"DRIVERS OF CONSUMER TRUST INTO AI CUSTOMER SERVICE: A SOUTH AFRICAN CONTEXT"

Research Paper

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"Abstract"

The paper discusses the role of innovation in artificial intelligence (AI) technology and its potential to stimulate further innovation. Research indicates that AI can be employed in various ways to create novel products, services, and processes and improve existing ones. However, there are stark and missing gaps that presents opportunities to research on areas such as; (a) Workers are facing difficulties in incorporating AI into their skill sets. Companies are; (b) failing to adequately assist workers in utilising AI for their own advantage and the advantage of their employers. Entities have; (c) a fiduciary responsibility to develop technologies that are ethically sound in terms of joblessness and morality. The; (d) high costs associated with implementing such technologies may outweigh the intended benefits. The paper's findings show that although AI undeniably possesses the capacity to stimulate favourable transformation and ingenuity, it is incapable of achieving this unaided.

Keywords: South Africa, Artificial Intelligence (AI), Innovation

1. Introduction

This study examines the organizational difficulties in incorporating AI into the skills sets and explores the South African retail entities as companies failing to adequately incorporate AI and utilise it for their own advantage and the advantage of their employers (Saheb and Saheb, 2023) Moreover, the study observes entities and their fiduciary responsibility to develop technologies that are ethically sound in terms of joblessness and morality, although, the high costs associated with implementing such technologies may outweigh the intended benefits.

2. Literature review

2.1. Introduction

The chapter deals with the substance of innovation as the deliberate outline and implementation of ideas, processes, products, or procedures that are novel to the relevant unit of adoption (Makridakis, 2017) The revision aimed at providing substantial advantages to individuals, groups, organisations, and society, within the study of entities in the South African context (Hassani and Silva, 2020) This literature review synthesized the topics of New Leadership Forms and Artificial Intelligence (AI) by highlighting the key perspectives within the academic field on Leadership in the context of the Fourth Industrial Revolution (4IR), defined by AI-driven technology (Unger and TajMazinani, 2020) The study acknowledges that numerous academic studies that have assessed innovation via the lenses of

innovation efficiency and innovation efficacy (Mac Feely, 2020) This results in the crafting of research gaps and the framing of hypothesis.

2.2. Evolution of artificial intelligence (AI)

The emergence of the first industrial revolution saw the transfer from animal power to the steam engine, enabling a shift from agrarian lifestyles to industrialisation, defined by the use of special-purpose machinery (Crafts, 2012) However, Sahai and Rath (2021) contend that the convergence of artificial intelligence and the Fourth Industrial Revolution has led to the integration of artificial intelligence (AI) and machine learning in corporate management. Sahai and Rath (2021) contend that the combination of escalating computer power, machine learning, and big data analytics has transformed our environment. This study aims to investigate the impact of AI and machine learning on retail enterprises (West and Allen, 2020; Dunga, 2019; Sahai and Rath, 2021) Contemporary computers function as knowledge machines, possessing cognitively advanced architectures that utilise layers of neural networks (Sahai and Rath, 2021) Today, we do not direct robots to perform tasks; rather, we have trained them to autonomously learn and resolve issues that have eluded human beings, and they contend and performs these tasks faster and with limited margins of error. Does this, however, influence the clients that these enterprises aim to serve? Is this reliable? These constitute a bombardment and fusillade of questions raised by this and other investigations. Advancements in cognitive and neural sciences have facilitated deep learning and machine learning, transforming the functioning of the knowledge economy (Sahai and Rath, 2021) Recent studies indicate a significant transformation in immersive automation and mechanisation propelled by artificial intelligence across commodities and services, manufacturing, transportation, utilities, and human interactions (Bayraci et al., 2021) Demiralay and Gencer (2021) assert that Artificial Intelligence and robotics frameworks have exhibited co-movement with both traditional and alternative assets during the era of the Fourth Industrial Revolution. Nevertheless, their research uncovered further consequences and insights pertaining to the COVID-19 period (Bayraci et al., 2021) Contemporary research indicate that technology has progressed from analytical to predictive and prescriptive applications due to advancements in artificial intelligence (Demiralay and Gencer, 2021) Machine learning has facilitated significant advancements in various domains, including economics, finance, marketing, operations, image processing, and medical diagnostics (Bayraci et al., 2021) Software personal assistants, robotics, context-aware processing, image processing, and facial recognition are prominently acknowledged uses of artificial intelligence. Machine learning has demonstrated its influence and enhancements within the economic sector, functioning as a service in the software domain, for developing machine learning algorithms applicable to marketing, risk analysis, stock trading, fraud detection, and predictive analysis (Bayraci et al., 2021; Demiralay and Gencer, 2021; Sahai and Rath, 2021) Although Artificial Intelligence (AI) and Machine Learning (ML) are revolutionising various sectors within the south African economy, they also present challenges regarding data privacy, ethical considerations on the internet, and cybersecurity concerns, highlighting the necessity for comprehensive cyber legislation and policy development in the future (Allen, 2006; Dunga, 2019; Sahai and Rath, 2021) The revolutionary influence of artificial intelligence, machine learning, and embedded technology will redefine the economy and market landscape. This study aims to investigate how economies, markets, ecosystems, and organisations react and respond in an increasingly interconnected world. This continues to be an enigma (Sahai and Rath, 2021)

