states; L., Nedelkoska and G. Quintini op cit note 6.

When AI is structured to fall outside of existing tax treaties at present, extending the definition of a PE or a “person” would allow for AI to be taxed at source irrespective of how the technology is used. Revenue Authorities would therefore not be confined to the limitations of the listed provisions and taxable entities could be free to argue or to position taxation within the scope of these provisions whilst not being able to avoid taxation where AI does not fit into these articles.

The nexus for taxation in a state is typically source or residence. For source taxation a nexus requires a sufficiently close connection between the income generated and the territory within a contracting state, for such income to be taxable.¹⁹¹ Given that the definition of AI chosen for this dissertation, as aligned with academic literature, requires that the AI be in control of the tasks it performs, have managerial powers in doing so, and the tasks performed must be on par with or beyond the scope of human activities and when combined with robotics, AI is physically linked to the source state within which it operates.¹⁹² In consideration of the definition and requirements for a PE, it may be possible that the AI may carry out the activities of the business from within an office or other such fixed location within the source state. However, as AI acts autonomously the question of whether the AI and the activities performed are at the disposal of the taxpayer may become increasingly relevant as there may come a time when AI is simply owned, but control vests entirely with the AI due to the complexity of the task performed. As AI develops it is therefore clear, that it may not remain possible in the long term for AI to be taxed at the PE level, once the technology advances beyond the scope of control of the owner.¹⁹³ The current trend therefore appears to be that policy writers and courts are tending towards inclusivity when considering facts that may arise in the creation of a PE.¹⁹⁴ The recognition that the Model Convention and tax treaties are not static, and it is the business activities and facts of each case that should determine the creation of PE as opposed to rigid rules, is a positive indicator that art.7 as read with art. 5 could be the avenue through which source states may have the right to tax AI generated income.¹⁹⁵

¹⁹¹ United Nations Commentary op cit note 103 at para 4; *Formula One World Championship Ltd* op cit note 107.

¹⁹² Carvalho op cit note 63; OECD, “Artificial Intelligence op cit note 55.

¹⁹³ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁹⁴ *MasterCard* supra note 110 summarizes the courts approach to PE’s and automation.

¹⁹⁵ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

Given that many states gain a sizeable portion of tax revenue from employment income, the loss of such income could be problematic.¹⁹⁶ Therefore, this could be resolved by extending employment tax to AI. To tax AI, the definition of “person” under the Model Conventions and “resident” under the Model Conventions and/or per state domestic law will need to be widened to include AI. In extending the definition of ‘person’ and should a clear definition of ‘AI’ be introduced, this could lead to the taxation of employment income to AI.¹⁹⁷

5.2. Conclusion

As AI develops the questions that result with regards to the taxation in the international context will increase, rather than stabilize until such time as AI is commonly used and the full taxation consequences can be understood. Based on the function, purpose and intention of the AI robot, and the consequences of ownership, residence and autonomy get more complex so too will the taxation consequences. The question is therefore perhaps not so much one of nexus, but at what future point AI will develop to the stage where AI can justifiably be considered a full, independent taxpayer, with the same rights and limitations of current taxpayers and therefore the nexus rules that currently apply to recognized legal persons and taxpayers can be applied to AI.¹⁹⁸ Only time will tell, and what is certain, is that the technology is being developed and that changes will continue to emerge, and international tax will continually need to adapt to the changes to the labour market and economy, through the use of AI.

For this dissertation, AI can be taxed under the current international tax framework although AI does not fit cleanly into the Model Conventions at present for taxation under articles 5, 7 and 15, due to the definition and function of AI provided that the definition of PE and/or “person” is extended to include AI. However, with a widened interpretation of limited definitional extension¹⁹⁹ as per the OECD and UN Model Conventions, income generated by Artificial Intelligence (AI) as combined with machinery can be taxed at source.²⁰⁰ For the sake of legal certainty, direct treaty

¹⁹⁶ National Treasury and SARS op cit note 7.

¹⁹⁷ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁹⁸ OECD Model Convention op cit note 3; UN Model Convention op cit note 3.

