The Impact of Artificial Intelligence on the future of jobs in the South African automotive sector

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LIST OF ACRONYMS

AI - Artificial Intelligence

WEF – World Economic Forum

TOE – Technology Organization Environment

GDP – Gross Domestic Product

DECLARATION

I, Portia Setati declare that this research report is my own work except as indicated in the references and acknowledgements. This document is presented as partial fulfilment of the prerequisites for obtaining a Master's degree in Business Administration (MBA) from the University of the Witwatersrand, Johannesburg. It has not been previously submitted for any degree or examination at this institution or any other university.

Name: Portia Setati Signature: 

Signed at Centurion on the 22nd day of March 2024.

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ABSTRACT

This report attempted to provide insights on the impact of Artificial Intelligence on the future of work in the automotive industry. The aim of this paper was to identify the potential benefits and challenges of AI adoption in the automotive sector and to develop strategies to maximize the benefits while mitigating the risks. South Africa, a significant player in the global automotive market, faces unique challenges and opportunities as AI integration progresses.

The study employed a qualitative method approach and conducted semi-structured interviews to gather data. By examining current trends and future projections, the research interprets how AI technologies are reshaping traditional automotive manufacturing processes and workforce dynamics.

Findings suggest that while AI adoption promises enhanced productivity, efficiency, and product quality, it also poses challenges in terms of workforce displacement, skill gaps, and job redefinition. The South African automotive industry, characterized by a diverse workforce and socio-economic disparities, must navigate these changes with a strategic approach to ensure inclusive growth and equitable distribution of opportunities.

This research contributes to a deeper understanding of the transformative impact of AI on the future of work in the South African automotive industry, offering insights into the opportunities and challenges that lie ahead and proposing strategies for harnessing AI's potential for inclusive and sustainable growth.

Keywords: Artificial Intelligence, Future of work, Robotics, Automation, AI adoption, AI algorithms

CHAPTER 1: INTRODUCTION

1.1 STATEMENT OF PURPOSE

The purpose of this study was to explore the impact of artificial intelligence (AI) on the future of work in the automotive industry and to identify strategies for adapting to a rapidly changing work environment. The study aims to identify the potential benefits and challenges of AI adoption in the automotive sector and to develop strategies to maximize the benefits while mitigating the risks.

The study began by reviewing the existing literature on the impact of AI in the automotive industry and the workforce. This included a review of studies on the economic, social, and ethical implications of AI adoption in automotive. The study was explored through a qualitative research method, which provided in-depth understanding of the problem(Sekaran & Bougie, 2016).

The study involved interviews with industry experts and workers to gain insights into their experiences and perspectives on AI adoption in the automotive industry. The interviews were conducted to understand the challenges and opportunities that AI presents for the workforce and to identify potential strategies to address these challenges.

Based on the literature review and the interviews, the study developed recommendations for policymakers and industry leaders on how to harness the power of AI to improve efficiency and productivity in the automotive industry, while minimizing the negative impact on employees and addressing the potential social and economic challenges that arise from the increasing adoption of AI.

Overall, the study aimed to contribute to the ongoing debate on the impact of AI on the workforce furthermore to provide guidance for policymakers and industry leaders on how to navigate the complex landscape of AI adoption in the automotive industry.

Table 1: Literature Matrix

Author (Year)	Organisational Problem	Research Problem	Conceptual Frame Used	Population & Sample	Research Gap
(Wang & Siau, 2019a)	Technological unemployment	To examine the impact of AI, machine-learning, automation, robotics and their impact on the future of work and humanity(Wang & Siau, 2019a).	Qualitative		AI's effects on issues pertaining to human work, society, and humanity(Wang & Siau, 2019a). AI on the future of jobs and humanity(Wang & Siau, 2019a).
(De Stefano, 2019)	Quality of jobs in future labour markets.	The adoption of new technologies at work and the nature of work in the future (De Stefano, 2019).	Qualitative		Introduction of AI and the use of big data need to be governed and regulated(De Stefano, 2019).
(Webb, 2019)	Decline in employment due to technological advancements.	"To foresee how artificial intelligence will affect jobs in the future" (Webb, 2019, p.1).	Mixed		The ways in which technology affects labour demand, (Webb, 2019, p. 2).
(West, 2018)	Poor governance in response to digital economy	The effects of new technologies on politics, business, education, and public policy(West, 2018).	Qualitative		"To cope with automation policy-makers need to undertake a number of economic and political reforms" (West, 2018).

1.2 BACKGROUND OF THE STUDY

The use of artificial intelligence (AI) in the automotive industry is rapidly increasing, and it is expected to hugely transform the automotive industry(Nizam, 2021). AI can be used to automate tasks, optimize production processes, and improve product quality.

The use of AI in the automotive sector has the potential to transform the industry and improve efficiency and productivity. However, it is crucial to consider the potential impact of AI on the workforce and to develop strategies to mitigate any negative consequences.

(Puckett et al., 2020) highlighted the need for reskilling and upskilling programs, among other strategies, to ensure a smooth transition to the future of work in automotive. In order to manage this new industrial revolution, humanity must be proactive rather than reactive(Wang & Siau, 2019b).

The automotive industry in South Africa has a long history and is a significant economic driver for the nation(Chigbu & Nekhwevha, 2022). For many years, the automotive industry has played a significant role in South Africa's industrial structure. It is essential to the nation's economic growth, export earnings, and job creation.

Manufacturing of vehicles, producing automotive components, retail and distribution, and aftermarket services are all included in this industry. The industry is a significant source of employment in South Africa(Naude, 2013). It provides jobs not only in manufacturing but also in related sectors such as logistics, retail, and automotive services. The automotive sector's contribution to the country's GDP is 4.9% making it a key pillar of the South African economy(STATSSA, 2022). It offers diverse job opportunities across various segments which are:

- **Manufacturing Jobs** -Vehicle assembly plants and component manufacturers employ a significant number of workers which include engineers, technicians, assembly line workers, quality control inspectors, and supervisors.
- **Research and Development** - With the increasing adoption of advanced technologies, there is a growing demand for skilled professionals in research and

development (R&D) roles. This includes automotive engineers, data analysts, AI specialists, and software developers.

- **Logistics and Supply Chain** - The movement of vehicles and parts within the country and for export requires a robust logistics and supply chain network, leading to job opportunities in logistics management, warehouse operations, and transportation.
- **Sales and Marketing** - The retail and distribution sector employs sales representatives, marketing professionals, and customer service personnel.
- **Aftermarket Services** - The maintenance and repair of vehicles contribute to job opportunities for mechanics, technicians, and service advisors.
- **Electric Vehicles and Sustainable Mobility** - With the global shift towards sustainable mobility, there is a growing need for professionals in electric vehicle manufacturing, battery technology, and renewable energy-related roles.

Despite its importance, South Africa's automotive industry faces obstacles like global competition, shifting demand, the requirement to adopt new technologies, and changing consumer preferences (Chigbu & Nekhwevha, 2022).

1.3 RESEARCH PROBLEM

The automotive industry has been one of the most significant contributors to economic growth over the past century. However, as technology continues to evolve, the industry faces a new set of challenges. One of the most pressing issues is the increasing adoption of artificial intelligence (AI) in automotive and its impact on the future of work(World Economic Forum Report, 2022).

On the one hand, AI has the potential to transform automotive by improving efficiency, reducing costs, and increasing productivity(Chigbu & Nekhwevha, 2022). On the other, the widespread adoption of AI in automotive raises concerns about the displacement of workers(Chakma & Chaijinda, 2020).There is a risk that many jobs in the automotive industry will be replaced by automation as machines become more intelligent and capable of performing tasks that were previously done by humans.

This shift has the potential to create significant social and economic challenges, including job loss, income inequality, and the need for new skills and training for the workforce. It also raises questions about the role of government and industry leaders in ensuring that the benefits of AI are shared equitably(Chigbu & Nekhwevha, 2021).

Therefore, the problem is that AI has the potential to disrupt traditional employment structures, leading to changes in job availability and skillsets. Little is known about the impact AI will have on employees and challenges that will arise from fully adopting AI in automotive (Acemoglu & Restrepo, 2020; and Nizam, 2021).

This research problem required an investigation into ways in which technology (AI) is likely to change the nature of work, as well as an examination of the potential consequences of these changes in the South African context.

1.4 RESEARCH QUESTIONS

The research questions for this study were formulated as follows:

1.4.1 What types of jobs are mostly at risk of being replaced by automation and how will this impact the job market in the automotive sector?

1.4.2 What new types of jobs are likely to emerge as a result of technological advancements, and what skills will be needed for these jobs?

1.4.3 What are the potential benefits and risks associated with the adoption of AI in automotive, and how are these being managed?

1.5 RATIONALE

The increasing adoption of (AI) in automotive has the potential to revolutionize the industry by improving efficiency, reducing costs, and increasing productivity (Brynjolfsson & Mitchell, 2017). However, this shift also raises concerns about the impact on the workforce and the need for new skills and training.

The rationale for studying the impact of AI on the future of work in automotive is two-fold. Firstly, it is important to understand the potential benefits and challenges of AI adoption in automotive to inform policy decisions and industry strategies by providing valuable insights, optimizing processes, and enabling data-driven decision-making. Secondly, it is crucial to identify strategies to mitigate any negative consequences of AI adoption in automotive, such as job displacement and income inequality.

A study by (Bughin et al., 2017)) suggested that the impact of AI on the workforce will depend on the specific application of AI in automotive. The study identified several applications of AI that have the potential to complement human labour, such as collaborative robots and predictive maintenance systems. Furthermore, a study by (Kagermann & Wahlster, 2022) proposed a set of guidelines for the responsible use of AI in automotive. The guidelines emphasize the importance of transparency, human-centricity, and the ethical use of AI to ensure that the benefits of AI adoption are shared equitably among all stakeholders(Kagermann & Wahlster, 2022).

1.6 DELIMITATIONS OF THE STUDY

According to (Theofanidis & Fountouki, 2018) ensuring that the study's aims and objectives are not rendered impossible to achieve, delimitations are the definitions that the researchers choose to set as the boundaries of their work.

For this study there are several delimitations to consider when analysing this topic. Some of the key delimitations include:

1.6.1 Timeframe - The impact of AI on jobs is a long-term trend that has been unfolding for decades, and it will continue to evolve in the future. In this study the time frame was narrowed down to avoid information overload and ensuring that the analysis remains relevant and manageable.

1.6.2 Industry - The impact of technology on jobs can vary significantly across industries. Some industries, such as automotive and transportation, have been more affected by automation and robotics, while others, such as healthcare and education, have been slower to adopt new technologies(Frank et al., 2019). In this

study the focus was on a target company in automotive around Gauteng in South Africa.

1.6.3 Geography - The impact of technology on jobs can also vary across geographic regions. Different countries and regions have different levels of technological advancement, labour market conditions, and government policies that can affect the pace and nature of job displacement and creation. The manufacturing automotive industry, being an expanding technological sector, holds substantial importance in both economic and societal advancement in South Africa, hence why the South African viewpoint was pertinent in this research.

By considering these delimitations, we can better understand the potential impact of technology on jobs and develop policies and strategies to manage this impact.

1.7 DEFINITION OF TERMS

1.7.1 *Technological unemployment* is described as a temporary, brief phenomenon that occurs when individuals are displaced from their jobs as a result of technological advancements(Kuzior, 2022).

1.7.2 *Future jobs* refer to the outlook for employment opportunities in the coming years, inclusive of jobs that will be in demand, the skills and qualifications required for these roles, and the impact of technological and social trends on the workforce(World Economic Forum Report, 2022).

