THE ROLE OF ARTIFICIAL INTELLIGENCE ON THE OVERALL SUCCESS OF SMES IN THE E-COMMERCE SECTOR

BY

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DECLARATION

I hereby declare that:

(1) This undergraduate FYP is the end result of my own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Sole contribution has been made by me in completing the FYP.

(4) The word count of this research report is 11054 words.

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DEDICATION

This article is dedicated to Universiti Tunku Abdul Rahman (UTAR) for providing us with a platform and opportunity to enhance and apply the knowledge we have learned over the past few years.

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LIST OF ABBREVIATIONS

SMEs	Small and Medium-Sized Enterprises
AI	Artificial Intelligence
Covid-19	Coronavirus disease 2019
TOE	Technology Organization Environment
PhD	Doctor of Philosophy
KPIs	Key Performance Indicator
H1, H2, ...H	Hypothesis Development
IV	Independence Variable
DV	Dependence Variable
SPSS	Statistical Package for Social Sciences
α	Alpha Value
Y	Dependent Variable
$X_1, X_2, ..., X$	Independent Variable
β_0	y-intercept
$\beta_1, \beta_2, ..., \beta_p$	Regression Coefficients for Each Independent Variable
ε	Random Error Term
Q-Q plot	Quantile–Quantile Plot
MRA	Multiple Regressions Analysis

SS	Success of SMEs in E-commerce Sector
RS	AI Recommendations Systems
CS	AI Customer Service Solutions
IM	AI Inventory Management Systems
AD	AI Data Driven Analytics
Sig	Significance Level
N	Sample Size
SD	Strongly Disagree
D	Disagree
N	Neutral
A	Agree
SA	Strongly Agree

PREFACE

The research project I am currently completing satisfies the requirements for the Bachelor (Hons) International Business course. I proposed “The role of artificial intelligence on the overall success of SMEs in the e-commerce sector” as the topic of my research project. In this article, I outline several variables, where the independent variable is perception AI Recommendation system, Ai customer service solution, Ai inventory management, and ai driven-data analytics, and the dependent variable is success of SMEs in e-commerce sector

This research will help provide suggestions for SMEs companies, especially e-commerce, to help them understand the success and role of artificial intelligence in e-commerce. Therefore, small and medium-sized enterprises in the e-commerce field can use artificial intelligence and make the overall enterprise successful.

ABSTRACT

The main objective in undertaking this research project is to educate SMEs in the business sector about the role of artificial intelligence in the overall success of their business. Therefore, we studied various factors such as AI Recommendation system, AI customer service solution, AI inventory management, and AI driven-data analytics will have an impact on the success of SMEs in e-commerce sector. Using a quantitative approach, 200 questionnaires were distributed to Malaysians from SMEs in the business sector through Random Sampling technology.

The data collected from the questionnaires can be analyzed by using Statistical Package for Social Sciences (SPSS). The results of SPSS show that there is a significant relationship between all independent variables and the dependent variable. However, Ai Recommendation System has no significant relationship with the adoption of Success of SMEs in E-commerce sector. The study also mentions limitations in the progress of the research project and provides recommendations for future researchers.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

Within this chapter, the research background, research problem, research objectives, and research questions will be addressed. Following that, the discussion will turn to the research significance at the chapter's conclusion.

1.1 Research Background

SME e-commerce competitiveness is developing worldwide. Competition drives company innovation and technology adoption. Digital transformation is a priority across sectors. Digital technologies are strategically used to convert non-digital corporate processes and services to suit market needs (GetITAdmin, 2022). Thus, AI drives SME market rivalry (LinkedIn, 2023).

AI is employed throughout businesses and operations. AI and web technologies help organisations streamline processes. Beyond marketing and HR, it automates processes, enhances data analytics, and accelerates organisational decision-making (Upwork, 2023).

SMEs contribute to worldwide employment and GDP, but ignorance, technophobia, scepticism, and reluctance to change or technical constraints hinder them (Yaqoob, 2016). SMEs confront resource restrictions, lack of understanding, and worker impact issues while larger enterprises use machine learning and AI to simplify operations.

AI has been used by several SMEs (Osni, 2023). Strategic AI helps SMEs improve operations, costs, and resource allocation. It lets them focus on core company activities and flourish (LinkedIn, 2023).

SMEs must consider AI applications in e-commerce and retail as AI grows. Companies must explore its potential and challenges to be competitive globally.

1.1.1 Overview of Artificial Intelligence in E-commerce

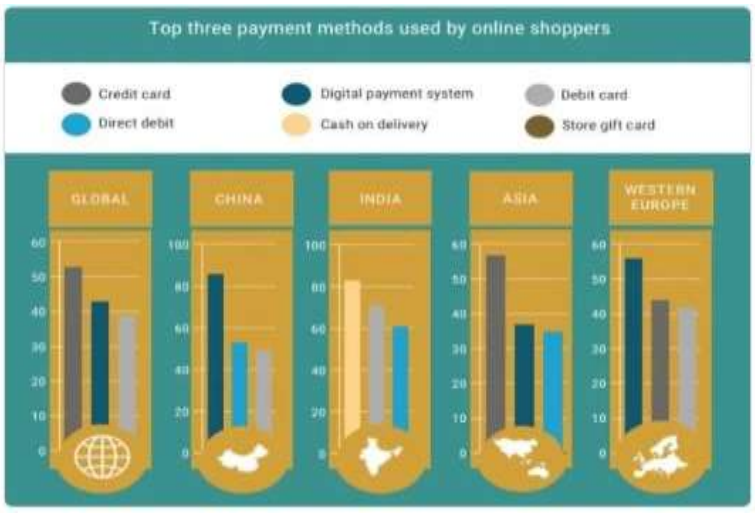
Recent e-commerce has been modest, but Covid-19 has expedited it. Online shopping has given e-commerce firms unparalleled potential to attract more customers, but it also presents several obstacles. Rising consumer demands, support inquiries, and fraud need a diverse strategy to online business management. Many merchants employ AI to obtain deeper consumer insights and give exceptional customer service to manage these jobs without sacrificing.

In 2023, AI is in practically every area of our life, from appliances to security systems. AI will change business. Its development in e-commerce is redefining corporate models and customer relationships, promising to revolutionise operational methods. E-commerce needs AI (Munagapati, S, 2023).

Many significant retail firms use AI, such Amazon and Alibaba. Online shops may employ AI to improve operations as natural language processing, computer vision, and robots advance (Bowman, J., 2023).

Alibaba employs Tmall Genie and AI-powered assistants to compete. Their AI-powered customer service chatbots answer many spoken and written questions, making a lasting impact. Alibaba improves search, product recommendations, and delivery route mapping with AI. Intelligent logistics solutions from Alibaba have cut journey time and vehicle consumption (Munagapati, S., 2023).

Figure 1.1: Total E-commerce Sales in 2021



Note. Top three payment methods used by online shoppers

It's no surprise that online shoppers now number over 2 billion and are growing fast. However, these customers are now picky. With thousands of online stores, they expect a flawless shopping experience.

AI-powered tools help e-commerce businesses of all sizes. AI has the potential to impact all aspects of e-commerce operations, from inventory control to customer service (Bončová, B, 2023).

1.2 Research Problem

In the ever-changing world of e-commerce, AI is vital for SMEs globally. AI may change e-commerce SMEs, but its effect is uncertain.

SME employment and home output support the global economy. AI adoption involves downsides such limited resources, expertise, and labour problems. AI may assist SMEs, thus some are embracing it (Osni, 2023).

Considerations are needed while implementing AI. AI SMEs struggle most with talent and skill gaps. Few individuals know how to maximise AI's potential (Davenport TH, 2018), making it challenging to satisfy HR's AI adoption requirements (Ulrich, 2021). Workers typically lack AI fundamentals (Hansen, 2021), resulting in inadequate AI application training. How SMEs—especially smaller ones—can recruit and retain technical competence should be the emphasis.

New computing skills are scarce in the post-pandemic digital economy. AI and digital services may boost income, but cost-conscious SMEs may struggle to buy processing capacity. Porter (2014) states that advanced solutions boost upfront and continuing expenditures, which rises organisational service costs (Sjödin et al., 2020).

Technology like cyber-physical systems and autonomous robots is costly for SMEs (Moeuf et al., 2019). For struggling organisations, AI implementation may effect profitability and customer spending (Sun & Medaglia, 2019). SMEs without value delivery and AI knowledge may struggle digitally (Morid et al., 2021).

Technical issues arise when functional AI uses digital connection to raise product and service performance technologies. Digitization may ambiguously effect collaborative

production. Five AI technology adoption considerations are comparative advantage, compatibility, complexity, testability, and observability (Rogers, 2014). Technology benefits (e.g., financial returns in crises), product usability, and compatibility determine AI adoption (Tizhoosh & Pantanowitz, 2018).

To contribute to the literature, this research examines AI's involvement in e-commerce SMEs' success.

1.3 Research Objectives

1.3.1 General Objective

to investigate the function of AI in e-commerce in the worldwide market for small and medium-sized enterprises.

1.3.2 Specific Objective

a) Investigate the impact of AI recommendation systems on the overall success of SMEs in the e-commerce sector.

b) Examine the impact of AI customer service solutions on the overall success of SMEs in the e-commerce sector.

c) Evaluate the influence of AI inventory management on the overall success of SMEs in the e-commerce sector.

d) Explore the impact of AI-driven data analytics on the overall success of SMEs in the e-commerce sector.

1.4 Research Questions

The underlying research questions that form the basis of this study's objectives are the following ones.

a) What is the impact of AI recommendation systems on the overall success of SMEs in the e-commerce sector?

b) What is the impact of AI customer service solutions on the overall success of SMEs in the e-commerce sector?

c) What is the influence of AI inventory management on the overall success of SMEs in the e-commerce sector?

d) What is the impact of AI-driven data analytics on the overall success of SMEs in the e- commerce sector?

