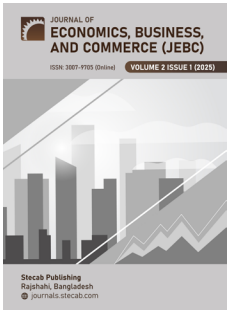

Journal of Economics, Business, and Commerce (JEBC)

ISSN: 3007-9705 (Online)

Volume 2 Issue 1, (2025)

https://doi.org/10.69739/jebc.v2i1.392

https://journals.stecab.com/jebc

Published by
Stecab Publishing

Research Article

Investigating the Integration of ICTs and Adoption in Business Management: A Study of Insurance Sectors in Zambia

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About Article

Article History

Submission: January 15, 2025
Acceptance : March 19, 2025
Publication : March 26, 2025

Keywords

E-Commerce, Information and Communication Technology, Insurance, Predictive Analytic, Risk Management

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ABSTRACT

This study focused on the integration of ICTS and adaptation in business management of Zambia insurance industry. The main objectives were to: investigate the effectiveness of ICT integration in data mining and enhancing evidence based on decision making in the insurance sector; assess the effectiveness of ICT integration in facilitating E-commerce services and improved marketing strategies and investigate the effectiveness of ICT integration system in predictive analytic for risk management. The study employed the interpretive research paradigm. The instruments for data collection included the questionnaires and in-depth interview schedules. The study found that the ICT integration in data mining for enhancing evidence-based decision-making in the insurance sector was effective because it enabled low-cost network establishment in the mining industry, led to better customer service and cost reduction, assisted businesses in identifying vulnerabilities, improved operational efficiency, helped companies make data-driven decisions and new product designs and developments. The study also found that ICT integration in facilitating e-commerce services and improving marketing strategies in the insurance sector was effective because it was utilized in online commerce for data interchange, promotion, e-mail, conversation and consumer counseling. Further, ICT transformed how businesses operate and interact with consumers. ICT was also used for information exchange, media promotion, electronic mail, mailing lists, dialogue, discussions, and consulting with consumers online. In addition, ICT enabled businesses to create targeted advertising campaigns on social media platforms, allowing them to reach specific audiences based on their demographics, interests, and behaviors. Lastly, the study unveiled that the integration of ICT systems in predictive analytic for risk management in the insurance sector was effective because it improved customer experiences, relations and management, better business insight, optimized, cost-saving operations, profitability, growth and increased productivity. Based on the study finding, to enhance the effectiveness of ICT integration in the insurance sector, the study recommends that insurance companies to invest in ICT infrastructure, skills development and training, regulatory reform, customer education and engagement, collaboration and knowledge sharing, continuous monitoring and evaluation, partnerships with technology providers, adoption of data analytic and predictive modeling in insurance companies.

Citation Style:

Kasalu, P., & Kabubi, M. (2025). Investigating the Integration of ICTs and Adoption in Business Management: A Study of Insurance Sectors in Zambia. *Journal of Economics, Business, and Commerce, 2*(1), 38-46. https://doi.org/10.69739/jebc.v2i1.392

1. INTRODUCTION

1.1. Background

Technological advancements play a vital role in driving economic development and improving individual welfare. According to Liddell (1980), technology encompasses tools, machinery, and processes used by humans. In the business context, Quinn (2013) defines ICT as the study and application of computer-based information systems to improve business operations. ICT tools such as intranet, extranet, mobile apps, e-commerce websites, and cloud technologies are now essential for business success, enhancing productivity and enabling businesses to manage data efficiently.

Dezdar and Ainin (2011a) highlight that ICT has rapidly become a fundamental element of modern society, with many countries considering ICT skills as core educational competencies, alongside traditional literacy and numeracy. The World Bank reports that increased internet connectivity has contributed to economic growth, while ICT's applications have proven to be cost-effective across various sectors.

The growing volume of data in businesses necessitates ICT solutions for data collection, storage, and analysis (Berzal, 2013). These tools have helped businesses optimize operations, from inventory management to customer relationship management. Baruah (2012) and Abdullahi (2013) further emphasize that ICT systems enable businesses to reduce costs, increase efficiency, and enhance competitiveness.

ICT's influence extends beyond large corporations to small businesses, improving their profitability and efficiency by streamlining processes, enabling innovation, and expanding market reach (Aralu, 2015). Additionally, ICT contributes to economic growth by creating job opportunities, facilitating global market access, and enhancing the efficiency of public services.

Globally, innovations in ICT such as mobile solutions, cloud computing, and improved client segmentation have transformed business operations (IT Business Edge, 2016). However, in Zambia, the adoption of ICT in the insurance industry lags behind global trends, facing challenges such as low ICT penetration, infrastructural and attitudinal barriers, and a lack of skilled personnel (Mutale, 2021; Mumbi & Mupeta, 2019; Chizwina & Moyo, 2020; Tembo, 2022; Banda, 2018; Phiri & Banda, 2017).