2.3. Artificial intelligence (AI) and new leadership (NL)

The current literature review identifies the three main directions of the scholarly and practitioner research, though the lens of an innovative leader who incorporate (AI) as tools of service within commerce and industry. The findings by Moldenhauer and Londt (2018) argue that (AI) tools can analyze employee performance data, customer feedback, and market trends to help leaders make more informed decisions (Moldenhauer and Londt, 2018) Contemporary studies and findings of Peifer et al. (2022) also show that (AI) also facilitates better communication within organizations by enabling real-

time language translation and sentiment analysis of communications, thereby enhancing interpersonal interactions and understanding (Peifer et al., 2022) The study looks at (AI) as an additional assistance to current leadership functions as the new forms of leadership enhancement from the new leadership perspective. The findings by Milton and Al-Busaidi (2023) laments the new role of leadership in AI era, particularly within the educational sector. Milton and Al-Busaidi (2023) argue in their findings that new leaders are required to adapt and adopt digital technologies, methodologies, and mind-sets as Higher Education sector becomes more competitive (Milton and Al-Busaidi, 2023) Digital transformation is essential to be successful in new digital world. AI is the main component in the digital world specially in Digital transformation. Milton and Al-Busaidi (2023) argue that Artificial Intelligence (AI) yields tremendous opportunities not only in teaching and learning but also in leadership, and thus cement it in their findings that leaders within the educational sectors are expected to be more prepared, adaptable, updated and aligned with the new technologies. In this article we attempt to analyse how the Role of Leadership is going to change with the inclusion of Artificial Intelligence. We aim to structure this research article in a way so as to answer the research question. The major questions that drive this study will be on how the Role of Leadership is going to change with use of AI, as well as What could be considered new within a set of competencies required by leaders in coming future, and also how (AI) replaces the Human role in leadership. Milton and Al-Busaidi (2023) argue in their findings that Artificial Intelligence (AI) have changed the role of leadership in the aspect of IQ and EQ (Milton and Al-Busaidi, 2023) They emerged in their findings with insights on (AI) and with that, they used robust data analytics grounded in AI and machine learning techniques to reveal further new insights for educational applications. Hence, they argued that the leaders of this digital era in should have Hard skills like cloud computing and Data flow to manage new technologies and soft skills to manage team as a package to lead from the top level. It is the assertion within the study that (AI) will indeed replace followers and leaders within the trajectory of a leader replacement model and e fresh leadership perspective. The study also looks at (AI) as an oversold idea within the contemporary analysis as a sceptical perspective. This literature review addresses a lack of substantial literature review and empirical data providing a balanced view of different perspectives on (AI)-based technologies as its influences and impressions on the influence on the leadership of modern organizations. The objective of the current paper is to conduct an initial literature review on Leadership in Industry 4.0, dominated by AI-based technologies, with emphasis on the AI-based technologies, and their influences on the leadership of modern organizations. Possible contribution of this paper is that identified perspectives could become a basis for future empirical research by the Authors and other scholars and practitioners in the field. While the concept of leadership has been researched for years, research in the artificial intelligence field, and moreover the intersection of leadership and artificial intelligence, is quite recent (De Cremer, 2019) The key terms that associate with artificial intelligence (AI) are seen in big data, automation, machine learning, and Industry 4.0. AI is used in such fields as in entertainment, healthcare, service industry such as finance, marketing, logistics, e-commerce, agriculture, and accounting, education, and others. Therefore, in the last decade or so the academic community cautiously started to look at the relationship between leadership and artificial intelligence or Leadership in an Artificial Intelligence based economy (De Cremer, 2019; Moldenhauer and Londt, 2019) Naqvi and Munoz (2018), argue stating that the issue is that the cognitive transformation is sweeping through the global economy, and it is not like anything traditional leaders have ever experienced before (Moldenhauer and Londt, 2019) Having said that, the study and findings in De Cremer (2019) argue and states that 85% of questioned executives were planning to extensively invest in (AI) related technologies in the period of the next years. Therefore, this raises the questions in this study, whether AI-based technologies implementation will influence the heart of the organizations, their leadership, and whether today's leadership will be relevant in the future (De Cremer, 2019; Moldenhauer and Londt, 2019) Having said that, the current knowledge of this epistle and within this paper, the problem this study addresses is a lack of substantial literature review and empirical data providing a balanced view of different perspectives on the AI-based technologies and their influences on the leadership of modern organizations. As such the paper conducts an initial literature review on Leadership in Industry 4.0, dominated by AI-based

