# THE IMPACT OF DIGITALISATION ON TAX REVENUE IN THE FOURTH INDUSTRIAL REVOLUTION: A SYSTEMATISED REVIEW

by

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**Remofilwe Selebogo**

## ABSTRACT

### THE IMPACT OF DIGITALISATON ON TAX REVENUE IN THE FOURTH INDUSTRIAL REVOLUTION: A SYSTEMATISED REVIEW

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**Background:** Digitalisation has evolved around the world, as such resulting in the use of computer-generated systems as opposed to making use of human capital. The fourth industrial revolution has introduced the use of artificial intelligence, robotics, and machine learning. It is established that, where the computerised systems, such as robots replace human workers, the government may lose large amounts of income as personal income tax is a high revenue contributor for governments. As a result of the many technological advancements being explored, it is crucial that the tax systems are updated to accommodate the changes which may be experienced in the market.

**Main purpose of study:** The main purpose of this study is to understand and explore the impact digitalisation has on tax revenue where the digitalised revolution is being explored. In this regard, the current study systematically analyses existing published literature relating to the impact of digitalisation on tax revenue in the fourth industrial revolution.

**Method:** The current study is based on the interpretation and analysis of existing literature gathered from credible academic journals. The research method followed in this study is a qualitative research method which follows a systematic review.

**Results:** After analysing the publications, it is noted that digitalisation and tax is a complex issue with the majority of the authors concluding that the fourth industrial revolution has

resulted in automation having a huge influence not only on the unemployment rate but also on the economy of countries.

**Conclusions:** The study indicates that technological advancements may result in high unemployment as human workers are replaced by computer-generated systems. As individuals are the main revenue contributors for the government, tax authorities might have to explore the introduction of a tax on the technological advancements to make up for the loss to the fiscus.

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## LIST OF ABBREVIATIONS AND ACRONYMS

**Table 1: Abbreviations and acronyms used in this document**

| Abbreviation | Meaning |
|---|---|
| ABDC list | Australian Business Dean Council |
| Australia | The Commonwealth of Australia |
| USA | United States of America |

# CHAPTER 1:
# INTRODUCTION

## 1.1. BACKGROUND

Since the 1800s, following the introduction of steam power which was introduced in the first industrial revolution, technological efficiencies allowed various industries to improve production. This led to the second industrial revolution where human labour was replaced by electrical energy (David, 2015:9; Eberhard, Podio, Alonso, Radovica, Avotina, Peiseniece, Caamaño Sendon, Gonzales Lozano & Solé-Pla, 2017:49; Erdoğdu & Karaca, 2017:82; Gružauskas & Statnickė, 2017:127; Varga, Ágoston, Cseh & Sipiczki, 2018:1). The second industrial revolution which ended in the 1970s paved the way for an era where electrical machinery was utilised to manufacture products without human intervention (Bonciu, 2017:11; Eberhard *et al.*, 2017:49; Erdoğdu & Karaca, 2017:82; King, Hammond & Harrington, 2017:56).

The progression made in the third industrial revolution with the automation of electronic systems, created opportunities for technology to interact with the internet (Bonciu, 2017:11; Erdoğdu & Karaca, 2017:83). This led to the fourth industrial revolution where artificial intelligence comes into play, providing industries with faster and more intelligent solutions for manufacturing. It is understood from many researchers that the fourth industrial revolution introduced the use of artificial intelligence, robotics and machine learning (Jones & Pimdee, 2017:12; King *et al.*, 2017:56; Lee, Yun, Pyka, Won, Kodama, Schiuma, Park, Jeon, Park & Jung, 2018:22; McCredie, Sadiq & Chapple, 2019:648; Prisecaru, 2016:58). However, the results of this is a higher unemployment rate in the economy as technological advancements replace human workers (Akhter & Sultana, 2018:152; Bonciu, 2017:11; David, 2015:4; Elliott, 2018:40; McCredie *et al.*, 2019:648; Mokyr, Vickers & Ziebarth, 2015:45). Although automation does not eliminate work, it will unfortunately eliminate jobs which are performed by humans workers (David, 2015:4; Mokyr *et al.*, 2015:47; Varga *et al.*, 2018:2).

Digitalisation has evolved around the world and as such, resulting in a greater use of computer-generated systems as opposed to making use of human capital (Eberhard *et al.*, 2017:48; Ionescu, 2019b:33; Prisecaru, 2016:58; Sae-Lim & Jermsittiparsert, 2019:747).

As jobs are eliminated, it is estimated that governments may lose large amounts of income due to less personal income tax that is collected (Ahmed, 2017:710; Floridi, 2017:3; King *et al.*, 2017:53). Personal income tax is one of the biggest revenue income streams for the governments (Mazur, 2018:297) and as robots do not pay tax, governments potentially face large losses (Abbott & Bogenschneider, 2018:1; Floridi, 2017:3; Ionescu, 2019a:66; Mazur, 2018:281). A possible solution to this problem is if tax authorities consider the introduction of a certain tax for the utilisation of robots (Bonciu, 2017:15; Mazur, 2018:280).

Due to human capital being replaced as a consequence of technological advancements, studies are also undertaken to analyse and investigate whether taxing robots will minimise the income tax loss which governments might face due to the loss of human capital (King *et al.*, 2017:55; Mazur, 2018:281; Patias & Leventi, 2017:127). The initial analysis is to understand and explore the impact digitalisation has on the labour markets in economies where the digitalised revolution is being explored (Eberhard *et al.*, 2017:47; Sae-Lim & Jermsittiparsert, 2019:749). However, an introduction of robot tax might result in a broad tax policy change and adjustment (Ahmed, 2017:710; Ionescu, 2019a:66; Oberson, 2017:249).

A robot tax is not considered to be the most efficient way to curb out the massive unemployment rate as well as the decline in tax revenue collected by authorities (Mazur, 2018). There are a few practical issues which must be taken into account, for instance defining the term ‘robot’ for tax purposes and as a result measuring the income the robot generates (Mazur, 2018:280; Oberson, 2017:249; Patias & Leventi, 2017:127). As a result of the many technological advancements being explored, it is crucial that tax systems are updated to take into account the challenges which are experienced in the market (Abbott & Bogenschneider, 2018:1). Nevertheless, a good government tax policy plays an important role in resolving this problem caused by automation (Mazur, 2018:280).

## 1.2. RATIONALE FOR THE STUDY

Digitalisation, as a result of the fourth industrial revolution, is an inevitable consequence hence, it is of the utmost importance that a government has solutions set in place in order to address the challenges it may face. The current study aims to provide insight into

digitalisation and the consequences it bears on tax revenue in the fourth industrial revolution by analysing existing literature obtained from academic journals.

The fourth industrial revolution is changing the labour market drastically by inventing new specialised skills and by digitalising work performed by human capital within companies (Eberhard *et al.*, 2017:47; Elliott, 2018:41; Lee *et al.*, 2018:23). Not only does this increase productivity but, there will also be a global increase in new scientific inventions (Abbott & Bogenschneider, 2018:3). However, the high unemployment rate which arises due to digitalisation through the upcoming years is likely to have a negative impact on tax revenue collected by tax authorities. It is also a disadvantage to those employees without an educational background which is required so as to remain employed in the fourth industrial revolution (Akhter & Sultana, 2018:149; Bonekamp & Sure, 2015:36; Gružauskas & Statnickė, 2017:131; Jones & Pimdee, 2017:23; Prisecaru, 2016:60). There is an understanding that due to the invention of machine learning, big data and robotics, a decrease in the demand for individuals is expected (Eberhard *et al.*, 2017:48; Erdoğdu & Karaca, 2017:104; Mokyr *et al.*, 2015:45).

Automation requires the government to explore possible solutions, such as the implementation of a tax on robots or technological advancements in order to regain tax revenue that is collected from taxpayers (Bonekamp & Sure, 2015:37; Erdoğdu & Karaca, 2017:118). In this regard, the taxation system needs to be upgraded in such a way it will encourage companies to make use of automation, for instance introducing tax incentives for the use of robots (Abbott & Bogenschneider, 2018:5).

There are changes which are happening in the market as a result of digital transformation. Hence, tax revenue collectors must adopt a different tax approach in order to cater for such changes (Portolese & Folloni, 2018:432). However, there is currently no introduction of a tax on robots or any other technological advancements. This study seeks to explore, in further detail, the impact which digitalisation has on tax revenue in the fourth industrial revolution and how to address such challenges.

### 1.3. RESEARCH OBJECTIVE

The main research objective of the current study is to systematically analyse the existing literature relating to the impact of digitalisation on tax revenue in the fourth industrial

revolution. The information analysed for this study is obtained from credible sources published in quality academic journals.

The research objective of this study is driven by the following research questions:

- What are the main themes emerging from these selected articles?
- In which academic journals are these scholars publishing their research and what are the quality ratings of the academic journals in terms of the Australian Business Dean Council (ABDC) rating list?
- What is the timeframe of publications on digitalisation and tax income in the fourth industrial revolution?
- To which main academic discipline do the selected academic journals belong to?
- What is the country perspective from which the research in the publications is done?
- What is the taxpayers' perspective from which the research in the publications is done?
- What is the research design and methodologies adopted by the selected articles?