This study aims to investigate the integration of ICT in the Zambian insurance sector, assess the challenges hindering effective implementation, and explore strategies for overcoming these barriers to enhance business management and risk management capabilities through ICTs.

1.2. Statement of the problem

The rapid growth of Information and Communication Technology (ICT) has significantly transformed industries worldwide, including the insurance sector, enhancing operational efficiency, customer service, and competitive advantage. In advanced economies, insurance companies leverage ICT to streamline operations and innovate through Insurtech. However, in Zambia, the adoption of ICT in the insurance industry lags behind global trends. Despite recognizing its potential benefits, the sector faces major challenges, including inadequate infrastructure, low digital literacy, regulatory barriers, unreliable internet connectivity, and a shortage of skilled staff. Studies by (Mutale, 2021) and (Tembo, 2022) highlight these issues, with further research by Mumbi and Mupeta (2019) noting the impact of inconsistent power supply and limited broadband access. Additionally, organizational resistance to change and customer scepticism regarding data privacy and security hinder ICT adoption. These barriers create a significant knowledge gap regarding the effectiveness of ICT integration in the Zambian insurance industry. This study aims to address this gap by evaluating the extent of ICT adoption, identifying the challenges faced, and exploring the potential benefits of successful ICT integration in the industry. The findings will help inform strategies to enhance the use of ICT in business management within Zambia's insurance sector.

1.3. General objectives

The general objective of this study is to investigate the integration of Information and Communication Technology (ICT) and its adoption in the business management practices within the Zambian insurance industry. The study aims to explore how ICT tools, systems, and innovations are being incorporated into business operations, decision-making processes, customer service, and overall management in the insurance sector. It also seeks to understand the challenges and opportunities associated with ICT adoption in enhancing efficiency, competitiveness, and service delivery in the Zambian insurance market.

1.4. Research questions

i. How effective is ICT integration in data mining for enhancing evidence-based decision-making in the insurance sector?

ii. How effective is ICT integration in facilitating e-commerce services and improving marketing strategies in the insurance sector?

iii. How effective is the integration of ICT systems in predictive analytic for risk management in the insurance sector?

1.5. Theoretical framework

This study is guided by two primary theoretical models: the Diffusion of Innovation (DOI) Theory and the Technology-Organization-Environment (TOE) Framework. The Diffusion of Innovation (DOI) Theory, developed by Everett Rogers in 1962, explains how new technologies spread within a society or organization. It identifies five stages of adoption: knowledge, persuasion, decision, implementation, and confirmation. In the context of ICT adoption in the Zambian insurance industry, this framework helps understand how stakeholders become aware of, evaluate, and eventually implement ICT innovations. The DOI theory also categorizes adopters into five groups: innovators, early adopters, early majority, late majority, and laggards, which helps identify key players in the adoption process. Technology-Organization-Environment (TOE) Framework, developed by Tornatzky and Fleischer in 1990, provides a comprehensive model for understanding the factors that influence the adoption of technological innovations. It highlights three key dimensions:

i. Technological Context, which assesses the available ICT solutions and their compatibility with the organization.

ii. Organizational Context, which involves factors such as organizational size, structure, culture, and resources, is critical for ICT adoption.

iii. Environmental Context, which examines external factors like industry dynamics, regulatory policies, and market pressures that shape technology adoption. Combining the DOI theory and the TOE framework offers a multi-dimensional approach to understanding the factors that facilitate or hinder ICT adoption in Zambia's insurance industry, providing insights into both the adoption process and the contextual influences at play. This integrated approach allows for a deeper understanding of how ICT can enhance business performance and competitiveness in the sector.

2. LITERATURE REVIEW

Globally, ICT integration is recognized as a critical driver of organizational success and digital transformation. Barlow and Graham (1999) highlight its significance in enabling businesses to adapt to rapidly evolving technological landscapes. Modern organizations prioritize ICT strategies to automate processes, enhance customer experiences, and improve adaptability. A study by Accenture further confirms that organizations focusing on digital transformation report higher success rates. However, the extent to which these benefits apply in Zambia remains unclear. They emphasize ICT's role in enhancing operational efficiency within the insurance sector. Technologies like Enterprise Resource Planning (ERP) systems streamline coordination across departments, reduce manual errors, and improve overall agility, leading to cost savings. ICT also boosts productivity by automating repetitive tasks, allowing employees to focus on value-adding activities. Additionally, promoting IT literacy among staff facilitates effective collaboration and efficient information sharing. Nonetheless, whether these advantages are realized in Zambia's insurance sector warrants further investigation.