technologies, with emphasis on the AI-based technologies' influence on the leadership of modern organizations.

2.4. Problem statement

Despite numerous honours and undeniable reputations, the use of AI in South Africa's business and commerce remains dubious and constrained across various economic sectors, regions, and provinces. It is essential to comprehend and mitigate these issues to guarantee the responsible and efficient utilisation of this potent technology (Mhlanga, 2020)

2.5. Research gaps

The perusal of literature revealed insufficient operationalization of AI processes within retail studies (Shneiderman, 2020) The heterogeneity of the stakeholders involved in AI system development, operations and governance makes it challenging to identify stakeholder roles (Schiff et al., 2020) There are gaps in the AI literature which relates to the organizational implementation of AI (Tsamados et al., 2022) Empirical research offering direction on AI initiatives has been limited and inadequate to address the emerging occurrences (Shneiderman, 2020) There exist the research gaps on the cost benefit analysis of AI pertaining to the SME economies, particularly in south Africa (Wei and Pardo, 2022)

2.6. Study objectives

Through the engagement in AI-related activities and the exhibition of items that signify their affinity for AI, the study seeks to explore its impact on employee profiles, job allocation, and skills development, ultimately leading to AI integration behaviours within the retail sector and enhanced efficiency (Sahai and Rath, 2021) The primary objective of this research is to provide a structured constraint management system in AI planning and implementation, while acknowledging the restricted boundaries of AI in the South African industry and commerce (Mhlanga, 2020; Sahai and Rath, 2021; Smith, 2000)

2.7. Research question

What is the effect of Artificial intelligence (AI) on the innovation process and performance of firms in the business sectors within South Africa, and how can industry integrate the existing knowledge on the constraints of AI within its categorisation and different efforts in constraint modelling into a comprehensive framework for effectively managing limitations in the implementation of AI within organisations to gain a competitive edge?

This results in the following variables:

- *Independent Variable (IV): Innovation process*
- *Dependent Variables (DVs): Artificial intelligence (AI) and performance of firms.*

This results in the following hypothesis crafted in this study.

- H_1: The Greater usage of Artificial intelligence (AI) within the firms, the greater the products range and customer satisfaction index for AI using firms.
- H_0: There is no relationship between AI using firms and their performance in products range and customer satisfaction index.

3. Theoretical framework

The study theorizes as follows, firstly; The integration of customer trust (CT) into business operations (BO) influences the product selection procedures as a regulated procedure of (AI), leading to

heightened firm activities as a consequence of innovation appetite (IA) Secondly, Embedded consumer trust (CT) leads to customer satisfaction (CS), which subsequently fosters brand loyalty (BL) for enterprises, as their performance (FP) is influenced by the use of (AI) Thirdly, (AI) facilitates the firm's innovative activities (FIA), leading to enhanced firm performance (FP) within the entities examined. Fourthly, the performance of the businesses (FP) being analysed directly influences the embedded customer trust (CT) in business operations (BO) and consequently mediates the product selection processes within these enterprises. Fifthly and lastly, the firm's innovation activities (FIA) are directly influenced by the Embedded consumer trust (CT) regarding the (AI) instruments utilised within the enterprises under examination, as seen in Figure 1 below.

