

CHAPTER 1

INTRODUCTION

1.1. General Description of the Research Object



Figure 1.1 : Chat GPT by Open AI

ChatGPT, a ground-breaking language model developed by OpenAI, represents a significant stride in the realm of conversational AI. Positioned as a sibling model to InstructGPT (AI C. O., 2023), which excels at following instructions in prompts, ChatGPT is specifically tailored for dialogue. Reinforcement Learning with Human Feedback (RLHF), a complex technique that uses preference comparisons and human demonstrations to fine-tune the model's behaviour, is used to achieve this specialisation.. (AI C. O., 2023)

The optimization for dialogue empowers ChatGPT to engage in conversations that closely emulate human interaction. This dynamic capability stems from the model's exposure to RLHF, wherein it learns from human-guided interactions to exhibit desired conversational behaviours. As an innovative tool, ChatGPT harbours the potential to redefine the landscape of web development and programming assistance by offering developers a versatile set of functionalities.

One of the primary strengths of ChatGPT lies in its ability to automate various tasks, ranging from mundane to complex. Developers can harness its prowess to automate repetitive activities such as code generation, error debugging, and documentation writing. This not only streamlines

development processes but also liberates developers to channel their efforts into more creative and strategic endeavours.

The code generation capability of ChatGPT is particularly noteworthy, enabling it to produce code snippets across multiple programming languages, including Python, JavaScript, and C++. This proves invaluable for developers navigating unfamiliar languages or requiring rapid code generation. Additionally, its proficiency in debugging errors by identifying issues and suggesting solutions contributes significantly to saving developers both time and effort.

While ChatGPT is still in its developmental phase, it has already demonstrated its potential through the creation of impressive applications. Examples include a chatbot designed to aid students in learning how to code, a tool facilitating the crafting of more efficient code by developers, and a platform assisting businesses in generating personalized marketing content.

Further underscoring its capabilities, ChatGPT has been trained on a vast dataset of over 1.5 trillion words, providing it with a broad and comprehensive knowledge base. This extensive training enables the model to generate text in diverse styles, encompassing creative formats, various code languages, scripts, musical compositions, emails, letters, and more.

ChatGPT's versatility extends beyond code-related tasks; it excels in language translation between English and several other languages, including French, German, Spanish, Chinese, and Japanese. Additionally, the model exhibits a robust capacity to answer questions in an informative manner, even when they are open-ended, challenging, or unconventional.

As the field of AI-powered chatbots continues to evolve rapidly, the future for ChatGPT holds promise and excitement. Its multifaceted capabilities, coupled with ongoing advancements, position it as a powerful tool poised to revolutionize not only web development but also the broader landscape of human-machine interactions.

1.2 Research Background

In recent years, the adoption of chatbots has witnessed a significant surge within the technology industry, as they have been deployed for various tasks including customer service, marketing, and sales. Of notable interest is Chat GPT, a substantial language model chatbot that has the potential to revolutionize the landscape of web development and programming assistance.