Quinn (2013) defines ICT as the use of digital technologies to process, store, and exchange information, combining hardware, software, and communication tools across sectors like business, education, and healthcare. Abdullahi (2013) expands this definition by linking ICT to the management of computer-based systems for business success. ICT is now a cornerstone of modern society, fostering economic growth and efficiency, particularly through high-speed internet connections and innovative applications in core sectors.

Key ICT tools identified includes Intranet: Private networks for internal communication among employees. Extranet: Extends intranet access to external stakeholders, such as suppliers. Websites: Serve as digital storefronts for communication and feedback. E-commerce websites: Facilitate online buying and selling of goods. Software robots: Examples like Chabot's streamline virtual interactions and support customer service. These technologies are crucial in improving operational efficiency, facilitating communication, and driving strategic business growth.

E-commerce, defined as the buying and selling of goods via the internet, has transformed the way businesses operate, particularly through m-commerce, which facilitates transactions on mobile devices. It encompasses electronic processing and transmission of data, enabling seamless business transactions, information sharing, and relationship management through telecommunications networks. E-commerce offers customers convenience, a broader product selection, and the ability to transact from home. Businesses benefit by accessing new markets, reducing inventory and utility costs, and streamlining operations. However, they face challenges such as website management expenses and supply chain setup costs. Karakaya and Stahl (1991) highlighted that proprietary technology provides a competitive edge in e-commerce, with firms investing in research and development to enhance innovation. Conversely, Razi (2004), Yarn (2004) and Siddiqui (2004) observed that insufficient funding led to the failure of many e-commerce firms. Despite its rapid growth, many e-commerce businesses remain in the investment phase, struggling to achieve profitability while focusing on brand building. E-commerce also increases price competition by reducing search costs, allowing customers to compare prices easily (Bakos, 1998). Furthermore, research by Restrict and Corner (2010) found that ICT and e-commerce compel businesses to adopt innovative strategies to attract and retain customers, restructure operations, and deliver products and services more effectively. Although previous studies examined the general role of ICT in business, the current study emphasizes its specific impact on business management in e-commerce.

3. METHODOLOGY

Methodology outlines the methodology employed in the study, addressing key aspects such as research design, target population, sampling design, data collection, analysis, limitations, ethical considerations, and a chapter summary. Research Design. The study adopted a descriptive research design combining quantitative and qualitative approaches. Kombo (2006) defines research design as the structure of research that integrates all elements of a study to address its central questions, while Orodho (2003) describes it as a plan for generating answers to research problems. The descriptive design, grounded in constructivism, emphasizes the subjective creation of meaning while acknowledging some objectivity (Stake, 1995; Yin, 2011). A case study approach was chosen to gain a deeper understanding of ICT integration and adoption in the Zambian insurance industry. This design enabled the in-depth exploration of factors influencing ICT adoption, highlighting unique challenges and opportunities within this context. Its flexibility allowed the use of multiple data collection methods, including interviews and surveys, providing comprehensive data from varied perspectives. Justification and Contributions. The case study approach aligned well with the research questions, which focused on ICT integration in Zambian business management.

4. RESULTS AND DISCUSSION

The findings are presented as per research question. The data in this chapter is presented using tables, charts and descriptions of what is contained in tables and charts as collected from the participants.

4.1. Presentations of research findings

The data in this chapter is presented using tables, charts and descriptions of what is contained in tables and charts as collected from the participants. The information sought includes gender, age group and education level of the participants. All these variables helped to sort out the effectiveness of integration of ICT and adoption in the business management of Zambia insurance industry.

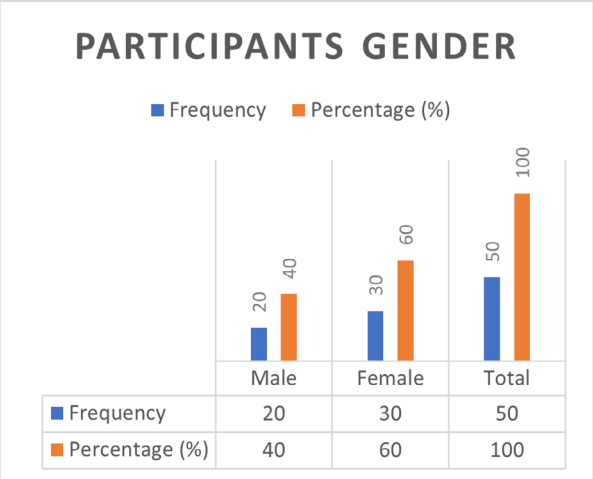

Figure 1. Participant's gender

From the table above, the 50 Participants who participated in the study, 30 (60%) of the respondents were females and 20 (40%) were males. This implies that in terms of gender, the number of female participants in the research was more than the number of the male participants.