1.7.3 *Cybersecurity* is known as the practice of preventing unauthorized access, theft, damage, and other malicious activities from computer systems, networks, and sensitive data (Nadikattu, 2020).

1.7.4 *Artificial intelligence* is the term used to describe algorithms that, rather than following instructions from humans, learn to complete tasks by spotting statistical patterns in data (Webb, 2019).

1.7.5 *Machine-learning* can be defined as a subgroup of artificial intelligence (AI) which involves creating statistical models and algorithms that allow computers to automatically learn from input data and make predictions or

decisions without having to be explicitly programmed for each task (Brown, 2021).

1.7.6 *Deep learning* can be defined as a subgroup of AI that focuses on building massive neural network models that can make precise data-driven judgments (Kelleher, 2019).

1.7.7 *Algorithms* are procedures or a set of guidelines that must be followed when performing calculations or other problem-solving operations, particularly by a computer (Lindebaum et al., 2020).

1.8 ASSUMPTIONS

1.8.1 Automation will replace many routine and repetitive jobs, such as those in automotive, transportation, and certain administrative tasks. This will lead to a significant shift in the types of skills and roles that are in demand.

1.8.2 Digital transformation will create new jobs that require skills in data analysis, artificial intelligence, and other advanced technologies. These jobs will be highly specialized and require significant training and education.

1.8.3 Some jobs will remain difficult to automate, such as those that require complex problem-solving, creativity, and emotional intelligence. These jobs may become even more valuable in the future.

1.8.4 The use of technology in the workplace will require workers to continually adapt and update their skills, leading to a need for lifelong learning and upskilling.

1.9 CHAPTERS OUTLINE

Chapter 1 -Introduces the study by providing background information, outlining the research problem, stating the research objectives, and establishing the significance of the study.

Chapter 2 – Presents the theoretical framework of the study and an empirical review of the literature on the impact of AI on the future of work in the automotive industry.

Chapter 3 - The research methodology chapter presents the approach, techniques, and procedures used to conduct the study. It provides a detailed explanation of how the research questions were addressed, data were collected, and analysis was performed.

Chapter 4 – The findings chapter presents the results of the study based on the data collected and analysed.

Chapter 5 –The discussion chapter provides a critical analysis and interpretation of the research findings, offering insights into their significance and implications for the broader field of study.

Chapter 6 – The conclusion and recommendations section of a research paper or thesis serves to summarize key findings, provide actionable recommendations based on those findings, and draw overarching conclusions.

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 INTRODUCTION

Artificial intelligence (AI) has enticed attention amongst researchers and experts around the world, with many suggesting that it will significantly impact the future of jobs (Acemoglu & Restrepo, 2019a; Arntz et al., 2019;Wang & Siau, 2019b). Artificial intelligence is the term used to describe algorithms that, rather than following instructions from humans, learn to complete tasks by spotting statistical patterns in data (Webb, 2019). The labour market in the automotive sector is undergoing transformational changes due to innovation and employees need to adapt quickly to these changes.

2.2 BACKGROUND OF THE STUDY

The impact of artificial intelligence (AI) on the future of work has been a topic of increasing interest over the past five years. There is a growing body of literature that explores the potential benefits and challenges of AI in the automotive industry, both globally and in the South African context. This section will provide a brief background discussion on the topic, along with recent scholarly references.

The impact of AI on the future of work is complex and multi-dimensional. On the one hand, AI has the potential to increase productivity, reduce costs, and improve the quality of work. For example, AI-powered tools can automate repetitive tasks, allowing workers to focus on important activities (Acemoglu & Restrepo, 2020). On the other hand, AI could also displace workers from their jobs, particularly in industries that are highly susceptible to automation (Badet, 2021).

Recent research suggests that the impact of AI on the workforce is likely to be targeted and depend on various factors, such as the nature of the job and the level of education and skills of the workers (Acemoglu & Restrepo, 2019;Arntz et al., 2019; Wang & Siau, 2019b). Conversely (Vasilescu et al., 2020) argued that workers with higher levels of

education and skills are less likely to be replaced by AI and may even benefit from the increased productivity and demand for high-skilled labour.

In the South Africa's automobile sector, there has been an increase in technology since 2003 (Chigbu & Nekhwevha, 2022). In real time most companies that used to manufacture only 20 units of cars hourly can now manufacture over 100 units an hour using the same number of autoworkers(Chigbu & Nekhwevha, 2022).

Overall, the impact of AI on the future of jobs is a complex issue that requires careful consideration and planning by policymakers, business leaders, and individuals alike. While the full extent of its impact is yet to be seen, AI will however continue to transform the job market and the way we work in the years to come. The (World Economic Forum Report, 2022) highlighted the need for proactive strategies to manage workforce transitions and adapt to the changing nature of work.

2.3 EMPIRICAL LITERATURE REVIEW

The purpose of the empirical review of literature is to explore the impact of Artificial intelligence on the future of work in the automotive sector in the South African context to identify the potential benefits and risks associated with the adoption of AI in automotive.

Table 2: Literature Matrix

Theme	**No. of Articles**	**References**	**Research Gap**
Job creation	4	(Manyika & Sneader,2018)	• The unreadiness of the work force when organizations adopt these technologies. • The need for massive training data (Manyika & Sneader, 2018).

Job displacement	4	(Acemoglu &Restrepo,2019b)	• The need to invest in education and retraining programs to help workers adapt to the changing labour market. • Potential skills displacement of labour by AI technologies. • The need for policies that promote human capital accumulation and technological innovation
Skills mismatch	4	(Vasilescu et al., 2020)	• Limited attention to the role of institutions and policy • Limited analysis of the impact on specific industries and occupations • Limited focus on the social and ethical implications of automation such as the effects on job quality, worker well-being, and the distribution of benefits and costs.
Reskilling and upskilling	2	(Focacci & Perez, 2022)	• Focus on education and training (re-skilling) policies applied in the past 150 years, responding to successive tech-nological revolutions, • Urban and rural divide which will lead to “accessibility gaps” (Focacci & Perez, 2022)

2.3.1 Job creation

The World Economic Forum reported that AI will create new job roles that require a range of skills, including data analysis, project management, and collaboration with AI systems (World Economic Forum Report, 2022). Similarly, another study by (Smit et al.,2020) suggests that AI will create new jobs that require social and emotional skills, creativity, and cognitive abilities that cannot be replaced by machines.

A study by (Brynjolfsson & Mitchell, 2017) found that AI is creating new jobs and increasing productivity, but it is also leading to skill-biased technological change and exacerbating income inequality. Additionally, a study by (Badet, 2021) found that AI is enhancing job quality by automating routine tasks and allowing workers to focus on higher-value activities.

In summary, the impact of AI on the future of jobs is still unclear, with some studies suggesting that AI will create more jobs than it will replace, while others suggest that it will lead to substantial job losses (Acemoglu & Restrepo, 2019a; Arntz et al., 2019; Wang & Siau, 2019b). However, it is clear that AI would have a significant impact on specific sectors, with routine and manual tasks being most at risk of being automated (Manyika & Sneader, 2018).

2.3.2 Job displacement

According to (Acemoglu & Restrepo, 2019b) who estimated that the negative effects from the introduction of one of the leading examples of automation technology, industrial robots, suggesting that the displacement effects could be significantly larger than the productivity effect. Similarly, the study by the World Economic Forum, reported that AI and automation will lead to the displacement of 85 million jobs globally by 2025 (World Economic Forum, 2020).

(Hötte et al., 2022) argued that AI is likely to lead to significant job losses, particularly in routine and low-skilled occupations. In the same breath (Davenport & Kirby, 2016) found that while most believe that AI will lead to significant job losses, they also believe

that it will create new job opportunities, particularly in areas such as data analytics and software development.

According to (Chigbu & Nekhwevha, 2022) the increase in job automation and deskilling in South Africa can cause some workers to lose their jobs because their skills have been substituted by machines. Furthermore, in their study they found that automation is well advanced, with the sector's body shop being fully automated while the paint shop is 80% automated.

South African trade unions, such as the Congress of South African Trade Unions (COSATU), advocate for policies and regulations that protect workers from job displacement and ensure fair treatment during transitions. They push for measures like retraining programs, social safety nets, and regulations on automation to mitigate the negative effects on employment.

2.3.3 Skills mismatch

This concept examines the potential for AI to create a skills mismatch in the labour market, where the skills required for the jobs of the future may differ significantly from the skills possessed by the current workforce (Puckett et al., 2020). It explores the potential need for retraining and upskilling to prepare for the changing job market. (Ortiz et al., 2020) highlighted that, the concept of skills mismatches is often used at the individual level to refer to the degree to which workers possess the right skills or education for their current job.

The "skills mismatch" creates the illusion of employment and economic and social stability due to a disparity between the skills possessed by the workforce and the skills demanded by employers(Puckett et al., 2020). Similar to this, (de Rugy & Salmon, 2020a) noted that it is getting more difficult for educators to adequately prepare students for the workplace in the digital age when we consider that most students will likely be working in jobs that do not even exist today in 20-to-30 years' time. To prepare for this shift, employees must be willing to reskill or upskill to stay relevant in the job market.

The impact of AI on the future of work underscores the importance of continuous learning and development. Reskilling and upskilling are essential for both individuals and organizations to stay ahead of the curve and remain competitive in the job market. Furthermore, by strengthening partnerships between government, industry, and educational institutions to ensure that curricula are responsive to changing skill demands.

2.3.4 Reskilling and upskilling

As AI continues to be integrated into the workplace, there is a growing need for workers to acquire new skills and training. A study by (Manyika & Sneader, 2018) found that up to 375 million workers worldwide may need to switch occupational categories and learn new skills by 2030 due to automation. A study by (Li, 2022) mentioned that the increase of automation and innovative technologies changed the world of work, requiring a need for large-scale upskilling and reskilling. Furthermore, (Li, 2022 p.11) argues that "it is the responsibility of both individuals and companies to commit to reskilling and upskilling and make career development an essential phase of the future workforce".

In a similar vein (Chakma & Chaijinda, 2020; Wahab et al.,2021) stated that in an era characterized by constant technological advancement and evolving workplace dynamics, ensuring that one's current skills remain pertinent has never been more crucial. In addition, McKinsey Global Institute (2018) mentioned that training and retraining both midcareer workers and new generations for the coming challenges (Automation, AI, and machine learning technologies) will be an imperative.

In conclusion relevant continuous education is crucial for workers to adapt to the changing demands of the workplace in the context of AI and the future of work. Continuous education can help workers acquire new skills and knowledge, enhance their employability, improve their job performance, and facilitate career transitions. Employers and policymakers should invest in continuing education programs to ensure that workers are prepared for the changing nature of work.

2.4. RESEARCH THEORY- TOE FRAMEWORK

A theoretical framework is a representation of your beliefs about the relationships between various phenomena, variables, and concepts, as well as your theory that explains these relationships (Sekaran & Bougie, 2016).There are various technological adoption theories widely used in the adoption of technology in organizations.

Firstly, Technology Acceptance Model (TAM) is a widely used theoretical framework for analysing how individuals choose to adopt new technologies, furthermore before users of the technology interact with the system, TAM aims to anticipate user acceptance and identify any potential design flaws.

Secondly the Theory of Planned Behaviour (TPB) is a useful model to use to address consumer acceptance of various technologies because it is widely used in marketing research studies(Koul & Eydgahi, 2017). The TPB primarily focuses on the prediction of planned human behaviour combined with the constructs of perceived behavioural control(Koul & Eydgahi, 2017); however, TAM and TPB cannot be used to understand and analyse the impact of technologies on organizations and their environment.