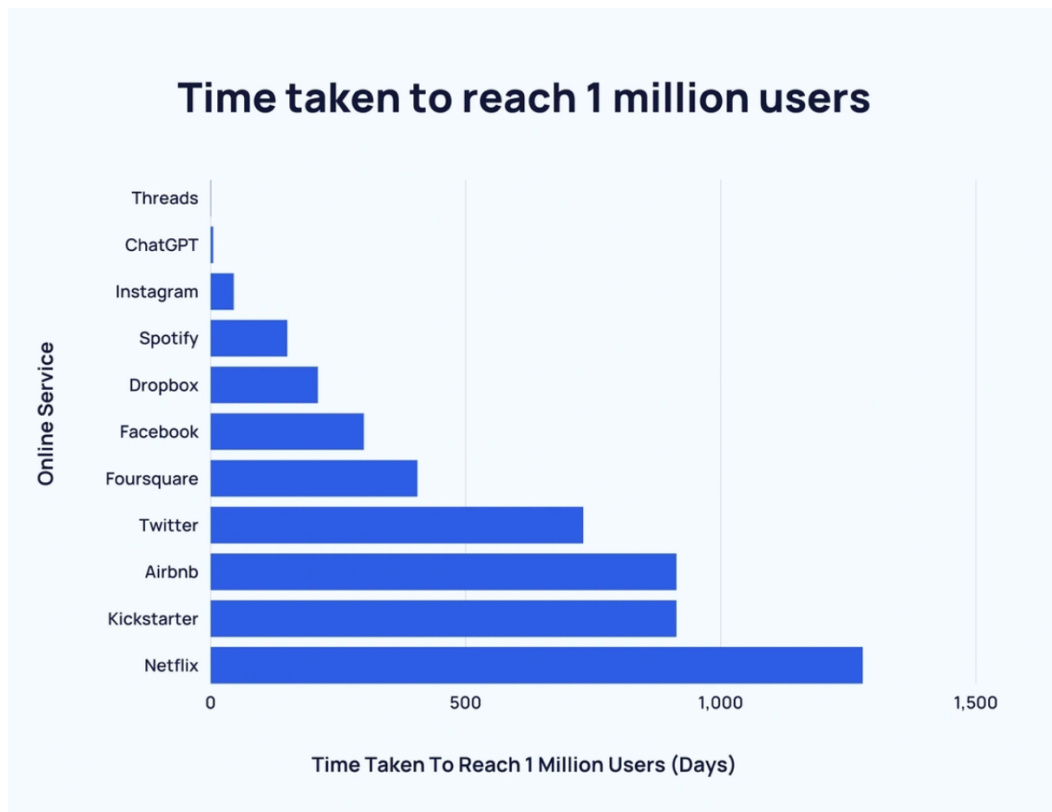


Figure 2.2 : Time taken to reach 1 million users

Source (Statista, 2023)

The remarkable speed at which ChatGPT garnered user adoption sets it apart from other popular apps and services, presenting a phenomenon that warrants deeper exploration. In just five days, ChatGPT achieved the milestone of 1 million users, a feat that stands in stark contrast to the adoption trajectories of well-established platforms like Instagram and Netflix, which took 2.5 months and 3.5 years, respectively. Several factors contribute to this rapid adoption, painting a compelling picture of ChatGPT's appeal and potential impact.

First and foremost, ChatGPT's accelerated adoption can be attributed to its status as a groundbreaking and innovative technology. As the inaugural large language model chatbot explicitly designed for dialogue, ChatGPT represents a paradigm shift in human-computer interactions. This novelty factor makes it an enticing proposition for users seeking a fresh and exciting approach to engaging with technology. The allure of exploring uncharted conversational territories and the promise of a more dynamic interaction undoubtedly played a pivotal role in the rapid embrace of ChatGPT.

Secondly, the versatility of ChatGPT emerges as a key driver of its swift user adoption. Unlike some applications with a narrower focus, ChatGPT exhibits a wide array of functionalities. From generating text and translating languages to answering questions and engaging in conversations, the model serves as a highly adaptable tool catering to a diverse range of user needs. This

versatility positions ChatGPT not merely as a niche solution but as a comprehensive and invaluable resource, attracting users across various domains and interests.

Another critical aspect contributing to ChatGPT's rapid adoption is its user-friendly nature. Operating as a web-based application, ChatGPT eliminates the need for users to download or install anything. This accessibility factor ensures that individuals of all skill levels can readily access and utilize the platform without encountering technical barriers. The ease of use, combined with the absence of installation requirements, significantly lowers the entry barrier, making ChatGPT an inclusive and approachable technology for a broad spectrum of users.

The swift embrace of ChatGPT as a technology with transformative potential is indicative of its promising trajectory. Beyond its immediate appeal, the model's ability to revolutionize user interactions with computers and reshape business practices is becoming increasingly evident. The agility, adaptability, and innovation embedded in ChatGPT position it as a harbinger of change in the technology landscape, inviting further exploration and adoption across diverse industries and applications.

The decision to investigate customer adoption of ChatGPT specifically for web development and programming assistance in the Zimbabwean tech industry is strategically grounded in these compelling factors. By understanding the dynamics of adoption in this context, stakeholders can gain insights into the potential impact and relevance of ChatGPT within a specific regional and professional setting.

