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Allam Hamdan *Editor*

Achieving Sustainable Business Through AI, Technology Education and Computer Science

Volume 3: Business Sustainability and Artificial Intelligence Applications

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Editor

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Foreword

Firstly, I would like to thank the editor of this book, Prof. Allam Hamdan, for inviting me to write the Foreword for this valuable book, which contains a collection of carefully selected chapters. This book covers topics on teaching technology and business sustainability. It explores ways of achieving sustainable business through artificial intelligence, business analytics, technology education and computer science. The book provides a platform for researchers, practitioners, scholars and industry experts to exchange ideas, present research findings, discuss emerging trends and explore the latest developments in the fields of business, technology, law, economics and engineering. This volume discusses through 65 chapters some of them are carefully selected from ICBT'Amman2024 with various tracks on innovation and implementation of emerging technologies in business; entrepreneurship, start-ups and business success; digital transformation in marketing and e-commerce; sustainable finance, innovation and business in uncertain situations; supply chain management and emerging technologies.

In conclusion, I hope that this book will serve as a solid foundation for those interested, including researchers, academics and industry experts in the field of business sustainability and artificial intelligence applications.

July 2024

Prof. Dr. Ra'ed Masa'deh
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Preface

It is with great pleasure that I present my editing book titled *Achieving Sustainable Business Through AI, Technology Education and Computer Science*. This third volume, titled *Business Sustainability and Artificial Intelligence Applications* comprises 65 chapters divided into the following parts:

Part One. Artificial Intelligence Applications
Part Two. Technological Innovation Entrepreneurship and Sustainability
Part Three. Digital Marketing, Technology and Social Media with Industry 4.0
Part Four. Digital Finance, Accounting and Performance

All the chapters have been compiled by researchers and research groups, some of which were presented in scientific forums, while others were developed by esteemed professors and graduate students based on their high-quality and exceptional theses. Furthermore, it is worth mentioning that all these chapters have undergone thorough evaluation by the book's editor and at least two reviewers.

I express my heartfelt gratitude to all the contributors who have dedicated their time, expertise and knowledge to make this volume a valuable resource.

I hope that this book serves as a valuable reference for researchers, academicians, professionals and students who are interested in exploring the business sustainability and artificial intelligence applications.

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Contents

The Impact of Artificial Intelligence on Customer Relationship Management in Insurance Companies in Palestine

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Abstract The research highlights the impact of AI on CRM in insurance companies in Palestine, as it shows how advanced technology can improve the efficiency and effectiveness of services provided to customers. The research examines the use of artificial intelligence systems to analyze big customer data to provide personalized experiences and improve customer interaction. It also examines how these technologies can be used to provide accurate risk estimates and customize offers according to the needs of each customer. In addition, the research discusses the challenges facing the application of these technologies in the Palestinian market, such as regulatory constraints and the need to train employees to use AI tools efficiently. Out of the 220 responses received from the online survey, 200 were deemed valid and included in the analysis. The results indicated that artificial intelligence is positively related to the dimensions of customer relationship management (effective communications, level of investment in the relationship, customer satisfaction, and customer loyalty), and this accepts the four supported hypotheses. The study recommends for increased investment in AI technologies to better personalize customer services and enhance interaction quality through precise data analysis. It also emphasizes the need for developing analytical skills for improved fraud detection and risk assessment, alongside training employees for ethical AI use and improving interdepartmental communication. This finding gives policymakers opportunities to evaluate the balance between different related parties as well as develop between technical and customer service departments that ensure sustainability while optimizing the benefits of related parties and responsible use of AI.

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Keywords Artificial intelligence · Customer relationship management · Insurance companies · Infrastructure system

1 Introduction

AI, originating in the 1940s and advancing with technology, is now key to business and innovation, with significant future potential, particularly in marketing [1]. Amidst advancing technology and increasing customer independence, companies must innovate in targeting and engaging customers, focusing on communication strategies that attract, understand, and retain them as long-term partners [2]. Facing global competition, institutions must adapt quickly using smart technologies. AI, with its predictive abilities, helps turn challenges into opportunities, fostering growth and sustainability [3]. With the development of AI, systems are able to analyze big data to enhance customer insight, allowing insurance companies to provide personalized services and improve customer experience [1]. The widespread use of big data has emphasized the importance of CRM from the frontend perspective [2]. AI-driven systems are revolutionizing CRM by analyzing extensive data, predicting behaviors, and enhancing institutional adaptability and competitiveness [3].