¹⁹⁹ Ibid.

²⁰⁰ Ibid.

recognition would create both more certainty and clarity as to the right of a state to tax AI.

Reference List

Primary Sources

Legislation

Constitution of the Republic of South Africa, 1996.

South African Income Tax Act 58 of 1962.

International Treaties

Agreement between the Government of the Republic of Singapore and the Government of the Republic of India for the Avoidance of Double Taxation and the Prevention of Fiscal Evasion with Respect to Taxes and Income, 1994.

Vienna Convention of the Law of Treaties, 1969.

United Nations, Statute of the International Court of Justice, 18 April 1946.

Model Conventions

OECD Model Tax Convention on Income and on Capital: Condensed Version 2017 (21 November 2017).

United Nations Model Double Taxation Convention between Developed and Developing Countries, 2017.

Multilateral Convention to Implement Tax Treaty Related Measures to Prevent Base Erosion and Profit Shifting, 2016.

Secondary Sources

International Cases

Amadeus Global Travel Distribution SA (2008) [113 TTJ 767].

Formula One World Championship Ltd. v CIT (Civil Appeal No.3849 of 2017).

Galileo International (2008) [114 TTJ 289].

MasterCard Asia Pacific Pte. Ltd (AAR No. 1573 of 2014).

Ram Jethmalani v. Union of India ((2011) 8 SCC 1.

South Dakota v. Wayfair, Inc. - 138 S. Ct. 2080 (2018).

Other Sources

Accenture, 'Why Artificial Intelligence is the Future of Growth,' available at <https://www.accenture.com/futureofAI> [accessed on 16 January 2018].

Adams, R.L. '10 Powerful Examples of Artificial Intelligence in Use Today' available at <https://www.forbes.com/sites/robertadams/2017/01/10/10-powerful-examples-of-artificial-intelligence-in-use-today/#229f4c02420d> [accessed on 20 March 2020].

Atabekov,A. and Yastrebov, O. 'Legal Status of Artificial Intelligence Across Countries: Legislation on the Move' (2018) 4 Volume XXI *European Research Studies Journal*.

BDO Global "Articles: Taxation of the Digital Economy - Rethinking the world tax system" available at <https://www.bdo.global/en-gb/insights/tax/international-tax/taxation-of-the-digital-economy-rethinking-the-world-tax-system>.

BDO Global "Taxation of the Digital Economy and pushing fiscal boundaries" available at <https://www.bdo.global/en-gb/microsites/tax-newsletters/corporate-tax->

news/world-wide-tax-news-alerts/taxation-of-the-digital-economy-and-pushing-fiscal-boundaries [accessed on 10 January 2021].

Castrounis, A. “*Artificial Intelligence Deep Learning, and Neural Networks Explained*” 2021 available at <https://www.innoarchitech.com/blog/artificial-intelligence-deep-learning-neural-networks-explained> [accessed on the 11 of January 2019].

Carvalho, L. “The International Taxation of Autonomous Artificial Intelligence (May 28, 2019) *Brazilian Institute for Tax Law (AAI): Questions from Prof. Xavier Oberson.*

Chand, V. Kostić, S. and Reis, A., ‘Taxing Artificial Intelligence and Robots: Critical Assessment of Potential Policy Solutions and Recommendation for Alternative Approaches – Sovereign Measure: Education Taxes/Global Measure: Global Education Tax or Planetary Tax’ *World Tax Journal* (2020) 12 *World Tax Journal* 711-761.

Cheng, J. and Burgers, P. “The boundaries of legal personhood: how spontaneous intelligence can problematise differences between humans, artificial intelligence, companies and animals” (2018) *Artificial Intelligence and Law* (27) 73-92.

Dobinson, I. and Johns, F. “Qualitative Legal Research” in *Research methods for law* M. McConville and W. Hong Chui (eds) (2017) University Press, Edinburgh.

European Parliament ‘Report with Recommendations to the Commission on Civil Law Rules on Robotics’ Report 27.1.2017 (A8-0005/2017).