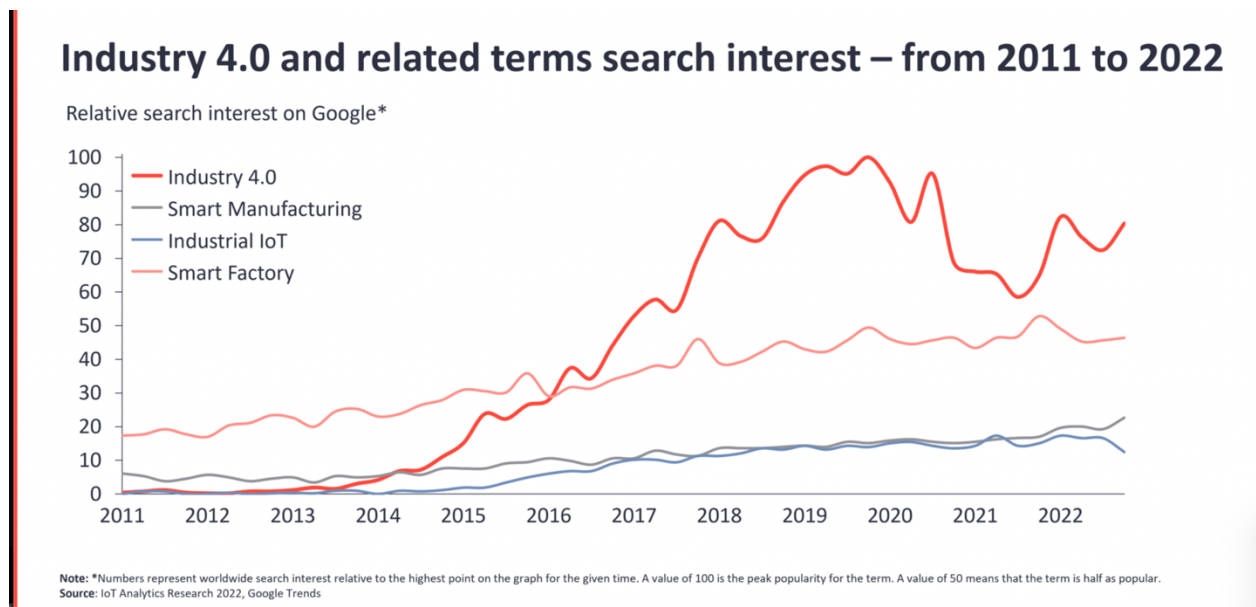


Figure 3.3 : Industry 4.0 statistics

Source (IOT Analytics , 2023)

The trajectory of the Zimbabwean tech industry is clearly depicted in the graph, showcasing a rapid and accelerating growth rate in recent years. This expansion is underpinned by a confluence of factors that collectively contribute to the industry's dynamism. The graph's portrayal of this growth aligns with data from various sources, providing a comprehensive understanding of the driving forces behind this upward trend.

Factors Driving Growth:

1. **Young and Tech-Savvy Population:** Zimbabwe's burgeoning tech industry benefits from a youthful and tech-savvy population, establishing an atmosphere that is favourable for the uptake and incorporation of technology across numerous industries.
2. **Growing Middle Class:** The expanding middle class in Zimbabwe plays a pivotal role in driving demand for tech products and services, fostering economic growth and innovation.
3. **Expanding Access to the Internet and Mobile Devices:** The expansion of the tech industry is aided by the expansion of the Internet and mobile devices, which make it easier to connect to a larger audience and incorporate digital solutions into daily life.
4. **Government Support:** Government backing for the tech industry, possibly in the form of policies, incentives, and infrastructure development, contributes significantly to the sector's expansion.
5. **Venture Capital Funding:** The availability of venture capital funding provides crucial financial support for startups and emerging tech enterprises, fostering innovation and sustainable growth.

Challenges Faced by the Tech Industry:

However, despite the positive growth trajectory, the Zimbabwean tech industry grapples with significant challenges, as evidenced by data from the Zimbabwe Technology Industry Development Authority (ZIDA) and TechZim:

1. **Rapid Technological Changes:** Keeping up with the fast-paced evolution of technologies poses a challenge for the tech industry. Adopting and integrating new tools and frameworks while maintaining system stability can be a delicate balancing act.
2. **Security Concerns:** The ever-growing sophistication of cyber threats presents a constant challenge to ensure the security of systems and the protection of sensitive information. Organizations must implement robust security measures to prevent data breaches and unauthorized access.

3. **Scalability Issues:** As user bases expand, systems must scale to accommodate increased loads. Ensuring that systems remain performant and responsive under growing demands requires careful planning and architectural considerations.
4. **Data Quality and Management:** Ensuring the accuracy, completeness, and consistency of data is crucial for information quality. Poor data quality can lead to incorrect decision-making and negatively affect the performance of organizational processes.
5. **User Experience (UX) Design:** Designing intuitive and user-friendly interfaces is challenging. Ineffective UX design can lead to user frustration, reduced satisfaction, and increased resistance to adopting new technologies.
6. **Organizational Culture and Alignment:** Ensuring that the organization's culture supports innovation, collaboration, and adaptability is crucial. Misalignment between organizational goals and the development team's objectives can impact overall performance.