1.5 Research Significance

This research aims to enhance AI's support in addressing pivotal challenges and barriers encountered in e-commerce solutions, paving the way towards success. By gaining a profound understanding of these challenges, it endeavors to foster the creation of more efficient strategies and solutions tailored for small and medium-sized enterprises in the realm of e-commerce. Additionally, the study delves into the role and potential impact of artificial intelligence technology on the advancement of SMEs. It provides invaluable insights and guidance for business leaders, policymakers, and academia to champion the digital transformation of these enterprises, ensuring their continual growth and prosperity. Ultimately, this research seeks to advocate for the integration of AI within e-commerce.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview

The literature on AI in e-commerce and SMEs is reviewed in this chapter. The literature review will cover AI recommendation systems, AI in customer service, AI in inventory management, and AI driven-data analytics. This chapter uses relevant studies to show how these AI applications are crucial to e-commerce SMEs' success in a competitive business environment.

2.2 Theoretical Framework

The Technology-Organization-Environment (TOE) framework underpins this investigation. TOE addresses all organisational technology implementation aspects. The research will employ TOE to demonstrate how SMEs leverage AI in e-commerce. Innovation qualities are TOE's initial factor (Amini et al., 2023). Relevant AI technologies include recommendation systems, customer service solutions, inventory management tools, and data analytics applications. The complexity, compatibility, and comparative advantage of AI systems for e-commerce SMEs are technical concerns. For instance, AI systems' user-friendliness, capacity to satisfy SMEs' requirements, and influence on SMEs' perceived efficiency and efficiency advantages must be studied. TOE may show AI features that support or inhibit SMB adoption.

The TOE model's "Organisation" element assesses internal organisational issues impacting technology adoption. To assess SMEs' AI preparedness for e-commerce, it considers size, organisation, resources, and technology. Consider workplace culture, computer literacy, and flexibility. Technology innovation demands leadership and strategy. The present research will employ TOE to explore how organisational environment and success impact e-commerce SMEs' AI usage.

2.3 Success of SMEs in the E-Commerce Sector

E-commerce success for SMEs depends on several aspects. Almatrafi and Alharbi (2023) argue KPIS boosts revenue, customer happiness, and market competitiveness. Studies have examined whether AI may help SMEs prosper online. AI recommendation systems are important for online business SMEs, say experts. Borah et al. (2022) discovered AI-based item suggestions boosted SME maintenance and modifications. With additional bargains and perks, computer-based intelligence offerings will boost customer experience.

SMEs employ AI-based customer service and recommendations. This application enhanced customer responsiveness, low-resolution time, and satisfaction, according to Khan and Iqbal (2020). Small and medium firms prosper with devoted consumers and a good brand. According to literature, AI aids inventory management in e-commerce SME. Lakshmi Aishwarya demonstrated that AI-enabled inventory optimisation improved order fulfilment and carrying costs. AI-based inventory management is essential for SMEs to succeed in a competitive e-commerce industry, lowering costs and efficiency.

According to considerable research, small businesses need AI-driven data analytics in e-commerce. Majeed and Hwang (2021) suggest AI-enabled analytics examine huge data. This influences customer choices, market developments, and competitive strategy. Thus, data-driven choices improve corporate success (Awan et al., 2021). There are additional dangers to employing AI in SMEs. Bhalero (2021) highlighted expensive installation and technological challenges needing staff training. SMEs should overcome these obstacles to gain from AI and sustainable e-trade.

2.4 AI Recommendation Systems in E-Commerce

Personalisation via AI recommendation systems has revolutionised e-commerce, according to Habil et al. (2023). The systems developed from collaborative filtering and content-based recommendations. User-item interactions and similarity characterise collaborative filtering. Content-based recommendations take item preferences and attributes into account (Glauber & Loula, 2019). Advanced recommendation systems are being created utilising machine and deep learning. Neural collaborative filtering and hybrid models enhance accuracy.

E-commerce needs AI recommendation algorithms. Hussien et al. (2021) indicate these systems propose items based on user behaviour, purchasing history, and preferences. This AI recommendation system predicts client requirements based on preferences, making shopping more fun. Personalisation increases client happiness and conversions.

AI recommendation systems are crucial for e-commerce SMEs, according to many studies. Rane (2023) reported AI recommenders enhanced small store sales by luring clients. AI suggestions raised average order value. System strength encouraged customers to spend more. Al Tit (2020) explored how recommendation systems effect SME customer satisfaction and loyalty. Better recommendation systems helped tiny e-commerce enterprises retain consumers. Various works support this idea. AI-based SME e-commerce recommendations. Raza covers Ding (2022) and recommendation algorithm development, usage, and issues.

Trust and satisfaction affect user trust in AI recommenders, according to Chi et al. (2020). The main psychological reasons people trust and enjoy recommendation systems are transparency and explainability. Users must trust AI systems to offer meaningful ideas based on their inputs and know how they did it to be pleased. Personalisation accuracy and relevance affect user confidence and pleasure.

2.5 AI Customer Service Solutions

Chaturvedi and Verma (2023) predict that AI-enabled SME customer care would be responsive and dependable in e-commerce. AI solutions like chatbots, virtual assistants, and automated system optimisation consumer contact are listed above. Chatbots and virtual assistants provide 24/7 help. The AI-based customer support system can manage several requests at once and answer promptly (Kang & Choi, 2023). Sharma et al. (2020) say chatbots help SMEs resolve issues faster and more efficiently. AI e-commerce aid for SMEs goes beyond response. Chatbots allow product searches and payments. Information about products, personalised guidance, and troubleshooting. These technologies work wonderfully together to improve client experience and service loyalty.

Effective AI-aided customer care boosts e-commerce consumer pleasure and retention, according to studies. Lee (2020) observed that chatbots increased customer satisfaction above conventional service. Yu (2021) examined AI client services and consumer loyalty. Companies with the finest AI-based support infrastructure have more loyal customers. E-commerce literature recommends building AI-based customer care solutions in SMEs to make customer experience more significant. Dwivedi et al. (2021) and Chen et al. (2021) discuss customer support issues like trust, privacy, and AI improvement. Suta et al. (2020) examined how natural language processing and machine learning algorithms affect chatbots.

2.6 AI Inventory Management

E-commerce SMEs require aid with variable demand, complicated supplier networks, and just-in-time delivery. Stocking too many items, stockouts, and improving operational expenses are examples. SMEs use AI-based stock adjustment solutions to save supply chain costs. Online supply management for small businesses requires precise demand forecasts. Due to client desire, market trends, and various external influences, organisations must select how many items to purchase (Dash et al., 2019). Due to capital tie-up and excess inventory, stockouts and angry customers result. Other issues include manual inventory methods taking time and being error-prone, exacerbating the situation.

An AI-powered inventory management system that examines prior sales and market trends may assist solve these problems. SMEs may better estimate demand, retain less stock, reduce holding costs, and deliver on time using such solutions. AI outperforms conventional forecasting and inventory management, according to Feizabadi 2021. AI case studies for SME inventory management via e-commerce. Stitch Fix, an online personal styling company, uses AI algorithms to predict consumer preferences and maintain supply (Evangelista, 2020). Stitch Fix can limit surplus inventory and provide usual and quick client experiences at their preferences. Wang et al. (2020) discuss the obstacles of applying AI in inventory management and demonstrate how AI decreases costs and improves operational efficiency. Shopify and Magento both provide SMEs AI-enabled inventory optimisation and automation.

2.7 AI-Driven Data Analytics

Rajeshwari et al. (2023) stated that AI-driven data analytics may help E-commerce SMEs make better decisions and grow by processing massive volumes of data. AI technologies for trend and connection detection in expanding data sets. AI uses advanced machine learning to find data patterns, trends, and correlations. Images, natural language processing, and predictive modelling benefit from deep learning and neural networked algorithms. E-commerce SMEs learn and make effective choices using data.

In 2023, Akter, Ahmed, and Islam published. AI-Based Data Analytics and Smart Supply Chain Management for Sustainable SME Growth. Businesses may now forecast client preferences, provide customised advise, and adjust marketing campaigns using machine learning algorithms. AI-powered analytics may enhance client profile and customised marketing initiatives, say Haleem et al. Additionally, AI-based data analysis helps SMEs comprehend market dynamics. However, social media attitudes, rival activities, and industry trends might provide a firm an edge. Riahi et al., 2021, demonstrate that AI can analyse market patterns, revealing new trends and possibilities that traditional research might miss.

SMEs need AI-based analytics in real time and viable data for e-commerce decision making. AI offers dynamic pricing, inventory optimisation, and targeted marketing, making a firm more competitive and lucrative. Data-based decision-making improves operations by allowing real-time resource allocation to adapt to changing markets. Provost and Fawcett (2019) explain data science and decision-making. Predictive modelling and model assessment include understanding the challenges and ethics of obtaining crucial information to influence strategic choices for various reasons.