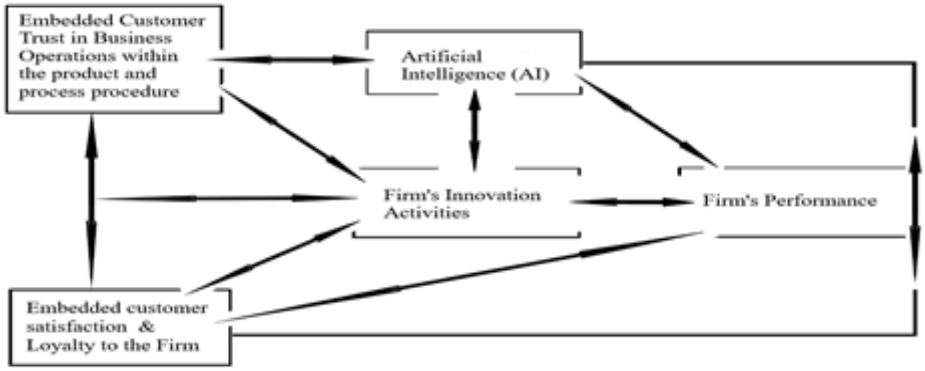

Figure 1. The diagram represents the foundational conceptual model of Artificial Intelligence (AI) and its impact on consumer experiences.
Source. Authors

4. Methodology

4.1. Research design

This was a Quantitative study that used a questionnaire for its survey method relying on deductive reasoning (Prado and Chadha, 2011) This survey question reflected a robust sentiment towards innovation and the utilisation of AI and employed a confidence interval of +/- 5, which was then asserted (Wagenmakers et al., 2016) It indicated the frequency with which the responses from our chosen sample mirrored those of the entire population. Consequently, a 95% confidence level indicated that we might be 95% assured (Hossan and Dato'Mansor, 2023) This stratified study resulted in the following strata.

	Stratified Samples			
Factor	Factor Description	Strata - A	Strata - B	Strata - C
	Strata characteristics	young, Educated, involved, Trust & use -AI	Medium aged, Rigid culture, Educated, partially involved, use -AI	Retired and old, Educated, not involved, don't trust or use -AI
Population (#)	Total Population represented in sample	50,000	50,000	50,000
Proportinate Level	Probabilty that the sample accurately represent the characteristics of polulation	10%	25%	50%
Confidence level	The Range that the population's responses may deviate from the sample	5%	5%	5%
Totals	Sample Size calculated	138	287	382

Table1. Stratified sample study as a measurement of the survey's confidence level.
Source. Authors

4.2. Data collection procedure

From the 1050 legitimate responses collected and selected following the deletion of incomplete questionnaires, upon further examination, 240 companies were excluded in the study, yielding 810 final participants answering 25 questions on a Linkert scale (Chandel and Pal, 2015)

4.2.1. Instrumentation and sample.

Artificial Intelligence (AI) was measured on 3 scales with 5 items on each scale. In this study, higher scores of Artificial Intelligence (AI) behaviours was seen to be correlated with higher scale scores in these subscales (Mirahmadizadeh and Delam, 2018)

In the strata 1, the variable under scrutiny and measure was the Artificial Intelligence on Pricing in South Africa (AIP-SA) We decided on a 5% confidence interval and wanted to achieve a 95% confidence level, the sample size was 138 (Wagenmakers et al., 2016)

In the strata 2, the variable under scrutiny and measure was the Artificial Intelligence on the Innovation Process (IP) We decided on a higher accuracy and increased the confidence level to 99%, and the recommended sample size was at 287 (Rouder and Lee, 2016)

In the strata 3, the variable under scrutiny and measure was the Artificial Intelligence on the impact of Innovation on Productivity (IIP) We decided on an even higher accuracy and thus we choose a 2% confidence interval and 99% confidence level and arrived at a sample size of 382 (Morey and Hoekstra, 2016) The chosen samples from the different strata were amalgamated into one sample, with a substantial sample size for generalisation using the formula suggested by Tabachnick and Fidell (2007), where $N > 50 + 8m$. Where, N represented the sample size and m denoted the number of independent variables (Pallant, 2013) This yielded the sample size of 810 with a confidence level of 95% that the real value was within ±5% of the measured/surveyed value (Delice, 2010)

4.3. Statistical methodologies.

Confirmatory Factor Analysis (CFA) and Structural Equation Modelling were used to analyse the statistical data (Shi and DiStefano, 2022) Data analysis was conducted using IBM SPSS version 21 and IBM SPSS AMOS version 22 statistical software. The predominant reliability coefficient employed in the study was Cronbach's Alpha (Maydeu-Olivares and Lee, 2022), which was calculated for all nine items of the scale, yielding a value of 0.743, indicating the scale's reliability (Shi and DiStefano, 2022) As such the comparative fit index; **CFI = 0.9411**; showed a goodness of fit for the model used in the study (Van Laar and Braeken, 2021) However, the df, (degrees of freedom); GFI, (goodness of fit index); CFI, (comparative fit index); RMSEA, (root mean square error of approximation) below, indicated that all components exhibited a substantial loading value exceeding 0.50 (Maydeu-Olivares and Lee, 2022) The composite reliability (CR) and average variance extracted (AVE) values exceeded 0.70 and 0.50, respectively. This thus affirmed the satisfactory convergent validity of the measurement model, as articulated by Fornell and Larcker (1981)