The Technology Organization Environment (TOE) model is a theoretical framework by Tornatzky and Fleischer (1990) which can be used to understand the impact of technology on organizations and their environments. When applied to the impact of AI on the future of work, the TOE model can help to identify and analyse the factors that are likely to shape the future of work in the era of AI. An organization's success is determined by how well-suited it is to both internal and external elements, such as the environment, organization size, and organization strategy(Baker, 2012).

The TOE theory states that an organization's internal structure as well as its surrounding environment have an impact on how technology is adopted (Tran & Tian, 2013). The external environment includes elements like competition, the regulatory environment, and societal trends, whereas organizational structure includes elements like size,

complexity, culture, and power structures (Baker, 2012). The researcher deemed the TOE model appropriate for the study and subsequently selected it.

- **Why the researcher selected TOE as a valuable tool in researching the impact of technology on the future of work in the automotive industry:**

  - **Technology Assessment**

The TOE framework allowed the researcher to assess the technological landscape within the automotive industry, including advancements in automation, artificial intelligence, and robotics. By analyzing technological factors such as innovation cycles and disruptive technologies, researcher could comprehend how these advancements will shape the future of work.

  - **Organizational Analysis**

Through the organizational lens of the TOE framework, the researcher examined how automotive companies are adapting their structures, processes, and workforce capabilities in response to technological changes. This included studying organizational structures, management practices, and HR strategies aimed at integrating new technologies and enhancing workforce skills. This gave a holistic view on how AI would affect the future of work.

  - **Environmental Considerations**

The TOE framework emphasizes the importance of considering external environmental factors that influence technology adoption and organizational adaptation. In this study TOE assisted the researcher to explore how industry trends, regulatory policies, market dynamics, and socio-economic factors impact the future of work in the automotive sector.

The adoption of AI technologies in the automotive impacts organizational structure by changing the nature of work and job roles. For example, the use of AI in automotive processes can improve efficiency and reduce costs by automating routine tasks. This will

impact the workforce by reducing the need for manual labour and creating new job roles requiring AI-related skills, such as data analysis and programming.

According to (Autor, 2015) some jobs may become automated, while new job roles requiring AI-related skills will emerge. Organizations will need to restructure their workforce to adapt to these changes.

However, the adoption of AI technologies in the automotive industry will also bring challenges such as the need for ethical guidelines and the potential for job displacement. Organizations will need to address these challenges to ensure a smooth transition to a future where AI plays a more significant role in the automotive industry.

The following four concepts are thoroughly examined and analyzed to acquire a comprehensive understanding of the implications of Artificial Intelligence on the evolving landscape of work:

2.4.1 The Effect of Artificial Intelligence on the Labour Market

The effect of artificial intelligence (AI) on the labour market has been a topic of much debate among researchers (Acemoglu & Restrepo, 2019b; Manyika & Sneader, 2018; Baldwin, 2019). While some argue that AI will lead to job displacement and economic disruption, others argue that it will create new job opportunities and increase productivity (Autor, 2019).The study by (Acemoglu & Restrepo, 2019b) found that while some jobs may be automated, new jobs will also be created, and many jobs will be transformed as AI technology is integrated with work processes.

A recent study by the World Economic Forum (2018) found that while AI will create new job opportunities, it will also displace some jobs, particularly in areas such as administrative and manual labour(World Economic Forum Report, 2022). However, the impact of AI on the labour market will depend on several factors, including the rate of technological advancement, the skills required to work with AI, and the ability of workers to adapt to new job requirements.

2.4.2 Human-AI Collaboration

A report by the World Economic Forum (2021) examined the potential for human-AI Collaboration to create new job opportunities(Hollister, 2021). The report noted that AI is likely to augment human intelligence, rather than replace it. There are many problems that machines cannot yet solve alone, such as applying expertise to decision making, planning, or creative tasks just to name a few therefore collaboration with these machines is critical for them to function effectively. Therefore, the importance of investing in reskilling and upskilling programs should be enforced to ensure that workers are equipped with the skills needed for the jobs of the future.

2.4.3 Impact of AI on Job Quality

AI is also changing the nature of work and the quality of jobs. A study by (Brynjolfsson & Mitchell, 2017) found that AI is creating new jobs and increasing productivity, but it is also leading to skill-biased technological change and exacerbating income inequality. Another study by (Davenport & Kirby, 2016) found that AI is enhancing job quality by automating routine tasks such as production and the assembly of parts; and allowing workers to focus on higher-value activities. However, the same authors caution that AI can also lead to deskilling if workers are not adequately trained to work alongside AI systems.

2.4.4 Impact of AI on Skills and Training

Kagermann & Wahlster, (2022) recommend a range of strategies to ensure that workers are prepared for the changing nature of work, including lifelong learning, flexible work arrangements, and investment in human capital. Ways that AI is affecting skills and training are as follows:

Automation of routine tasks - AI is already automating many routine tasks, which means that employees need to acquire new skills to remain relevant in the workforce. Jobs that involve repetitive or predictable tasks, such as data entry or automotive, are particularly vulnerable to automation.

New types of jobs - As AI technology advances, new types of jobs are being created, such as data scientists, machine learning engineers, and AI ethicists. These jobs require specialized skills that are in high demand.

Human-AI Collaboration - In many cases, AI will not replace humans but will work alongside them to enhance their capabilities. This requires employees to learn how to collaborate effectively with AI systems.

In summary while AI will undoubtedly have an impact on the labour market, the exact nature and extent of that impact remain uncertain. It is evident, that workers will need to continually acquire new skills and adapt to changing job requirements to remain competitive in the AI-enabled workplace.

2.5 CONCEPTUAL FRAMEWORK

The descriptive conceptual framework synthesised the literature around the impact of Artificial intelligence on the future of work. This study explored the impact of AI on future of work through the TOE theory by Tornatzky and Fleischer, (1990). The conceptual framework will link the research concepts with the empirical literature review and other important theories that will subsequently form the basis of this study.

A conceptual framework on the impact of AI on the future of work provides a structured approach to understanding the multi-layered effects of artificial intelligence technologies on employment, job roles, and the labour market. In this context the figure provides a holistic view that integrates various perspectives and factors influencing this complex phenomenon.

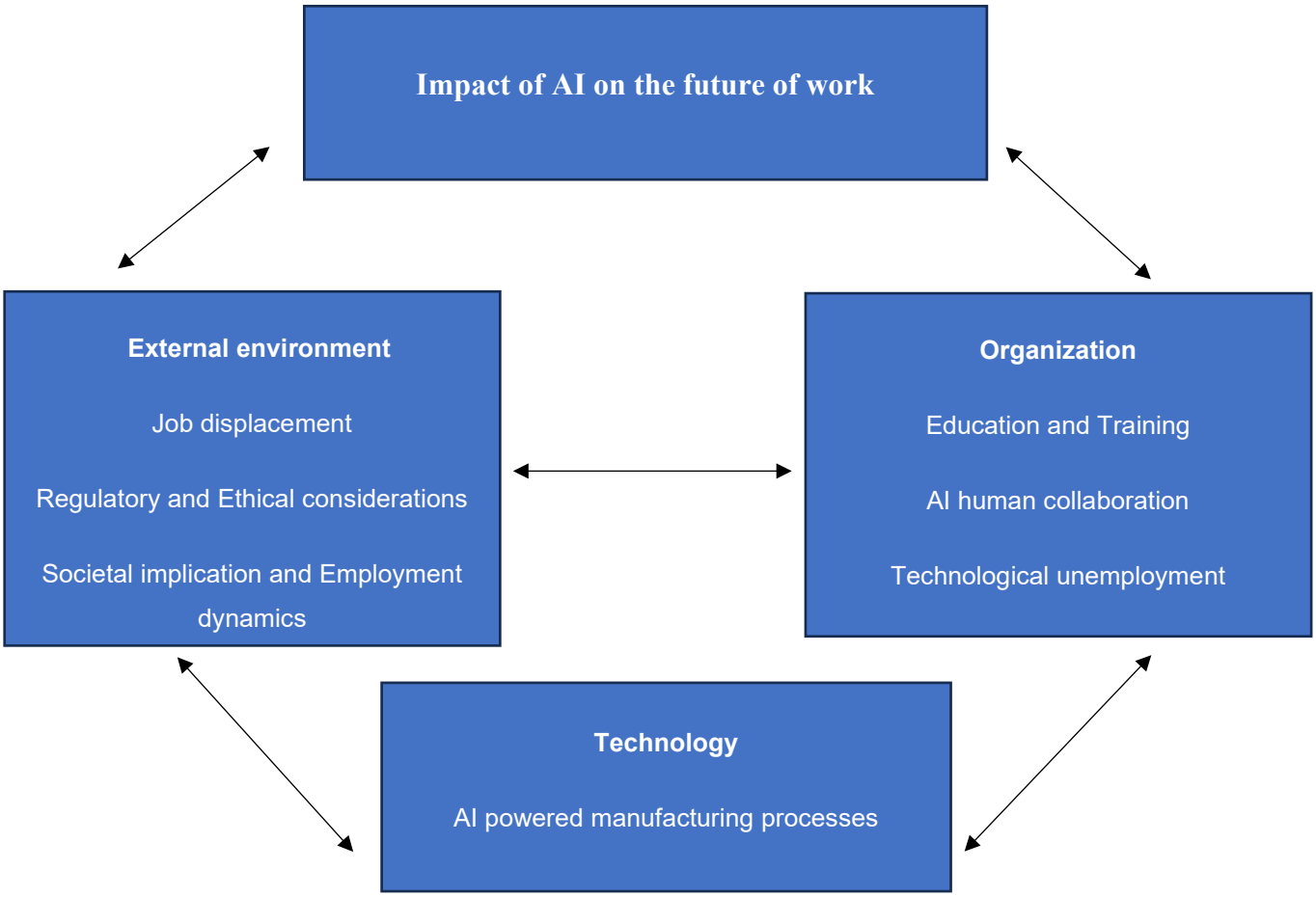

Figure 1: Conceptual framework - AI and future of work

Source: Author's own creation based on (Baker, 2012)

2.5.1 Linking Artificial Intelligence and future of work with conceptual framework

The impact of AI on the future of work in the automotive industry will involve several concepts detailed below, including education and training, AI-human collaboration, technological unemployment, job displacements, regulatory and ethical considerations and societal implications and employment dynamics.

2.5.1.1 Education and training

Education and training are essential for preparing the workforce to adapt to the changes brought about by the adoption of AI in the automotive industry. Workers will need to learn new skills related to data analysis, programming, and other areas in which AI technologies are being used (Manyika & Sneader, 2018). A study by (de Rugy & Salmon, 2020a) argues that successful education and training programs increase employees ‘s responsiveness to labour-market needs by establishing mechanisms to anticipate occupational demands and skills, including any changes resulting from technological innovations. Providing education and training opportunities is crucial for ensuring that workers remain competitive in the job market.

2.5.1.2 AI-human collaboration

AI-human collaboration is another critical concept in the impact of AI on the future of work in the automotive industry. While AI technologies can automate routine tasks, they cannot replicate human creativity, intuition, and emotional intelligence (Manyika & Sneader, 2018). Therefore, it would be necessary to develop strategies for AI-human collaboration, where AI technologies can support human workers in tasks that require creativity, problem-solving, and decision-making.

2.5.1.3 Technological unemployment

Technological unemployment refers to the displacement of human workers by automation and technological advancements (Kuzior, 2022). Technological unemployment in the automotive industry can have broader impacts on the labour market, affecting not only manufacturing workers but also related industries such as logistics, maintenance, and support services. Displaced workers may struggle to find new employment opportunities, leading to economic hardship and social dislocation in affected communities. To prevent technological unemployment from escalating into more severe structural unemployment, which poses significant social and economic risks, it's crucial to monitor economic and

social dynamics, predict labour market trends, and effectively oversee education and skill development initiatives (Kuzior, 2022).