2.8 Measuring Overall Success in E-Commerce

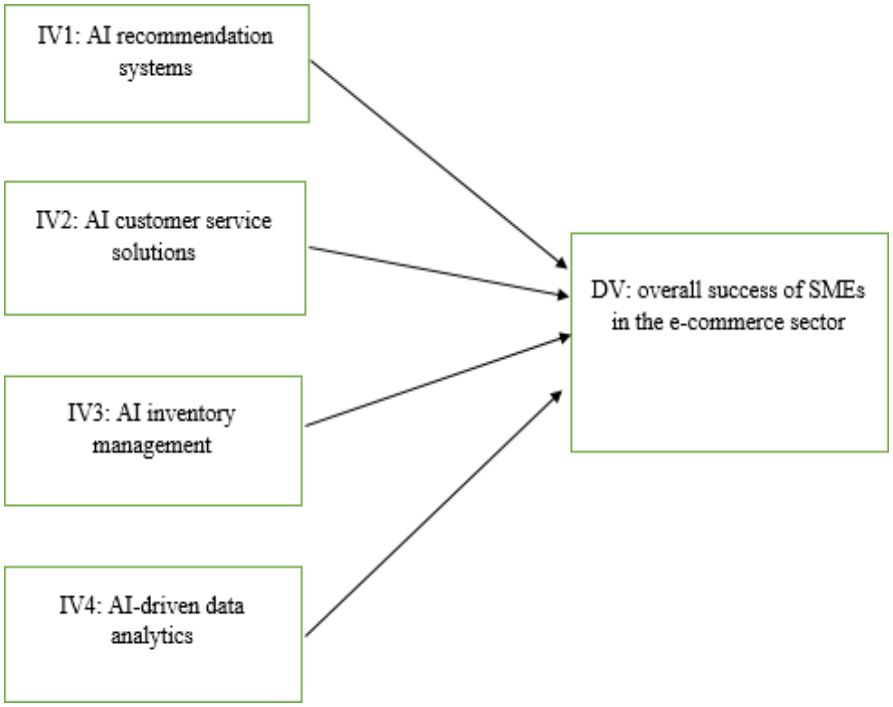
SME success is measured across numerous business characteristics using KPIs. One KPI may be customer conversion rate, customer happiness, or revenue growth. Conversion rate is the percentage of site visitors that make an offer or buy. consumer satisfaction indicates how happy the consumer was with his total experience, which may affect whether he returns or recommends the firm. Revenue growth is crucial to a company's health since it generates money rapidly.

AI-based technologies greatly impact SMEs' most important e-commerce success elements. To increase conversion rates, it combines personalised marketing and AI-based recommendation systems for targeted client involvement (Bag et al., 2022). Response improves user experiences and customer satisfaction with AI-enabled chatbots and virtual assistants. Thirdly, AI's analytical skills enable organisations fast-track customer requests by identifying flaws. Data analytics uses AI. It provides market trends, customer behaviour, and competitive landscape information to help SMEs forecast revenue growth.

2.9 Conceptual Framework

IVs are AI applications SMEs adopt for recommendation systems, customer services, supply management, and data analysis. IVs' importance cannot be underestimated. They list technology used in various SMEs' online activities. DV measures SME performance by conversion rates, customer happiness, and revenue growth. Applied AI models are KPIs for SMEs' success. AI-based recommendation systems, customer service, inventory management, and data analytics are projected to boost conversion rates, customer happiness, operational efficiency, and income.

Figure 2.1: Theoretical Framework



2.10 Hypotheses Development

Hypotheses for this study in developed as followed (see Figure 2.1):

H1: There is a significant relationship between AI recommendation systems and the overall success of SMEs in the e-commerce sector

H1 assumes that AI recommendation systems results strongly influence the success of an average small and medium-sized e-commerce firm. SME adoption of AI-recommended technologies will boost KPIs, according to the theory. Because they learn client preferences and provide customised items, these AI recommendation systems are intended to enhance conversions, satisfaction, and organisational success. Previous research supports this theory. A Bag et al. (2022) case study found that AI-powered personalised SMEs suggestions boost customer engagement and conversions. As e-commerce evolves, H1 provides a foundation for investigating how AI-based suggestions might improve SME business operations' relevance and efficiency.

H2: AI customer service solutions are closely connected with small and medium enterprises in the e-commerce sector.

H2, SMEs in e-commerce survive by using AI for customer service. This hypothesis proposes merging chatbots and computerised reasoning-based menial assistance in SMEs to improve presentation. Using AI technologies should make an organisation more responsive, efficient, and able to improve client connections, enhancing customer happiness and loyalty. Wang et al. (2019) found that AI chatbots improve resolution time and customer satisfaction. He/She says the SME's existence in competitive e-commerce depends on optimising customer experiences.

H3: The role AI inventory management plays in the success of SMEs in the e-commerce sector.

Thus, H3 implies that AI inventory management boosts SMEs' e-commerce success. The hypothesis predicts that AI-enabled inventory management organisations would increase overall success metrics. Order fulfilment should improve to enable AI-driven inventory management to regulate stock levels and operating costs. According to Li et al. (2020), AI in inventory management decreases carrying costs and increases order fulfilment for SMEs. H3 examines how SMEs employ AI in competitive e-commerce. It emphasises on AI to solve inventory management issues to boost small and medium firms' efficiency and success.

H4: The link between AI-based data analytics and the overall success of SMEs in the e- commerce sector

Artificial intelligence-based data analytics (H4) may be crucial to e-commerce SMEs' performance. This claims that AI-based data analytics will improve SME KPIs. AI-driven big data analytics will boost revenue, customer experience, and decision-making. The newest Rana et al. (2022) study on AI and company performance agrees. H4 addresses how much information SMEs can consume to make educated decisions.

CHAPTER 3: RESEARCH METHOLOGY

3.0 Introduction

Research methodology involves finding, categorising, analysing, and evaluating information on a topic. A research paper's methodology section lets readers objectively assess the study's validity and reliability. Research design, sampling design, data collection method, research instrument, construct measurement, and proposed data analysis tool will be described here.

3.1 Research Design

Singh Si (2024) describes research design as the systematic selection and implementation of methods to collect and analyse research question variables. Based on research objectives and parameters, experimental, observational, survey, case study, and longitudinal research designs are used for diverse study subjects and purposes (Alam, M, 2024).

The study uses several data gathering approaches to explore how AI affects e-commerce SMEs' productivity. Researchers employ surveys, literature reviews, books, newspapers, and websites to describe SMEs' e-commerce performance without identifying causes.

To solve population problems and gather fresh data, Jain Y's (2024) quantitative research design is used to analyse data. Results from a key worker productivity study were given in statistics, graphs, and numbers.

A Google Forms survey sent samples to the target group via email, WhatsApp, Redbook, Instagram, and manual collection. SPSS analysed Likert scale questionnaire replies.

This study intends to show SMEs how AI may improve recommendation systems, customer service, inventory management, and AI-driven data analytics.

3.2 Sampling Design

Research uses stratified random sampling and convenience sampling. The sample frame is divided by SMEs' size and e-commerce activity. Each stratum uses convenience sampling to select participants based on availability and interest. This method ensures inclusivity while considering practical constraints in getting a complete employee and supervisor roster.

3.2.1 Target Population

Due to their economic significance and stress, this research examines the issues and demands of SMEs' employees and supervisors. This group has diverse education, experience, and work responsibilities. Study accuracy and dependability are ensured by repeated sampling. Understanding their demands helps SMEs expand sustainably by providing better advice and solutions.

3.2.2 Sampling Frame, Sampling Element and Sampling Location

3.2.2.1 Sampling Frame

The research will focus on SMEs operating in the e-commerce sector. Data will be sourced from reliable sources like government databases and industry portals. The validity of the sampling frame is crucial for the study's reliability and depends on its accuracy and suitability. Ensuring the accuracy of the sampling frame is vital for the credibility of survey results (Berndt, 2020).

3.2.2.2 Sampling Element

The study includes Malaysian e-commerce SMEs from reliable sources including government databases and industry groups. It will be carefully checked for correctness, completeness, and study goals. This frame will help identify research participants (managers and workers) (Berndt, 2020).

3.2.2.3 Sampling Location

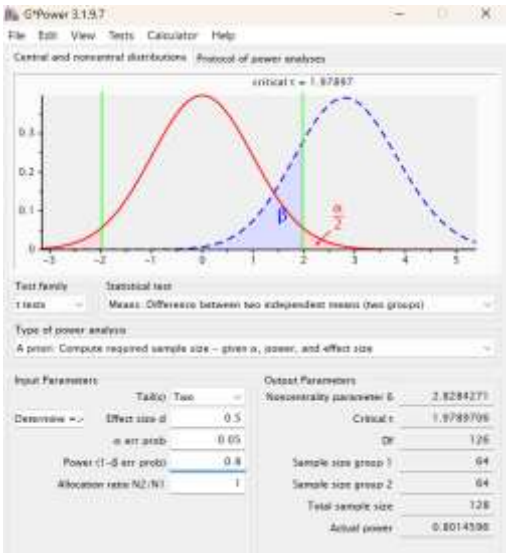
This research will sample Malaysian e-commerce SMEs. The key sample location is Malaysia because to its growing e-commerce SMEs and development potential. This specific emphasis allows in-depth sector research in Malaysia's cultural, economic, and legal environment. Limiting data collection to Malaysia allows comparison of similar e-commerce businesses in other countries. The survey will involve SMEs from Kuala Lumpur, Selangor, Penang, and Johor to highlight Malaysia's e-commerce variety.

3.2.3 Sampling Technique

The study will use convenience and stratified random sampling (Obilor, 2023). Stratified random sample groups SMEs by size (micro, small, and medium) and e-commerce activity for subgroup comparisons and Malaysian e-commerce industry representation. Within each stratum, convenience sampling will find available and willing participants and managers for the research (Van Haute, 2021). Given time and resource restrictions and the difficulty of listing all workers and managing selected SMEs, this technique is adopted (Khan, 2020). The study will aim for demographic diversity in age, gender, and job titles to reduce convenience sample biases (Emerson, 2021). The study uses these strategies to speed up data gathering while retaining representativeness and generalizability.