Moreover, AI is transforming CRM in the insurance sector, providing innovative solutions to understand customers and provide them with better services [4]. This transformation is particularly impactful in regions such as Palestine, where it can significantly enhance customer experience and operational efficiency amid difficult circumstances [5]. AI is used in marketing and communication to enhance customer engagement, satisfaction, and loyalty, and to acquire and retain customers efficiently through tools like chatbots, automated responses, and data analysis [6, 7]. AI enhances CRM and marketing by improving data management and analysis, enabling targeted approaches to valuable customers [8, 9].

The study explores the transformative role of AI in CRM. It delves into how AI enhances customer interactions and experience by making operations more efficient, analyzing big data for insights into customer behaviors and preferences, and thus enabling personalized services [10]. Furthermore, it aims to identify challenges in AI integration into CRM systems and propose solutions for overcoming these obstacles, highlighting the potential of AI to optimize CRM practices [11].

AI is revolutionizing the insurance sector in Palestine by automating processes, enhancing risk assessment through big data analysis, and customizing customer offers. Insurance companies are also using AI to create decision support systems and to refine customer service with chatbots and virtual assistants, leading to a more seamless experience. This digital evolution boosts efficiency and competitiveness, allowing these companies to offer innovative services tailored to customers' needs, thereby fostering stronger, lasting relationships.

The research underscores the transformative role of artificial intelligence in revolutionizing customer relationship management by enhancing interactions and improving customer experiences. It emphasizes AI's ability to analyze data swiftly

and accurately, offering personalized services and insights, thereby boosting efficiency and competitiveness for businesses. Furthermore, it delves into the ethical and practical challenges of AI application, offering guidance for responsible and effective integration into practice and policy.

AI revolutionizes CRM by enabling personalized and efficient services through big data analysis and machine learning. This enhances customer experiences by accurately understanding their needs and enabling swift responses to inquiries, ultimately boosting satisfaction and brand loyalty. Thus, it can be said that AI plays a vital role in improving CRM by providing personalized and superior experiences, which contributes to the success of companies and strengthens their position in the market.

2 Theoretical Aspect, Previous Studies and Developing Hypotheses

The study [4] explores how the integration of AI in CRM and marketing has transformed the business landscape, leading to improved customer loyalty and profitability. It highlights the evolving role of marketing managers, emphasizing the importance of updating skill sets to incorporate technical knowledge alongside traditional marketing expertise. Ultimately, the research emphasizes the significance of embracing AI to enhance marketing performance and offers guidance for successful implementation.

This study [5] examines the impact of AI on CRM in Egyptian private pharmaceutical distribution companies. Based on data collected from 193 managers using a descriptive analytical approach, it identifies a significant correlation between AI usage in customer relationship management and gaining competitive advantage. Recommendations highlight leveraging AI for innovation, addressing implementation challenges, and employing smart technologies for data analysis in decision-making.

This study [7] investigates the impact of AI-powered chatbot marketing efforts (CMEs) on brand-customer relationships. Data from 1072 customers in the USA were analyzed using structural equation modeling. Findings suggest that CMEs influence communication quality, which in turn affects customer-brand relationships and responses. This underscores the importance of AI in enhancing user experiences and guiding CMEs strategy development for relationship building.

This study [6] investigated the influence of artificial intelligence (AI) techniques on customer relationship management within Egyptian telecommunications firms. It sought to evaluate customer benefits from AI technologies and assess companies' success in managing customer relationships. Findings from a quota sample of 300 individuals highlighted positive attitudes towards AI, facilitating cooperation and timely service information. The study concluded that AI applications notably enhance

customer relationship management across diverse dimensions in telecommunications companies.

This study [12] investigates the impact of AI-powered applications and employee service quality on customer satisfaction and loyalty in the Portuguese hotel industry. Both AI and employee service quality influence overall service quality, satisfaction, and loyalty, though certain dimensions have more significant effects. Notably, when both factors are examined together, AI's significance decreases. These findings offer valuable insights for resource allocation in hotels and have financial implications.