In summary, the impact of AI on the future of work in the automotive industry involves addressing the challenges of job displacement while also investing in education and training to develop AI-related skills. Additionally, it would be necessary to develop strategies for AI-human collaboration to leverage the strengths of both AI technologies and human workers.

2.5.2 Linking AI and future of work with TOE framework.

2.5.2.1 Job displacement

The adoption of AI technologies in automotive industry is expected to have a significant impact on the future of work (Tubaro et al., 2019). AI technologies can automate tasks that were previously done by humans, leading to job displacement in some areas (Badet, 2021). However, AI will also create new job opportunities in areas such as data analysis, software development, and engineering.

In the long term, AI technologies are likely to change the nature of work in the automotive industry, as well as the skills required for certain jobs (Li, 2022). For example, workers may need to be trained in new technologies and data analysis skills to adapt to the changing work environment. Additionally, AI technologies may lead to the development of new job roles and functions, such as AI trainers and explainability engineers (users interacting with AI to understand its conclusions and recommendation) (Baldwin, 2019).

Job displacement is a critical variable to consider when assessing the impact of AI on the future of work in the automotive industry. While AI automation offers opportunities for increased efficiency and innovation, it also presents challenges related to workforce transitions and economic stability.

2.5.2.2 Regulatory and Ethical implications

The rapid advancements of technology have created a need for policies to govern their use and impact. Here are some reasons why such policies are needed:

- **Protecting individuals' privacy and data**

The rapid advancements of technology have resulted in an increased amount of personal data being collected, processed, and stored. This has led to concerns over privacy and data protection. Privacy policies are needed to ensure that personal data is collected, processed, and stored appropriately. A study by (Rajvanshi et al., 2022) found that privacy policies can have a positive effect on individuals' willingness to share their personal information online.

In addition, despite the policies being in place, there are still concerns about privacy in terms of personal data being exposed.

- **Ensuring ethical use of technology**

As technology continues to advance, ethical policies have become increasingly important. These regulations guarantee that technologies are created and applied ethically. The need for ethical policies has been highlighted by various incidents, such as the Cambridge Analytica scandal. Studies by (Ryan et al., 2021) and (Benjamins, 2021)) found that ethical considerations are key factors that influence individuals' perceptions of technology.

2.5.2.3 Societal implications and employment dynamics

It is important to consider the potential societal implications of the adoption of AI technologies in the automotive industry. For example, AI technologies may exacerbate income inequality by displacing low-skilled workers while creating new job opportunities for highly skilled workers (Brynjolfsson & Mitchell, 2017). As a result, it is crucial for decision-makers, business giants, and other interested parties to consider any potential effects of AI on the workforce and take action to counteract them.

2.6 SUMMARY OF THE LITERATURE REVIEW

The impact of AI on the future of work is substantial and would continue to evolve as the technology advances. While AI has the potential to automate many routine tasks, it also

presents new job opportunities and the potential to enhance productivity and decision-making. However, the impact of AI on the labour market will depend on several factors, including the rate of technological advancement, the skills required to work with AI, and the ability of workers to adapt to new job requirements. Therefore, it is crucial that individuals and organizations invest in ongoing learning and training to remain competitive and adapt to the changing workplace.

As AI technology continues to advance, it is clear that collaboration between humans and machines will be essential for the future of work. With the right strategies and approaches, the integration of AI in the workplace has the potential to create a more efficient, productive, and fulfilling work environment for all. In summary AI would lead to significant job displacement in the short term, particularly in production and assembly line roles in automotive. However, in the long term, the adoption of AI technologies would create new job opportunities in some areas. Education and training would need to be adapted to meet the changing demands of the labour market, with a greater emphasis on upskilling and reskilling to prepare workers for the jobs of the future. The skills required for the jobs of the future would differ significantly from the skills possessed by the current workforce, creating a skills mismatch that would require significant investment in retraining and upskilling.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the methodology that was used to evaluate the effects of artificial intelligence on the labour market in the automotive industry and to identify the potential benefits and challenges of AI adoption. The chapter outlines the steps that were followed in the research process, e.g., qualitative data collection through semi structured interviews.

3.2 RESEARCH PARADIGM

A research paradigm is referred to as the theoretical or philosophical foundation for the research work(Khatri, 2020). It provided guidance to the researcher throughout the entire investigation process, including the choice of the research problem, formulation of the research questions, assessment of the nature and varieties of reality, knowledge, methodology and importance of the research work (Khatri, 2020).

The paradigms are commonly classified into three categories namely: positivism, interpretivism and pragmatism. Interpretivism recognize that individuals' perceptions, meanings, and interpretations of reality are subjective and shaped by their unique experiences, cultural backgrounds, and social contexts (Ugwu & Onoh, 2021a). Considering the study's design and research's purpose, the interpretivism paradigm was deemed fitting for this research. The study's intention is to collect data on the subjective experience of the target sample.

The interpretivist epistemology is subjectivism, which maintains that both the researcher and the research subjects are involved in the knowing process and that reality is affected by context (Nguyen, 2019).The paradigm supports the use of qualitative methods in that it assumes that the researcher and the participants are involved in the knowing process and the reality influenced by the context and the belief that cause and effects are

mutually interdependent (Ugwu & Onoh, 2021b). Therefore, the interpretivism paradigm enabled the use of qualitative research method for data collection and analysis.

3.3 RESEARCH APPROACH

The impact of AI on the future of work in the automotive industry is a complex and multi-faceted issue, and therefore requires a comprehensive research approach. There are three different research methods which includes quantitative, qualitative and the mixed method which a researcher can use to conduct research.

Quantitative research methods, such as surveys and statistical analysis, can help to measure the scale and scope of the impact of AI on the automotive industry. These methods can provide data on the number of jobs affected, the skills required for new roles, and the financial and economic implications of AI on the industry.

Qualitative research describes variation in the phenomenon, situation, or issue (Kumar R., 2011). Qualitative research methods, such as interviews, focus groups, and case studies, can help to uncover the experiences, attitudes, and opinions of workers, managers, and other stakeholders in the automotive industry.

In this study, a qualitative research approach was employed for investigation., and the researcher gained a more complete understanding of the impact of AI on automotive industry, considering both the human and technical aspects of the issue. The study provided valuable insights into the impact of AI on employees at work, including changes in job roles, skills requirements, and workplace culture.

3.4 RESEARCH DESIGN

A research design is a blueprint or road map that specifies how a researcher will gather data pertinent to answering the initial research questions (Ochara, 2016). In a similar vein (Kumar, 2011) defined research design as a plan, structure and strategy of investigation conceived to obtain answers to research questions or problems.

The descriptive design was used to conduct the study because it required to answer the "why" questions of the research and determine why a phenomenon or problem occurs in society (Sekaran & Bougie, 2016).

3.5 DATA COLLECTION METHODS

3.5.1 Population

The population comprised of employees from an automotive plant in and around Gauteng in South Africa to understand their perceptions and attitudes towards AI and how it can impact their future career prospects.

The participants were HR staff, Managers and Plant assemblers/technicians, moreover interviews were conducted to gather information about their perceptions of AI technologies and how they might affect their future career prospects.

3.5.2 Sampling design

In the context of the impact of AI on the future of work in the automotive industry, purposive sampling was used to gather insights from relevant participants who possessed valuable knowledge and experience in this domain.

By employing purposive sampling, the researcher ensured that the study captured a range of perspectives from knowledgeable individuals who were directly involved in the automotive industry and had valuable insights into the impact of AI on the future of work. A sample size of 15 employees was drawn from an automotive plant around Gauteng.

3.5.3 Research Instruments & Data Collection Procedure

The researcher conducted semi-structured interviews with aid of open-ended questions from an interview guide. This method was used because it was a different approach that allowed the researcher to ask and answer different types of questions.

Participants were interviewed through Microsoft Teams. A selection of 15 associates were interviewed from a manufacturing plant around Gauteng to get their insights on the effect of technology on the future of work in the automotive sector.

Confidentiality was fully exercised in the process of data collection. Participants were made aware that the information that was obtained during interviews would be kept private and would not be shared without their consent.

Data collection process for this study was as follows:

The criteria listed in this chapter's section on sampling methods were used to identify the possible participants. Emails were sent to potential participants asking them to take part in the research and the participant consent form (Appendix B) and the interview guide (Appendix A) were attached to the email. Following confirmation of participation through a signed participant consent form, a Microsoft Teams virtual meeting was scheduled for thirty minutes.

Prior to Microsoft Teams meeting being recorded, the attendees were informed about the recording. The meeting was automatically transcribed by Microsoft Teams and the transcription of the meeting was cross-checked using the recordings. Transcripts were therefore used to do data analysis and interpretation.

3.6 DATA ANALYSIS

Data analysis refers to the process of inspecting, transforming, and interpreting raw data to extract meaningful insights, identify patterns, and make informed decisions (Mezmir, 2020). Thematic analysis offers insights into the experiences, perceptions, and meanings participants construct, allowing researchers to explore the rich and nuanced aspects of qualitative data (Lester et al., 2020).

The purpose of thematic analysis in this study was to identify recurrent themes and patterns among the large amount of qualitative data. The researcher used thematic analysis to establish connections between common themes and individual participant perspectives, allowing for the assessment of these themes' prevalence throughout the

study. Thematic analysis was deemed fit for this study as it explored a deeper understanding of participants' experiences and thoughts.

3.7 LIMITATIONS OF THE STUDY

- The study had a limited sample size, which affected the generalizability of the findings to a larger population. The sample included employees in paint body which is 90% automated and management representatives. However, the primary goal was typically not generalizability but rather depth of understanding.

- External validity - because the study was conducted in just one automotive company, it lacked external validity. Aside from company X, no other automotive company is represented in the study.

- It's possible that other automotive companies may not be able to replicate the context of company X.

3.8 TRANSFERABILITY AND DEPENDABILITY

3.8.1 Transferability

It is simpler to assess transferability when participant responses and the researcher's interpretations are described in detail. When research findings are consistent with the experiences of the person evaluating the study, naturalistic generalization occurs, and the findings appear transferable in the reader's eyes. Purposive sampling was used in this study to allow transferability.

3.8.2 Credibility

A qualitative research method with semi-structured interviews was used as part of the research technique. To ensure credibility participants with vast experience in AI were selected to conduct the study and semi structured interviews were used to get their full

insights on the study. Maintaining anonymity during interviews promoted honest participation.

3.8.3 Dependability

The study can be replicated by other researchers through the thematic analysis. However, the replication of this study is open to variation as mentioned on page 38 because the study was conducted in just one automotive company.

3.8.4 Confirmability

Confirmability concentrated on the researcher's objectivity of the results to prevent biases. For the purpose of ensuring objectivity and neutrality of the results, the researcher ensured to document every action taken during the study. One of the techniques the researchers used to ensure confirmability was to maintain the audit trail (interview response transcripts).

3.9 RESEARCH ETHICS

While researching how AI affected the nature of work, ethical issues were considered. The following subsections describe the significance of ethical considerations and how they were upheld throughout the study.

3.9.1 *Permission to Conduct the Study*

Permission was sought from the necessary parties, including the Research Ethics Committee and the participating organization before the study was conducted. The researcher was responsible for making sure the study was carried out in accordance with all applicable laws and guidelines.