5. Study results

5.1. Population data

The study takes elucidations from Shah and Freedman (2005) as well as from Vekiri (2005) for the results presentation. This population was youthful, young and vibrant. In the entire retained sample, 57.14% were female and 37.14% were male. Age ranged from 18 to over 56. Approximately 48.3% of respondents belonged to the 18-25 age group, followed by 21.6% in the 26-35 age group, 16.2% in the

36-45 age group, and 9.4% in the 46-55 age group. Merely 4.5% of the respondents belonged to the age group of 56 or older. The majority of respondents (59%) possessed a college degree, and a significant portion of participants were in managerial positions (54.2%)

5.2. Classification of variables

Tobin (1958) elucidates on the approximation and assessment of relationships for limited dependent variables. Elucidated by Tobin (1958), the study identified a pair of random variables exhibiting three types of relationships*: correlated, uncorrelated, or independent.*

5.3. Table

Survey Question	Variables	Factors Loading	Type of Variable
1-6	Familiar, Artificial Intelligence (AI), retail.	0.9	Dependable
6-9	Primary, reasons purchasing, (AI), products	1.0	Dependable
9-12	Often, purchase, (AI), products, productivity, purposes.	0.7	Composite
12-15	Satisfied, (AI), options.	1.3	Dependable
15-19	More, profitable, now, using, (AI), products, before	0.7	Composite
19-22	Communities, operate, customers, not ready, believe, trust, (AI), value, recommendations, products, services.	0.8	Composite
22-25	very interested, trying out, new, (AI), product, processes.	0.9	Composite

Table 2. Study results to show numerous graphs for a quantitative display and interpretation. Source. Authors

Wieselquist and Rusbult (1999) as well as in Foster and Agnew (1999) laments the commitment of the pro-relationship behavior of variables and argue that such a relationship is mediated by trust in close relationships. This study examined a pair of correlated variables that fluctuated together, either favourably or negatively (Tobin, 1958) The results are seen in Table 2.

The results generated a Factor loading, which played a vital part in factor analysis, reflecting the association between the variable and the factor (Peterson, 2000) The investigation produced a factor loading of 0.7 and above as seen on the tabulated results. This demonstrated that the factors adequately accounted for the variance of the variables. The loadings facilitated the assessment of the significance and contribution of each variable to a factor (Peterson, 2000)

5.4. Section - B: Scrutiny and clarification of results

5.4.1. AI needs profile

The study delineated the objectives of a retail customer's AI requirements. The profile facilitated a deeper comprehension of the target audience's fundamental demands, enabling a tailored approach (McArthur and Ault, 2009) The client profile included demographic information such as age, location, and gender, along with interests. The results indicated that higher productivity, enhanced customer experience, and cost reduction, accounting for 85.71% of replies, are fundamentally the reasons cited for the necessity of AI, as well as the justification for corporate expenditures. This was important in the assessed requirements for AI profiling and necessity specifications. The subsequent classification,

pertaining to the necessity of acquiring competitive advantages, accounted for 82.86% of the collected replies.

5.5. Section - C – Interpretation of findings

5.5.1. AI leading industry marketing within retail and fashion

(Q11-15) - What factors influence your decision to purchase AI products?

Results indicated that artificial intelligence in retail is revitalising the business, enabling merchants to enhance their operations, discover innovative customer engagement strategies, and elevate retail standards, with a standard deviation of 1.77. This is congruent to the findings of Ajiga and Ndubuisi (2024), who in their findings conclude that the retail landscape is largely moderated by transformations within the digitalization of retail spaces. The study indicated that AI represents a new frontier for retail success, with personalisation becoming standard, with a standard deviation of 1,86. However, the findings also highlight the presence of digitally astute consumers with ever-evolving preferences, who anticipate shopping experiences that are customised, immediate, and seamless, exhibiting a standard deviation of 1.10. This finding is congruent to Asuzu and Owolabi (2024), who in their findings concluded that the integration of Artificial Intelligence (AI) and predictive analytics transforms business and customer interactions within retail. The findings indicate that AI is the paramount instrument for fulfilling these expectations, demonstrating an intuitive comprehension of client preferences and the capacity to provide tailored services, with a mean of 3.24 and a median of 3.0. this finding is consistent with the judgements of Ajiga and Ndubuisi (2024) as well as the conclusions of Asuzu and Owolabi (2024)

5.5.2. Usage of AI within retail

(Q16-19) What drives your AI desires within business resulting in your search for AI products?