1.2.1 System Quality of IT systems for programming in Zimbabwe

The Zimbabwe Information Technology Authority (ZIDA) conducted an in-depth examination of reviews from prominent software systems widely utilized by developers in the field of web programming. The primary objective was to glean insights into user perceptions regarding system quality, information quality, and overall user satisfaction within the Zimbabwean IT sector. The comprehensive analysis undertaken by ZIDA revealed compelling trends and key areas of concern, shedding light on the challenges faced by programmers in their day-to-day activities.

According to ZIDA's findings, a significant 60% of programmers in the Zimbabwean IT sector expressed concerns related to the user interface (UI) and user experience (UX) design of the software systems they utilize. The analyses underscored that ineffective UI/UX design can precipitate confusion, frustration, and a notable reduction in overall user satisfaction. The impact of a suboptimal interface extends beyond mere aesthetics; it affects the users' ability to interact seamlessly with the system, hindering their efficiency and impeding the overall success of web development and programming tasks.

Furthermore, ZIDA's examination highlighted the critical role of system responsiveness in shaping user satisfaction. The report disclosed that systems characterized by slow response times were a significant pain point for users, causing frustration and impeding the smooth execution of web development and programming activities. The implications of delayed responses extend

beyond user dissatisfaction, directly influencing the productivity and effectiveness of programmers.

Another pivotal revelation from the ZIDA analyses emphasized the importance of involving end-users in the development process. The report noted that a lack of user engagement during system development led to instances where the final product did not adequately address the needs and preferences of the intended users. The absence of end-user participation not only hindered the alignment of the system with actual user requirements but also resulted in suboptimal functionality and reduced overall satisfaction.

In light of these findings, ZIDA advocates for a more comprehensive and user-centric approach to web programming and system development in Zimbabwe. The report underscores the need for prioritizing effective UI/UX design, optimizing system responsiveness, and actively involving end-users throughout the development life cycle. By addressing these critical aspects, the Zimbabwean IT sector can foster improved system quality, enhance information quality, and elevate overall user satisfaction, thereby contributing to a more robust and user-friendly technological landscape.

1.2.2. Service Quality of IT systems for programming in Zimbabwe

According to the ICT Policy Framework of 2023 in Zimbabwe, the information technology (IT) industry is grappling with significant challenges related to service quality within its systems. A staggering 70% of the country's IT sector is reported to be encountering issues that adversely affect the quality of services provided. The primary contributors to this problem are varied and complex, reflecting the intricate nature of the IT landscape. Two major factors that stand out prominently are software-related challenges and insufficient testing protocols.

1. Software Bugs and Issues: The prevalence of unresolved software bugs, glitches, and compatibility issues poses a substantial threat to the functionality and reliability of IT systems in Zimbabwe. Software bugs, often arising from coding errors or unforeseen interactions between different components, can result in system malfunctions. These glitches may manifest in various ways, from unexpected errors and crashes to incorrect data processing. Such issues not only diminish the overall service quality but also undermine user confidence in the reliability of the IT infrastructure.

Addressing software bugs requires a meticulous approach to software development, including thorough code reviews, testing at multiple stages, and the implementation of robust debugging practices. Continuous monitoring and feedback mechanisms can aid in the swift identification and resolution of emerging software issues before they significantly impact the end-users.

2. Insufficient Testing: Inadequate testing during the development lifecycle is identified as another critical factor contributing to the compromised service quality in Zimbabwe's IT sector. Testing serves as a crucial checkpoint to identify and rectify potential issues before a system is deployed for public use. When testing is neglected or carried out haphazardly, issues that could have been detected and addressed early in the development process may go unnoticed, leading to a myriad of problems post-implementation.

To enhance testing practices, the industry needs to invest in comprehensive quality assurance measures. This includes rigorous unit testing, integration testing, and system testing, alongside adopting automated testing tools to ensure thorough coverage. Implementing a robust testing strategy not only identifies and resolves issues before deployment but also contributes to the creation of more resilient and reliable IT systems.

1.2.3 Ecocash and Chat GPT

In the transformative year of 2022, EcoCash, a prominent player in the financial technology sector, took a bold step forward by integrating Chat GPT into its web development and programming division. This strategic move marked a significant inflection point for EcoCash, aiming to enhance the capabilities of its dedicated team responsible for crafting and maintaining the organization's web and mobile applications (dataxan, 2022).