This study [7] examines AI advancements, particularly in chatbots for online retailing. Analysis of chatbot patents spanning two decades shows a shift toward natural language-based agents. Efforts focus on improving chatbots' ability to infer from diverse data sources and utilize consumer knowledge for personalized solutions, emphasizing the importance of analytical skills for seamless user interaction.

This study [13] explores the impact of AI integration on customer experience in shopping, using a trust-commitment theoretical framework. Analyzing survey data from 434 customers using AI-enabled services from a beauty brand, the study finds that trust and perceived sacrifice mediate the effects of AI on customer experience, while relationship commitment directly influences it. The findings provide practical insights for retailers adopting AI in customer services.

2.1 Customer Relationship Management (CRM)

CRM is described as a strategy focusing on balancing organizational and customer needs to enhance customer value, satisfaction, trust, and loyalty. This approach aims at retaining customers, extending relationships, and maximizing profitability [14]. CRM aims to strengthen customer relationships, boost loyalty and satisfaction through personalized experiences, and improve communication, thereby increasing revenue and reducing costs [15]. CRM focuses on customer value and organizational excellence to boost client awareness, performance, and profitability through strategic leadership and culture [16, 17].

The importance of CRM is to focus on building strong relationships with customers, enhancing satisfaction, loyalty, sales and cost efficiency, while enhancing word-of-mouth promotion and improving ROI and market positioning through targeted marketing and sales efforts [12]. CRM integrates with customer experience and journey management by using data to foster lasting relationships and consistently enhance customer experience, focusing on touchpoint improvement [18].

3 Dimensions of CRM

The dimensions of CRM include a wide range of aspects that contribute to building and maintaining strong relationships with customers, which are:

1. Effective communications: This includes communication via email, text messages, social media sites, and more [13].
2. Level of investment in the relationship: This includes developing loyalty programs, providing after-sales services, and providing high-quality technical support [19].
3. Customer satisfaction: It measures the extent of customer satisfaction with the products or services provided. Customer satisfaction depends on several factors, including product quality, technical support, ease of use, and the extent to which the product or service meets customer needs and expectations [20].
4. Customer loyalty: It relates recommending products or services to others, and positive engagement in communities or across social media platforms [21].

3.1 Artificial Intelligence

The advent of the AI era, propelled by swift economic and technological advances, has significantly impacted all life aspects, revolutionizing labor and daily living worldwide [4]. AI refers to systems that simulate human intelligence to perform tasks and improve themselves through data analysis, focusing on cognitive abilities rather than specific forms or functions [10]. AI involves technologies that allow machines to undertake tasks requiring human intelligence, using machine learning, data analysis, natural language processing, and robotics to achieve goals [22].

AI is reshaping processes, improving outcomes, and opening new horizons for innovation and progress [23]. AI revolutionizes the finance sector by enhancing efficiency, decision-making accuracy, and enabling personalized banking services, while also posing challenges in security, privacy, and the need for regulatory oversight.

Artificial Intelligence Technologies:

AI technologies are diverse and include several methods and tools that contribute to the development of smart applications and solutions. Among these technologies [24]: Machine Learning, Deep Learning, Natural Language Processing (NLP), Neural Networks and Expert Systems: Computer programs designed to provide advice or make decisions in specialized fields, relying on a database of knowledge and rules.

AI is revolutionizing CRM within Palestinian insurance companies, significantly improving the interaction between companies and their customers. By analyzing and learning from big data, AI can anticipate customer needs and provide personalized recommendations, contributing to customer satisfaction and loyalty. AI also enables insurance companies to provide automated and efficient customer service via chatbots and virtual assistants, reducing wait times and improving the customer experience. In addition, it helps improve decision-making processes within companies by providing accurate and real-time analytics on product performance and customer preferences. Therefore, artificial intelligence is reshaping the insurance industry in Palestine, pushing companies to adopt innovative, customer-focused strategies and enhance their competitiveness in the market.

3.2 Study Objectives

1. A study to identify the impact of artificial intelligence on customer relationship management for insurance companies in Palestine.
2. Identify the impact of artificial intelligence on effective communication for insurance companies.
3. Knowing the impact of artificial intelligence on the level of investment in the relationship in insurance companies.
4. Knowing the impact of artificial intelligence on customer satisfaction for insurance companies.
5. Knowing the impact of artificial intelligence on customer loyalty to insurance companies.