3.9.2 Informed Consent

The importance of informed consent was to ensure that participants were aware of the study's goals, the advantages and risks of participating, and their right to exit the study at any time. Before they agreed to take part in the study, participants received all

necessary information, had a chance to clarify any uncertainties, and were given the opportunity to ask questions. This information was described in the informed consent letter (refer to Appendix A?)

3.9.3 Voluntary Participation

The study's respondents participated voluntarily. They were informed of their right to withdraw from the study at any time without suffering any consequences. They were not coerced in any way. The researcher made sure that each participant signed a consent form, which served as a record of their voluntary participation.

3.9.4 Confidentiality and Anonymity

Protection of the participants' privacy depended heavily on maintaining their anonymity and the confidentiality of their responses.

No personal identifying information was gathered, and the researcher made sure that participant's data was kept private. The researcher was the only one with access to the data, which was safely stored in a password-protected electronic file.

3.9.5 Data management

The protection and integrity of the data gathered depended heavily on data management. The researcher abided by all data protection laws and made sure that the information was only used for the investigation. The researcher ensured that no data breaches occurred while the study was being conducted, and the data collected was stored securely.

CHAPTER 4: PRESENTATION OF FINDINGS

4.1 INTRODUCTION

This section presents the research findings of the study. Thematic analysis was employed for data analysis, with coding facilitated by the use of ATLAS.ti software. This chapter presents an analysis of the results of qualitative research that was carried out using the methodology described in Chapter 3. The background of the research participants and the organisation where the study was conducted is presented at the beginning of this chapter. To ensure confidentiality and anonymity, the participating company was anonymized and referred to as Company X.

4.2 BACKGROUND INFORMATION ON COMPANY X

The study was carried out within the framework of a particular company as a target company and is one of the major manufacturing plants in South Africa.

The company has a significant presence in the South African automotive industry, contributing to economic growth and employment opportunities in the region.

As technology continues to advance, Company X has been at the forefront of integrating innovative solutions, including AI and automation, into its manufacturing processes. These advancements aim to enhance efficiency, quality, and competitiveness in the market while also adapting to the evolving landscape of the automotive industry.

The impact of AI on the future of work in Company X's operations was a topic of interest, as it raised questions about workforce dynamics, job roles, and the broader implications for the automotive sector in South Africa. Studying this impact provided valuable insights into the challenges and opportunities presented by technological advancements and underscored the importance of strategic planning and investment in workforce development to navigate this rapidly changing landscape.

4.3 BACKGROUND OF PARTICIPANTS

This section primarily provides contextual background information about the study participants within the framework of the target company. As illustrated in Chapter 3, the participants were chosen through purposive sampling, comprising solely of employees from Company X. In order to preserve anonymity, the names of participants were omitted and instead referenced numerically as Participant 1, Participant 2, Participant 3, and so forth.

Table 2: Participants' profile

Identifier	Role	Race	Gender	Years of service
P1	Manager	White	Male	5
P2	HR consultant	Black	Male	15
P3	Robot specialist	Black	Male	5
P4	Quality engineer	White	Male	20
P5	Structure and product planning manager	White	Female	3
P6	Technician-water treatment	Black	Male	11
P7	Manager; Technical	White	Male	23
P8	Controls and robotics specialist	Black	Male	15

P9	Manager: Talent	Indian	Male	3
P10	Manager: HR	White	Female	1
P11	Production manager	White	Male	15
P12	Control system engineer	Indian	Male	5
P13	Robot specialist	White	Male	5

4.4 RESULTS PERTAINING TO RESEARCH PROPOSITIONS

4.4.1 What types of jobs are mostly at risk of being replaced by automation and how will this impact the job market in the automotive sector?

- Proposition:

  Jobs most at risk of automation in the automotive sector include assembly line worker, welding, driving, quality control inspection, and administrative work. Automation could lead to job losses in routine and manual roles but also drive the emergence of new positions in robotics maintenance, programming, and data analysis. Overall, while automation may improve efficiency, it poses challenges for workers requiring upskilling and reskilling to remain competitive in the evolving job market.

4.4.2 What new types of jobs are likely to emerge as a result of technological advancements, and what skills will be needed for these jobs?

- Proposition:
  - **Robotics Technician** - With the increasing use of automation and robotics in various sectors, there will be a growing demand for technicians who can install, maintain, and repair robotic systems.
  - **Data Analyst** - As companies gather large amounts of data, there will be a need for professionals who can analyse and interpret this data to derive insights and make informed business decisions.
  - **Cybersecurity Specialist** - With the rise of cyber threats, organizations will require experts who can protect their systems, networks, and data from cyber-attacks.
  - **Artificial Intelligence (AI) Specialist** - As AI technologies become more prevalent, there will be a demand for specialists who can develop and implement AI algorithms and systems.

These emerging roles highlight the importance of a diverse skill set that combines technical expertise with soft skills such as communication, critical thinking, adaptability, and continuous learning. As technology continues to evolve, individuals who possess a willingness to learn and adapt to new challenges will be well-positioned to succeed in these dynamic job roles.

4.4.3 What are the potential benefits and risks associated with the adoption of AI in automotive, and how are these being managed?

Proposition:

AI offers significant potential benefits, such as efficiency in production, maintenance, and operation for the automotive industry. Effective management of risks is essential to ensure the safe, secure, and responsible deployment of AI-enabled systems in vehicles. Despite the potential for enhanced safety, there are concerns about the reliability and robustness of AI systems, particularly in autonomous vehicles. Ensuring the safety and security of AI-driven technologies is paramount to gaining public trust and regulatory approval.

Collaboration among stakeholders, including governments, industry experts, researchers, and advocacy groups, is crucial to address these challenges and maximize the benefits of AI in automotive.

4.5 RESEARCH RESULTS

The research results are arranged below according to the following themes:

4.5.1 Upskilling and Reskilling

Upskilling and reskilling are crucial aspects in adapting to the changing job landscape influenced by technological advancements. In a rapidly evolving technological landscape, individuals and organizations must embrace a culture of continuous learning to stay updated with emerging trends and acquire new skills. Participants had the following to say on this theme:

Participant 8

"*Umm the problem is upskilling which is the first thing and some of the other thing is that like (sic) you're looking at people that are maybe all the older than 40 going for 50 and then you know that they're so used into doing a routine every day and then now you can easily switch or channel them or like teach them new things because they are so used to doing the things they used to do every day so that one there is a bit of an issue because I'm you end up with having skilled people doing."*

Participant 5

"Upskilling is important and the there's a lot of investment that's required in it and also because of unemployment rate in South Africa, it's something that most people cannot necessarily afford themselves to do so they need that supports financially but also the opportunities in terms of offers to be able to upscale that."

Both reskilling and upskilling are vital in today's rapidly evolving job market, where technology and industry trends can quickly render certain skills obsolete while creating demand for new ones.

4.5.2 Integrated education system

The education system has undergone significant transformation as a result of technology, with digital tools and online resources playing an increasingly prominent role in teaching, learning, and educational administration.

Participant 6

"I've already had discussions with some of, you know (sic), my daughters currently in primary school, but we have discussions regarding their school projects, the kids are requested to run some of these AI projects that is already taking place where in certain schools in certain grades the children are requested to initiate AI related project as part of the schoolwork. So, in terms of development, it's already starting at a very young age and where and I think we can build from that, especially in the primary level as well as in university level. Universities may be able to roll out modules specifically related to AI, but they will need to update them on a regular basis to keep up with the developments."

Participant 4

I believe that we'll have a lot of people from outside the country who've been exposed a bit more to these technologies in the country and that's going to bid to be a bit of a disadvantage and then the more you get people that are out of the country, the less jobs will be paying because will be dependent on those people as well.

Participant 5

"Addressing these topics of training and development earlier rather than waiting for another unemployment crisis or something, and then, yeah, it's too late to do anything about it. So that includes universities, basically increasing the capacity for stems.

Increasing the capacity for training, engineering, training, technical skills so that people can be upskilled at the same rate as is required by AI developments."

Participant 7

"*Again, making sure that we have the people that are fit for purpose is crucial. What we require going ahead and that means for me again that education will play a bigger role. The education system must also adapt to technological advancements so that we have the right skillsets".*

There is a need for an integrated and a well-designed curriculum that covers foundational concepts in AI, including machine learning, deep learning, natural language processing, computer vision, robotics, and ethics in AI. Integration of interdisciplinary subjects such as mathematics, statistics, computer science, and domain-specific knowledge to provide a holistic understanding of AI applications.

4.5.3 Technological unemployment

Unemployment resulting from AI, also known as technological unemployment, is a concern that arises due to the automation of tasks and jobs previously performed by humans. Unemployment caused by AI-driven automation may exacerbate income inequality and socio-economic disparities, as displaced workers may face difficulties in finding new employment opportunities or may be forced into lower-paying jobs.

Participant 6:

"So, from what I've been reading about in the last couple of days, it says that AI will actually have a negative impact in terms of white-collar jobs in both emerging markets as well as in developed markets. So, what I mean by that is, in first World countries, AI is likely to take over most office jobs in a way because of their simplification of certain tasks."

Participant 4

The more we use and focus too much on AI, we will somehow increase the unemployment rate of the country because also people that goes through the formal education system, would also stay for a long time without a job.

Participant 5

"*I think to minimize the effect that AI has on the employment rate in South Africa and on our workforce, is to upskill the people. So, if you make sure that early enough you already start app scaling the people, then instead of taking away the job completely, they can transition into higher skill level job that can then run parallel with AI instead of just eliminating the position completely. It can be something that is integrated with AI, something like robot operators. But unfortunately, the fact is that you will not necessarily be able to transition everyone, not unfortunately with our background in South Africa, not everyone has the education level needed for that and also through the transition into AI, so you do reduce some work opportunities. We have to work parallel and also look at other employment options or expanding the employment."*

As technology evolves, the skills required for certain jobs may change, leading to a mismatch between the skills possessed by workers and the skills demanded by employers. Workers who lack the necessary skills may find themselves unemployed or face difficulties in transitioning to new roles.

4.5.4 Raising awareness about impact of AI

Raising awareness about the impact of AI on the future of work is crucial to ensure that individuals, organizations, policymakers, and the public are informed and prepared to navigate the opportunities and challenges presented by AI-driven transformations.

Participant 4

"If you develop an AI structure or system internally and people don't realize the benefit of it in where they don't understand how it works, then they won't use it. So, I think that

communication in terms of the benefits that these systems will have on individuals inside the work organization needs to be understood. And once the benefit is understood that's where there might be willingness to put up their hand and say I'm interested in this, I want to develop further in order to benefit not only themselves but also the company."

Participant 1

"It will be beneficial for companies to start conducting workshops and training sessions to provide information about AI, its applications, and its implications for the workforce. Furthermore, to focus on explaining how AI works, its benefits, and potential challenges, fostering a basic understanding among participants."

Participant 12

"Communication is important to make sure that employees understand the benefits and risks of AI. Bring them on board on the technological advancements that the company is willing to adopt."

There has been an increase in awareness among individuals, businesses, and governments about the potential impact of AI on the workforce. This awareness is driven by media coverage, research studies, and public discourse on the topic. However continuous communication and awareness is crucial for employees and other stakeholders as technology advances for a smoother transition.

4.5.5 Changes in job roles

As technology continues to evolve, we can expect the emergence of additional job roles that leverage emerging technologies and address emerging challenges and opportunities. Participants shared these insights about emergence of new roles due to technological advancements:

Participants 7

"So for me, I see that the impact of technology at the moment in the job market is a very positive thing because I think it, it changes the way of the way that people now have to

look at themselves because where we've previously, you know at a lot of people that is used to do manual work, for instance in, in the sense of I make myself an Excel list, I said make myself a database, I make myself this, that can now actually be and change to a lot more in the sense of making your life a lot more easier. So, the person that was used to excel is now having to upskill himself to become a little bit more IT related."