## 1.4. RESEARCH DESIGN AND METHODOLOGY

The research design seeks to address the type of study and data which is collected, as well as the method in which the information is analysed (Goddard & Melville, 2004:12). This study follows a systematic review, which is a qualitative as well as a cross-sectional study as the data was collected during a specified period. A pragmatism philosophical stance, which is inductive, is utilised in an attempt to understand the impact that digitalisation has on tax revenue which is a result of the fourth industrial revolution. As the study analyses existing articles on the selected topic, the unit of analysis is classified as secondary data.

The research method is the technique followed as a collection instrument of data which is analysed in order to answer the research question; to find a solution to the problem; and to achieve the research objectives of the study (Walliman, 2017:1). The valuation and reliability of the data collected is analysed so as to evaluate if the data can be utilised for the purpose of this study.

## 1.5. MAIN CONSTRUCTS OF THIS STUDY

The main constructs identified in this study are digitalisation, fourth industrial revolution, and tax revenue. Each one of these constructs are explained in detail below.

### 1.5.1 Digitalisation

"Digitalisation reveals the world in new varieties and forms" (Fors, 2010:27).

Digitalisation has mostly affected the way businesses operate and thus, have affected our everyday life. The world is witnessing a noticeable shift of attention from human system interactions to digital technology (Berg, Buffie & Zanna, 2018; Fors, 2010:27; Lee, Cameron & Hassall, 2019:327; McCredie *et al.*, 2019:120). The use of technological advancements has increased and developed over the years (Lee *et al.*, 2019:327).

This increase of digital developments in businesses has made it challenging for human workers to move towards a digitalised world where human interaction is limited (Bonciu, 2017:8). Thus, digital developments are having an influence on human behaviour, as people find themselves questioning whether they should appreciate digitalisation or not (Fors, 2010:29).

As a result of the fourth industrial revolution, automation plays a significant role in digitalisation. These technological innovations have changed the labour market landscape (Eberhard *et al.*, 2017:47; Jones & Pimdee, 2017:21). Research speculates that jobs in advanced digital economies are at "high risk" of being automated (Eberhard *et al.*, 2017:47). Digitalisation, automation and robotics are enforcing the substitution of a human workforce in the markets (Eberhard *et al.*, 2017:48).

Digitalisation, automation and robotics has emerged in the use of computer generated systems in businesses as a result of the fourth industrial revolution (Lee *et al.*, 2018:23). However, this impacts the employment rate, as technology is the preferred choice to human workers (Bonciu, 2017:8; Fors, 2010:29; Lee *et al.*, 2019:333). Businesses operate by making use of different digital platforms and technological advancements available in order to improve operational performance (Lee *et al.*, 2019:325). The new technology

being developed in the digitalised world consists of interface technology, automatic control technology and mechanical manufacturing technology (Yu, Zhao, Li, Zhang, Zhao, Guo & Qui, 2018:3).

Businesses focus more on the development of technological advancements in order to grow the digital platform (Fors, 2010:29). In the past, businesses could interact in different forms and ways, however, businesses today have transformed into virtual environments as a result of digitalisation (Lee *et al.*, 2019:328). Businesses, however, need to consider the distribution of work to workers in order to continue to improve performance in the fourth industrial revolution (Lee *et al.*, 2018:28).

### 1.5.2 Fourth industrial revolution

The fourth industrial revolution, also known as industry 4.0, has developed through the past revolutions (Varga *et al.*, 2018:2). However, this is the first revolution in human history to raise the question of the impact of technology on human labour (Bonciu, 2017:8). This revolution focuses on innovative automation, robotics, as well as the use of machine learning, data analytics, artificial intelligence, and virtual systems (Chiţiba, 2018:72; Chou, 2019:107; de Ruyter, 2019:37; Li, Hou & Wu, 2017:627). However, it appears as though there is a high demand for robotics (Chou, 2019:114; Li *et al.*, 2017:633).

The first industrial revolution created jobs and allowed human workers to take part in the development of steam power (Eberhard *et al.*, 2017:49; King *et al.*, 2017:56); which lead to the second industrial revolution where electrical machinery replaced human capital in the work force (Erdoğdu & Karaca, 2017:49; Lee *et al.*, 2018:1). The third industrial revolution introduced an interaction of technology and the internet (Bonciu, 2017:11; Prisecaru, 2016:57). Over the years, these developments resulted in the fourth industrial revolution, where technological advancements limit human labour in the work place (Chiţiba, 2018:72; Jones & Pimdee, 2017:12).

The development of technological advancements offers a huge transformation in terms of how businesses function; thus creating new opportunities and threats (Lee *et al.*, 2019:327; Li *et al.*, 2017:633). The fourth industrial revolution provides the opportunity to

improve current technologies, however, it imposes change on the business systems, decision making of management and business performances for companies which are enhancing digitisation in the market (Chiţiba, 2018:73; Lee *et al.*, 2019:337; Seyedghorban, Tahernejad, Meriton & Graham, 2020:96; Yu *et al.*, 2018:1).
The fourth industrial revolution is likely to affect every industry in the economy and in this regard, may require most companies to restructure their business in order to accommodate this innovative change (Jones & Pimdee, 2017:5). Due to the lack of digital resources, companies might find it difficult to adapt to this developing digital market (Olbert & Spengel, 2017:3). The fourth industrial revolution appears to have a positive impact on the transformation of the economic growth of a country, however, this may impact the unemployment rate of a country (Li *et al.*, 2017:631).

The future of human capital in businesses needs to be considered as technology is proven to raise productivity and to replace existing human capital in the fourth industrial revolution (Berg *et al.*, 2018:120; Lee *et al.*, 2018:29; Li *et al.*, 2017:632; Mokyr *et al.*, 2015:33; Varga *et al.*, 2018:2). In doing so, companies must ensure that all the appropriate skills or training is provided to employees in order to enable them to work in the digitalised world so as to meet the priorities of companies (Chiţiba, 2018:73; David, 2015:17; de Ruyter, 2019:37; Jones & Pimdee, 2017:12; Lee *et al.*, 2019:337; Li *et al*., 2017:631; Venter, 2019:3).

Even though governments are not responsible for the technological development and the changes in the labour markets, they will have to structure the legal regulations and tax systems in a manner which will take into account the new developments in the market (de Ruyter, 2019:46; Li *et al.*, 2017:634).

### 1.5.3 Tax revenue

Tax revenue is income received by the government from the taxes collected from taxpayers. The tax authorities collect tax revenue from individuals and companies which consists of direct tax revenue in the form of personal income tax and corporate tax revenue, and indirect tax revenue such as value added tax. The tax revenue collected from taxpayers form part of the budget of a country (Baunsgaard & Keen, 2010:564; Doerrenberg, 2015:32; Gnangnon & Brun, 2019:3516; Oz-Yalaman, 2019:107).

The government uses the tax revenue collected to fund the country's infrastructure and public works (Kafkalas, 2014:438). The only way for a government to collect the necessary tax revenues is if the citizens of the country adhere to the tax laws and regulations (Doerrenberg, 2015:31).

Research has proven that digitalisation in the fourth industrial revolution has a huge impact on unemployment (Ionescu, 2019a:64). The impact on unemployment results in a decrease in the personal income tax collected by the tax authorities (Abbott & Bogenschneider, 2018:150; Ahmed, 2017:751).

Automation should not reduce the tax revenue collected by governments and therefore, tax policies must be revised to take these technological advancements into account (Abbott & Bogenschneider, 2018:145). A challenge tax authorities face with digitalisation is the imposition of tax on robots as robots are not a "person" for tax purposes (Floridi, 2017:4; Oberson, 2017:258). Hence, robots are not subject to tax and by replacing human workers in the future, will negatively impact the overall tax base (Abbott & Bogenschneider, 2018:150; Lee *et al.*, 2018:29; Mazur, 2018:297; Oberson, 2017:249). An option to make up for the loss in tax revenue is to impose a tax on robots (Bonekamp & Sure, 2015; Oberson, 2017).

The question which still remains is whether a tax on robots will provide enough funds for the government and whether such funds will be sufficient to assist with the social grants for the unemployed workers as a result of automation (Bonciu, 2017:15; McCredie *et al.*, 2019:648; Oberson, 2017:256). The need for a robot tax to be brought in may not be sufficient, because as automation accelerates, tax policies will need to be revised constantly so as to take into account the impact of such technological developments on tax revenue (Mazur, 2018:298; Patias & Leventi, 2017:129).

## 1.6. STRUCTURE OF THE MINI-DISSERTATION

The structure of this study is summarised below:

**Chapter 1: Introduction**

This chapter provides the background of the research topic; it also contains the rationale for the study by providing a synopsis of why the current study is being conducted and the importance thereto. The chapter also sets out the research objectives which need to be achieved to be able to answer the research question. In addition, the chapter indicates how the current study fits into the existing body of knowledge.

**Chapter 2: Research design and methodology**

This chapter explains each research design element setting out the philosophical stance, the nature of the current study, the reasoning methods followed, the time horizon of the study, the unit of analysis which is under consideration, the types of data and the sources of data applicable for the current study. In addition, this chapter also sets out the methodological classification, data collection, and the quality assessment of the suitable articles selected for this study.