The survey revealed that numerous business sectors within retail are leveraging artificial intelligence to enhance productivity, reduce costs, and elevate customer experience, with a mean score of 2.1. The findings are congruent to Tubokirifuruar and Adeleye (2024), who conducted a thorough examination of contemporary trends in AI-driven predictive analytics in the retail industry and investigated novel consumer interaction tactics that utilise these sophisticated technologies and arrived at similar conclusions. The study revealed that achieving optimal results necessitated a strategic amalgamation of appropriate expenditures in technology and personnel, yielding a median of 3.5, (Tubokirifuruar and Adeleye, 2024) The study indicated that a collaborative effort from both industry and commerce is necessary for AI to serve as a guiding force in retail, with 67% of respondents expressing supporting agreement within this assertion (Rane and Choudhary, 2024) Consequently, the management and proprietors of retail establishments must assume a pivotal role in the transformation of retail through artificial intelligence, contingent upon the provision of guidelines for the application of AI in the retail sector. The results reveal that this has predominantly been absent in the analysis (Rane et al., 2024) As such this research offers new insights into the framework of AI constraints management. The review commences by clarifying the fundamental principles of AI and predictive analytics, emphasising its collaborative function in anticipating consumer behaviour, demand patterns, and market trends. This study highlighted the necessity of incorporating additional stakeholders in the AI paradigm shift and presents a framework wherein a peer-to-peer CEO network occupies the centre, accompanied by industry insights on AI (Rane et al., 2024) The firm's strategy and processes constitute the left pivotal leg (Rane and Choudhary, 2024), while the right leg is represented by collaborative activities that integrate customer input into technology at the company level (Tubokirifuruar and Adeleye, 2024)

5.5.3. Figure

As demonstrated in Figure 2 below.

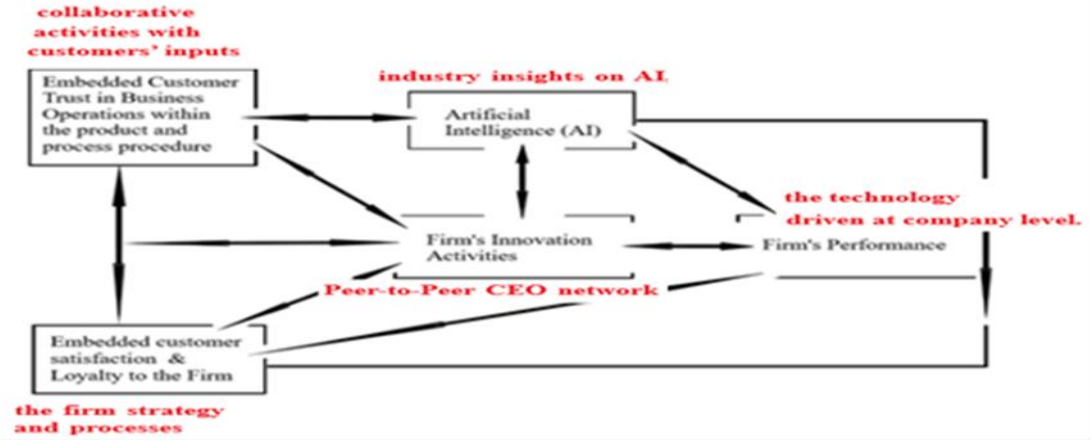

Figure 2. A New Framework showcasing the study findings depicted in the new crafted design constraint modelling on artificial intelligence in retail.
Source. Authors.

5.5.4. AI as a strategic partner

(Q20-22) - We use Artificial intelligence (AI) as an enabling tool and a set of technologies that enable us to computerize and to perform a variety of advanced managerial functions.