AI is expected to transform job roles across various sectors. Some routine and repetitive tasks will be automated, allowing humans to focus on more creative, strategic, and interpersonal aspects of their work. Jobs that require empathy, emotional intelligence, and complex decision-making are likely to remain in demand.

Participant 7 had this to say:

"We used to have a job role called a fitter in maintenance, we previously had those skills sets that have now had to change and we have to make sure that we adopt our training needs to maintenance, that understand IT, systems that understand and how to talk about this next level in terms of artificial intelligence and that stuff, digitalization and so forth." So yeah, our job market is going to have to change a lot.

Participant 10

"Cyber security, data analytics will be new roles that would be more prevalent".

4.5.6 Regulations and Policies

Regulatory policies on the impact of AI and the future of work are prudent to ensure that the integration of artificial intelligence technologies into the workforce is done responsibly, ethically, and with consideration for the well-being of workers and society as a whole. In answering the question "What do you think should be the measures or strategies to manage the risks associated with AI adoption in automotive systems? Participants had this to say about the mitigation strategies in adopting AI:

Participant 2

"Implementing effective policies and regulations on AI requires a collaborative effort involving governments, industry stakeholders, academia, and the public. A well-crafted regulatory framework can foster responsible AI innovation while mitigating potential risks and ensuring that AI benefits society at large".

Participant 5

"*So, I think putting policies in place is very important and that is something that either needs to be regulated globally or needs to be regulated per country. But policies in terms of obviously certain testing procedures that need to be in place before the implementation. We have certain levels and certain policies in place on what can be implemented, but having approval process for topics before they get implemented, that we can do or we ensure that people or companies do the 360-risk assessment before something is implemented and unfortunately that is the speed of AI development is, I believe at this point AI is a bit quicker than the development of the policies. Unfortunately, development of policies in any government takes longer than industry and it is important that government sticks to the same rates as the development side of AI so that we make sure we have the policies in place before the new level."*

There is an urgent need for government to explore ways to update labour laws and regulations to address issues related to AI and the gig economy. This includes considerations for worker classification, benefits, wages, and job security in the context of AI-driven automation and digital platforms.

4.5.7 Human-machine Collaboration

Humans and machines often possess complementary skills and capabilities. In contrast machines excel at repetitive tasks, data processing, and precision, while humans bring creativity, critical thinking, emotional intelligence, and complex problem-solving abilities to the table. By combining these strengths, human-machine teams can

accomplish tasks more efficiently and effectively than either humans or machines working alone. For this theme participants stated that:

Participant 3

"The Germans have implemented robots that work hand in hand with people. We need empathetic people who are going to sit there and, you know (sic), with emotional intelligence, to understand the problems of another human. Machines cannot do that. It will be ideal for machines to work together with humans".

Participant 5

I think that AI taking over completely is not a realistic scenario. I think it's also a good thing that it's not a realistic scenario. First of all, we are very far away from anything like that, and I think it's important to have a healthy balance. So, using AI to its full extent of bringing benefit to us as humans and not replacing us as people, I think the one thing that AI cannot bring and something that we need in the world is emotions "sic".

Rather than replacing human workers, machines are often used to augment human capabilities, enabling workers to accomplish tasks more efficiently or safely. For example, in manufacturing, robots can handle repetitive assembly tasks, while human workers focus on quality control, problem-solving, and process optimization.

4.6 SUMMARY

The impact of AI on the future of work in the South African automotive sector requires a comprehensive approach. Upskilling, training, and education should be prioritized, with a keen focus on minimizing unemployment risks. Awareness campaigns, robust privacy measures, and well-crafted regulations will contribute to a balanced and responsible integration of AI, fostering a collaborative future for human workers and advanced technologies.

CHAPTER 5: DISCUSSION OF THE RESULTS

5.1 INTRODUCTION

The automotive industry in South Africa, like many other sectors, is undergoing significant transformations due to advancements in (AI) and automation technologies. The findings of the study are interpreted, contextualized, and synthesized against the backdrop of the literature review (Chapter 2).

5.2 DISCUSSIONS OF FINDINGS ACCORDING TO THEMES:

5.2.1 Upskilling and Reskilling

In response to the integration of AI in the South African automotive sector, there is a pressing need for upskilling and reskilling programs. Traditional job roles may evolve or become obsolete, requiring workers to acquire new skills. Upskilling initiatives can focus on enhancing existing competencies, while reskilling efforts may involve completely transitioning workers into new roles that leverage AI technologies.

Data supports the theory that AI technologies are likely to change the nature of work in the automotive industry, as well as the skills required for certain jobs (Li, 2022) Furthermore, the realization of advanced manufacturing's vision will be achieved through a workforce that is prepared for the future(Li, 2022).

The willingness and motivation of people to show interest in learning new things is paramount in this process. Businesses need to prioritize the enhancement and adaptation of their workforce's skills in response to the swift advancements in technology. According to(Chakma & Chaijinda, 2020) companies must now expand their perspective beyond traditional employees on their balance sheet and account for freelancers and workers in the "gig economy."

5.2.2 Integrated education system

The dawn of AI in the automotive industry necessitates a comprehensive overhaul of training and education programs. Educational institutions and industry players must collaborate to develop curricula that incorporate AI-related skills. Continuous training programs should be established to keep the workforce abreast of technological advancements, encouraging a culture of lifelong learning.

The analysis identified that:

"Companies need to invest in retraining to align with the new job requirements that come with Artificial Intelligence technologies."

The education system must incorporate technology skills from the early development phase to better prepare the labour market with the skillsets that will be required in future. Additionally, it should undergo a transformation to align with the rapid advancements in artificial intelligence (AI). This adaptation is crucial to prepare students for the evolving landscape of technology and equip them with the skills necessary to thrive in an AI-driven world."

Traditional educational models often focus on imparting knowledge that may become outdated as AI technologies continue to progress. To address this, curricula should integrate AI-related subjects and concepts, ensuring that students gain a fundamental understanding of AI principles, applications, and ethical considerations.de Rugy & Salmon, (2020b) pointed out that a conventional university education cannot shield forthcoming generations from the uncertainty brought by technological advancements and disruptions. Therefore, there will be a surplus of college graduates, indicating an abundance of educated individuals with insufficient job opportunities to accommodate them due to skills mismatch. In contrast (Li, 2022) asserted that promoting increased educational accessibility necessitates business schools to accelerate their transition beyond the confines of conventional degree-centred education. Therefore, emphasis should be placed on developing skills that complement AI, such as critical thinking, creativity, problem-solving, and emotional intelligence. These skills are essential for tasks that AI may not easily replicate, fostering a workforce capable of collaborating with

AI systems effectively. Data suggests that successful education and training programs increase employees' responsiveness to labour-market needs by establishing mechanisms to anticipate occupational demands and skills, including any changes resulting from technological innovations (de Rugy & Salmon, 2020a).

Furthermore, educational institutions need to provide opportunities for hands-on experience with AI tools and technologies. This practical exposure allows students to apply theoretical knowledge in real-world scenarios, promoting a more comprehensive understanding of AI and its applications.

5.2.3 Technological unemployment

The introduction of AI in the automotive sector may initially lead to concerns about job displacement. However, a strategic approach to workforce planning, combined with effective upskilling initiatives, can mitigate the risk of unemployment. Governments, industries, and educational institutions should work together to create a supportive environment for transitioning workers. Technological advancements have the potential to increase overall productivity and income. However, they can also result in structural changes by generating new job opportunities and industries while displacing and altering existing ones(Peralta-Alva et al.,2018).

The analysis identified that the integration of artificial intelligence (AI) enhances the adaptability of these robotic systems, allowing them to learn from experiences, optimize processes, and adapt to varying conditions. This adaptability contributes to their ability to outperform humans not only in speed but also in the ability to handle complex and repetitive tasks with a high degree of accuracy.

There is a growing emphasis on retraining programs. These initiatives aim to equip the workforce with the skills needed to thrive in a technology-driven environment. (Kuzior, 2022) argued that lack of adequate education, encompassing lifelong learning, poses a threat of shifting from technological unemployment to structural unemployment, a far riskier scenario for economic and social welfare. Findings from this study opposes the fact that AI will take over people's job entirely, similarly (Acemoglu & Restrepo, 2019b)

found that while some jobs may be automated, new jobs will also be created, and many jobs will be transformed as AI technology is integrated with work processes.

It's important to note that while AI may contribute to job displacement in certain sectors, it also has the potential to create new jobs and industries. The net impact on employment will depend on how effectively societies and individuals adapt to the changes brought about by AI technologies.

5.2.4 Raising Awareness

Raising awareness about the impact of AI on the automotive sector is crucial. Stakeholders, including workers, employers, unions, and policymakers, need to be informed about the benefits and challenges associated with AI integration. This awareness can drive proactive measures in preparing the workforce for the future job landscape.

Findings of this study supports the theory that raising awareness is crucial in the process of AI adoption as it fosters a collaborative environment and inclusivity. This proactive engagement can contribute to a more informed, empowered, and adaptable workforce. Raising awareness about AI is not only beneficial but also necessary for building a responsible and inclusive future. Responses imply that awareness empowers individuals, guides policy decisions, and fosters a collaborative environment that acknowledges the transformative potential of AI while addressing its associated challenges.

Promoting transparency in AI development and deployment processes is critical for building trust and confidence among stakeholders. Automakers and technology providers should prioritize open communication and accountability regarding the capabilities, limitations, and potential risks associated with AI-driven automotive technologies.

Public awareness campaigns, workshops, and forums can provide platforms for sharing knowledge, raising concerns, and soliciting feedback from diverse perspectives.

5.2.5 Changing job roles

Many routine and repetitive tasks across various industries are being automated through AI and robotics. Jobs that involve manual data entry, basic analysis, or predictable physical tasks are increasingly being performed by machines. This automation frees up human workers to focus on more complex and value-added activities. Data indicates that while AI technologies can automate routine tasks, they cannot replicate human creativity, intuition, and emotional intelligence (Manyika & Sneader, 2018). Jobs that involve complex decision-making, strategic planning, innovation, and customer interaction are in high demand. Findings from this study supports the theory that AI will automate routine tasks but cannot replicate human creativity. *"Cybersecurity, data analysis and critical thinking will be roles that will be in demand".*

Some job roles are evolving into hybrid roles that require a combination of technical skills and domain expertise. For example, healthcare professionals may need to become proficient in using AI-powered diagnostic tools, while marketers may need to understand data analytics and AI-driven marketing automation platforms.

5.2.6 Regulations and Policies

Establishing policies and regulations on AI is crucial to ensure the ethical development, deployment, and use of artificial intelligence technologies. The goal is to strike a balance between fostering innovation and safeguarding against potential risks.

Participants stated that the South African government should establish clear and adaptive regulations to govern the use of AI in the automotive industry. These regulations should address ethical considerations, data privacy, and the responsible deployment of AI technologies. A well-defined regulatory framework will provide a stable environment for businesses and promote public trust in AI applications.

"Implementing effective policies and regulations on AI requires a collaborative effort involving governments, industry stakeholders, academia, and the public."

The analysis identified that implementing effective policies and regulations on AI requires a collaborative effort involving governments, industry stakeholders, academia, and the public. A well-crafted regulatory framework can foster responsible AI innovation while mitigating potential risks and ensuring that AI benefits society at large(Benjamins, 2021). Data suggests that as technology continues to advance, ethical policies have become increasingly important therefore regulations guarantee that technologies are created and applied ethically (Ryan et al., 2021).