3.2.4 Sampling Size

Figure 3.1 Sample Size by Using G*power Software



Note: The result of G*power software by using to calculate sample size

Survey sample size will be set using G*power software. Figure 3.1 indicates 126 people needed. Thus, 200 Malaysian e-commerce SMEs employees and managers are sought for the study. The sample size relies on the study's aims, statistical power to identify significant effects, and data collecting and analytic resources (Lakens, 2022). Description, correlation, and regression analysis are possible with a 200-person sample size that represents the target population. It also accounts for mistakes, poor replies, and the necessity to recruit enough participants from each demographic stratum (Kang, 2021).

3.3 Data Collection Method

Study design requires data gathering strategies to identify and use meaningful data to improve and conclude research. Data gathering strategies vary by field and information needed (Bhat, A, 2024). The study collected primary data to avoid obsolete information and undertake novel research. Email, Instagram, WhatApps, and manual collecting were employed.

3.3.1 Primary Data (Questionnaires)

This research used Google Forms to send respondents questions via email, WhatsApp, Instagram, and other media. This questionnaire has four sections: A, B, C, and D. The poll begins with a broad question on AI knowledge. Section B queries respondents' demographics. Section C assesses technology solutions' efficacy. Technology-based SME success is measured in Section D. Thus, the data was collected to understand respondents' views on SMEs' e-commerce success.

3.4 Research Instrument

3.4.1 Questionnaire Design

This questionnaire consists of three sections. Section A consists of general question related to knowledge of artificial intelligence (AI) and whether they have used this technology in practice.

Section B comprises of questions related to demographic profile, such as age, gender, education background and marital status in this section.

Section C consists of questions related to asks respondents about their use and effects of different technology solutions, which are recommendation system, customer service solutions, inventory management system, and AI-driven data analytics.

Section D covers questions related to the dependent variable of this study (the success of SMEs), exploring the respondents' perceptions and experiences of how different technological solutions have helped them achieve success in the market.

3.5 Construct Measurement

3.5.1 Measurement of Scale

Statistics uses different measuring scales to describe and classify variables, or numbers, according to Shukla D (2023). Statistical analysis applications depend on measuring scale level characteristics. This study uses nominal, interval, and Likert-style rating scales for the research questionnaire.

3.5.1.1 Nominal Scale

In Section B, which includes demographic profile questions like age, gender, marital status, and educational attainment, a nominal scale will be utilized (Li, Y, and Wong, A, K, F, 2006).

3.5.1.2 Likert-Style Rating Scale

Five-point Likert scale provide five responses options, which is used in sections C and D of the questionnaire to analyze independent and dependent variables.

3.5.2 Origin of Construct

The questionnaire's self-developed sections A and B contain questions. Concurrently, the measuring items for the constructs in sections C and D were taken and modified from various earlier studies in the literature. Appendix B displays each construct and sample measurement item.

3.6 Proposed Data Analysis Tool

SPSS conducts data analysis, providing descriptive statistics for summarizing sample populations and distribution patterns. Validity and reliability tests evaluate scale construct validity and internal consistency. Correlation and multiple regression analyses assess hypotheses and variable relationships, with a focus on verifying assumptions before validating findings (Roni & Djajadikerta, 2021).

3.6.1 Reliability Analysis and Multiple Linear Regression

3.6.1.1 Cronbach's Alpha of Pilot Test:

Cronbach's alpha will be assessed in the pilot study to test questionnaire scale homogeneity and reliability. Cronbach's alpha, a common coefficient, evaluates test samples for correlation and consistency (Maharana, Mondal, & Nemade, 2022).

Table 3.2: Cronbach's Alpha of Pilot Test (n = 30)

Variable	Number of Items	Cronbach's Alpha
AI Recommendation Systems	4	0.856
AI Customer Service	4	0.912
AI Inventory Management	4	0.795
AI-Driven Data Analytics	4	0.883
Overall Success of SMEs	5	0.901

Source: Developed for the study

3.6.1.2 Range of Cronbach's Alpha value:

Cronbach's alpha ranges from 0 to 1, indicating internal consistency and reliability. As the number increases, the interpretation becomes clearer. Cronbach's beta is usually understood using these guidelines:

Table 3.3: Range of Cronbach's Alpha Values and Interpretation

Cronbach's Alpha Range	Interpretation
$\alpha \geq 0.9$	Excellent reliability
$0.8 \leq \alpha < 0.9$	Good reliability
$0.7 \leq \alpha < 0.8$	Acceptable reliability
$0.6 \leq \alpha < 0.7$	Questionable reliability
$0.5 \leq \alpha < 0.6$	Poor reliability
$\alpha < 0.5$	Unacceptable reliability

Note: A Cronbach's alpha value of 0.7 or higher will be considered acceptable, indicating that the measurement scales have sufficient internal consistency and reliability.

3.6.1.3 Multiple Linear Regression:

Multiple linear regression is a statistical method used to represent the linear correlation between a dependent variable and two or more independent variables. The multiple linear regression equation is often expressed in the following general form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_p X_p + \varepsilon$$

Where:

- Y is the dependent variable
- $X_1, X_2, ..., X_p$ are the independent variables
- β_0 is the y-intercept (constant term)
- $\beta_1, \beta_2, ..., \beta_p$ are the regression coefficients for each independent variable

- ε is the random error term

The will apply the following multiple linear regression equation:

SME Success = β_0 + β_1(AI_Recommendation) + β_2(AI_CustomerService) + β_3(AI_InventoryManagement) + β_4(AI_DataAnalytics) + ε

Where:

- SME_Success is the dependent variable representing the overall success of SMEs
- AI_Recommendation, AI_CustomerService, AI_InventoryManagement, and AI_DataAnalytics are the independent variables representing the adoption and use of AI in recommendation systems, customer service solutions, inventory management, and data analytics, respectively
- β_0, β_1, β_2, β_3, and β_4 are the regression coefficients to be estimated
- ε is the random error term

3.6.2 Pilot Test and Reliability Analysis

The questionnaire's reliability will be tested with 30 participants in a pilot. Internal consistency will be assessed using Cronbach's alpha, with values over 0.7 indicating reliability. The pilot test will inform questionnaire changes before the main study.

3.6.3 Normality

Data normality is determined via Shapiro-Wilk and histogram/Q-Q plot assessment. If data deviates greatly from normality, logarithmic or square root modifications are applied. If normality is impossible, apply non-parametric testing. Statistical research accuracy requires normalcy (Cooksey & Cooksey, 2020).

3.6.4 Pearson's Correlation Coefficient

Pearson's correlation coefficient will be used to assess the linear relationships between AI recommendation systems, customer service solutions, inventory management, and AI-driven data analytics and SME success. Magnitude and statistical significance will interpret correlation coefficients (Shrestha, 2020).

3.6.5 Multiple Regressions Analysis (MRA)

Multiple regression analysis will determine which independent variables predict the dependent variable. Regression model quality of fit, coefficients, and statistical significance will be assessed. To verify regression results, linearity, homoscedasticity, and multicollinearity will be examined (Cooksey & Cooksey, 2020).

3.7 Conclusion

The strategies for determining "who, what, where, when, and how" to gather the data and produce the results via methodology are covered in Chapter 3. In this chapter, SPSS software was utilised to provide results based on the data that was obtained.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

This chapter will elaborate on the sample size-derived hypotheses and the survey's target population's analytical results. Data will be analysed and compiled using SPSS. Inferential analysis, scale measurements, construct core tendencies, descriptive analysis, and conclusions are covered in this chapter.

4.1 Response Rate

Response rate is sample group total participants divided by completed surveys (SurveyMonkey, nd). Rate of survey questionnaire responses. The response rate equals eligible sample members divided by usable answers. Research credibility depends on response rate. Low response rates reduce statistical power and test reliability, damaging research. Society can't use the study's findings. A successful response rate depends on target audience accessibility and availability. Low response rates result from weak criteria.

Research response depends on subject sensitivity. For sensitive investigations, obtaining participants may be difficult, reducing response rates. To increase response rates, study credibility, and publishability, researchers must carefully evaluate the research topic, aims, questions, and target population (Dovetail Editorial Team, 2023). This study delivered surveys by email, WhatsApp, and other channels. Therefore, Table 4.1 shows the total response rate.

Table 4.1: Overall Response Rate

Questionnaire (Google-Form)	No. of questionnaire (Google Form)	Percentage (%)
Distributed	201	100%
Returned (Valid)	190	94.53%
Returned (Invalid)	11	5.47%
Not return	11	5.47%

Note: A total of 201 questionnaires were distributed

As can be seen from Table 4.1, a total of 201 questionnaires were distributed, accounting for 100% of the total number of questionnaires distributed. In addition, the researchers successfully received all 201 complete questionnaires out of the 201 distributed, with a cumulative response rate of 100%. Therefore, there were 10 cases of invalid responses or distributed questionnaires being returned. Therefore, the researchers successfully collected a total of 190 questionnaires, with a recovery rate of 94.53%.

4.2 Descriptive Analysis

Currently, 201 questionnaires have been distributed, and after reviewing the data, only 190 respondents met the standards set by the study.

4.2.1 Respondent general questions

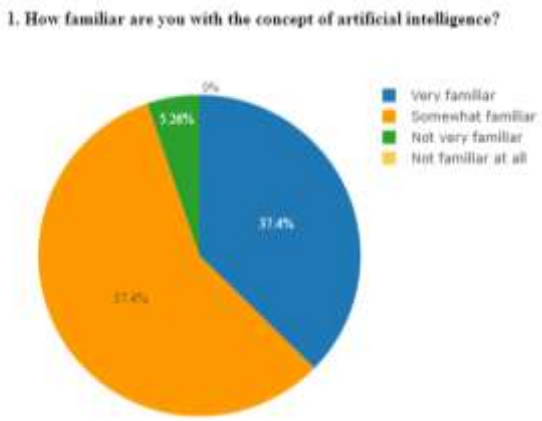
There are a total of 5 questions under general questions that respondents are asked to answer.