**Chapter 3: Data analysis and results**

As the current study follows a systematic literature review, this chapter provides a detailed description of the way in which the information is analysed. This chapter also sets out the conclusions obtained from the research in response to the research question of the study.

**Chapter 4: Conclusion**

This chapter sets out a summary of the main objectives obtained from this study. The chapter also provides a summary of the findings obtained to answer the research question and the research objectives of the study. In addition, recommendations are made for future research on this topic which are also set out in this chapter.

# CHAPTER 2:
# RESEARCH DESIGN AND METHODOLOGY

## 2.1. INTRODUCTION

The purpose of this chapter is to elaborate on the research design and the methodology applied in this study. The previous chapter elaborates on the importance of the study, as well as the rationale of the study. The first chapter identifies the main objectives which are addressed in this study, as well as the research question which the study is aimed at answering.

This chapter starts with an introduction of the research design to give a full understanding of how data is collected, analysed, and interpreted to provide answers on the research question. The discussion on the research design is followed by a discussion of the research methodology applied to provide the solution to the research problem of this study.

## 2.2. RESEARCH DESIGN

The research design is a plan utilised to obtain answers to the research questions by describing the method in which the information is being collected and analysed, as well as how the findings are communicated (Kumar, 2019:94). Furthermore, the research design is the logical sequence which connects the information collected and analysed to a study's primary research question which finally leads to the conclusion of the study (Creswell & Poth, 2016:5). This section of the study sets out the plan followed to be able to answer the research question and achieve the objectives of the study.

### 2.2.1. Philosophical stance of the study

Philosophy is the idea or belief that is derived from historical events and hence shapes how the world is perceived from one's perspective (Burns & Burns, 2008:13). The philosophical stance creates a unique style of thinking, and it is the foundation of how knowledge is used as a guide to navigate through life (Burns & Burns, 2008:13). A study can adopt four types of philosophical stances, namely:

- Positivism: Positivism involves the scientific manner, in which an experimental study is conducted within a theory or model. It is observable and descriptive which interprets the final results by taking into consideration the original theory (Ponterotto, 2005:128). This stance is objective, and the observable facts identified are based on the results of a scientific research method based on hypothesis testing (Burns & Burns, 2008:14; Maree, 2007:2).
- Realism: Realism focuses on the understanding of human behaviour and acceptance of being able to accept circumstances as they are (Maree, 2007:2).
- Interpretivism: Interpretivism is based on the understanding of people and the world in which they live. The main focus is on interacting with people in order to understand their views on life with respect to their cultural, historical and social experiences (Creswell, 2007:20-21).
- Pragmatism: Pragmatism focuses on the research problem being studied and the research questions asked to address the solutions to the problem. The researcher's primary focus is on the real-world implications of the research and highlights the significance of conducting research (Creswell, 2007:22-23).

The current study follows the pragmatism stance as the study strives to address the research question by identifying the problem. This study aims to identify the impact which the fourth industrial revolution has embedded on businesses and society at large through digital transformation and the impact this has on tax revenue (Prisecaru, 2016). Therefore, the reason for this study is to understand the impact on tax revenue as a result of the fourth industrial revolution and to identity the problems which may result from it.

### 2.2.2. The nature of the study

A study is classified based on the application, objectives and the method of enquiry of the research study (Kumar, 2019:9). Three types of studies are described below:

- Exploratory study: An exploratory study investigates a situation or problem that has happened in the past and further studies are needed for it in future (Kumar, 2019:111). A study of this nature is pursued with the purpose to gather more understanding of an area with minimal information or the opportunity of conducting a specific research

study. Therefore, this study allows for the development of procedures to explore an area where little is known (Kumar, 2019:11-15).

- Descriptive study: A descriptive study focuses on providing factual and accurate descriptions of an event or situation (Christensen, Johnson & Turner, 2014:36). One of the most useful strategies in obtaining information which is descriptive, is by using multiple investigators who collect and provide an interpretation of that data. By making use of multiple investigators, the interpretation of the data is not based on an individual's perspective. Therefore, based on the significant number of investigators who share the same interpretation and reach the same conclusion, it allows the reader to place more reliance on the study (Christensen *et al.*, 2014:366).
- Causal study: A causal study is designed to determine the cause-and-effect of relationships by manipulating the independent variable, the outcomes are identified by conducting experiments. The crucial feature of this approach is to see what happens to 'something else' when one aspect is intentionally changed (Christensen *et al.*, 2014:46-49).

The current study is a descriptive study, based on that it focuses on unfolding and analysing the challenges which the fourth industrial revolution has on tax revenue in the economy.

### 2.2.3. Reasoning methods

The method of reasoning is the process followed in order to formulate an answer to the research problem (Sekaran, 2003:27). The method of reasoning refers to the approaches followed in order to gain knowledge on the observations identified so as to reach a theory (Walliman, 2017:17).

- Inductive reasoning: Inductive reasoning exists when one reaches a conclusion based on opinions that arise from observations made (Sekaran, 2003:27). This reasoning is influenced by the specific observations or experiences, which in some instances are seen as a belief or rule (Walliman, 2017:17).
- Deductive reasoning: Deductive reasoning occurs when a conclusion is formulated based on general information that already exists (Sekaran, 2003:27). This reasoning

starts with the general statement and then broadens the statement through logical argument in order to reach a specific conclusion (Walliman, 2017:17).

- Abductive reasoning: Abductive reasoning first starts with an observation and logically deduces the results in order to formulate the conclusion (Sekaran, 2003:27). This reasoning combines the inductive and deductive reasoning approaches, regularly referred to as the scientific method (Walliman, 2017:20).

The current study follows an inductive reasoning approach, as a conclusion is based on the observations and information analysed. This study is based on the outcomes which are identified in order to understand the impact which digitalisation as a result of the fourth industrial revolution may have on tax revenue.

### 2.2.4. Time horizon of the study

Time horizon refers to the time it takes to gather adequate data, analyse it, extract insights from it and eventually obtaining a solution for the research problem (Sekaran, 2003:138). Below the two types of time horizons are discussed:

- Cross-sectional study: Also referred to as one-shot, is a study in which data is collected just once for a specific period in order to provide a solution for a research question (Sekaran, 2003:135). Although, for this type of study, data is collected at one point in time, it also involves the collection of data on multiple scenarios. The two main conditions for this type of research design is that the data collected must be of a quantifiable nature and it must involve more than one variable. Another restriction following this research design is that it only measures correlations between variables (Bryman & Bell, 2003:55).
- Longitudinal study: Is a study whereby data is collected at more than one point in time in order to address the research questions (Sekaran, 2003:135). This type of study allows for observations to be made on a continuous basis in order to collect factual information so as to examine the changes in trends over time. The intervals used in this research design are not fixed and the information is visited numerous times at regular intervals. If longitudinal studies are defined in terms of cross-sectional studies, a single longitudinal study is equivalent to multiple cross-sectional studies (Kumar, 2019:110).

The current study is based on a cross-sectional study considering that data is collected at one specific period.

### 2.2.5. Unit of analysis

In a research study, the unit of analysis refers to the object which is being studied so as to address the problem statement identified. It varies across different scenarios depending on the information which is being gathered (Sekaran, 2003:132).

The unit of analysis for the current study is existing literature pertaining to the chosen topic in a means to understand the two important aspects which the study is aiming to address. Firstly, digitalisation in the fourth industrial revolution and secondly, the impact on tax revenue due to digitalisation. The literature collected is examined with the aim to address the impact digitalisation has on tax revenue; and to identify the solutions in order to achieve the objective of the study. Thus, the existing literature gathered, is intended to answer the research question.

### 2.2.6. Types of data

The type of data refers to the nature of information needed which the researcher uses in order to define the research problem (Sekaran, 2003:59). The different types of data are discussed below:

- Quantitative data: Quantitative data collects numerical data used to answer the research question (Christensen *et al.*, 2014:46). This data focuses on the quantification of observations which often involves large scale sampling to observe variances as well as the measurement and analysis of relationships between two or more quantifiable variables (Ponterotto, 2005:128). Researchers use numbers and statistics, which are obtained through the use of structured questionnaires or tests in order to gather numerical data, to explain what is observed (Burns & Burns, 2008:22).
- Qualitative data: Qualitative data is non-numerical data which is used to answer the research question (Christensen *et al.*, 2014:46). However, this data describes, interprets and analyses the observations in a contextual manner (Ponterotto, 2005:128). The aim of this data is to give a complete and detailed description of the

data, usually presented in words or images (Burns & Burns, 2008:22). Such data is obtained from various sources, such as interviews, films, case studies, documentaries and documents which are used to textually interpret the observations or feedback gathered when answering the research question (Sekaran, 2003:409).

The information collected in the current study is qualitative data, as it is non-numerical data analysed from existing theoretical literature used to answer the research question.