5.2.7 Human Collaboration

While AI may automate certain tasks, the emphasis should be on fostering collaboration between humans and machines. The South African automotive sector should encourage a symbiotic relationship wherein AI complements human skills. This collaborative approach can lead to increased productivity, innovation, and job satisfaction among the workforces.

Humans and machines often possess complementary skills(Hollister, 2021). Machines excel in tasks requiring speed, precision, and computation, while humans bring creativity, emotional intelligence, and complex problem-solving capabilities. Together, they can tackle a broader range of tasks more effectively.

Automation, powered by machines and artificial intelligence, can handle repetitive and routine tasks with speed and accuracy. This allows humans to focus on more complex and value-added activities, improving overall efficiency and productivity. Manyika & Sneader, (2018) supports the theory that human-machine collaboration facilitates adaptive learning because machines can learn from human input and feedback, continuously improving their performance and adapting to changing circumstances therefore humans, in turn benefit from machine-assisted learning and decision support.

In manufacturing and other industries, collaborative robots, or cobots, work alongside humans, assisting with tasks like assembly, quality control, and material handling. Cobots are designed to operate safely in close proximity to humans, fostering a collaborative work environment.

5.3 SUMMARY

The impact of AI on the future of work in the South African automotive sector requires a comprehensive approach. Upskilling, training, and education should be prioritized, with a keen focus on minimizing unemployment risks. Awareness campaigns, robust privacy measures, and well-crafted regulations will contribute to a balanced and responsible integration of AI, fostering a collaborative future for human workers and advanced technologies.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter outlines the recommendations and conclusion of the study based on the research questions outlined in chapter 1 of this report. The primary objective of the study was to to identify the potential benefits and challenges of AI adoption in the automotive sector and to develop strategies to maximize the benefits while mitigating the risks.

Recommendations are made for government agencies, industry experts, academia, workers' representatives and for further research. and the objective was achieved through answering the following research questions mentioned in page 13 of chapter 1.

6.1.1 Conclusion regarding question 1

The findings confirmed that more routine and repetitive tasks will be replaced by automation, and this will hugely impact the job market. It is believed that automation will replace some work and create others. Jobs that are predominantly routine and repetitive in nature are most at risk of being replaced by automation.

The impact of automation on the job market in the automotive sector will be significant. In contrast automation will undoubtedly lead to the displacement of certain jobs, it will also create new opportunities. AI will reshape the job market in the automotive sector, it also presents opportunities for innovation, growth, and the development of new skills and industries. Adaptation to these changes will be essential for both companies and workers to thrive in the evolving automotive landscape.

6.1.2 Conclusion regarding question 2

As technological advancements continue to reshape industries, including the automotive sector, several new types of jobs are likely to emerge. These jobs will require a combination of technical expertise, analytical skills, and critical thinking abilities. Examples of these new types of jobs are data analysts, AI specialists, Robotics specialists, Cybersecurity analysts etc.

With the increasing amount of data generated by connected vehicles, supply chain systems, and customer interactions, there will be a growing demand for professionals who can analyse and derive insights from this data.

In addition to technical skills, these emerging roles will also require strong critical thinking, problem-solving, and decision-making abilities. Professionals in these fields will need to adapt to rapidly changing technologies and be able to collaborate effectively across interdisciplinary teams. Continuous learning and staying updated on industry trends will also be essential for success in these dynamic roles.

6.1.3 Conclusion to question 3

The feedback to this question was that the adoption of (AI) in the automotive industry offers several potential benefits, but it also comes with certain risks.

AI can automate routine and repetitive tasks, allowing employees to focus on more creative and high-value work. This leads to increased efficiency and productivity across various industries. By automating tasks that were previously performed by humans, companies can reduce labour costs and increase their bottom line. AI-driven automation can streamline workflows, minimize errors, and optimize resource allocation. AI technologies can analyse vast amounts of data at high speeds, providing valuable insights to support decision-making processes. This can lead to more informed and strategic decision-making across all levels of an organization.

One of the most significant risks associated with AI is the potential displacement of jobs. As automation technologies become more sophisticated, certain roles may become obsolete, leading to unemployment and economic disruption, particularly for workers in low-skilled and routine-based occupations. The benefits of AI may not be distributed equally, leading to growing inequality between workers who have the skills to adapt to the changing job market and those who do not. This could exacerbate socioeconomic disparities and widen the gap between the rich and the poor.

AI also raises ethical concerns related to privacy, bias, transparency, and accountability. Biased algorithms could perpetuate discrimination or reinforce existing societal

inequalities. There are also concerns about the ethical implications of AI-driven decision-making, particularly in sensitive areas such as healthcare, criminal justice, and finance.

Effective management of AI adoption in the automotive industry requires collaboration between stakeholders, including government agencies, industry players, academia, and workers' representatives. Regulatory frameworks and policies should be established to ensure the responsible and ethical development, deployment, and use of AI technologies, while also safeguarding against potential risks such as data privacy breaches and algorithmic biases.

Investments in education, training, and reskilling programs are essential to prepare the workforce for the evolving demands of AI-driven automotive technologies. By fostering a culture of lifelong learning and innovation, South Africa can harness the transformative potential of AI to drive economic growth, competitiveness, and job creation in the automotive industry, while also ensuring that the benefits are equitably distributed across society.

6.2 RECOMMENDATIONS

6.2.1 For policymakers or industry leaders:

- **Establish Comprehensive Training Programs**

Develop and implement extensive training programs that focus on upskilling and reskilling the existing workforce in the South African automotive sector. These programs should be designed in collaboration with educational institutions and industry experts to meet the specific needs arising from AI integration.

- **Promote Public-Private Partnerships**

Foster collaborations between government bodies, industry stakeholders, and educational institutions. Public-private partnerships can facilitate the creation of tailored educational

initiatives, ensuring that the workforce is adequately prepared for the evolving demands of AI-driven technologies.

- **Raise Awareness Through Outreach Campaigns**

Launch awareness campaigns to inform both employees and employers about the benefits and challenges of AI in the automotive sector. These campaigns should highlight the positive impact of AI, dispel myths, and prepare the workforce for the upcoming changes, fostering a positive attitude towards technological advancements.

- **Develop and Enforce Ethical AI Regulations**

Work with regulatory bodies to develop and enforce clear ethical guidelines and regulations for the use of AI in the automotive sector. Ensure that these regulations address issues related to data privacy, algorithm transparency, and the responsible deployment of AI technologies.

- **Encourage Human-AI Collaboration**

Promote a culture that recognizes AI as a collaborative tool rather than a threat. Establish frameworks that encourage the integration of AI with human capabilities, emphasizing the importance of human judgment in critical decision-making processes. This can contribute to a more harmonious and effective working relationship between humans and AI.

- **Invest in Data Security Measures**

Allocate resources to invest in robust data security measures to address concerns related to the privacy of information. Implement state-of-the-art encryption, access controls, and compliance measures to safeguard sensitive data collected and processed by AI systems in the automotive sector.

6.2.2 For Academia:

- **Regularly Updated Training Programs**

Recognize that technology evolves rapidly, and regular updates to training programs are essential. Create a system that allows for continuous learning and adaptation, ensuring that the workforce remains equipped with the latest skills and knowledge necessary to navigate the changing landscape of the automotive industry.

- **Curriculum Development**

Integrate AI, machine learning, and robotics into engineering and technical education curriculums. Emphasize hands-on experience with these technologies. Promote interdisciplinary courses combining AI with business, ethics, and social sciences to prepare students for the holistic impact of AI in the industry.

- **Research and Development**

Industry collaboration by partnering with automotive companies for research on AI applications, ensuring that academic research is aligned with industry needs. Research AI solutions tailored to the specific needs and challenges of the South African automotive industry, such as cost-effective automation and local supply chain optimization.

- **Training and Upskilling**

Invest in lifelong learning programs by developing continuous education programs to upskill current workers in the automotive industry, focusing on AI and related technologies. In addition, offer specialized workshops and certification programs in AI, data analysis, and related fields.

6.3 SUGGESTIONS FOR FUTURE RESEARCH

6.3.1 Skill Requirements and Workforce Training

Examine the evolving skill requirements for automotive industry workers as AI technologies become more prevalent. Assess the effectiveness of current workforce training programs in preparing employees for roles that incorporate AI and automation and identify potential gaps that need to be addressed.

6.3.2 Job Creation and Innovation

Explore how AI is creating new job opportunities within the automotive industry, particularly in areas such as AI software development, data analysis, and cybersecurity. Investigate the role of AI-driven innovation in shaping the future of work and competitiveness in the automotive sector.

6.3.3 Human-AI Collaboration

Investigate strategies for promoting effective collaboration between humans and AI systems in automotive manufacturing and design processes. Examine how AI can augment human capabilities and improve productivity, safety, and quality in the workplace.

6.3.4 Ethical and Societal Implications

Consider the ethical and societal implications of AI adoption in the automotive industry, including issues related to job displacement, privacy, bias, and algorithmic transparency. Examine approaches for addressing these challenges and ensuring that AI technologies are deployed responsibly.

6.4 LIMITATIONS OF THE RESEARCH STUDY

6.4.1 Scope: the analysis did not cover all aspects of AI's impact on the future of work in the automotive industry in South Africa comprehensively. Certain niche areas or specific subsectors within the industry might not have been adequately explored.

6.4.2 Bias and Perspective: the research might have been influenced by the biases and perspectives of the researcher or sources consulted. Different stakeholders may have conflicting views on the implications of AI for the automotive industry, and alternative viewpoints should be considered for a balanced assessment.

6.4.3 Geographical Variability: the impact of AI on automotive workforces could vary significantly across regions due to differences in regulatory environments, technological readiness, and labour market conditions.

6.4.4 Social and Cultural Factors: the research might not have fully considered the social and cultural factors influencing AI adoption and workforce dynamics in South Africa's automotive sector. These factors could play a significant role in shaping attitudes towards technology and labour practices.

6.5 SUMMARY

This chapter provided a comprehensive overview and summaries detailing the accomplishment of the research goal and objectives. The researcher has arranged the research findings into themes, conclusions, and recommendations. These findings have been corroborated through the literature review and by referencing previously conducted studies.

The participants shared their insights about how AI will impact the future of work and challenges that will come with these technological advancements. However AI presents opportunities for automating repetitive tasks and enhancing productivity, it also poses challenges related to job displacement, skill requirements, and workforce reskilling based on the outcomes of the research. Understanding the evolving nature of automotive jobs and the skills needed in an AI-driven environment is crucial for preparing the workforce

for the future. Based on the discussions, the recommendations concerning regulations, education and awareness, AI human collaboration, and additional research are deemed appropriate.

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ANNEXURES

APPENDIX A: QUALITATIVE RESEARCH INSTRUMENT

Name of researcher: Portia Setati

TOPIC: THE IMPACT OF AI ON FUTURE OF WORK IN THE SOUTH AFRICAN AUTOMOTIVE INDUSTRY

1. **Research question: what new types of jobs are likely to emerge as a result of technological advancements, and what skills will be needed for these jobs"? [All staff regardless of rank]**

- What is your understanding of the impact of technological advancements on the job market and the emergence of new types of jobs?
- How do you see the emergence of these new types of jobs affecting the entire labour market? Follow up - In your industry, what are the kinds of jobs that are emerging?
- What are some of the challenges facing workers who are seeking to switch or transition to these new types of jobs?
- What is your understanding of the current and future state of AI adoption in the automotive industry?