3.3 Study Problem

In the midst of the technological revolution that humanity is witnessing, many companies have resorted to trying to adapt modern technological applications, especially artificial intelligence tools, and working to employ them to support the communication function based on customer relationship management, as it is believed that this technology can enhance efficiency and improve interaction with customers. However, insurance companies in Palestine face special challenges related to the technological infrastructure, affordability, and technical know-how to effectively integrate AI into their existing systems without negatively impacting the relationship with customers or losing sight of the ethical and legal aspects related to data use. Therefore, here lies the formulation of the study's problem through the main question: "What is the impact of artificial intelligence on customer relationship management in insurance companies in Palestine?".

3.4 Study Hypotheses

H0: There is no statistically significant effect of the impact of artificial intelligence on customer relationship management in insurance companies at the significance level (0.05).

H1: There is a statistically significant effect of the impact of artificial intelligence on effective communications in insurance companies at a significance level of (0.05).

H2: There is a statistically significant effect of the impact of artificial intelligence on the level of investment in the relationship in insurance companies at a significance level (0.05).

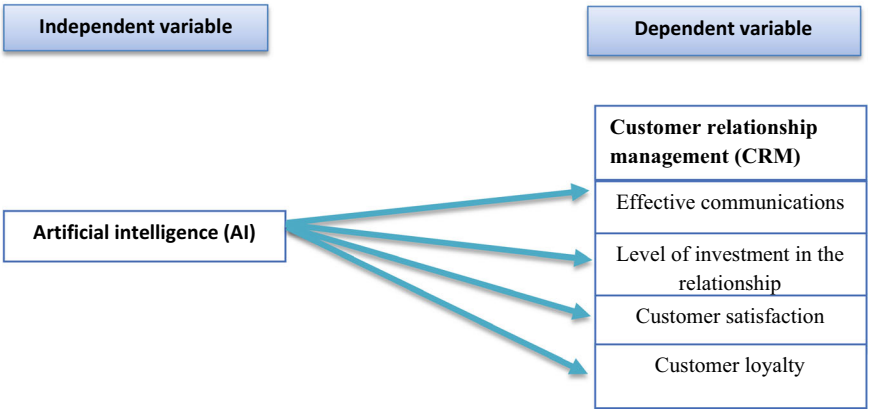

Fig. 1 Study mode

H3: There is a statistically significant effect of the impact of artificial intelligence on customer satisfaction in insurance companies at a significance level of (0.05).

H4: There is a statistically significant effect of the impact of artificial intelligence on customer loyalty in insurance companies at a significance level of (0.05) (Fig. 1).

4 Methodology

The researcher used an appropriate sampling method to collect data from insurance companies in Palestine. They developed a questionnaire designed to evaluate the study variables. This questionnaire used a seven-point Likert scale for its questions, with more details provided in the study appendix, and paragraphs were taken from a previous study [6]. The questionnaire was distributed in Arabic and was converted to English using statistical analysis. Of the 220 responses received via the online survey, 200 were considered valid and were used in the analysis. Sample characteristics are shown in Table 1. Table 1 shows the demographic characteristics of customers, where the percentage of females reached 54%, which is slightly higher than the percentage of males, 46%. As for the ages of clients, 3% are less than 20 years old, 45% are between 20 and 30 years old, 40.5% are between 30 and 40 years old, and 11.5% are older than 40 years old. In addition, 9.5% of the clients hold a high school diploma, 22.5% of them hold a diploma, 55.5% of the clients hold a bachelor's degree, 12% of the clients hold a master's degree, and 0.5% of the employees hold a degree. Ph.D. While the period of dealing with insurance companies was 51.5% less than 3 years, 35% 3–10 years, and 13.5% more than 10 years.