Table 4.2: How familiar are you with the concept of artificial intelligence?

		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Very familiar	71	37.4	37.4	100
	Somewhat familiar	109	57.4	57.4	62.6
	Not very familiar	10	5.3	5.3	5.3
	Not familiar at all	0	0	0	0
	Total	190	100	100	

Source: Developed for the research

Figure 4.2: How familiar are you with the concept of artificial intelligence?



Source: Developed for the research

Table 4.2 and Figure 4.2 show many participants know AI. They had the most "somewhat familiar" replies (109), 57.4%. 37.4% of 71 respondents said "very familiar". This suggests most responders comprehend AI.

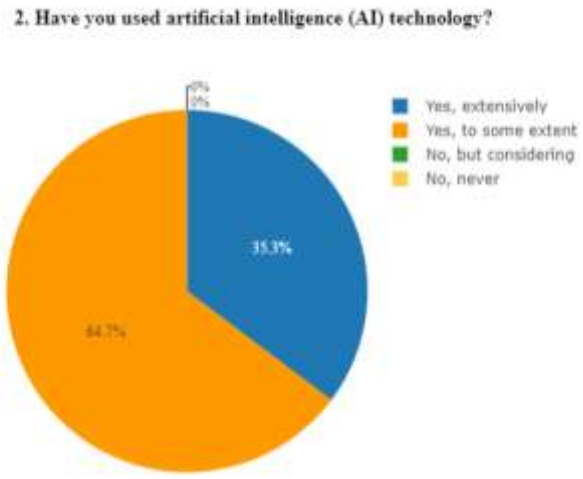
Ten respondents (5.3%) picked "not very familiar". Though tiny, the statistic implies some respondents struggle with AI. Not selecting "not at all familiar" suggests respondents comprehended AI.

Table 4.3: Have you used artificial intelligence (AI) technology?

		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Yes, extensively	67	35.3	35.3	35.3
	Yes, to some extent	123	64.7	64.7	100
	No, but considering	0	0	0	0
	No, never	0	0	0	0
	Total	190	100	100	

Source: Developed for the research

Figure 4.3: Have you used artificial intelligence (AI) technology?



Source: Developed for the research

Based on Figure and Table 4.3, 35.3% of 67 polls suggest extensive AI usage. It seems that some individuals utilise AI regularly.

Secondary, 64.7% (123 questions) utilise AI. This shows that another set of respondents may utilise AI without understanding it.

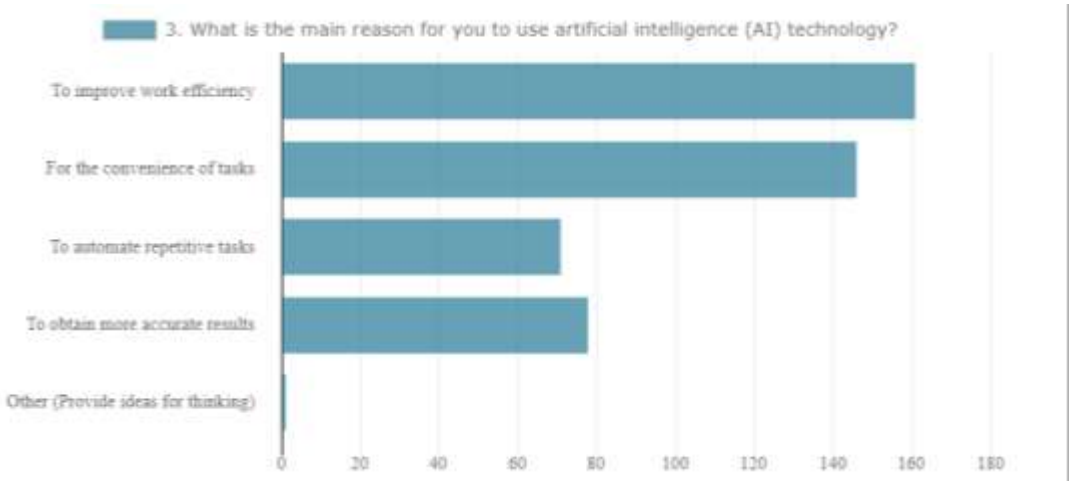
None of the poll respondents had never used or explored AI. This may imply that artificial intelligence technology is extensively utilised and accepted in contemporary culture, and most respondents have relevant expertise or have explored employing it.

Table 4.4: What is the main reason for you to use AI technology?

		Frequency	Percent (%)	Percent of Cases
Valid	To improve work efficiency	155	35.1	82.0
	For the convenience of tasks	142	32.1	75.1
	To automate repetitive tasks	69	15.6	36.5
	To obtain more accurate results	76	17.2	40.2
	Other	1	0.2	0.2
	Total	443	100	233.9%

Source: Developed for the research

Figure 4.4: What is the main reason for you to use AI technology?



Source: Developed for the research

Data was evaluated to discover why work efficiency should improve. Improvement in labour efficiency and task convenience were the main reasons stated in the study. Specifically, 155 (35.1%) sought job efficiency and 142 (32.1%) wanted task ease. Nearly 70% of the remarks were for job efficiency and task ease, showing a need for workplace improvements.

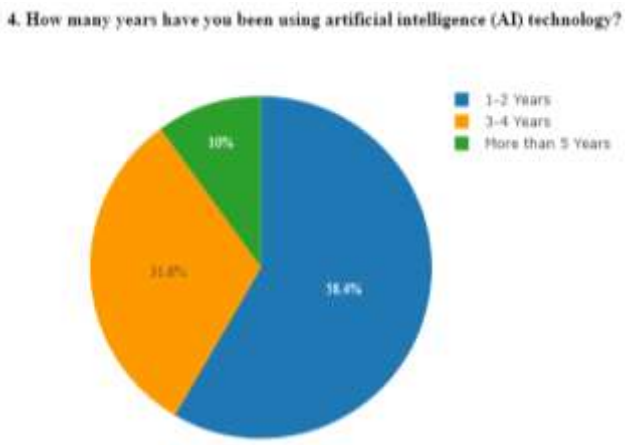
However, 76 (17.2%) desired more accurate findings and 69 (15.6%) wanted to automate repetitive procedures to save time. Though rarely addressed, these two reasons are crucial. Only one "Other" reason was cited in the survey, suggesting individuals had individual or less common reasons.

Table 4.5: How many years have you been using a AI technology?

		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	1-2 Years	111	58.4	58.4	58.4
	3-4 Years	60	31.6	31.	90
	More than 5 Years	19	10	10	100
	Total	190	100	100	

Source: Developed for the research

Figure 4.5: How many years have you been using AI technology?



Source: Developed for the research

The table and figure 4.5 show respondents' AI technology usage duration. The research received 190 valid questions. People were asked whether they had used AI for 1-2, 3-4, or 5 years.

From 190 queries, 58.4% (111 responses) use AI for 1-2 years. 31.6% (60 surveys) use 3-4 years. Finally, 19 surveys (10%) have used AI for over 5 years. Cumulative percentages show how many answered before each option. Prior to "1-2 years," 58.4% answered.

Duration of respondents' AI technology usage. Most responders began using AI technology in the last 1-2 years, showing its fast adoption. Some respondents used these tools for 3–5 years, indicating early adopters or AI specialists.

4.2.1.1 Summary of Respondents' General Questions

General Questions	Sample (n)	Percentage (%)
How familiar are you with the concept of artificial intelligence (AI) ?		
Very familiar	71	37.4
Somewhat familiar	109	57.4
Not very familiar	10	5.3
Not familiar at all	0	0
Total	**190**	**100**
Have you used artificial intelligence (AI) technology?		
Yes, extensively	67	35.3
Yes, to some extent	123	64.7
No, but considering	0	0
No, never	0	0
Total	**190**	**100**
What is the main reason for you to use artificial intelligence (AI) technology?		
To improve work efficiency	155	35.1
For the convenience of tasks	142	32.1
To automate repetitive tasks	69	36.5
To obtain more accurate results	76	40.2
Other (Provides ideas for thinking)	1	0.2
Total	**443**	**100**
How many years have you been using artificial intelligence (AI) technology?		
1-2 Years	111	58.4
3-4 Years	60	31.6
More than 5 Years	19	10
Total	**190**	**100**

4.2.2 Respondent demographic profile

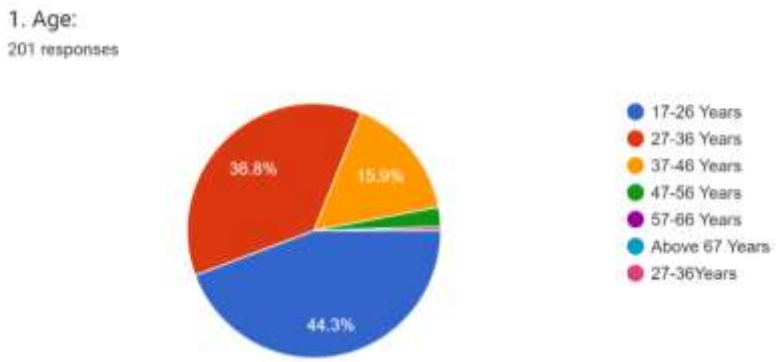
In this study, the demographic section included three questions: gender, age, Educational Background, and Marital Status.

Table 4.6: Age

		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	17-26 Years	86	45.3	45.3	45.3
	27-36 Years	69	36.3	36.3	81.6
	37-46 Years	32	16.8	16.8	98.4
	47-56 Years	3	1.6	1.6	100
	57-66 Years	0	0	0	0
	Above 67 Years	0	0	0	0
	Total	190	100	100	

Source: Developed for the research

Figure 4.6: Age



Source: Developed for the research

Table and Figure 4.6 reveal 45.3% of 86 questionnaire respondents aged 17–26. Second, 36.3% of 27–36-year-olds answered 69 questions. With 32 polls, 16.8% are 37–46. Only a small number of 47–56-year-olds got 3 surveys. No one over 57 was surveyed.