2. **Research question: which types of jobs are most at risk of being replaced by automation, and what will be the implications for workers in the automotive sector? [HR staff and management]**

- What are the specific job roles within the automotive sector that are most vulnerable to automation?
- How will the implementation of automation technologies impact the overall workforce in the automotive sector?
- Does your company have plans to re-shuffle displaced workers or place them in alternative employment within the organisation?

3. **What are the potential benefits and risks associated with the adoption of AI in automotive, and how are these being managed? (Management)**

- Could you please describe your role and experience in the automotive industry, particularly regarding in the adoption of AI technologies?
- In your opinion, what are the potential risks or challenges associated with the adoption of AI in the automotive sector?
- How do you see the balance between the benefits and risks of AI adoption in the automotive industry? Follow up- Are the benefits outweighing the risks, or vice versa?
- What measures or strategies are being employed to manage the risks associated with AI adoption in automotive systems? Follow up- How are these risks being mitigated or controlled?

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

APPENDIX B: CONSENT FORM

Name of researcher: Portia Setati

TOPIC: THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE FUTURE OF WORK IN THE SOUTH AFRICAN AUTOMOTIVE INDUSTRY

INFORMED CONSENT FORM

I....., hereby voluntarily consent to participate in the interview related to the **Impact of AI technologies on the Future of Work in the Automotive Industry.**

I understand that the information that I will share will be used for research purposes only and that nowhere will my identity be made known in any research report or publication. I agree that the interview may be audio recorded and understand that my personal particulars will remain confidential.

I am also aware of the fact that I can withdraw at any time during the study without any obligations or penalty. I agree that the information I provide may be used anonymously for academic purposes by other researchers after this project, subject to their own ethical approval.

.....

Signature of research participant

APPENDIX C: PERMISSION LETTER

To whom it may concern

Company X plant Rosslyn

Rosslyn

Akasia

Pretoria, South Africa

2000

May 19, 2023

Dear Sir/Madam,

Re: Permission to conduct research at your Plant.

My name is Portia Setati, a student at Wits Business School (University of the Witwatersrand) in the Faculty of Commerce, Law, and Management.

I am studying for a Master of Business Administration (MBA) and require permission to conduct this research at Company X Rosslyn plant.

My research topic is the "**Impact of Artificial Intelligence Technologies on the future of work in the automotive industry**." The purpose of this study is to explore the impact of artificial intelligence (AI) on the future of work in the automotive industry and to identify strategies for adapting to a rapidly changing work environment.

I will invite individuals from your organization to participate in this study. I would like to interview members from management (operations), HR and workers who are responsible for assembly in the plant. If they consent to participate in my research, they will each be interviewed for 15 minutes.

The interviews will take place either at the plant's premises or within a suitable environment (quiet and private) and at a time convenient to each participant. The participant's responses will be audio recorded for study purposes only and the recordings will be kept in a safe place with access limited to only the researcher and her supervisor.

Participants will be asked to give their written and verbal consent before the research begins. Their responses will be treated confidentially, and their identities and those of Company X Rosslyn plant will be kept anonymous. Individual privacy will be maintained in all published and written data resulting from the study. The research results will be uploaded on the university 's electronic portal.

Participation in this research will not advantage or disadvantaged respondents in any way. Furthermore, respondents can withdraw their participation from the study at any time without any penalty. There are no foreseeable risks in participating in this study. Participants will not be paid for this study. All research data will be preserved and kept anonymous.

I therefore request permission in writing to conduct my research at your organization. The permission letter should be on your organization's formal letterhead, signed and dated; and specifically referring to myself by name and the title of my study.

Please let me know if you require further information.

Sincerely,

Portia Setati
1897099@students.wits.ac.za
082 708 4615
Supervisor:
Dr. LM Tabane
Ph.D., Industrial & Organisational Psychology (HPCSA)
lehlogonolo.tabane@wits.ac.za

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APPENDIX D: PARTICIPANT INFORMATION SHEET

Name of researcher: Portia Setati

TOPIC: THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE FUTURE OF WORK IN THE SOUTH AFRICAN AUTOMOTIVE INDUSTRY

RE: Participants information sheet

My name is Portia Setati, and I am a master's student at Wits Business School (University of the Witwatersrand, Johannesburg). I am conducting a research study about the future of work. The study title is the **Impact of Artificial Intelligence on the future of work in the South African automotive industry.**

I am inviting you to take part in an interview about the future of work due to technology. If you decide to take part, your participation in this research study will last about 15-30 minutes. The interview will take place at the premises of your company or at any quiet and safe you are comfortable in.

With your permission, I would like to audio record the interview. This data will be stored in a password locked device and will be deleted after 5 years. Only the researcher will have access to the data. The interview will be confidential and anonymous. When I share the results of the research study, I will not include your name or anything else that could identify you.

If you decide to take part in the research study, it should be because you want to volunteer. You do not have to take part. You can stop being in the study at any time. You do not

have to answer any questions if you do not want to. You will not get any direct benefits if you choose to join the research study.

You will not lose any services, benefits, or rights you would normally have should you decide not to join. Taking part in the research study will not cost you anything. You will not be paid for being in this research study. Your travel/data costs to attend the interview will be reimbursed to a maximum of R150 should you need to travel to a place of an interview.

The are no risks involved in partaking in the study. This research study will be written up as a research report. The report will be available on the university library website. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me or my supervisor on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Sincerely,

Portia Setati

1897099@students.wits.ac.za

+2782 708 4615

Supervisor: Dr TL Tabane

Lehlohonolo.tabane@wits.co.za

+27114626609

APPENDIX E: SCHEDULE AND TIMELINES FOR THE STUDY

Below are the details on the planned timelines for the research project:

Week 1-2 of April 2023: Conducted a literature review on the topic, including academic papers, industry reports, and other relevant sources. Began to develop a framework for the research questions.

Week 3-4 of April 2023: Developed research questions and hypotheses based on the literature review. Refined the research methodology and sampling strategy.

Week 1-2 of May 2023: Sent requests to conduct study to target groups.

Week 3-4 of June 2023: Developed and pilot tested survey questions. Identified potential participants.

Week 1-4 of July 2023: Awaited feedback from target groups. Sent follow-up emails.

Week 1-4 of August 2023: Follow-up emails were sent.

Week 1-4 of September 2023: Awaited approval from target groups to conduct study.

Week 1-4 of October 2023: Awaited approval from target groups to conduct study.

Week 1- 4 of November 2023: Awaited approval from target groups to conduct study.

Week 3-4 of December 2023: Approval was granted. Target company closed for end of year holidays.

Week 2-4 of January 2024: Data collection process began. Wrote up preliminary findings and draft sections of the final report.

Week 1-4 of February 2024: Finalized data analysis and synthesized findings. Developed recommendations based on research findings.

WEEK 1-4 of Marh 2024: Presented findings and recommendations to stakeholders. Submitted final report.

APPENDIX F: ETHICS CLEARANCE CERTIFICATE

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg

Wits Business School

Wits Business School Ethics Committee
Constituted under the University Human Research Ethics Committee (Non-Medical)

Ethics Clearance Certificate

Ethics protocol number: WBS/BA1897099/591
This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below).

This certificate is only valid if accompanied by formal permission from the relevant stakeholder(s).

Project title	The impact of artificial intelligence on the future of work in the South African automotive industry
Investigator / Researcher	Ms Portia Setati
Nature of Project	MBA (Research Article)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed confidentialty.
Issue Date of Certificate	9/12/2023
Expiry date	Date of submission of the project / research report
Chairperson	Dr Pius Oba ☎ +27 11 717 3976 +27 82 733 6587 ✉ pius.oba@wits.ac.za

Declaration by Researcher

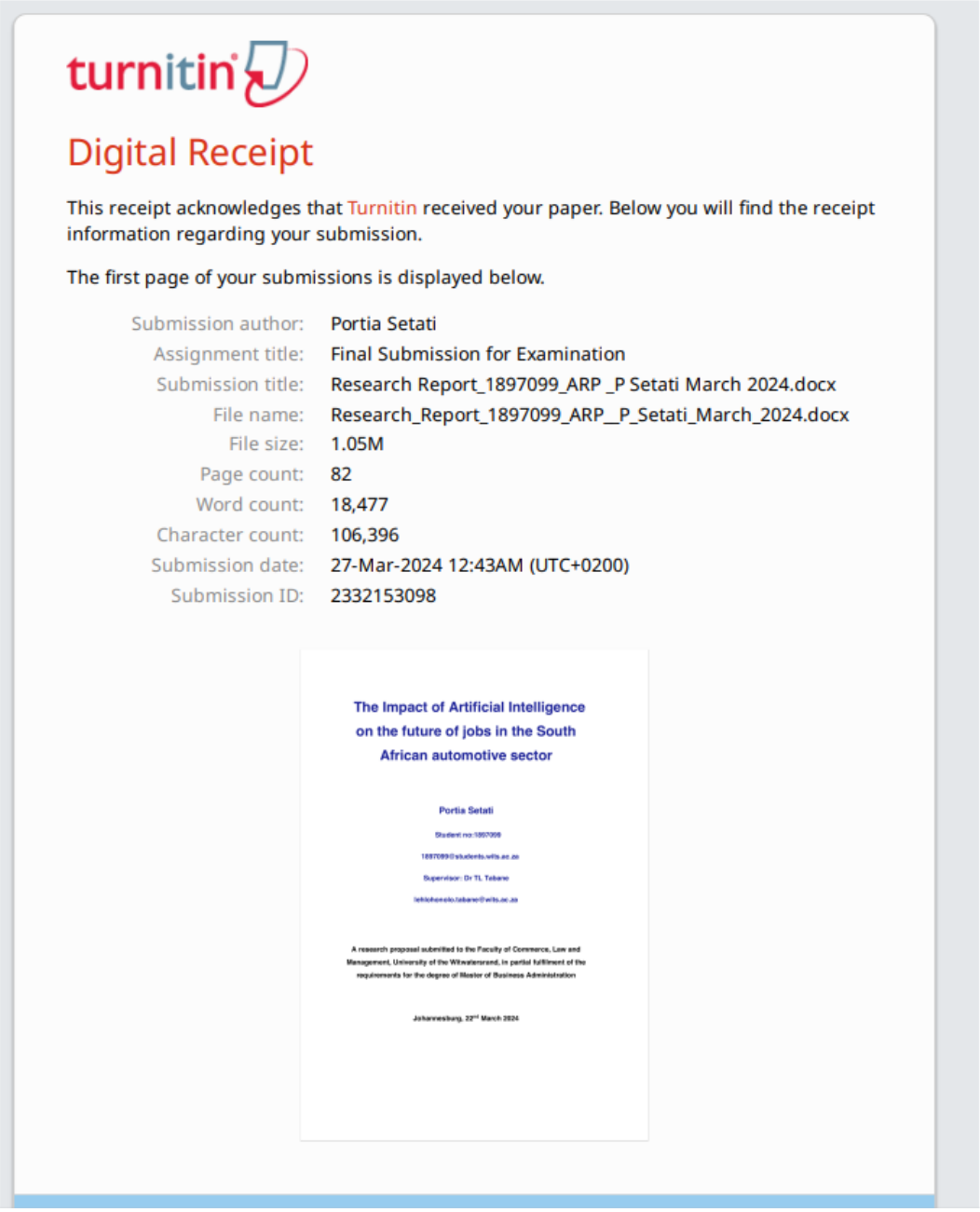
One copy must be signed by the Researcher and returned to the Chairperson of the Wits Business School Ethics Committee.

I fully understand the conditions under which I am authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I undertake to resubmit the protocol to the Committee.

P.Setati — Signature

03 January 2024 — Date:

APPENDIX G: TURNITIN REPORT



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