### 2.2.7. Sources of data

Data is gathered in two different ways. The difference between the two ways being the time of the occurrence of the event and the time span in which the event is recorded (Walliman, 2017:69). There are instances where data is readily available and only needs to be retrieved, as well as instances where data needs to be collected in order to conduct a research study (Kumar, 2019:138). There are two types of data sources which are discussed below:

- Primary sources: Refers to data which is collected first-hand. The sources of primary data include gathering information through people, specific groups, interviews and questionnaires, in most cases set up by the researcher in order to gather the information required for the research study (Sekaran, 2003:219). The primary data is the first and immediate observation of a situation or event (Walliman, 2017:70).
- Secondary sources: Refers to data retrieved from information which already exists. The sources of secondary data include, amongst others, company records, government publications, specific industry studies of which such information can be obtained on the media and web sites, when gathering information for a research study (Sekaran, 2003:219). Therefore, secondary data is documented matter which interprets primary data (Walliman, 2017:69).

The current study is based on the interpretation and analysis of existing literature gathered therefore the study is based on secondary sources which already exist.

## 2.3. RESEARCH METHODOLOGY

This section looks at the research methodology adopted for this study in terms of its methodological classification as well as the research strategy which is adopted. This section also addresses the valuation and reliability of the data which is collected and identifies the academic articles selected and analysed in order to address the research objectives of this study.

Furthermore, the purpose of this section is to explain the research tactics and strategy which is undertaken to analyse and scrutinise the data which is collected and selected for the purposes of answering the research question (Maree, 2007:34).

### 2.3.1. Methodological classification

When conducting research, it is important that the results obtained are comparable and reliable. The results of the data collected must be substantiated and make sense when practically observed. It is also important to note that the conclusions reached as a result of the analysis of the data is seen to be valid, therefore, the data which is used must be reliable (Maree, 2007:37). There are three ways in which research is classified as described below:

- Qualitative research: Qualitative research has been explored by applying various techniques to ensure that the results of the data is reliable and trustworthy. Although not all researchers believe in the quality assurance techniques, some researchers focus on the following four data aspects: creditability; confirmability; dependability; and transferability. The validity of the data is likely to have the same interpretation and idea for both the researcher and the participant (Maree, 2007:38). This research study includes the understanding of human behaviour through field study as opposed to laboratory experiments being conducted (Burns & Burns, 2008:18).
- Quantitative research: When applying quantitative research, it is important to explain, in the most simplified manner, the numerical techniques followed in order to answer the research question. This includes methods such as descriptive statistics and inferential statistics which determine the level of statistical significance, as well as measure and calculate the meaning of effect sizes to ascertain the level of significance of such results (Maree, 2007:39). This suggests that ideas, opinions, and personal beliefs must be tested and should not simply be accepted to be true by conducting techniques to

verify the accuracy of the information. Quantitative scientific techniques are conducted in order to establish the general rules and values through carefully controlled experiments (Burns & Burns, 2008:14-15).

- Mixed method research: This method is a combination of the qualitative and the quantitative methods in the same research study and combines the concepts and styles followed under the two methods (Christensen *et al.*, 2014:382).

The research method followed in this study is qualitative as the study is making use of a systematic review.

### 2.3.2. Systematised review of the literature

As mentioned above, this study follows a systematic review. There are various other ways in which information can be reviewed by conducting a traditional or narrative review, however, they do not form part of this study, therefore are not discussed.

A systematic review is a process in which large amounts of data is analysed, arranged, organised and reduced to be modified to include only data that assists in answering the research question and addresses the research objectives of the study. The data is organised in such a manner that any data which is not suitable or relevant to this study is excluded and only relevant and authoritative data is utilised. This is the preferred method to be used when answering specific research questions and analysing the theory. It also proves to be useful when summarising, evaluating and setting out the results and consequences identified in the study (Booth, Papaioannou & Sutton 2012:3; Petticrew & Roberts, 2006:2-9).

The systematic review method assists in identifying where new research studies are required, particularly in instances where there are doubts, false information given or there is minimal research available pertaining to a research problem. Systematic reviews assist researchers in understanding the difference between instances where researchers convey the data as real, versus where the knowledge is based on assumptions. This method helps to identify each instance. As studies may be biased, it is important to select the studies wisely which will be reviewed as it is possible to review data which may result in contradictory conclusions (Petticrew, 2006:2).

In addition, a systematic literature review is a logical method for identifying, evaluating, and synthesising the existing literature. There are some types of reviews which include, amongst others mapping review, meta-analysis, mixed studies, overview, rapid review, scoping review and umbrella review (Booth, 2012:1-2). Systematic literature review methods consist of the following five steps, which are followed in the current study:

- Articulation of a research question,
- Searching for relevant information which is utilised,
- A quality assessment of the information obtained,
- Analysis and sorting of data; and
- Presentation of the information obtained.

(Booth, 2012:25-31)

### 2.3.3. Data collection technique

This section describes how the data is collected to answer the research question of this study. This section provides a clear explanation of how the data is collected, the manner in which it is sorted and the categories which are used, as well as the reason for each technique used (Maree, 2007:34; Walliman, 2017:39).

There are several ways in which data is collected to answer the research question of a study. As discussed above, in point 2.2.7, on page 15, there are two ways in which information is obtained, either from primary sources or secondary sources. Primary data is collected by means of surveys, questionnaires, interviews and focus groups. However, as previously discussed in point 2.2.7 above, this study sets out an analysis of existing literature collected from secondary sources.

These secondary sources were obtained from a search on the University of Pretoria's library website by making use of Google Scholar and other academic databases. The journal articles obtained for the study are peer-reviewed journal articles published in academic journals. Since the academic articles are obtained from academic platforms these articles are, therefore, viewed as credible, of good quality and reliable for the purpose of this study.

The articles selected for the purpose of this study are obtained by searching for relevant keywords. Only articles which are identified to address the research question and objectives of the study are selected. As part of the selection process of the articles used in this study, academic articles which are not relevant are excluded. This study focuses on academic articles published in the 21st century, which contain information on digitalisation and the fourth industrial revolution. This study is conducted by making use of articles which deal with the evolution of machine learning, big data and artificial intelligence which relates to the impact of digitalisation on taxation. Only English academic journal articles from credible sources are used to assist in addressing the research question and objectives of the present study.

The data collection technique explains how the literature which is obtained is analysed, to determine which information is excluded and which information is relevant for the study in order to address the research question. It is crucial that the research findings obtained in this study is taken from relevant and reliable sources (Walliman, 2017:61). The sections below cover in detail the keywords, search criteria, and the recording of data.

#### *2.3.3.1. Keywords*

The process which is followed to obtain the literature used in this study is to identify keywords and perform a search using these keywords. These keywords are words identified from the title of the present study, the research question, and the research objectives. These keywords are essential as they help identify the literature relevant to this study. The literature obtained is from the University of Pretoria's library website where published academic literature is available in electronic format. Google Scholar is used as a search engine and where applicable, the search is directed to the EBSCOhost, ProQuest, and other various search engines for relevant academic journals in electronic format. Table 2, below, sets out the keywords which are used to obtain the relevant journal articles for the study:

**Table 2: Keywords**

| From topic | Related terms | Wider terms | Narrower terms |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Digitalisation/ Digitalization<br>Fourth industrial revolution<br>Tax revenue | Technology revolution<br>Industry 4.0<br>Tax systems<br>Tax authorities | Digital innovation<br>Digital economy<br>Tax administration<br>Technological drivers<br>Robot tax<br>G20 countries | Tax revenue challenges<br>Effects of digitalisation/ digitalization<br>Challenges of digitalisation/ digitalization |

The above table consists of four columns which include all the terms used to obtain search results of the literature which is used for this study. The first column sets out the terms which are used in the title, research question and the research objectives of the study. The second column sets out the terms which are identical, related, or have a similar meaning to the terms used in the first column. Since these keywords have a similar meaning to the terms used in the first column, the literature identified is in line with the study. The third column in Table 2 sets out the broader terms which are used to be able to gather further articles to use for the study. Lastly, the fourth column sets out the terms used to better align and obtain research articles which narrow down the study in identifying the effect of digitalisation on tax revenue.

#### *2.3.3.2. Search criteria*

This section explains the search criteria which is used in order to identify, select, and record academic articles which are used to conduct the study on the impact of digitalisation on tax revenue. The literature which is used in this study is in respect of articles published in academic journals. A total of 31 journal articles are identified by using the keywords as set out in Table 2, on page 19. The impact of digitalisation through innovation and advancements of computer capabilities is on a global scale. Therefore, this study is not limited to a specific country as it explores the general impact on tax revenue due to digitalisation. As digitalisation is a 21$^{st}$ century phenomena (Jones & Pimdee, 2017:12), only English academic articles published in the 21$^{st}$ century are considered for review in this study.

The academic articles obtained were uploaded onto a software program called Qiqqa, which is described in 2.3.3.3 below, where they are sorted and analysed.

#### *2.3.3.3. Recording of selected academic articles*

Qiqqa is a software program which is used to analyse and manage academic articles obtained for research purposes (Van Ullen, 2016:59). This software program is available online and is free of charge. It is used to tag and insert comments onto the portable document format academic articles and also organises the data obtained. Qiqqa allows for researchers to save, match, and bookmark the articles which are relevant and suitable for the study to answer the research question and address the objectives. (University of Pretoria, n.d:1-31).

Quiqqa software is used as a referencing tool when preparing a research document by integrating the Microsoft word document and a function called BibTex to simultaneously create in-text referencing as well as a reference list. Another useful tool regarding this software is that it can extract the articles from the saved folder and can sync Qiqqa and the said folder. (University of Pretoria, n.d:1-31).