Fumiya, A. and Pfeifer, R. “*Embodied Artificial Intelligence: Trends and Challenges*” in IIDA, Fumiya, Y., Kuniyoshi, R. Pfeifer and L. Steels “Embodied Artificial Intelligence” (2004) Berlin: Springer.

Gadžo, S. *Nexus Requirements for Taxation of Non-Residents’ Business Income* (2018) IBFD Tax Research Platform.

Gadžo, S. “The principle of ‘Nexus’ or ‘Genuine Link’ as a Keystone of International Income Tax Law: A Reappraisal” *Intertax* (46) 3.

Goertzel, B. and Pennachin, C. (Eds.). *Artificial General Intelligence*. (2007)
Rockville: Springer.

Greenwood, C. ‘Sources of International Law: An Introduction’ (2008) available at http://legal.un.org/avl/pdf/ls/greenwood_outline.pdf [accessed on 10 February 2019].

Haenlein, M. and Kaplan, A. “*Siri, Siri, in My Hand: Who’s the Fairest in the Land? On the Interpretations, Illustrations, and Implications of Artificial Intelligence*.” *Business Horizons*, 62(1). London: Elsevier 201.

IBFD ‘Global Tax Treaty Commentaries (GTTC) available at <https://www.youtube.com/watch?v=BOqTNdevTuk> [visited 11 December 2021].

Megan, M., and Cohen. B.S. ‘Can AI Be Tax?’ 7 May 2020 available at <https://www.withersworldwide.com/en-gb/insight/can-ai-be-taxed> [accessed on 27 August 2021].

Kovacev, Robert J. (2020) "A Taxing Dilemma: Robot Taxes and the Challenges of Effective Taxation of AI, Automation and Robotics in the Fourth Industrial Revolution," *The Contemporary Tax Journal*: Vol. 9: Iss. 2, Article 4.

KPMG ‘Global payment solution provider company has a permanent establishment in India’ available at <http://www.in.kpmg.com/taxflashnews/KPMG-Flash-News-MasterCard-Asia-Pacific-Pte.-Ltd-5.pdf> [accessed on 2 March 2019].

Lennard, M. “Act of creation: the OECD/G20 test of “Value Creation” as a basis for taxing rights and its relevance to developing countries” (2018) *Transnational Corporations* 25(3) 55-84.

Marvin Minsky, M., “*AI pioneer as used in the background note to define AI for the 2016 OECD Technology Foresight Forum 2016 on Artificial Intelligence*” Accessed

on 6 June 2019 [Available at <http://www.oecd.org/going-digital/ai/technology-foresight-forum-2016.htm>].

Nedelkoska, L. and Quintini, G. "Automation, skills use and training"(2018) *OECD Social, Employment and Migration Working Papers*, No. 202, OECD Publishing, Paris, <https://doi.org/10.1787/2e2f4eea-en>.

Oberson, Xavier ‘Taxing Robots: A Solution for the Future’ TEDx Geneva, June 15 (2018) available at <https://www.youtube.com/watch?v=7P9o1WBnM3E>.

Oberson, Xavier ‘Taxing Robots? From the Emergence of an Electronic Ability to Pay to a Tax on Robots or the Use of Robots’ (May 2017) *World Tax Journal*.

Organization for Economic Cooperation and Development ‘National policies for Artificial Intelligence: What about diffusion?’ in OECD The Digital Transformation of SMEs, OECD Studies on SMEs and Entrepreneurship (2021) available at <https://www.oecd-ilibrary.org/sites/cc3a9728-en/index.html?itemId=/content/component/cc3a9728-en#snotes-d7e32298> [accessed on 11 October 2021].

Organization for Economic Cooperation and Development, “Artificial Intelligence” available at <https://www.oecd.org/going-digital/ai/> [accessed on 10 February 2019].

Organization for Economic Cooperation and Development Commentary on Article 5 Concerning the Definition of Permanent Establishment, 2017.

Organization for Economic Cooperation and Development ‘Glossary of Statistical Terms’ *Transfer Pricing*. Available at <https://stats.oecd.org/glossary/detail.asp?ID=2757> [accessed on 10 November 2019].