Table 1 Distribution of sample members according to demographic characteristics of employees

Percentage (%)	Frequency	Demographic characteristics
Gender		
46.0	92	Male
54.0	108	Female
Age		
3.0	6	Less than 20 years
45.0	90	20–29 years
40.5	81	30–40 years
11.5	23	More than 40
Educational level		
9.5	19	Secondary school
22.5	45	Diploma
55.5	111	Bachelor's
12.0	24	Master's
0.5	1	Ph.D
Define the area City		
15.0	30	Tulkarm
21.0	42	Qalqilya
48.5	97	Nablus
15.5	31	Jenin
Period of dealing with insurance companies		
51.5	103	Less than 3 years
35.0	70	3–10 years
13.5	27	More than 10 years

5 Results

We used partial least squares (PLS) modeling through Smart-PLS 4 [25] as the statistical method of choice for analyzing both the measurement and the structural model.

5.1 Measurement Model

In evaluating the measurement model, our focus was on assessing loadings, average variance extracted (AVE), and composite reliability (CR). The established benchmarks for this evaluation stipulated that loadings should be more than 0.5, AVE must reach or surpass 0.5, and CR needs to be 0.7 or higher. As indicated in Fig. 2 and Table 2, all AVEs met the minimum requirement of 0.5, with CR values also

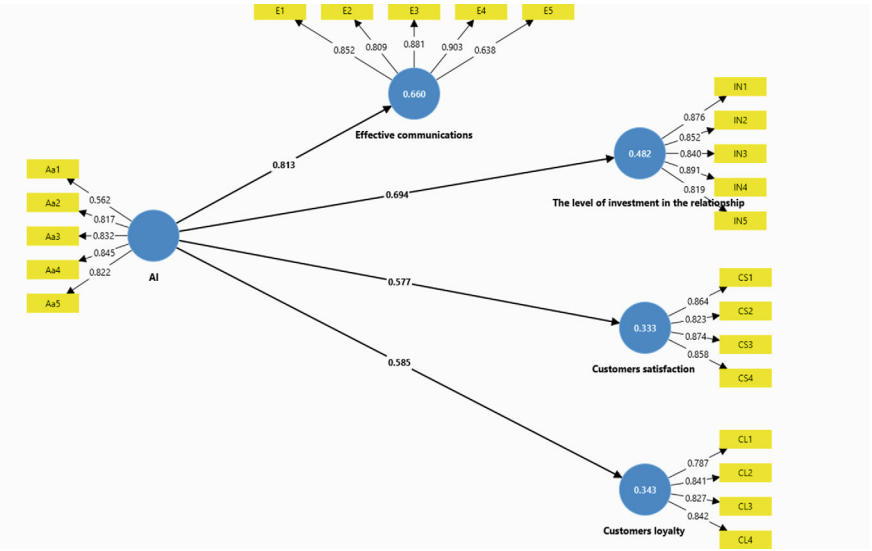

Fig. 2 Loadings of the measurement model

exceeding the 0.7 threshold. Additionally, loadings were considered adequate, all achieving values greater than the 0.5 criterion [24]. As shown in Fig. 2 and Table 2.

The discriminant validity of the constructs was assessed following the approach outlined by Fornell and Larcker. This form of validity gauges how well individual items distinguish between constructs, ensuring they measure separate concepts [26]. This involves analyzing the correlations among measures of potentially overlapping constructs. Saleem et al. [12] highlighted that the average variance that each construct shares with its measures should surpass the variance it shares with other constructs. Table 3 demonstrates this, as the square roots of the AVEs, marked in bold along the diagonal, exceeded the values in their respective rows and columns, confirming that the measures achieved discriminant validity.

5.2 Structural Model

The hypotheses formulated for this research were evaluated using a bootstrapping method with 5000 resamples, in line with the recommendations of Hair Jr et al. [18]. The outcomes, as shown in Table 4, present the path coefficients for the various constructs alongside their significance levels.

The results showed that the four hypotheses have a statistically significant relationship with their respective variables. Table 4 shows that the relationship between AI and effective communication is supported by H1: ($\beta = 0.813$, $p < 0.000$). Next, the relationship between AI and level of investment in the relationship is supported

Table 2 Measurement model

Constructs	Loading	(α)	CR	AVE
AI		**0.836**	**0.886**	**0.613**
Aa1	0.562			
Aa2	0.817			
Aa3	0.832			
Aa4	0.845			
Aa5	0.822			
Effective communications		**0.876**	**0.911**	**0.675**
E1	0.852			
E2	0.809			
E3	0.881			
E4	0.903			
E5	0.638			
Level of investment in the relationship		**0.909**	**0.932**	**0.733**
IN1	0.876			
IN2	0.852			
IN3	0.840			
IN4	0.891			
IN5	0.819			
Customer satisfaction		**0.878**	**0.916**	**0.731**
CS1	0.864			
CS2	0.832			
CS3	0.874			
CS4	0.858			
Customer loyalty		**0.843**	**0.895**	**0.680**
CL1	0.787			
CL2	0.841			
CL3	0.827			
CL4	0.842			