The cumulative percentage shows how many individuals responded before each age group. In the 37–46 age group, 98.4% responded.

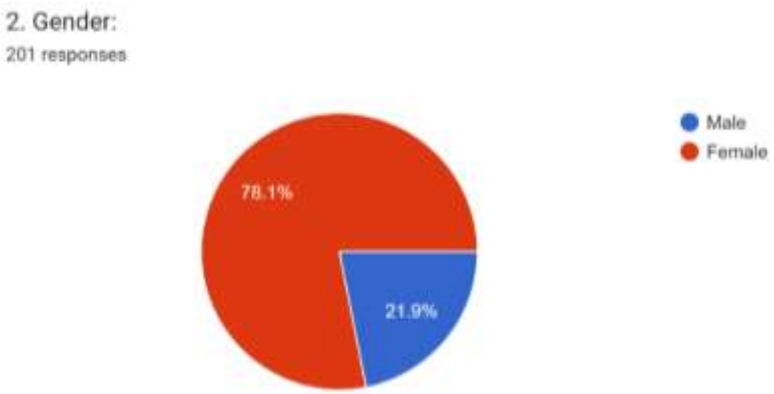
The respondent age distribution is shown. Fewer responses are older than 17–36. Participants diminish with age, perhaps because seniors are less tech-savvy. The younger generation may be more interested in AI.

Table 4.7: Gender

		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Male	151	79.5	79.5	79.5
	Female	39	20.5	20.5	100
	Total	190	100	100	

Source: Developed for the research

Figure 4.7: Gender



Source: Developed for the research

See table and figure 4.7 for survey respondent gender distribution. This study gathered 190 valid questionnaires and asked respondents to declare their gender.

Men make up 79.5% of the survey sample with 151 questionnaires, while women make up 20.5% with 39. Male survey responders outweigh female.

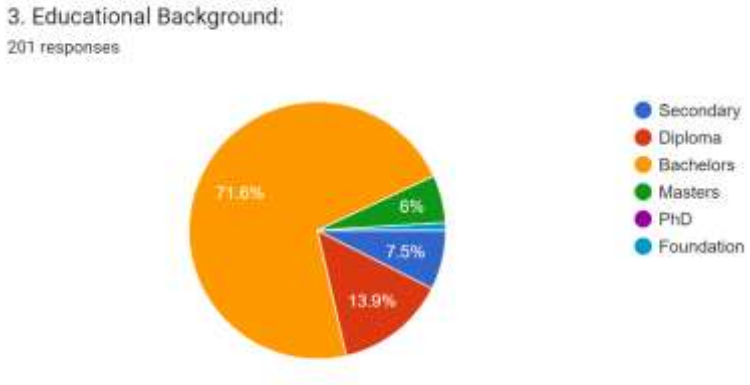
These cumulative percentages indicate how many people replied before each gender selection. When we reached "male", 79.5% had replied.

Table 4.8: Educational Background

		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Secondary	12	6.3	6.3	100
	Diploma	26	13.7	13.7	86.8
	Bachelors	139	73.2	73.2	73.2
	Masters	11	5.8	5.8	97.7
	PhD	0	0	0	0
	Foundation	2	1.1	1.1	87.9
	Total	190	100	100	

Source: Developed for the research

4.8: Educational Background



Source: Developed for the research

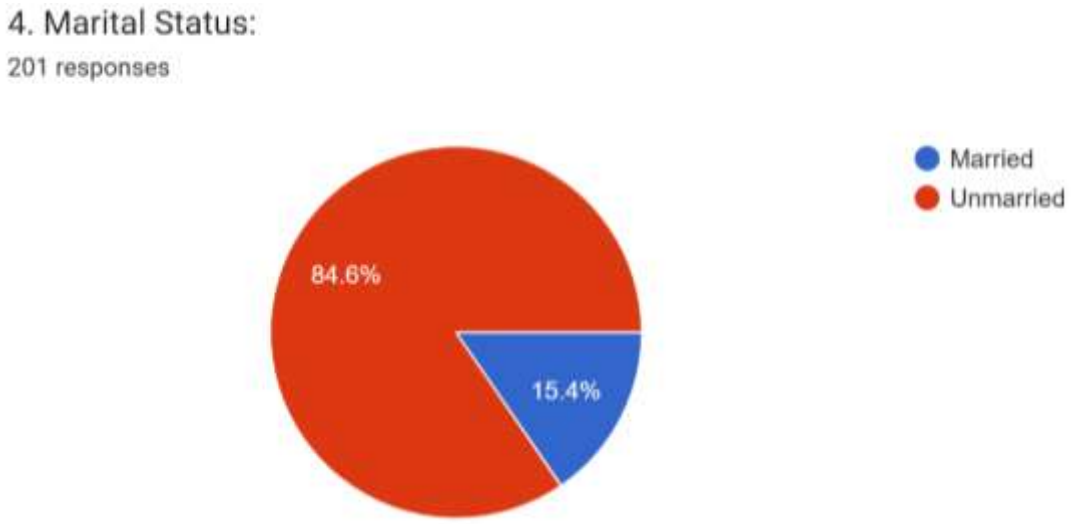
Table and figure 4.8 show the poll respondents' educational backgrounds: 12 questionnaires (6.3%) indicate high school graduates, 26 (13.7%) diploma recipients, 139 (73.2%) bachelor's degree recipients, 11 (5.8%) master's degree recipients, no doctoral degree recipients, and 2 (1.1%) basic education recipients.

Table 4.9: Marital Status

		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Married	29	15.3	15.3	15.3
	Unmarrie	161	84.7	84.7	100
	Total	190	100	100	

Source: Developed for the research

Figure 4.9: Marital Status



Source: Developed for the research

According to the data in table and figure 4.9, the marital status of the respondents is as follows. There were 29 questionnaires for married people, accounting for 15.3% of the total sample; while there were 161 questionnaires for unmarried people, accounting for 84.7% of the total sample.

This data reflects the distribution of marital status of the respondents. Most of the respondents are single

4.2.2.1 Summary of Respondents' Background

General Questions	Sample (n)	Percentage (%)
Age		
17-26 Years	86	45.3
27-36 Years	69	36.3
37-46 Years	32	16.8
47-56 Years	3	1.6
57-66 Years	0	0
Above 67 Years	0	0
Total	**190**	**100**
Gender		
Male	151	79.5
Female	39	20.5
Total	**190**	**100**
Education Background		
Secondary	12	6.3
Diploma	26	13.7
Bachelors	139	73.2
Masters	11	5.8
PhD	0	0
Foundation	2	1.1
Total	**190**	**100**
Marital Status		
Married	29	15.3
Unmarried	161	84.7
Total	**190**	**100**

4.2.3 Central Tendency

Table 4.10: Central Tendencies Measurement of AI Recommendation System

	Statement	SD	D	N	A	SA	Mean	Standard Deviation
RS 1	The recommendation system have led to better understanding of customer behaviors	1	9	25	92	63	4.09	0.834
RS 2	The recommendation system has helped in filtering the products consumers will like	0	6	24	75	85	4.26	0.798
RS 3	The recommendation system I use has helped in predicting the products consumers will like	1	9	26	89	65	4.09	0.843
RS 4	The recommendation system has helped in rating the products based on consumers' preferences	2	10	18	91	69	4.13	0.886
RS 5	The recommendation system has helped in the personalized products for consumers in the market	1	8	23	82	76	4.18	0.842
RS 6	The recommendation system has helped me in effective approach to the market	0	8	30	74	78	4.17	0.844

Source: Developed for the research

SD= Strongly Disagree, D=Disagree, N= Neutral, A= Agree, SA= Strongly Agree

Table 4.10 demonstrates AI recommender system central tendency. The recommendation system's statement standard deviation, mean, number of opinions, and standard deviation were surveyed. Statistics illustrate respondents' views:

Most or strongly approved proposals improved customer behaviour comprehension (RS 1). 92, 63 strongly agreed. Average rating: 4.09, SD: 0.834.

Second, the recommendation algorithm chooses consumer-friendly products. Most agreed

or strongly agreed. With an average rating of 4.26 and a standard deviation of 0.798, 75 agreed and 85 strongly agreed.

RS 3 respondents disagree on whether my recommendation system anticipates customer preferences. Standard deviation was 0.843, average rating 4.09. 65 strongly agreed, 89 agreed.

Most respondents agreed or were indifferent that the recommendation system follows customer preferences (RS 4). Statistics indicated 91 agreed, 69 strongly agreed, and an average rating of 4.13 and 0.886 standard deviation.

Most respondents agreed or strongly agreed that the recommendation system tailored items (RS 5). The average rating was 4.18 and the standard deviation was 0.842. 82 agreed and 76 strongly agreed.

Most respondents strongly believed that the suggestion system helped them sell (RS 6). At 4.17 average and 0.844 standard deviation, 74 agreed and 78 strongly agreed.

Table 4.11: Central Tendencies Measurement of AI Customer Service Solutions

	Statement	SD	D	N	A	SA	Mean	Standard Deviation
CS 1	The customer service solution has been responsive	1	15	49	87	38	3.77	0.878
CS 2	The customer service solution led to increased customer support workflows	0	8	34	89	59	4.05	0.812
CS 3	The customer service solution reduced the response and handle times used on customers and consumers	3	7	35	84	61	4.02	0.894
CS 4	The customer service solutions led to better predictions of customer behavior	0	12	43	81	54	3.93	0.873
CS 5	Augmented messaging identified better opportunities and helped in better routine processes	0	7	26	100	57	4.09	0.761
CS 6	The use of chatbots in SME led to increased sales in the market	1	20	39	78	52	3.84	0.963
CS 7	The customer service solution used led to increased customer engagement and interactions	2	10	31	82	65	4.04	0.902

Source: Developed for the research

SD= Strongly Disagree, D=Disagree, N= Neutral, A= Agree, SA= Strongly Agree

Table 4.11 shows AI customer service solution fundamental trend data. Survey respondents evaluated customer service.