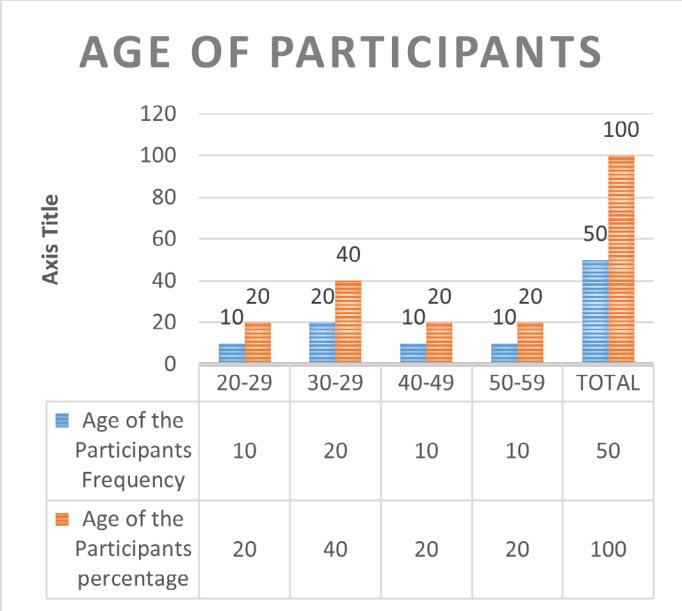

Figure 2. Participant's age

The table indicates that most participants, 20 out of 50 (40%), were in the 30-39 age group. This suggests that the most prominent age group in the study was composed of individuals who are typically in the early stages of their careers or personal lives. The 20-29, 40-49, and 50-59 age groups each accounted for 10 participants (20%), highlighting a more evenly distributed sample across the other age categories. The fact that a substantial portion of the participants were in the 30-39 age range is important because it represents a youthful demographic with a balanced combination of energy, experience, and insight, making their input valuable for the study's findings. Their age also implies they are likely to have relevant perspectives, potentially influencing the outcomes of the study in a meaningful way.

Table 1. Position of the participants

Years	Frequency	Percentage (%)
0-5	10	20
6-10	20	40
11-15	15	20
16-20	5	10
Total	50	100

The findings presented in table above indicate that majority, 20 (40%) participants who participated in the research worked between 6 and 10 years, 15 (30%) of the participants worked between 11 and 15 years, 10 (20%) respondents worked between 0 and 5 years and 5 (10%) worked between 16 and 20 years. This implies that most of the participants, who participated in the research worked between 6 and 10 years, experienced enough to inform the outcome of the study.

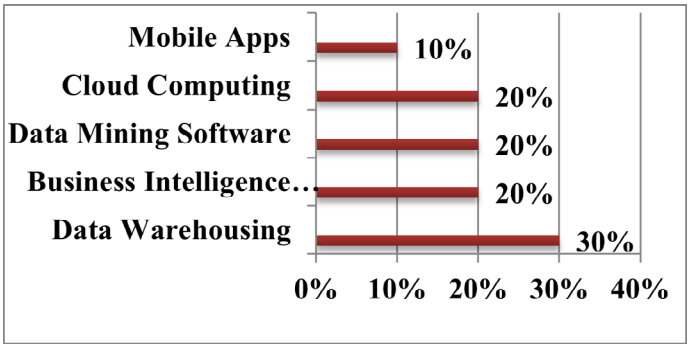

Figure 3. Specific ICTs tools used for data mining

The findings from the data above highlight various ICT tools employed in data mining, which enhance evidence-based decision-making in the insurance sector. The specific tools identified included data warehousing, business intelligence (BI) tools, data mining software (e.g., R, Python), cloud computing, and mobile apps.

According to the data, most participants (15, representing 30% of the total) indicated that data warehousing is one of the key tools used for data mining. Following closely were Business Intelligence (BI) tools, data mining software, and cloud computing, each cited by 10 participants (20%). Finally, mobile apps were mentioned by 5 participants (10%) as one of the tools for data mining.

These findings provide evidence that various ICT tools, such as data warehousing, BI tools, and data mining software, play an

important role in data mining activities that support evidence-based decision-making in the insurance sector. By utilizing these technologies, organizations can improve the accuracy and efficiency of their data analysis, leading to better-informed decisions and outcomes.