Bold represent the best statistically significant results

by H2: ($\beta = 0.694$, $p < 0.000$). H3 also showed that AI and customer satisfaction are positively related ($\beta = 0.577$, $p < 0.000$). Finally, the results of H4, where the relationship between AI and customer loyalty was supported by a positive relationship with ($\beta = 0.585$, $p < 0.000$). Therefore, all hypotheses are important. Furthermore, the effect size was also measured by R2. The R2 rate for effective communications was 0.660. Also, the R2 values for the level of investment in the relationship, customer satisfaction, and customer loyalty were found to be 0.482, 0.333, and 0.343, respectively, which is acceptable results with previous studies [5, 6, 13].

Table 3 Discriminant validity using Fornell-Larcker

Level of investment in the relationship	Effective communications	Customer satisfaction	Customer loyalty	AI	
				0.783	AI
			0.824	0.585	Customer loyalty
		0.855	0.673	0.577	Customer satisfaction
	0.822	0.525	0.545	0.813	Effective communications
0.856	0.713	0.406	0.426	0.694	Level of investment in the relationship

Bold represent the best statistically significant results

Table 4 Hypothesis testing

Results	*P* value	t-values	Std Error	Std Beta	Relationship	Hypothesis
Supported	0.000	20.470	0.040	0.813	AI → Effective communications	H1
Supported	0.000	15.435	0.045	0.694	AI → Level of investment in the relationship	H2
Supported	0.000	8.949	0.064	0.577	AI → Customer satisfaction	H3
Supported	0.000	7.946	0.074	0.585	AI → Customer loyalty	H4

6 Conclusion

AI is revolutionizing customer relationship management in insurance companies, making it easier to deliver personalized, multi-channel experiences to customers, and this significantly improves the customer experience. The use of AI helps simplifies claims processing and provides a more efficient means of dealing with large, unstructured data, allowing for a better understanding of customer behaviors and preferences. This technology enables companies to analyze data in a way that contributes to providing products and services tailored to meet customer needs. It can also help identify behavioral trends that may indicate fraud or potential risks, enhancing insurance companies' abilities to provide fairer prices and reduce operational costs [15, 19].

In addition, AI improves the ability of insurance companies to predict risks and reduce losses, such as in marine insurance where it is used to analyze data related to ship movement and weather conditions to reduce losses.

However, there are challenges associated with cost and the need to train employees to use this technology effectively. In the long term, these technologies are expected to radically reshape the insurance industry, by providing more personalized and efficient services, improving customer experience, and reducing losses through the use of

advanced data analytics. AI also contributes to detecting fraud and estimating risks more effectively. Accuracy, which leads to improved pricing policies and increased overall efficiency of the company.

According to what the results of the previous study showed, the study recommends enhancing investment in artificial intelligence technologies to improve the quality of interactions with customers and personalize services based on accurate data analyses. It is also recommended to develop companies' analytical capabilities to improve fraud detection and assess risks more effectively. Companies must also provide appropriate training to employees to ensure ethical and responsible use of AI, and enhance communication between technical and customer service departments to make optimal use of these technologies. This finding gives policymakers opportunities to evaluate the balance between different related parties as well as develop between technical and customer service departments that ensure sustainability while optimizing the benefits of related parties and responsible use of AI.

7 Limitation and Future Research

Research on the impact of AI on CRM in insurance companies in Palestine faces several limitations, including technical challenges related to the accuracy of the models, their integration with local data, and security and privacy issues. Future research requires exploring ways to improve these models to be more adaptive to cultural and linguistic characteristics, as well as developing solutions to effectively protect customer data. It is also necessary to study the social and economic impacts of these technologies, check the balance between technology and the need for human interaction, and evaluate professional ethics in the use of artificial intelligence. This research will enhance our understanding and improve the use of AI technologies in the insurance industry in Palestine.

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