In addition to this, the current study uses the software program to group the quality rating of the selected academic articles. The ABDC rating list is used to access the quality of the research articles. The analysis of the information obtained using the ABDC list is discussed in the next section.

### 2.3.4. Quality assessment of the data

This section of the study explains in detail the ABDC rating list of the peer-reviewed journal articles selected for this study. The ABDC rating list is used to identify articles which have credible information by rating the journals which the articles are published in as either A*, A, B, or C rated. It is important to note, that not all journals are included on the ABDC rating list (Hair, Wood & Sharland, 2019:644 - 650). Below is an explanation of the ratings:

- A* rated: The journals rated as A* are rated as the world-leading best journals. The information contained in these journals is credible and reliable.
- A rated: These journals are highly regarded journals.
- B rated: These journals are viewed as well-regarded journals.

- C rated: These journals are recognised journals.

(Duan, 2018:7)

The journal articles which are obtained from the University of Pretoria's library website and databases are stored in Qiqqa, where these articles are evaluated in terms of the ABDC rating list. The rating list of the journals assists in identifying which journal articles are from the most credible journals. The names of the journals in which the articles are published are searched on the ABDC listing.

The rating of the journal articles using the ABDC listing are illustrated in Table 3 below:

**Table 3: Journal ratings outcome**

| Name of the Journal | A* Rated | A Rated | B Rated | C Rated | Not Rated | Total number |
|---|---|---|---|---|---|---|
| Australian Journal of Management | | 1 | | | | **1** |
| Journal of Economic Perspectives | 2 | | | | | **2** |
| Journal of Management | 1 | | | | | **1** |
| Journal of Monetary Economics | 1 | | | | | **1** |
| Pepperdine Law Review | | | | 1 | | **1** |
| World Tax Journal | | | 2 | | | **2** |
| Various (unrated articles) | | | | | 23 | **23** |
| **Totals** | **4** | **1** | **2** | **1** | **23** | **31** |

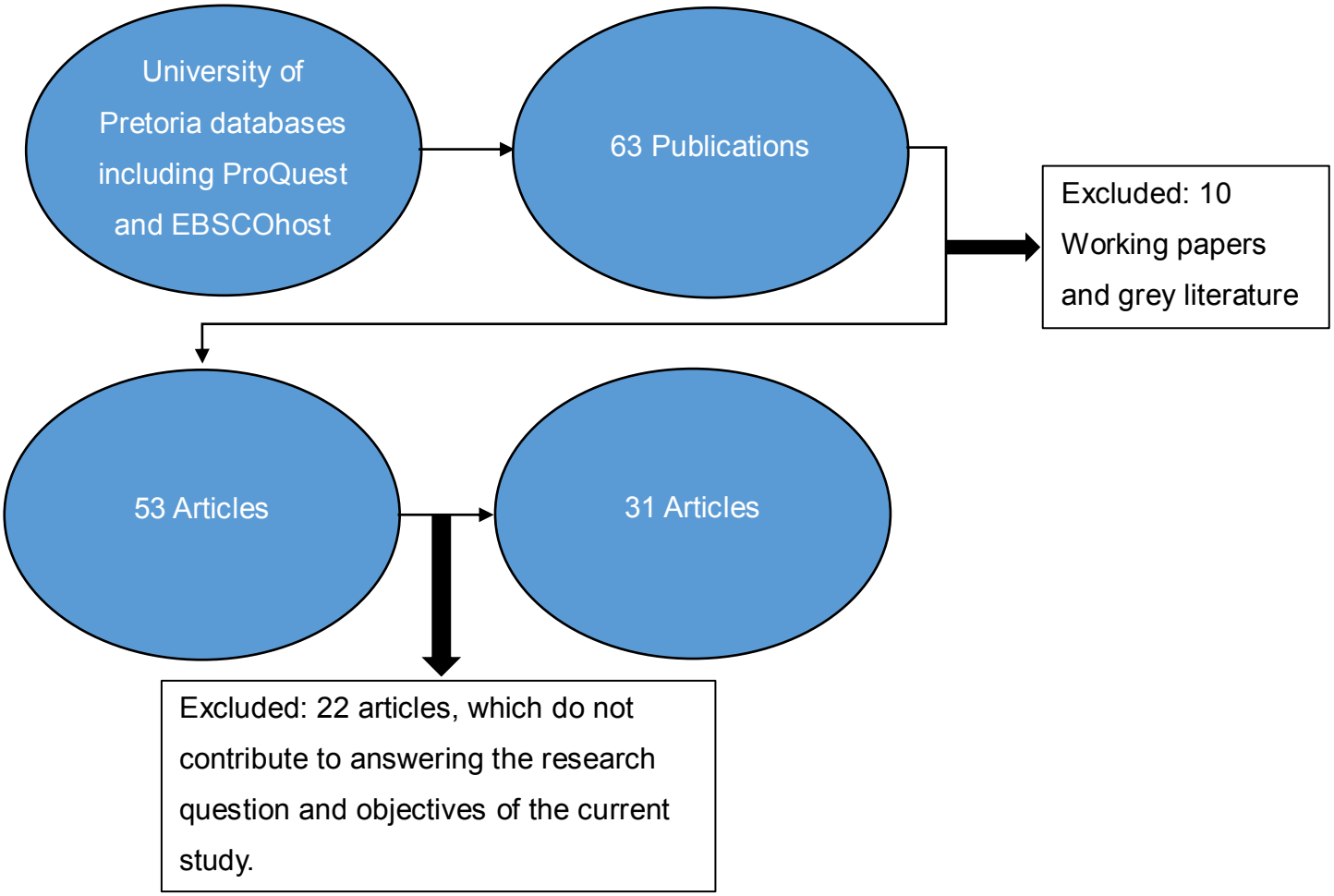
From Table 3, it is clear that four of the selected articles are published in A* rated journals, whereas, 23 articles are published in journals not rated on the ABDC rating list.

### 2.3.5. Summarised overview of data collected and quality assessment

This section of the study sets out the outcomes of the data collection and assessment of the academic articles. Figure 1, on page 23, illustrates the process in which the articles were obtained, included, and excluded from the study.

The search conducted on the University of Pretoria's library website using the keywords set out under section 2.3.3.1, identified 63 publications. However, ten of the publications are excluded because they are not obtained from accredited sources and contained public papers, internal working papers, dissertations, grey literature, and theses. A further 22 articles which do not contribute to answering the research question and objectives are excluded as they are not relevant to this study. Of the 63 publications, 31 articles remain which are relevant to this study.

**Figure 1: Summary of academic journals analysed**




## 2.4. CONCLUSION

This chapter explains the methods in which the existing literature is obtained, selected, and analysed for the purpose of this study. The research methods described in this chapter are followed in order to select the articles which are used to answer the research question and achieve the objectives of this study. In addition, this section sets out how the

articles are evaluated and analysed. The current study follows a descriptive systematic review, which is qualitative in nature and uses secondary data collected at a given point in time. The study follows an inductive approach and a pragmatism philosophical stance as it focuses on the research problem being studied as well as the research question. As the study analyses existing articles on the chosen topic, the unit of analysis is the existing literature on the chosen topic. Following the application of the techniques and strategies set out in this chapter, 31 articles are selected for purpose of this study.

# CHAPTER 3:
# DATA ANALYSIS AND RESULTS

## 3.1. INTRODUCTION

The main purpose of the current study is to address the research objectives by following a systematic review in identifying the impact of digitalisation on tax revenue in the fourth industrial revolution. The previous chapter discusses the research design and methodology which this study undertakes, while this chapter analyses and discusses the 31 selected journal articles. By making use of sub-headings, this chapter addresses each of the research objectives to answer the research question formulated. Lastly, conclusions are drawn from the findings.

## 3.2. DATA ANALYSIS TECHNIQUE

This study makes use of a thematic analysis technique. This technique is based on the analysis of themes discussed in a study following a logical approach (Kumar, 2019:292). In addition, the thematic data analysis technique is used to understand the main themes identified in the literature (Kumar, 2019:401), and as such, this technique is suitable for analysing the selected articles for the current study.

For purpose of analysing the 31 journal articles selected, which address the impact of digitalisation on tax revenue, 12 elements are utilised using Qiqqa. The articles are grouped and sorted using the tagging function on Qiqqa. The 12 elements which are used for tagging and analysing the articles aim at addressing the research questions as stated

in Chapter 1. Each element analysed from the 31 selected journal articles are explained in the next section as well as the results obtained from the analysis.

## 3.3. PRESENTATION OF RESULTS AND DISCUSSION

This section discusses the results after performing a thematic analysis on the 31 journal articles selected for this study, followed by a discussion pertaining to the specific research questions stated in Chapter 1.

### 3.3.1 Themes

The aim of this section is to identify any main themes addressed in each of the selected articles.

**Research question:** What are the main themes emerging from the selected articles?

When reviewing the selected articles, the main theme, aspects or topic which emerge from the development of the study are identified, this is referred to as the construct of the study (Kumar, 2019:37).The 31 articles selected are analysed for common themes in identifying the relevant issues pertaining to the chosen topic. Table 4 below, sets out and explains the themes and the main constructs identified from the 31 articles selected. The first column sets out the relevant number, the second column sets out the relevant themes identified from the selected articles, while the third column states the number of articles relating to that said theme. The themes identified are briefly discussed under each theme in Table 4 below.