A majority agreed or strongly agreed CS 1 responses. With 87 agreeing and 38 strongly agreeing, the average rating was 3.77 with 0.878 standard deviation.

Most respondents agreed or strongly agreed that CS 2 improved customer assistance. With 89 agreed and 59 strongly agreed, the average rating was 4.05 with 0.812 standard deviation.

CS 3, a customer service solution that reduces response and handling times, received equal support. 61% strongly agreed, 84% agreed, average 4.02 with 0.894 standard deviation.

Many respondents agreed or disagreed that customer service solutions improved consumer behaviour predictions (CS 4). With 81 agreed and 54 strongly agreed, the average rating was 3.93 with 0.873 standard deviation.

Most agreed or strongly agreed that improved messaging expands options and processes (CS 5). 100 agreed, 57 strongly agreed, 4.09 mean, 0.761 SD.

Most agreed or were indifferent about SMEs using chatbots to sell (CS 6). 78 agreed, 52 strongly agreed, 3.84 average, 0.963 SD.

Finally, most respondents agreed or strongly agreed that the customer service solution increased customer engagement and interactions (CS 7). With 82 agreeing and 65 strongly agreeing, the average rating was 4.04 with 0.902 standard deviation.

Table 4.12: Central Tendencies Measurement of AI Inventory Management System

	Statement	SD	D	N	A	SA	Mean	Standard Deviation
IM 1	The inventory management I use has led to better records management	1	5	46	74	64	4.03	0.857
IM 2	Better stock taking was enhanced through the system	2	4	29	84	71	4.15	0.829
IM 3	I stated vendor managed inventory from the inventory management system implemented	1	5	30	90	64	4.11	0.799
IM 4	Orders were got in time as a result of the inventory management system	1	6	29	79	75	4.16	0.836
IM 5	I reduced resources wastages as a result of implementing inventory management system	0	2	32	87	69	4.17	0.739
IM 6	I have increased continuous production from the inventory management I use	1	7	38	82	62	4.04	0.851
IM 7	The delivery lead time has decreased from using AI inventory management system	1	13	41	75	60	3.95	0.924

Source: Developed for the research

SD= Strongly Disagree, D=Disagree, N= Neutral, A= Agree, SA= Strongly Agree

AI inventory management system key patterns are shown in Table 4.12 with respondent ratings.

Most agreed or strongly agreed that inventory management enhances records management (IM 1). Specifically, 64 strongly agreed and 74 agreed. The average rating was 4.03, with 0.857 standard deviation.

Most respondents agreed or strongly agreed the method enhanced stock taking (IM 2).

With 84 agreeing and 71 strongly agreeing, the average rating was 4.15 with 0.829 standard deviation.

Vendor-managed inventory management system (IM 3) received excellent feedback. 90 agreed, 64 strongly agreed, averaging 4.11 with a standard deviation of 0.799.

Most respondents agreed or strongly agreed that inventory management helps fulfil orders on schedule (IM 4). With 79 agreements and 75 strong agreements, the average rating was 4.16 with 0.836 standard deviation.

Most responders agreed or strongly agreed that IM 5 decreased resource waste. The average grade was 4.17 with a standard deviation of 0.739 for 87 agreements and 69 strong agreements.

Inventory management (IM 6) was praised for boosting continuous output. 82 agreed, 62 strongly agreed, for a 4.04 average and 0.851 standard deviation.

Final thoughts on whether the AI inventory management system (IM 7) cut delivery time were varied. Many responses agreed or strongly agreed. For 75 agreements and 60 strong agreements, the average rating was 3.95 with a standard deviation of 0.924.

Table 4.13: Central Tendencies Measurement of AI-Driven Data Analytics

	Statement	SD	D	N	A	SA	Mean	Standard Deviation
AD 1	Data analytics has helped me in decreasing expenses in the organization	0	8	28	77	77	4.17	0.833
AD 2	Data analytics has helped me in launching new products and services to consumers	0	7	24	89	70	4.17	0.785
AD 3	Data analytics has helped in transforming the business for the future	1	4	22	82	81	4.25	0.783
AD 4	Use of data analytics has helped in finding new innovative avenues	0	3	27	91	69	4.19	0.732
AD 5	Data analytics has enabled me predict consumer demand and stopped shortage	2	7	22	80	79	4.19	0.860
AD 6	Data analytics has helped in the accurate prediction of change in customer preferences and needs	0	4	29	76	81	4.23	0.783
AD 7	Use of data analytics has enabled me forecast demand in the market	0	4	22	92	72	4.22	0.730
AD 8	I have been able to increase my supply chain agility as a result of data analytics	0	1	27	89	73	4.23	0.705

Source: Developed for the research

SD= Strongly Disagree, D=Disagree, N= Neutral, A= Agree, SA= Strongly Agree

Table 4.13 shows respondents' opinions on AI-driven data analytics' central tendencies.

Most respondents agreed or strongly agreed that data analytics lowered corporate expenditures (AD1). With 77 agreeing and 77 strongly agreeing, the average rating was 4.17 with 0.833 standard deviation.

Data analytics helps introduce new goods and services to customers, according to most

respondents (AD2). The average rating was 4.17 with a 0.785 standard deviation because 89 agreed and 70 strongly agreed.

Data analytics' role in corporate transformation (AD3) was praised. With 82 agreeing and 81 strongly agreeing, the average rating was 4.25 with 0.783 standard deviation.

Most respondents agreed or strongly agreed that data analytics can innovate (AD4). 91 respondents agreed and 69 strongly agreed, yielding a 4.19 average rating and 0.732 standard deviation.

Most respondents agreed or strongly agreed that data analytics can estimate customer demand and avert shortages (AD5). The average grade was 4.19 with 0.860 standard deviation for 80 agreements and 79 strong agreements.

AD6: Most respondents agreed or strongly agreed that data analytics predicts client preferences and demands. The average grade was 4.23 with a standard variation of 0.783 for 76 agreements and 81 strong agreements.

Data analytics for market demand forecasting (AD7) was favourably appreciated. Notably, 92 agreed and 72 strongly agreed, giving in a 4.22 average rating and 0.730 standard deviation.

Finally, most respondents agreed or strongly agreed that data analytics improves supply chain agility (AD8). The average grade was 4.23 with a standard variation of 0.705 for 89 agreements and 73 strong agreements.

Table 4.14: Central Tendencies Measurement of Success of SMEs in E-commerce

	Statement	SD	D	N	A	SA	Mean	Standard Deviation
SS1	The recommendations has helped me to succeed in the market	1	16	37	85	51	3.89	0.916
SS2	The use of customer service solutions has helped in better customer management	4	9	16	95	66	4.11	0.896
SS3	Using inventory management has enabled me succeed in increasing production and supply chain	2	6	22	90	70	4.16	0.827
SS4	Data analytics has helped me in succeeding to produce new products and services in the market	1	8	25	92	64	4.11	0.823
SS5	I have succeeded as a result of data analytics I employed	2	10	26	88	64	4.06	0.883

Source: Developed for the research

SD= Strongly Disagree, D=Disagree, N= Neutral, A= Agree, SA= Strongly Agree

Table 4.14 shows that most respondents agreed or strongly agreed that the advice helped them succeed in the market (SS1). 85 people agreed and 51 strongly agreed, resulting in an average rating of 3.89 with a standard deviation of 0.916.

Most respondents agreed or strongly agreed that customer service solutions improve customer management (SS2). The average rating was 4.11 with a standard deviation of 0.896 because 95 people agreed and 66 strongly agreed.

Inventory management improved production and supply chain (SS3), according to most opinions. The average rating was 4.16 with a standard deviation of 0.827, with 90 agreeing and 70 strongly agreeing.

Most respondents agreed or strongly agreed that data analytics helps create new products and services (SS4). Notably, 92 respondents agreed and 64 strongly agreed, resulting in a 4.11 average rating with 0.823 standard deviation.

Most respondents agreed or strongly agreed that data analytics (SS5) was successful. With 88 agreements and 64 strong agreements, the average rating was 4.06 with 0.883 standard deviation.

4.3 Scale measurement

4.3.1 Reliability Test

Table 4.16: Reliability Test for each Variables

No.	Variables	Cronbach's Alpha	No. of items	Result
1	AI Recommendation System	0.887	6	Good
2	AI Customer Service Solutions	0.874	8	Good
3	AI Inventory Management System	0.874	7	Good
4	AI-Driven Data Analytics	0.911	8	Excellent
5	Success of SMEs	0.888	5	Good

To evaluate reliability test for each variables, Table 4.16 was investigated. Cronbach's Alpha is 0.887 for the AI Recommendation System, showing strong internal consistency. The analysis's 6 items show strong recommendation system effectiveness measure internal consistency. AI Customer Service Solutions has "Good" Cronbach's Alpha of 0.874. This indicates good internal consistency across the 8 customer service solution evaluation elements. The AI Inventory Management System's 7 inventory management components had "Good" Cronbach's Alpha values of 0.874. AI-Driven Data Analytics' Cronbach's Alpha was 0.911, "Excellent." The 8 data analytics elements reviewed are internally consistent. Finally, the variable measuring SME success scored a "Good" Cronbach's Alpha of 0.888. These data indicate internal consistency in SME performance measuring items. The research asked 5 questions. We found strong internal consistency across AI technology and SME performance questions in the dependability test. Increases research data dependability.