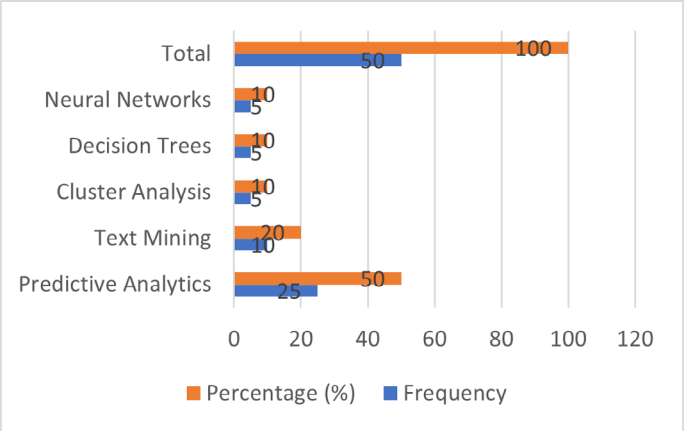

Figure 4. Specific data mining techniques

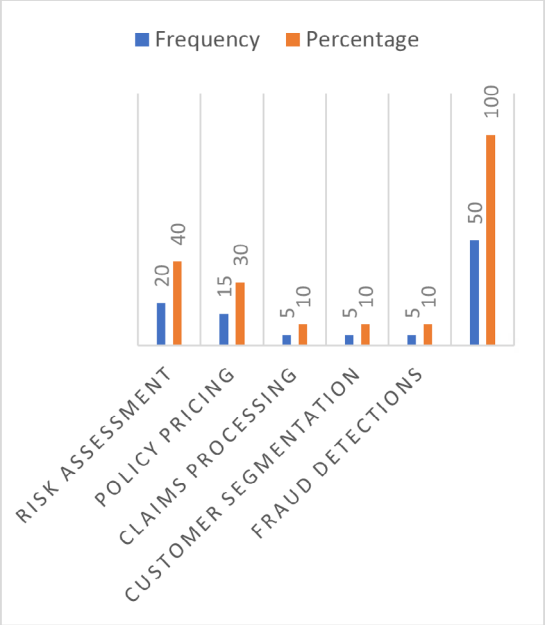

Figure 5. Area's data mining help in decision-making

The findings reveal that several specific ICT tools are employed in data mining to improve decision-making in the insurance industry. Most participants (30%) highlighted data warehousing as a key tool, emphasizing its role in storing and organizing vast amounts of data for efficient mining. Business Intelligence (BI) tools, data mining software (e.g., R, Python), and cloud computing were each cited by 20% of participants, indicating their widespread use in processing and analysing complex datasets. Mobile apps were less frequently mentioned, with only 10% of participants citing them as a tool.

These ICT tools are instrumental in integrating advanced data mining techniques into the insurance sector, enhancing the organization's ability to make evidence-based decisions. Data warehousing and cloud computing facilitate the storage and scalability of data, while BI tools and data mining software like Python provide the analytical power needed to uncover insights. By leveraging these technologies, insurance companies can enhance their decision-making processes, ultimately improving operational efficiency and customer service.

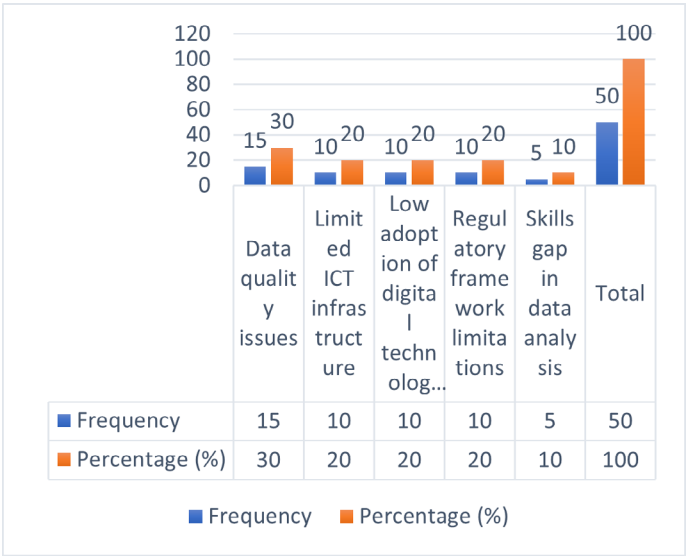

Figure 6. Area's data mining help in decision-making

4.2. Specific areas data mining help in decision making in your company

Participants were also asked to describe some of the specific areas data mining help in decision making in their company. The views of participants on the specific areas data mining help in decision making were captured in table below.

These identifies key areas where data mining supports decision-making, including risk assessment, policy pricing, claims processing, customer segmentation, and fraud detection. The majority (40%) of participants highlighted risk assessment as the primary area, followed by 30% who cited policy pricing. Claims processing, customer segmentation, and fraud detection were each mentioned by 10% of participants. These areas demonstrate how ICT integration in data mining enhances decision-making effectiveness in the insurance sector.

The findings highlight several key areas where data mining significantly contributes to decision-making in the insurance industry, such as risk assessment, policy pricing, claims processing, customer segmentation, and fraud detection. Most participants (40%) emphasized that risk assessment is a critical area where data mining aids decision-making, suggesting its importance in evaluating potential risks and making informed choices. This was followed by 30% of participants who cited policy pricing, indicating that data mining helps determine fair and competitive pricing for insurance policies.

A smaller percentage of participants (10%) noted that data mining is also useful in claims processing, customer segmentation, and fraud detection. While these areas were mentioned less frequently, they remain essential in ensuring efficient and secure insurance operations.