**Table 4: Themes identified**

| | **Theme** | **Number of articles** |
|---|---|---|
| 1 | <u>Digitalisation in the era of the fourth industrial revolution and unemployment:</u><br>The research articles indicate that digitalisation in the fourth industrial revolution has resulted in human workers being replaced by technological advancements such as robots (Eberhard *et al.*, 2017:48; Sae-Lim & Jermsittiparsert, 2019:747). In this regard, digitalisation has a huge impact on unemployment and tax revenue (Abbott & Bogenschneider, 2018:64; Ionescu, 2019a:64). Tax | 12 |

| | Theme | Number of articles |
|---|---|---|
| | revenue is impacted as a result of individuals being replaced by robots in the workplace (Akhter & Sultana, 2018:152; Mokyr *et al.*, 2015:45). Further research is required to determine whether a tax on robots will assist in regaining the loss to the fiscus (Bonekamp & Sure, 2015:37). | |
| 2 | Economic growth consequences due to digitalisation:<br>Research indicates that digitalisation negatively impacts the unemployment rate (Ionescu, 2019a:65). Therefore, the unemployment rate has a negative impact on the economy due to more people having to rely on government social grants (Bonciu, 2017:15; Oberson, 2017:256). Furthermore, a high increase in the unemployment rate results in a high loss of tax revenue collected by governments (Abbott & Bogenschneider, 2018:1; Mazur, 2018:281). In this regard, the impact of digitalisation must be addressed as economic growth is usually the key driver of tax revenue. | 7 |
| 3 | The influence of automation on tax systems:<br>Research indicates that taxation in cyber physical technology refers to the tax which is charged on the income of robots as a result of automation in a digital economy (Vishnevsky & Chekina, 2018:8). It is apparent that the fourth industrial revolution has resulted in automation being a huge influence on the economy. As a result, it is important that tax systems are updated to accommodate the introduction of automation in the digitalisation era (Sae-Lim & Jermsittiparsert, 2019:737). Taxation in the fourth industrial revolution, with regards to the development of technology, might help increase tax revenue in developing countries (Elmi, 2019:90). | 14 |
| 4 | Innovation in the fourth industrial revolution:<br>According to research, there is an awareness of the adoption of innovative technologies which focuses on promoting advanced technology (Sae-Lim & Jermsittiparsert, 2019:737). In this regard, developing countries need to respond to the industry by addressing the tax impacts which may arise in relation to innovation in the fourth industrial revolution (Lee *et al.*, 2018:38). Governments might consider the introduction of tax incentives for such businesses (Abbott & Bogenschneider, 2018:5). | 6 |
| | **Total** | **39*** |

*Please note that some articles deal with more than one theme identified, thus the total number of articles may differ from the original sample (N=31).

It is evident from the themes in Table 4 above, that the development of technological advancements in the fourth industrial revolution has an impact on unemployment leading to a loss of tax revenue for tax authorities (Mazur, 2018:297; Oberson, 2017:249). The loss in tax revenue and the high unemployment rate caused by digitalisation results in economic problems (Bonciu, 2017:11; Mazur, 2018:317). Therefore, it is important that tax

authorities identify solutions to respond to the loss of revenue and restructure the tax systems to accommodate for the technological interruptions in the market (Abbott & Bogenschneider, 2018:150).

### 3.3.2 Academic journals and ABDC rating

This section sets out the academic journals in which the 31 articles selected are published, as well as the quality rating in terms of the ABDC list (refer also to section 2.3.4).

**Research question:** In which academic journals is the research published in and what is the quality rating of the respective academic journals, based on the ABDC rating list?

The 31 articles selected for the study were obtained from academic journals using Google Scholar and where applicable, the search was directed to EBSCOhost, ProQuest and other various search engines which contain credible academic articles.

Table 5 below, sets out the academic journals in which the 31 articles are published, as well as the ABDC rating of the peer-reviewed journal articles selected as part the literature review for this study. The ABDC rating list is used to identify articles which have credible information by rating the journals from which the articles were received as per the A*, A, B, C, rating. It is important to note that not all journals are included in the ABDC rating list. Table 5 has three columns, the first column states all the academic journals in which the selected articles were published; the second column indicates the ABDC rating; and the third column indicates the number of articles which were published in the respective journals.

**Table 5: Academic journals and ABDC rating**

| Academic journals | ABDC Rating | Number of articles |
|---|---|---|
| American Journal of Engineering Research | Not rated | 1 |
| Asian International Journal of Social Sciences | Not rated | 1 |
| Australian Journal of Management | A | 1 |
| Contemporary Readings in Law & Social Justice | Not rated | 1 |
| Economics, Management, & Financial Markets | Not rated | 1 |
| Financing for Development | Not rated | 1 |
| Harvard Law & Policy Review | Not rated | 1 |

| Academic journals | ABDC Rating | Number of articles |
|---|---|---|
| International Journal of Accounting & Financial Reporting | Not rated | 1 |
| International Journal of Business & Economic Sciences Applied Research | Not rated | 1 |
| International Journal of Innovation, Creativity & Change | Not rated | 1 |
| International Review of Economics & Finance | Not rated | 1 |
| Issues in Science and Technology | Not rated | 1 |
| Journal of Business & Media Psychology | Not rated | 1 |
| Journal of Economic Perspectives | A* | 2 |
| Journal of International Affairs | Not rated | 1 |
| Journal of Management | A* | 1 |
| Journal of Monetary Economics | A* | 1 |
| Journal of Open Innovation: Technology, Market, & Complexity | Not rated | 1 |
| Journal of Strategic Innovation & Sustainability | Not rated | 1 |
| Journal of Tax Reform | Not rated | 1 |
| Knowledge Horizons Economics | Not rated | 2 |
| Pepperdine Law Review | C | 1 |
| Philosophy & Technology | Not rated | 1 |
| Polish Journal of Management Studies | Not rated | 1 |
| Regional & Business Studies | Not rated | 1 |
| Romanian Economic & Business Review | Not rated | 1 |
| South Carolina Law Review | Not rated | 1 |
| World Tax Journal | B | 2 |
| **Total** | | **31** |

The above table indicates that the journal articles are mostly published in economic, business and management journals. Research on the effect of digitalisation on tax revenue in the fourth industrial revolution is published in 28 different journals of which three journals published two of the selected articles. In the second column of Table 5, it indicates that six of the 31 journals consisting of eight articles were rated on the ABDC list of which four articles were A* rated.

### 3.3.3 Year of publications

This section sets out the year of publication of the academic journals which were selected for the study.

**Research question:** What is the timeframe of publications on digitalisation and tax income in the fourth industrial revolution?

The year of publication gives an indication of the period when the journal articles, in respect of the impact of digitalisation on tax revenue in the fourth industrial revolution, became relevant. Table 6, on page 29, indicates the year in which each journal article was published. The first column states the year in which the selected articles were published, while the second column indicates the number of articles published in that specific year.

**Table 6: Year of publications**

| Year of publication | Number of articles |
|---|---|
| 2015 | 3 |
| 2016 | 1 |
| 2017 | 10 |
| 2018 | 11 |
| 2019 | 6 |
| **Total** | **31** |

Based on Table 6 above, the selected academic articles on the fourth industrial revolution were published from the year 2015 onwards. This indicates that digitalisation is an issue of the 21st century. In 2017 and 2018 there is a spike in the number of articles published, as 10 and 11 academic articles respectively were published on this specific topic over the two years. This indicates that the impact of digitalisation on tax revenue in the fourth industrial revolution is a relatively new study which is being undertaken.

### 3.3.4 Academic discipline

An academic discipline is the supporting subject or focus area of a study and in addition it is also the academic subject which the study has an impact on (Kumar, 2019:400). This section sets forth the academic discipline to which journal articles pertain to.

**Research question:** To which main academic discipline does the selected academic journal belong to?

Table 7, on page 30, illustrates the academic disciplines which the 31 articles are of relevance to. Table 7 consists of two columns the first column states the academic disciplines which the study is based on. The second column states the number of articles which adopt the academic disciplines mentioned in the first column.

**Table 7: Academic discipline**

| Academic discipline | Number of articles |
|---|---|
| Accounting and business | 1 |
| Business | 2 |
| Economics | 5 |
| Economics and business | 22 |
| Politics | 1 |
| **Total** | **31** |

The research areas of the studies adopt five academic disciplines. Based on the information in Table 7 above, it appears that most articles are based on the findings of the economic and business academic disciplines. Based on these findings, it is evident that the economy of a country, as well as the business industry is mainly impacted. This is in line with the themes/constructs described above which entails that the study is more focused on automation and its influence on unemployment, which has a noticeable influence on the economy of a country.

### 3.3.5 Country specific perspective

This section of the study focuses on the country specific perspective, pertaining to the impact of digitalisation on tax revenue in the fourth industrial revolution.