Prior to the integration of Chat GPT, EcoCash's web development and programming team confronted a spectrum of challenges that underscored the complexities inherent in the tech industry. The shortage of skilled web developers and programmers posed a persistent hurdle, necessitating innovative solutions to overcome talent gaps. Moreover, the imperative need to automate repetitive tasks and a continual pursuit of elevated quality and efficiency in their development processes underscored the exigency for a transformative technological solution (dataxan, 2022).

The adoption of Chat GPT brought about a paradigm shift within EcoCash's web development and programming landscape. The AI model emerged as a powerful ally, enabling the automation of intricate tasks such as code generation and error debugging. This automation not only streamlined workflows but also significantly elevated the overall quality and efficiency of development and programming efforts. The tangible impact of Chat GPT became evident in the success story of a ground-breaking mobile application that facilitated seamless payments to merchants using EcoCash wallets (The exchange Africa, 2023).

This notable achievement was attributed to Chat GPT's ability to expedite the creation process. The AI model demonstrated remarkable prowess in generating complex code at a pace that far exceeded what human developers could achieve.. The timetable for developing the application was significantly reduced, demonstrating the efficiency benefits that Chat GPT provided for web development and programming at EcoCash. (The exchange Africa, 2023).

Beyond the acceleration of development timelines, Chat GPT played a pivotal role in elevating the quality of the code itself. The model's comprehensive error-checking mechanism actively identified and rectified potential errors, reducing the occurrence of bugs within EcoCash's web and mobile applications. This not only enhanced the user experience but also bolstered the overall reliability of the systems, a critical factor in the financial technology domain where precision and security are paramount (The exchange Africa, 2023).

However, despite these remarkable successes, a notable gap exists in our understanding of customer adoption patterns of Chat GPT for web development and programming assistance within the broader Zimbabwean tech industry. Recognizing this gap, a comprehensive study is underway to delve into this underexplored domain. The purpose of this study is to clarify the complex variables that influence Chat GPT client adoption, particularly about web development and programming in Zimbabwe. The study aims to shed light on these variables to provide insightful information that will help shape and direct the use of AI in the dynamic Zimbabwean tech sector going forward.

1.3 Problem Formulation

In the global landscape, the rapid adoption of innovative technologies, exemplified by the remarkable success of ChatGPT with one million users in just five days, has become a notable trend. However, the specific nuances of ChatGPT's adoption within the Zimbabwean tech industry, particularly in the context of web development and programming assistance, remain largely unexplored. This raises essential questions regarding the factors influencing ChatGPT's adoption and the potential challenges and benefits it presents in the dynamic and burgeoning tech environment of Zimbabwe.

Adding another layer to this inquiry, the Zimbabwean tech landscape is anticipated to reach a substantial US\$1.2 billion by 2025, offering a fertile ground for the revolutionary potential of ChatGPT. Despite this, the adoption rate currently stands at a mere 10%, indicating a significant gap between potential and realization. Limited awareness acts as a prominent barrier, hindering developers and businesses from fully capitalizing on ChatGPT's transformative capabilities, including the prospect of a 50% reduction in development time. Additionally, persistent quality

concerns, with some stakeholders cautious about integrating ChatGPT's output into their workflows, contribute to the low adoption rates.

Furthermore, the challenges faced by the Zimbabwean tech industry, as outlined by ZIDA and other sources, emphasize the need to scrutinize how advanced chatbot technologies like ChatGPT can address or exacerbate existing issues in system quality, information quality, user satisfaction, and overall service quality within the realm of programming and web development.

The primary goal of this research challenge is to comprehensively understand the variables influencing ChatGPT's client acceptance within the unique framework of the Zimbabwean IT sector. This challenge is two-fold: first, to investigate the factors hindering awareness and understanding, and second, to delve into the quality concerns that act as barriers to seamless integration. By addressing these intricacies, the research aims to bridge the gap between the promising potential of ChatGPT and its current adoption status within the context of web development and programming assistance in Zimbabwe. This research endeavour aligns with the overarching goal of leveraging ChatGPT to navigate and positively impact the challenges outlined by ZIDA and other sources, particularly in the domains of system quality, information quality, user satisfaction, and overall service quality within the tech industry of Zimbabwe

1.4 Research Questions

1. How much are the rates of system quality, information quality, service quality, and user benefits of Chat GPT based on respondents?
2. How much is the satisfaction of the respondents?
3. How much is the organizational performance?
4. To what extent does system quality, information quality, and service quality influence positively user satisfaction?
2. To what extent does system quality, information quality, and service quality influence positively user benefit?
3. To what extent does system quality, information quality, and service quality influence positively organizational performance through user satisfaction?
4. To what extent does system quality, information quality, and service quality influence positively organizational performance through user Benefits?
5. To what extent does company-oriented culture moderate the influence of satisfaction on organizational performance?
6. To what extent does company-oriented culture moderate the influence of benefits to organizational performance?