Overall, these findings demonstrate how data mining in these specific areas enhances the integration of ICT tools, making decision-making more accurate and effective in the insurance industry. By leveraging data mining, insurance companies can improve risk assessments, set competitive prices, streamline claims processing, better understand customer needs, and detect fraudulent activities. This integration ultimately leads to more informed, efficient, and reliable decision-making within the sector.

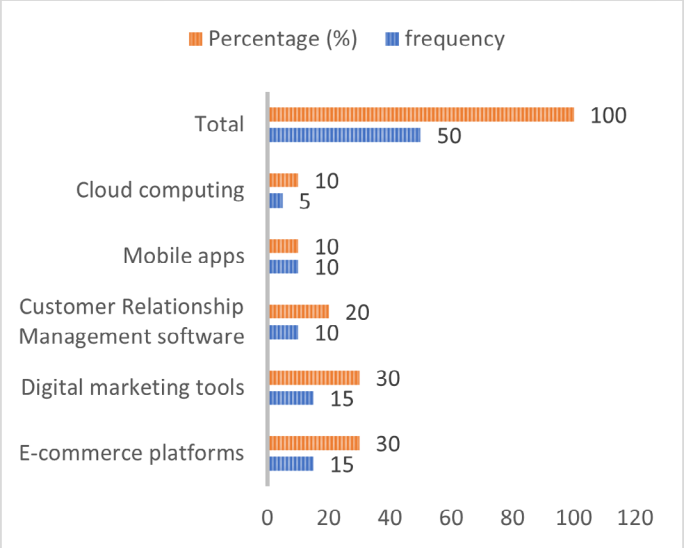

Figure 7. Specific ICTs tools used for e-commerce

This highlights key ICT tools utilized in e-commerce, including e-commerce platforms and digital marketing tools (30%), Customer Relationship Management (CRM) software (20%), and mobile apps and cloud computing (20%). These tools play a vital role in integrating ICT to facilitate e-commerce services and enhance marketing strategies. Participants were also asked to identify some of the challenges they faced in in e commerce. The views of participants on the challenges they faced in e commerce were captured in table below.

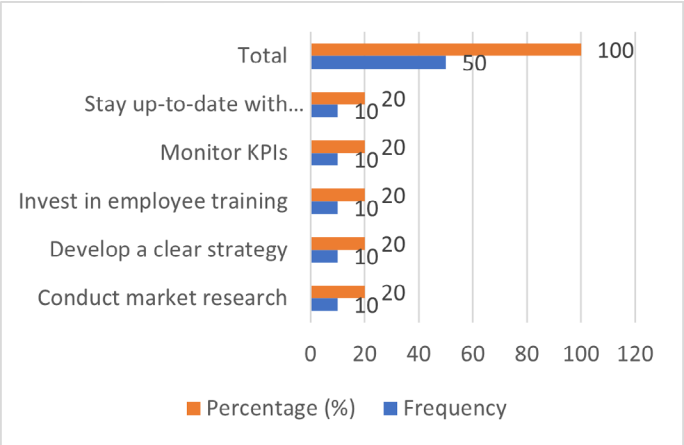

Figure 8. Practices followed in e-commerce and technology application

The practices followed in e-commerce and technology application, as shown in Table 4.8, include conducting market research, developing a clear strategy, investing in employee training, monitoring KPIs, and staying up to date with industry trends. Each of these practices was followed by 20% of participants. These practices contributed to the effective integration of ICT in e-commerce services and the improvement of marketing strategies.

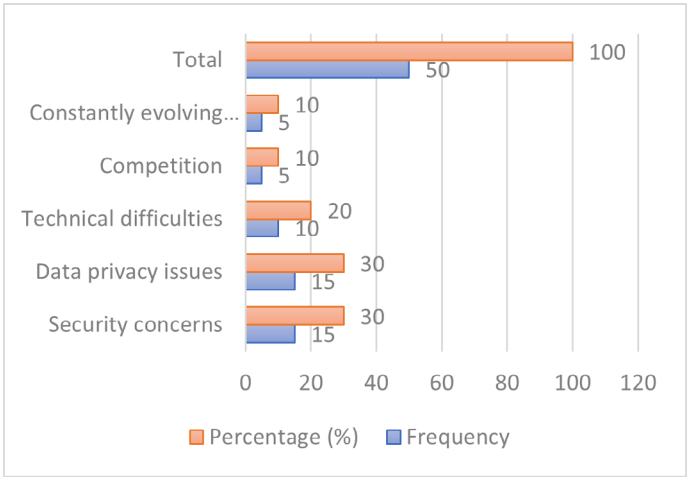

Figure 9. Challenges of e-commerce

The study revealed both the challenges and effectiveness of ICT integration in e-commerce, particularly in the insurance sector. Key challenges identified included security concerns, data privacy issues (30% of participants), technical difficulties (20%), competition, and constantly evolving technology (10%). These challenges hindered the effective integration of ICT in e-commerce.