The study demonstrated that merchants are maintaining profitability with the implementation of AI as seen in the 51,43% of respondents who strongly agreed (Rane et al., 2024) The study and current findings indicate that AI encompasses more than merely generating experiences that enhance loyalty. Although conventional methods may be diminishing in effectiveness (Huang and Rust, 2022) The results showed that AI provided a strategic perspective, delivering advanced analytics and predictions to assist retailers in rapidly adjusting to market fluctuations, with 81,84% of respondents who strongly agreed. The results indicated that hurdles exist in the application of AI in retail, with 90,20% who strongly agreed, as retailers cannot simply integrate artificial intelligence and anticipate immediate solutions. As such, the findings are congruent to Huang and Rust (2022), who sees artificial intelligence AI's collaborative effects within marketing. The findings suggest that firms must adopt a pragmatic strategy that emphasises sectors of their enterprise where AI may exert the most significant influence.

5.6. Section – D - Statistical analysis

5.6.1. Multiple regression analysis

The primary goal of this study's analysis was to determine the degree to which the five independent variables in (AI)'s price in South Africa (AI-PSA), Innovation process (IP), Leadership for depth in Innovation (LDI), impact of Innovation on Productivity (IIP), and enhancement of customer experience (ECE), influenced the technology (De Sá, 2007) With the help of the statistical package SPSS, we calculated for these variables as explained by Constantin (2006) and De Sá (2007)

5.6.2. Results-1

The data generated and required to carry out the multiple regression analysis are shown in the table below in figure 3.

Regression coefficients

Model		Unstandardized Coefficients		Standardized Coeff.	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1444.434	3680.374		.392	.715
(AI) Price in South Africa		.982	.049	1.012	19.904	.000
innovation process		39.806	10.049	.143	3.961	.017
leadership for innovation depth		-2.032	.480	-.122	-4.232	.013
Impact of innovation on productivity		5.991	23.805	.030	.252	.814
Enhance customer experience		-.910	.931	-.099	-.977	.384

a. Dependent Variable (DV: artificial intelligence (AI) and firm performance).

Figure 3. Drawn to show the study findings based on the Regression coefficients.
Source. Authors

In this particular study, a data set was essentially a collection of data that was typically presented in a tabular format. For a sample data set, the correlation between the variance and the standard deviation was then made.

5.6.3. Results-2

The table show the correlation between the variance and the standard deviation as it computed, which is as follows below.

Estimation of standard deviation - Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.999[a]	.998	.996	2168.975

a. Predictors: Improve Productivity, Enhance Customer Experience, Gain Competitive Advantage, Reduce costs

Figure 4. Study Outputs based on the Estimation of the Standard Deviation.
Source. Authors

As can be seen in the above table, the coefficient of determination (R2), which shows the percentage of the total variance that can be explained by the independent variable, was calculated to be 99.80%. A multiple regression analysis of variance was constructed based on the subsequent findings

5.6.4. Results-3

The figure below shows the multiple regression analysis of variance in the study.

Variation analysis - ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.087E10	5	2.174E9	462.098	.000[a]
	Residual	18817814.997	4	4704453.749		
	Total	1.089E10	9			

a. Predictors: (Constant), (AI) Price in South Africa; innovation process; leadership for innovation depth; Impact of innovation on productivity; Improve productivity

b. Dependent Variable: Performance of firms

Figure 5. Quantitative Outputs based on the Variation Analysis in ANOVA.
Source. Authors

The regression coefficient attributed in this study were commonly designated as 'b' and were represented in the original unit of measurement, as follows:

$$H_0 \doteqdot \beta 1+\beta 2+\beta 3+\beta 4+\beta 5.$$

Indicating that not every β coefficient in H_1 = is equal to 0.

This chapter on the simulation of hypothesis testing is elucidated by Efron (2004), who also makes an argument in favor of selecting a null hypothesis. According to Efron (2004), this presents new challenges as well as opportunities for statisticians. We used the F test, which necessitated an examination of the variance found in the aforementioned ANOVA table, to test the null hypothesis, and our findings agree with those of Anderson and Braak (2003) It was possible to determine from the data in the preceding table that the computed F value for the variance produced by the regression was 462.098. Using the computed 6.256, the study found that the critical value of F was within 5 degrees of freedom in the numerator and 4 in the denominator at the significance level of 0.05. The alternative hypothesis had to be retained based on a comparison of the F values, indicating that not all regression coefficients were equal to zero (Anderson and Braak, 2003) This indicated that the multiple regression model had a considerable impact on the dependent variables (Efron, 2004) For each of the five variables in; Price of Artificial Intelligence in South Africa (AI-PSA) Innovation Process (IP), Leadership for Innovation Depth (LID), Impact of Innovation on Productivity (IIP), Enhance Customer Experience (ECE), from the SPSS results, we got the calculated t values, as seen on the above table. The assimilation presented the following findings; Artificial Intelligence Price in South Africa (AI-PSA, was 19.904) Innovation Process (IP, was 3.961), Leadership for Innovation Depth (LID, was -4.232), Impact of Innovation on Productivity (IIP,.was 252), Enhance Customer Experience (ECE was -.977) In order to define the decision rule concerning the null hypothesis, the study calculated for the t values which were compared with the critical value of t at a significance level of 0.05 in the case of a two-tailed test, with 10 - (5+1), meaning it had 4 degrees of freedom (Efron, 2004; Kulcsar, 2009) This value computed was ±2.776. this study yielded the following hypothesis and findings.