Organization for Economic Cooperation and Development (2017), *OECD Science, Technology, and Industry Scoreboard 2017: The digital transformation*, OECD Publishing, Paris, available at <https://doi.org/10.1787/9789264268821-en> [accessed on 2 February 2019].

Organization for Economic Cooperation and Development *Review of comparability and profit methods: revision of chapters I-III of the Transfer Pricing Guidelines* (2010) available at <http://www.oecd.org/tax/transfer-pricing/45763692.pdf> [accessed on 29 September 2018] at part II and III.

Organization for Economic Cooperation and Development, “Recommendation of the Council on Artificial Intelligence” (2019) Available at: <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449> [accessed on 11 November 2019]

Organization for Economic Cooperation and Development ‘Unpacking E-Commerce: Business Models, Trends and Policies’ (2019) Available at <https://www.oecd.org/going-digital/unpacking-ecommerce.pdf> [accessed on 3 June 2019].

O’Sullivan, D. and Vuilleumier, M. ‘Corporate tax: slowing down the race to the bottom’ (2019) Available at https://www.swissinfo.ch/eng/vote-may-19--2019_corporate-tax--slowing-down-the-race-to-the-bottom/44943042; <https://stats.oecd.org/Index.aspx?lang=fr&SubSessionId=8135408e-882e-4b07-9fe7-0c018527605a&themetreeid=18> [Accessed on the 10 June 2019].

Permanent Court of International Justice Advisory Committee of Jurists, Procès-verbaux of the proceedings of the Committee, June 16th – July 24th, 1920, with Annexes (1920).

Petropoulos, G. 2021. Automation, COVID-19, and Labor Markets. ADBI Working Paper 1229. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/automation-covid-19-and-labor-markets>.

Republic of South Africa Department of National Treasury and South African Revenue Service (SARS) “2017 Tax Statistics” available at <https://www.sars.gov.za/Media/MediaReleases/Pages/20-December-2018---Tax-Statistics-2018.aspx> [Accessed on 10 February 2019].

Schäfer, A. and Spengel, C. “ICT and International Taxation: Tax Attributes and Scope of Taxation” (2002) Discussion Paper no. 02-81, Centre for European Economic Research.

Smits, J.M. *The Mind and Method of the Legal Academic* (2012) Edward Elgar Publishing.

Stuart, S.C. Should Robots Pay Taxes?, available at <https://www.pcmag.com/news/should-robots-pay-taxes> [accessed on 30 July 2021].

The Economist, why taxing robots is not a good idea, 25 February 2017; Xavier Oberson ‘Taxing Robots: Helping the Economy adapt to the Use of Artificial Intelligence’ (2019) Edward Elgar Publishing.

The Statute of the International Court of Justice at art. 38; Christopher Greenwood ‘Sources of International Law: An Introduction’ (2008) available at http://legal.un.org/avl/pdf/ls/greenwood_outline.pdf [accessed on 10 February 2019].

The United States and Eritrea tax based on citizenship not residence; Foreign Account Tax Compliant Act, 2010; UN Human Rights Council, Report of the detailed findings of the Commission of Inquiry on Human Rights in Eritrea, 5 June 2015, <http://www.ohchr.org/EN/HRBodies/HRC/CoIEritrea/Pages/ReportCoIEritrea.aspx>, (para 440). Date accessed: 10 May 2019.

United Nations Commentary on Chapter II Definitions: Commentary on the paragraphs of Article Five.

Vermuelen, B., Kesselhut, J., Pyka, A. and Saviotti, P. ‘The Impact of Automation on Employment: Just the Usual Structural Change?’ (2018) 10 *Sustainability* 1161.

World Economic Forum with A.T. Kearney, “White Paper: Technology and Innovation for the Future of Production: Accelerating Value Creation” (2017) available at http://www3.weforum.org/docs/WEF_White_Paper_Technology_Innovation_Future_of_Production_2017.pdf [accessed on 17 September 2019].

Vogel, K. "Double Tax Treaties and their Interpretation" (1986) *Berkley Journal of International Law* 4(1).