Despite these obstacles, the integration of ICT was found to be effective in enhancing e-commerce services and marketing strategies. Benefits included improved online presence, streamlined transactions, targeted social media advertising, enhanced customer experience, and better consumer Interactions. Specific tools used included e-commerce platforms, digital marketing tools, CRM software, mobile apps, and cloud computing.

Effective practices in e-commerce included market research, strategy development, employee training, KPI monitoring, and staying updated on industry trends. Addressing the identified challenges is crucial for maximizing the effectiveness of ICT integration in e-commerce.

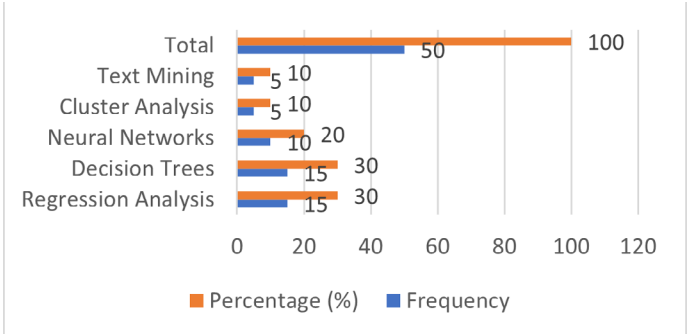

Figure 10. Risk predictive analytics tools used in insurance companies

Some of the risk predictive analytics tools used in insurance companies were regression analysis, decision trees, neural networks, cluster analysis and text mining. This was represented as 15 (30%) participants for regression analysis, 15 (30%) for decision trees, 10 (20%) for neural networks, 5 (10%) for cluster analysis and 5 (10%) for text mining.

Based on the findings above, some of the risk predictive analytics tools used in insurance companies were regression analysis, decision trees, neural networks, cluster analysis and text mining. In this way, the risk predictive analytics tools made the integration of ICT systems in predictive analytic for risk management in the insurance sector effective

4.3. Risk predictive analytics tools used in insurance companies

Risk predictive analytics tools commonly used in insurance companies include regression analysis (30%), decision trees (30%), neural networks (20%), cluster analysis (10%), and text mining (10%). These tools facilitate the effective integration of ICT systems for predictive risk management in the insurance sector.

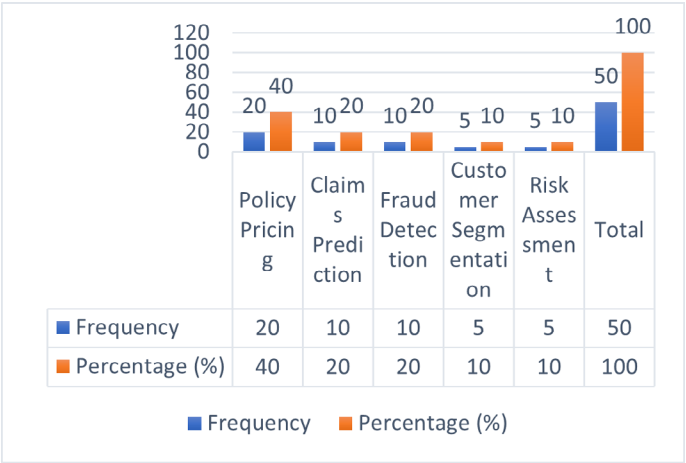

Figure 11. Application of risk predictive analytics to management

Risk predictive analytics was applied to management in policy pricing, claims prediction, fraud detection, customer segmentation and risk assessment. This was represented as 20 (40%) participants for policy pricing, 10 (20%) for claims prediction and fraud detection, 5 (10%) for customer segmentation and risk assessment, respectively. Based on the findings above, it was clear that risk predictive analytics was applied to management in policy pricing, claims prediction, fraud detection, customer segmentation and risk assessment. In this way, the integration of ICT systems in predictive analytic for risk management in the insurance sector was effective.

The integration of ICT systems in risk management for the insurance sector faces several limitations: limited data quality (50%), insufficient ICT infrastructure (20%), low adoption of digital technologies, regulatory framework limitations, and skills gaps in data analysis (each 10%). These challenges hinder the effectiveness of ICT integration in predictive analytics for risk management and must be addressed to improve outcomes in the insurance sector.