5.6.5. Testing hypothesis and findings

In the case of Artificial Intelligence Price in South Africa (AI-PSA), calculated at (19.904) is higher than critical (2.776) The level of significance indicated by the test 0.004 is lower than the chosen level of significance of 0.05. Therefore, the **null hypothesis is rejected,** and it is accepted that $\beta 1$, is different from zero. However, on the Innovation Process (IP), we can observe that calculated t (3.961) is higher that critical t (2.776) The **null hypothesis is rejected,** and it is accepted that $\beta 2$, is different from zero. Whereas, while observing the Leadership for Innovation Depth (LID), we can see that the calculated t (-4.232) is lower than the critical t (-2.776) This means that the **null hypothesis is rejected again**, and it is accepted that $\beta 3$, is different from zero. Nevertheless, looking at the Impact of Innovation on Productivity (IIP), we can observe that the calculated t (-0.252) is higher than the critical t (-2.776) This means that the **null hypothesis is retained**, and that $\beta 4$, is equal to zero. Whereas in the case of Enhance Customer Experience (ECE) the calculated t (-0.977) is higher than the critical t (-2.776) This means that the **null hypothesis is retained**, and that $\beta 5$, is equal to zero. The study sought to propose a research hypothesis, which was formulated as a statement of anticipation or forecast that had to be examined through research, identifying the independent variable. The study looked for a factor being manipulated or examined and the dependent variable, as outcomes being measured or observed (Kaur, 2013) The framed hypothesis was;

- H_0: There is statistically no relationship between AI using firms and their performance in products range and customer satisfaction index **is Retained.**

5.7. Interpretations of this study

We can conclude that, during the 2019–2024 study period, four performance indicators, Price of Artificial Intelligence in South Africa (AI-PSA), Innovation Process (IP), Leadership for Innovation Depth (LID), Impact of Innovation on Productivity (IIP), and Enhance Customer Experience (ECE), were significant predictors for the dependent variable. We discovered strong and substantial correlations between the independent variables using the multivariate analysis of dependencies approach. The indicators: Improve productivity (IP), Enhance customer experience (ECE), and Gain competitive advantage (GCA) exhibited the strongest association (0.977) Additional significant correlations were discovered between the Leadership for Innovation Depth (LID) (0.692) and the Innovation Process (IP), at (0.718) As a result, more factors will need to be considered while doing future studies.

5.8. Discussion and conclusion

5.8.1. Research vacuum concerning the integration of artificial intelligence(AI)

This study has revealed that there is a research vacuum concerning the integration of artificial intelligence (AI) with South Africa's industry and commerce sector, namely in the area of organisational planning for SMEs. The industry and commerce sector in South Africa, especially in the SMEs organisational planning, has to restructure its implementations with the sophisticated technology (Arakpogun and Elsahn, 2021) Government policy architects should also pay attention to the SMEs need for organisational planning and its restructurings, seeking a redress on the alterations and administration of novel prototypes, given the industry's constant need to adopt new technologies as part of the reformation agenda (Olan and Elsahn, 2021)

5.8.2. Future research

According to the study, future researchers should think about combining primary and secondary data when examining the possible major benefits of artificial intelligence (AI) in South Africa's industry and commerce sector, particularly in the organisational planning of SMEs (Chilunjika et al., 2022) This will help produce research findings that are up to date and representative of current trends regarding the integration of (AI) in the country's industry and commerce sector (Chilunjika and Intauno, 2022)

5.8.3. Implications of this study

Professionals in the field and software providers working in (AI) development will find great value in the study's conclusions. The study offers insights and views supporting the advancement of (AI) management procedures, AI funding and resources allocation (Shankar et al., 2020) The study lists goals that will be achieved through the suggested research, such as the benefits of (AI), its implications for business and industry, and a deeper understanding of its cost-benefit analysis for increased productivity (Schmitt and Kraume, 2020)

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