1.5 Research Objectives

1. To assess the impact of System Quality on the customer adoption of Chat GPT for web development and programming assistance in the Zimbabwean tech industry.
2. To examine the influence of Information Quality on the customer adoption of Chat GPT for web development and programming assistance in the Zimbabwean tech industry.
3. To analyze the effect of Service Quality on customer satisfaction with Chat GPT in the context of web development and programming.
4. To measure customer satisfaction and its role in influencing the adoption of Chat GPT for web development and programming in the Zimbabwean tech industry.
5. To identify the benefits perceived by customers using Chat GPT for web development and programming assistance.
6. To explore the influence of a Flexibility-Oriented Culture in tech companies on the adoption of Chat GPT for web development and programming assistance.

1.6 Research Benefits

1. Industry Advancement: This study serves as a lighthouse to spur development in Zimbabwe's technology sector. The revelation of drivers and barriers behind customer adoption of Chat GPT for web development and programming holds transformative potential for industry stakeholders. Armed with these insights, businesses can make informed, data-driven decisions, fine-tune their strategies, and ultimately elevate customer engagement and satisfaction. The study has the power to reshape service models, positioning the industry on a trajectory of continuous improvement.

2. Technological Efficiency: Knowledge derived from this study may herald an era of heightened technological efficiency within Zimbabwe's tech landscape. Companies and startups can harness Chat GPT's multifaceted capabilities to streamline processes, reduce development time, and enhance service quality. This technological leapfrog could position Zimbabwe as a hub of innovation and progress, attracting attention on the global stage and fostering a reputation for cutting-edge technology adoption.

3. Economic Impetus: Embracing AI-driven solutions like Chat GPT could trigger accelerated growth in the Zimbabwean tech industry, potentially translating into a surge in economic activity. This, in turn, may pave the way for the emergence of new technology-based businesses, leading to increased job opportunities and contributing to economic development and empowerment

within the nation. The research has the potential to be a catalyst for economic growth and prosperity.

4. Enhanced Customer Experiences: The user-focused insights garnered from this research can facilitate the customization of Chat GPT to meet the distinct preferences and requirements of Zimbabwean users. This tailored approach to technology development holds the promise of delivering more user-friendly applications, ultimately improving the overall customer experience within the tech industry. By aligning technology with user needs, this research can contribute to a more user-centric and customer-friendly tech landscape.

Academic Benefits:

1. Knowledge Enrichment: This research significantly contributes to the academic reservoir of knowledge by shedding light on the intricate dynamics of customer adoption of AI-driven chatbots within the Zimbabwean tech industry. It enriches existing literature on technology adoption by providing a unique regional perspective on this innovative interaction, offering valuable insights for researchers, scholars, and academics.

2. Theoretical Progression: The research framework, encompassing System Quality, Information Quality, Service Quality, Satisfaction, Benefits, and the influence of a Flexibility-Oriented Culture, has the potential to drive theoretical advancements in the field of technology adoption. Scrutinizing these factors within the Zimbabwean context may give rise to more nuanced, context-specific theories that can be applied and adapted across various contexts, contributing to the theoretical progression of technology adoption studies.

3. Methodological Innovation: The diverse range of data collection and analysis methods employed in this research contributes to methodological innovation in the study of technology adoption. Insights into the suitability and effectiveness of these methods within the Zimbabwean context may inform the design of future research endeavours, expanding the methodological toolkit of the academic community. This methodological innovation contributes to the advancement of research practices within the academic realm.

4. Interdisciplinary Collaboration: This research, which spans technology, customer behaviour, and organisational culture, is multidisciplinary, which makes it conducive to interdisciplinary collaboration and information sharing. The potential for holistic understanding and cross-disciplinary interactions nurtures an environment where scholars from various fields can come together, fostering collaboration that transcends traditional academic boundaries and enriching the overall academic discourse.