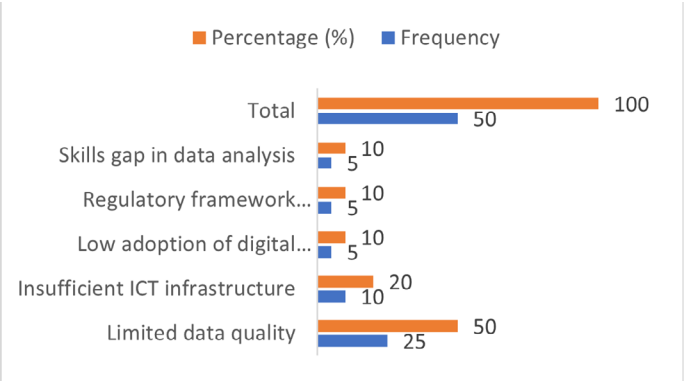

Figure 12. Limitations of ICTs integration on risk management

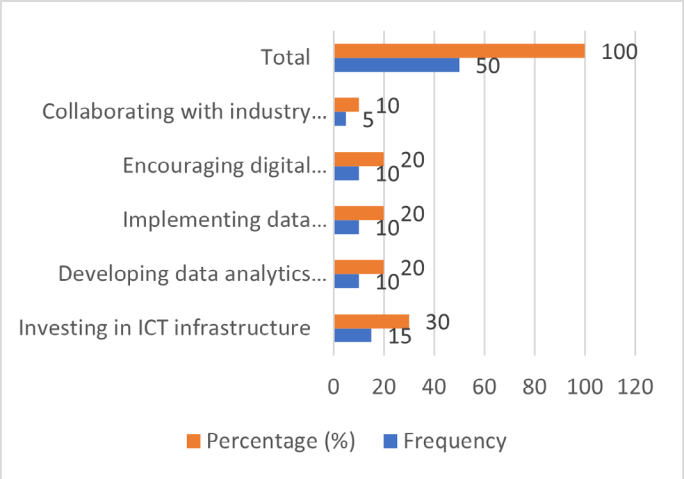

Figure 13. Suggestions to enhance ICTs integration in risk Management

The study highlighted the effectiveness of integrating ICT systems in predictive analytics for risk management in the insurance sector. Benefits included enhanced risk assessment, improved policy pricing, reduced claims frequency and severity, increased customer retention, competitive advantage, and increased productivity. Key tools used were regression analysis, decision trees, neural networks, cluster analysis, and text mining, applied in policy pricing, claims prediction, fraud detection, customer segmentation, and risk assessment.

However, limitations such as poor data quality, insufficient ICT infrastructure, and low adoption of digital technologies, regulatory constraints, and skills gaps hindered full effectiveness. To address these challenges, participants suggested investing in ICT infrastructure, developing data analytics skills, implementing data governance frameworks, encouraging digital transformation, and collaborating with industry stakeholders. These measures are essential for overcoming limitations and maximizing the impact of ICT systems in predictive analytics for risk management.

4.4. Discution of the findings

Data Mining and Decision-Making: ICT integration in data mining improved decision-making by enhancing customer segmentation, fraud detection, risk assessment, and operational efficiency. Tools like data warehousing, business intelligence software, and cloud computing allowed real-time analysis,

reducing costs and improving customer service. However, data quality issues were a challenge.

E-Commerce Services and Marketing Strategies: ICT transformed marketing and e-commerce in the insurance sector. Digital marketing platforms, Customer Relationship Management (CRM) software, and mobile apps improved customer engagement, personalized services, and operational efficiency. Benefits included streamlined transactions, targeted advertising, and better customer experiences. However, issues such as data privacy concerns, technical difficulties, and a lack of digital literacy remain.

Predictive Analytics for Risk Management: ICT systems enhanced risk assessment, policy pricing, claims management, and customer retention through tools like regression analysis, neural networks, and decision trees. These tools provided better insights into risk patterns and operational strategies. However, challenges like inadequate ICT infrastructure and regulatory limitations were noted.

Overall, ICT integration has significantly benefited the insurance sector but faces several barriers that need addressing for full potential realization.

5. CONCLUSION

The study found that ICT integration in Zambia's insurance sector is highly effective in enhancing business management. Key findings include:

Data Mining for Decision-Making: ICT supports evidence-based decision-making, improving operational efficiency, reducing costs, and enhancing customer service. Tools like data warehousing and business intelligence software enable real-time data analysis and product development.

E-Commerce and Marketing Strategies: ICT has transformed business operations by enabling efficient e-commerce, targeted marketing campaigns, and better customer engagement through online interactions, media promotions, and personalized advertising.

Predictive Analytics for Risk Management: ICT enhances risk assessment, policy pricing, fraud detection, and customer segmentation using tools like regression analysis and neural networks, which optimize operations, reduce costs, and improve profitability. Overall, the study highlights ICT's potential to foster innovation, improve competitiveness, and create value in the insurance sector, providing actionable insights for policymakers and industry stakeholders.

ACKNOWLEDGEMENT

I would like to express my gratitude to everyone who contributed to the successful completion of this research. First, I extend my deepest appreciation to my supervisor for their invaluable guidance, insightful feedback, and support throughout the research process. I am also grateful to the management and staff of the insurance companies in Zambia who participated in this study.

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