**Research question:** What are the country perspectives from which the research in the publications was done?

This part of the study identifies the countries which the articles or studies relate to. In the selection process of the 31 articles for the current study, there was no limitation in terms of country or region, and thus the selection includes studies from all around the world. Table 8, on page 31, sets out the countries to which the studies relate. Table 8 has two columns, the first column shows the countries in which the studies were performed while the second column indicates the number of the articles relating to each country.

**Table 8: Taxpayer perspective**

| Country | Number of articles |
|---|---|
| Australia | 1 |
| Bangladesh | 1 |
| Developing countries | 9 |
| European countries | 1 |
| Germany | 1 |
| Hungary | 1 |
| Japan | 1 |
| Kenya | 1 |
| Korea | 1 |
| Malaysia | 1 |
| Thailand | 2 |
| United Kingdom and Australia | 1 |
| United States of America (USA) | 10 |
| **Total** | **31** |

Based on the information given in Table 8, 10 out of the 31 articles were conducted in the USA. The reason being, the USA is one of the countries that is involved in digitalisation and automation, as well as being involved in the creation and investment of technological advancements and automation (Hamid, A Hamzah, Noor & Azali, 2018:95; Lee *et al.*, 2018:7). Based on the above findings, nine articles had studies based on developing countries which illustrates that developing countries anticipate the introduction of automation. However, studies are currently being conducted to explore the disadvantages, or advantages of the introduction of technological advancements.

### 3.3.6 Taxpayer perspective

This section of the study sets out the taxpayer perspectives to which the study is aimed at. The taxpayer perspective refers to the group which the study is targeting.

**Research question:** What is the taxpayer's perspective from which the research in the publications is done?

Table 9 below, illustrates the taxpayer perspectives which the study is aimed at: Table 9 has two columns, the first column sets out the taxpayer perspective, whereas the second column indicates the number of articles focusing on the specific taxpayers.

**Table 9: Tax perspective**

| Taxpayer perspective | Number of articles |
|---|---|
| Companies | 3 |
| Companies and government officials | 5 |
| Companies and individuals | 2 |
| Companies, individuals, and government officials | 4 |
| No taxpayer perspective | 17 |
| **Total** | **31** |

Of the 31 articles, 17 articles are not aimed at any specific taxpayer, however, these articles are conducted from a broader perspective and take into account the effects of digitalisation from an economy or business perspective. Digitalisation impacts on the economy from an individual, company and government perspective. The aim of the studies is to look at the tax system as a whole. This allows the researcher to conduct the research taking all perspectives into account, as well as all the elements which might affect the tax systems as a result of digitalisation.

### 3.3.7 Research designs and methodologies

This section sets out the research designs and methods elements which are adopted by the researchers.

**Research question:** What are the research design and methodologies adopted by the selected articles?

This section of the study presents the results obtained relating to the research designs and methodologies for the 31 articles selected. The following research design and methodology elements are explored in the articles namely; the philosophical stance, nature of the study, reasoning method, time horizon, types of data and sources of data and methodological classification.

#### *3.3.7.1 Philosophical stance*

This section of the study interprets the style of thinking of the 31 articles which are selected for this study. As discussed in detail in section 2.2.1, of the study, there are four types of philosophical stances which a study can adopt, namely positivism, realism, interpretivism and pragmatism stances (Burns & Burns, 2008:13-14). Table 10 below, illustrates the two philosophical stances adopted by the 31 articles reviewed. Table 10 consists of two columns the first column states the philosophical stances which are adopted by the 31 articles selected and the second column indicates the number of articles analysed using the philosophical stance described in the first column.

**Table 10: Philosophical stance**

| Philosophical stance | Number of articles |
|---|---|
| Positivism stance | 3 |
| Pragmatism stance | 28 |
| **Total** | **31** |

The findings indicate that of the four stances, only two are adopted by the articles selected for the study. Only three of the articles illustrate an experimental study using a model to interpret the findings observed by the study. The majority of the studies adopt a pragmatism stance.

Most of the studies focus on the implications of the impact of digitalisation on tax revenue in the real world which addresses the research problem of the study. The studies indicate

the significant influence and challenges which digitalisation has on the economy from a tax policy and economic perspective.

#### *3.3.7.2 Nature of the selected studies*

The nature of the studies is discussed in detail in section 2.2.2 of this study. This section shows the types of studies which the selected 31 articles adopt. Table 11, on page 34, indicates the nature of the studies of the articles. Table 11 has two columns the first column describes the nature of the study identified for the 31 articles. The second column indicates the number of articles which are classified as the type of nature of the study as set out in the first column.

**Table 11: Nature of the study**

| Nature of the study | Number of articles |
|---|---|
| Causal study | 3 |
| Descriptive study | 24 |
| Exploratory study | 4 |
| **Total** | **31** |

Based on the analysis from Table 11 above, 77% (24 out of 31 articles) of the studies conducted on the impact of digitalisation in the fourth industrial revolution articles are descriptive in nature. Only a few studies, seven in total, were causal and exploratory studies.

In this regard, most articles are conducted with the purpose of analysing the opportunities and challenges which automation brings in the fourth industrial revolution. The studies in the selected articles are conducted to have a clearer understanding of a topic of which little is known.

#### *3.3.7.3 Reasoning method*

The reasoning methods are detailed under section 2.2.3 of this study. This section identifies the method of reasoning adopted by the 31 articles selected to address the research problem and to reach a conclusion for the study. Table 12 below, sets out the

method of reasoning of the selected articles. Table 12 has two columns, the first column sets out the method of reasoning adopted by the 31 articles, while the second column indicates the number of articles which adopt the said reasoning method.

**Table 12: Reasoning method**

| Reasoning method | Number of the articles |
|---|---|
| Abductive reasoning | 2 |
| Deductive reasoning | 1 |
| Inductive reasoning | 28 |
| **Total** | **31** |

Based on the above results, 90% (28 out of 31) of the articles follow an inductive reasoning approach. This indicates that the studies focus on reaching a conclusion based on the opinions or observations conducted. These studies set out theories on the implications which digitalisation has on tax revenue in the fourth industrial revolution. Of the 31 articles, one article follows a deductive reasoning approach, where the researcher formulates a conclusion based on prior research. Two articles follow an abductive reasoning method which combines both the inductive and the deductive approaches to reach a conclusion.

#### *3.3.7.4 Time horizon*

As discussed in section 2.2.4 of this study, the time horizon refers to the time in which research was conducted to obtain the findings of the study. The time horizon of the study is analysed to allow the researcher to understand the time intervals of when the research was conducted. There are two types of time horizons, namely cross-sectional and longitudinal studies. A cross-sectional study refers to research which is conducted at a specific point in time, whilst a longitudinal study is conducted over a period of time (Sekaran, 2003:135).

All the articles selected for this current study are cross-sectional studies, therefore, all the articles were conducted at a specific point in time.

#### *3.3.7.5 Types of data and methodological classification*

The type of data needed by the researcher to identify the research problem of the study is either qualitative or quantitative data. This has been discussed in detail in section 2.2.6 of this study. Furthermore, there are an additional three methods in which research can be classified, namely qualitative research, quantitative research and the mixed research method, all of which are discussed in detail under section 2.3.1. Qualitative research refers to the different textual techniques which are conducted in the study to ensure that the results of the data is credible and reliable (Maree, 2007:38). Quantitative research refers to the numerical techniques used by the researchers to answer the research question (Maree, 2007:39). Mixed research is the method used when a researcher adopts a combination of the quantitative and qualitative techniques to answer the research question (Christensen *et al.*, 2014:382). Table 13, on page 36, sets out the types of data and research methods which the studies are based upon. Table 13 consists of two columns the first column states the types of data or research methods researchers utilise to define the research problem and reach a conclusion for the respective study. The second column indicates the number of articles that adopt the type of data or research method stated in the first column.

**Table 13: Methodological classification**

| Types of data/ research method | Number of articles |
|---|---|
| Qualitative data/ qualitative research method | 24 |
| Quantitative data/ quantitative research method | 3 |
| Mixed research method | 4 |
| **Total** | **31** |

Based on the figures shown in Table 13, 24 of the 31 articles use the non-numerical data, which is the qualitative research method, to obtain the findings of the studies. The studies are detailed and include an in-depth analysis of data in a contextual manner to answer the research questions of the studies. There are three articles which include numerical analysis, which is the quantitative research method, of the information by providing a statistical interpretation of the findings. These studies contain an analysis of the relationship between variables such as the impact of technological advancements on unemployment rate. There are four articles which follow the mixed research method and provide an overview of the data by using both textual and numerical methods of research.

#### *3.3.7.6 Sources of data*

Sources of data refers to the kind of information which is utilised in the selected articles to conduct an observation or analysis of the study, namely the primary and secondary sources of data. Primary sources of data refer to information which is collected by the researchers for the first time. Secondary sources of data refers to information which is gathered by another researcher and used in the study to develop a finding or conclusion (Walliman, 2017:69-70).

Table 14, on page 37, illustrates the sources of data which is analysed in the 31 articles selected for this study. Table 14 has two columns, the first column describes the types of data which is used in the 31 articles, while the second column indicates the number of articles.

**Table 14: Sources of data**

| Types of data | Number of articles |
|---|---|
| Primary data | 4 |
| Secondary data | 27 |
| **Total** | **31** |

Based on the information gathered in Table 14, most of the articles rely on information which already exists, namely secondary data. This implies that in order to address the research question of the study, secondary data is relied upon. Only 4 of the 31 articles contain information obtained from primary data which includes questionnaires and surveys.

## 3.4 CONCLUSION

This chapter explains the data analysis techniques and findings which the 31 articles selected for the current study adopt. The data analysis techniques of the articles are analysed for the purpose of this study. The 31 articles are selected with the purpose to answer the research questions and achieve the objective of the current study. In addition, these data analysis techniques detail how the articles are analysed for the purpose of this study.

Based on the thematic data analysis conducted, the selected articles mostly explore the impact of the unemployment rate and the resultant impact on tax revenue in the fourth industrial revolution, as a result of automation. Of the 31 articles which were selected for the study, eight are rated in the ABDC rating list and most of the articles relate to an economic and business academic discipline. The thematic analysis further indicates that content in 10 of the 31 articles focuses on the USA and a further nine articles focus on developing countries. This topic is so broad that 17 of the 31 articles have no taxpayer perspective as these articles take into account the effects of digitalisation from an economic point of view. The findings indicate that 28 articles follow a pragmatism stance while 24 articles adopt a descriptive study. From the selected articles, 28 articles adopt an inductive reasoning method and 24 articles are qualitative in nature. All the articles are cross-sectional studies and 27 articles are conducted by making use of secondary data.

# CHAPTER 4:
# CONCLUSION

## 4.1. INTRODUCTION

The previous chapter describes the thematic analysis technique which is followed to analyse the 31 articles selected for this study. Chapter 4 concludes the current study by setting out a summary of the findings and conclusions. This chapter also sets out the research limitations which are identified, as well as the research gaps on this topic which future researchers may want to explore. Lastly, final comments of the study are made.

## 4.2. SUMMARY OF FINDINGS AND CONCLUSION

The main research objective of this study is to systematically analyse the existing literature obtained from credible academic journals, relating to the impact of digitalisation on tax revenue in the fourth industrial revolution. The main objective includes an analysis of the journal articles by making use of sub-questions which guide the research in this study. The outcome of this study is detailed below by making use of the sub-questions as the structure and lastly with an overall conclusion for this study.

It is undisputable that the individuals are the biggest tax revenue contributors in a country (Vishnevsky & Chekina, 2018:10). The loss in the fiscus, as a result of automation, impacts the social and economic sectors of a country due to unemployment (Mazur, 2018:317). Reduced levels of revenue collected has a large impact on the economic growth of a country (Bonciu, 2017:11). For this reason, this study analyses the impact digitalisation has on tax in the fourth industrial revolution.

The thematic technique is mastered by conducting a study using the data analysis technique which is used to analyse the journal articles using the 12 elements. These 12 elements are; the main theme identified in each journal article, academic journals and ABDC rating, year of publication, academic discipline, country specific perspective, taxpayer perspective, philosophical stance, nature of the selected studies (causal, descriptive and exploratory study), reasoning method (abductive, deductive and inductive

reasoning), time horizon, types of data and research method (qualitative, quantitative and mixed), and lastly the sources of data (primary and secondary).

The elements of academic journals and ABDC rating list, academic discipline and the year of publication indicate the importance of the study. The study on digitalisation in the fourth industrial revolution is relevant to a wide range of academic disciplines, mainly the economics and business academic discipline. The topic of the current study gained attention from the year 2015 onwards which indicates that this is a new topic and it is likely that researchers will continue to conduct studies on this topic.

The element of country perspective highlights the countries where the study is conducted. The study was mostly conducted in the USA however, it was also performed in developing countries. This indicates that the study has not been conducted throughout the world and there is still room for further analysis.

The element of taxpayer perspective indicates that as the study has no taxpayer perspective, the study has a broad approach on the tax systems as a whole and is not limited to specific taxpayers. The philosophical stance and the nature of the study elements indicate that the study focuses on real world implications, hence most studies adopt the pragmatism approach and are descriptive in nature.

The element for types of data and research method reveal that the studies are mostly qualitative and based on non-numerical analysis for interpreting the study. The element of reasoning method highlights the method of reasoning adopted, and most studies follow an inductive approach, which indicates that most conclusions are based on observations made.

The element for time horizon and sources of data highlights that the study was performed at one specific point in time. Furthermore, most of the studies are based on information gathered from other researchers. This highlights the lack of research undertaken over time in respect of the topic of this study.

Ultimately, the study reaches a conclusion that tax authorities must combat the impact which digitalisation has on tax revenue.

## 4.3. LIMITATIONS

This study is subject to the following limitations:

- The literature selected is not exhaustive as the study only reviews published journal articles.
- The search for publications was only conducted in scholarly academic databases, such as Google Scholar, EBSCOhost and ProQuest and this could exclude other relevant studies on other databases.
- Only articles in English are considered, and this could exclude exposure to additional articles.
- Although all significant keywords and phrases are identified, based on the scope of the study, there is a possibility that some authors have used different terms to Industry 4.0 and digitalisation, and this could exclude other relevant studies.
- All the studies are cross-sectional which makes the study limited as it is impossible to determine the exposure of the study over time to investigate the research problem.

## 4.4. FUTURE RESEARCH

Digitalisation has an impact on tax revenue due to automation in the fourth industrial revolution. To make up for the loss of revenue it is advisable to introduce a tax on the technological advancements to make up for the loss in the fiscus. Future researchers may explore the introduction of a robot tax, as well as classifying robots as taxable persons (Oberson, 2017:258).

Additional sources of tax revenue, such as payroll taxes to support future government revenue income may need to be explored (Mazur, 2018:310). In this regard, researchers may need to reform the overall tax system to accommodate automation (Varga *et al.*, 2018:9). Due to the loss in revenue caused by the investment in technological advancements, the tax policies in place would need to be revised or be implemented to support digitalisation in the fourth industrial revolution (Abbott & Bogenschneider, 2018:150; McCredie *et al.*, 2019:6). This opens up a great opportunity for researchers to explore this topic further.

## 4.5. CONCLUDING REMARKS

The study highlights the impact digitalisation has on tax revenue in the fourth industrial revolution. Furthermore, the study describes how the fourth industrial revolution is a revolution where artificial intelligence and technological advancements come into play. In addition, the study also indicates that technological advancements may result in a higher unemployment rate as human workers may be replaced. It appears from the research conducted that individuals are the biggest revenue contributors for tax authorities, therefore, a possible solution to this problem might be an introduction of a tax on technological advancements to make up for the loss to the fiscus.

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## APPENDIX A:

## SAMPLE OF SELECTED QUALITY ACADEMIC PUBLICATIONS

**List of selected quality academic publications**

Abbott, R. & Bogenschneider, B. 2018. Should robots pay taxes: Tax policy in the age of automation. *Harvard Law & Policy Review,* 12:145-175.

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## APPENDIX B:
## DECLARATION OF PLAGARISM

## DECLARATION REGARDING PLAGIARISM

The Faculty of Economic and Management Sciences emphasises integrity and ethical behaviour with regard to the preparation of all written assignments.

Although the lecturer will provide you with information regarding reference techniques, as well as ways to avoid plagiarism, you also have a responsibility to fulfil in this regard. Should you at any time feel unsure about the requirements, you must consult the lecturer concerned before submitting an assignment.

You are guilty of plagiarism when you extract information from a book, article, web page or any other information source without acknowledging the source and pretend that it is your own work. This does not only apply to cases where you quote the source directly but also when you present someone else's work in a somewhat amended (paraphrased) format or when you use someone else's arguments or ideas without the necessary acknowledgement. You are also guilty of plagiarism if you copy and paste information directly from an electronic source (e.g., a website, e-mail message, electronic journal article, or CD-ROM) without paraphrasing it or placing it in quotation marks, even if you acknowledge the source.

You are not allowed to submit another student's previous work as your own. You are furthermore not allowed to let anyone copy or use your work with the intention of presenting it as his/her own.

Students who are guilty of plagiarism will forfeit all credits for the work concerned. In addition, the matter will be referred to the Committee for Discipline (Students) for a ruling. Plagiarism is considered a serious violation of the University's regulations and may lead to your suspension from the University. The University's policy regarding plagiarism is available on the Internet at *http://www.library.up.ac.za/plagiarism/index.htm.*

For the period that you are a student in the Faculty of Economic and Management Sciences, the following declaration must accompany **all** written work that is submitted for evaluation. No written work will be accepted unless the declaration has been completed and is included in the particular assignment.

| | |
|---|---|
| I (full names & surname): | Remofilwe Selebogo |
| Student number: | 13215133 |

**declare the following:**

- I understand what plagiarism entails and aware of the University's policy in this regard.
- I declare that this mini-dissertation is my own original work. Where someone else's work was used (whether from a printed source, the internet, or any other source), due acknowledgement was given, and reference was made according to departmental requirements.
- I did not copy and paste any information directly from an electronic source (e.g. a web page, electronic journal article or CD ROM) into this document.
- I did not make use of another student's previous work and submitted it as my own.
- I did not allow and will not allow anyone to copy my work with the intention of presenting it as his/her own work.

| | |
|---|---|
| Signature | ***2020-09-04*** |
| | Date |