4.4 Inferential Analysis

4.4.1 Normality

Table 4.17: Normality Test of Overall Data

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
AI Recommendation Systems	0.187	190	0.000	0.902	190	0.000
AI Customer Service Solutions	0.087	190	0.001	0.967	190	0.000
AI Inventory Management Systems	0.124	190	0.000	0.945	190	0.000
AI Driven Data Analytics	0.113	190	0.000	0.927	190	0.000
Success of SMEs	0.175	190	0.000	0.889	190	0.000

Source: Developed for the Research

Table 4.17 shows Kolmogorov-Smirnov and Shapiro-Wilk normality tests for each variable's overall data.

The Kolmogorov-Smirnov statistic for AI Recommendation Systems is 0.187 with a significance level of 0.000, indicating a non-normal distribution. The Shapiro-Wilk value is 0.902 with a significance level of 0.000, likewise indicating a deviation from normality.

AI Customer Service Solutions' Kolmogorov-Smirnov and Shapiro-Wilk tests show a significant deviation from normality, with statistics of 0.087 (p-value = 0.001) and 0.967 (p-value = 0.000).

The Kolmogorov-Smirnov and Shapiro-Wilk tests for AI Inventory Management Systems demonstrate a significant deviation from normalcy, with statistics of 0.124 (p-value = 0.000) and 0.945, respectively.

AI-Driven Data Analytics data also deviates from a normal distribution, with Kolmogorov-Smirnov and Shapiro-Wilk statistics of 0.113 and 0.927 (p-value = 0.000).

Finally, both Kolmogorov-Smirnov and Shapiro-Wilk tests show a significant deviation from normality for the Success of SMEs variable, with statistics of 0.175 and 0.889, respectively.

4.4.2 Correlations

Table 4.18: Rule of Thumb for Interpreting the Value of Correlation Coefficient Data (Schober, 2018)

Value of Correlation Coefficient Data	Strength of Correlation
0.00-0.10	Negligible
0.10-0.39	Weak
0.40-0.69	Moderate
0.70-0.89	Strong
0.90-1.00	Very Strong

Table 4.18 shows Schober's 2018 correlation coefficient evaluation guidelines. The calculated correlation coefficient is shown in this table to help understand the relationship between two variables. Per these instructions:

Correlation coefficients between 0.00 and 0.10 suggest weak or absent associations between variables. Weak correlations (0.10-0.39) suggest a low likelihood for variables to move together. Moderate correlation values of 0.40 to 0.69 indicate a larger tendency for variables to move together. Strong correlations between 0.70 and 0.89 suggest steady variable movement. Finally, a correlation score between 0.90 and 1.00 shows a near-perfect relationship when variables move in the same direction.

Table 4.19: Correlations

		DV1	IV1	IV2	IV3	IV4
Success of SMEs in E-commerce Sector	Pearson Correlation	1	0.540**	0.647**	0.657**	0.660**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
	N	190	190	190	190	190
AI Recommendation Systems	Pearson Correlation	0.540**	1	0.656**	0.629**	0.612**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
	N	190	190	190	190	190
AI Customer Service Solutions	Pearson Correlation	0.647**	0.656**	1	0.679**	0.647**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
	N	190	190	190	190	190
AI Inventory Management Systems	Pearson Correlation	0.657**	0.629**	0.679**	1	0.808**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
	N	190	190	190	190	190
AI Driven Data Analytics	Pearson Correlation	0.660**	0.612**	0.647**	0.808**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
	N	190	190	190	190	190

Note: Correlation is significant at the 0.01 level (2-tailed)

Table 4.19 correlates DV1 (SMEs' E-commerce Success) with IV1–IV4 (AI Recommendation Systems, Customer Service Solutions, Inventory Management Systems, and Driven Data Analytics). Each correlation coefficient has a 2tailed test significance level (Sig.) and sample size (N).

All independent factors (IV1–IV4) exhibit high positive correlations with SME performance, ranging from 0.540 to 0.660, with p-values below 0.001.

With p-values < 0.001, AI Recommendation Systems linked favourably with all

independent variables (IV1–IV4), ranging from 0.540 to 0.656.

AI Customer Service Solutions favourably associated with all independent variables (IV1-IV4) (0.647-0.679, p-values < 0.001).

With p-values < 0.001, AI Inventory Management Systems positively correlate with all independent variables (IV1–IV4), ranging from 0.657 to 0.808.

Finally, AI Driven Data Analytics correlates substantially with all independent variables (IV1–IV4), ranging from 0.660 to 0.808 with p-values < 0.001.

4.4.3 Multi Linear Regression

Table 4.20: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.730 [a]	0.533	0.523	0.49906

a. Predictors: (Constant), AI Driven Data, AI Recommendation System, AI Customer Service Solutions, AI Inventory Management Systems

Source: Developed for the Research

Table 4.20 provides a brief regression model performance summary. The R-squared score is 0.533, indicating that independent variables explain 53.3% of the dependent variable's variance. The adjusted R-squared value, which accounts for model predictors, is 0.523. Estimated standard error is 0.49906.

Table 4.21 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	52.620	4	13.155	52.817	0.00[b]
	Residual	46.077	185	0.249		
	Total	98.697	189			

a. Dependent Variable: Success of SMEs
b. Predictors: (Constant), AI Driven Data, AI Recommendation System, AI Customer Service Solutions, AI Inventory Management Systems

Source: Developed for the Research

ANOVA results are in Table 4.21. The regression model's F-statistic is 52.817, with Sig < 0.001. This shows that the regression model explains dependent variable variability statistically.

Table 4.22: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig
		B	Std. Error			
0.2011	(Constant)	0.235	0.272		0.866	0.387
	AI Recommendation Systems	0.053	0.076	0.050	0.694	0.488
	AI Customer Service Solutions	0.332	0.083	0.302	3.991	0.000
	AI Inventory Management Systems	0.231	0.106	0.201	2.185	0.030
	AI Driven Data Analytics	0.321	0.105	0.271	3.063	0.003

a. Dependent Variable: Success of SMEs

Source: Developed for the Research

Based on the output from Table 4.22, the linear equation is formed as below:

SS = 0.235 + 0.053(RS) + 0.332(CS) + 0.231(IM) + 0.321(AD) + ε

Where:

- SS = Success of SMEs in E-commerce Sector
- RS = AI Recommendations Systems
- CS = AI Customer Service Solutions
- IM = AI Inventory Management Systems
- AD = AI Data Driven Analytics

Table 4.22's coefficients show how several AI-driven variables affect SMEs. To understand SMEs, the coefficients illustrate how each independent variable influences the dependent variable.

Several fascinating outcomes are in the table. When all other parameters are zero, 0.235 measures SME performance. Its influence on SME performance is not statistically significant due to a 0.272 standard error and 0.387 p-value.

AI Customer Service Solutions improve SMEs by 0.332. SMEs benefit greatly from AI-driven customer service. The coefficient is very significant (p-value < 0.001).

AI-Driven Data Analytics improves SME performance (coefficient 0.321, p-value 0.003). SMEs need AI-driven data analytics to grow.

However, AI Recommendation Systems and AI Inventory Management Systems have 0.053 and 0.231 coefficients. These characteristics benefit SMEs, but AI Customer Service Solutions and Driven Data Analytics do more.

Finally, regression coefficients illustrate how AI impacts SME performance. New technologies are needed for AI Customer Service Solutions and AI Driven Data Analytics to boost SME performance and market competitiveness.

4.5 Testing of Hypotheses

In this study, there are 4 hypothesis had been developed to examine in this study and the suggested hypothesis are shown below:

H1: There is a significant relationship between AI recommendation systems and the overall success of SMEs in the e-commerce sector

H2: AI customer service solutions are closely connected with small and medium enterprises in the e-commerce sector.

H3: The role AI inventory management plays in the success of SMEs in the e-commerce sector.

H4: The link between AI-based data analytics and the overall success of SMEs in the e-commerce sector

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

This chapter will summarise the results of the whole study. Research will examine how independent variables impact the dependent variable, test hypotheses, and evaluate the dependent-independent interaction. The research's implications and primary hypothesis results will be reviewed in this chapter. This chapter finishes with a short review of the researchers' limitations and research suggestions.

5.1 Summary of statistical analysis

Additional experiments with 190 respondents expanded Chapter Four's research. Of them, 39 were women and 151 males. Most of the 86 responders were 17–26. The 27–36 age group included 36.3% of responders, or 69. Three respondents aged 47–56 made up 1.6%. Different academic levels received the survey questionnaire equally. The majority of target respondents held bachelor's, diploma, and master's degrees.

General inquiry indicated that 190 respondents were AI experts and 5.3% (10 respondents) were unaware. This means 10 responders understood AI. The poll also found that 111 respondents have used AI technology for one to two years, 60 for three to four years, and 10% for five years. Most said AI might enhance work productivity and simplify task completion and accuracy.

The mean and standard deviation of each variable showed central tendency. A standard deviation of 0.8–0.9 indicates that the data is evenly distributed and that most respondents agree with the questionnaire. All criteria average between 3.9 and 4.2, suggesting that participants "Agree" and "Strongly Agree" with the study issue. Researchers assessed each variable's reliability. Cronbach's Alpha exceeded 0.8. Maharana, Mondal, and Nemade (2022) define dependability as Cronbach's Alpha > 0.6. This study's variables are reliable

with Cronbach's Alpha > 0.8. Table 4.17 shows Kolmogorov-Smirnov and Shapiro-Wilk tests for variable normality. Every variable shows considerable deviation from normal. Shapiro-Wilk and Kolmogorov-Smirnov statistics of 0.902 and 0.187 indicate that AI recommendation system data deviates from a normal distribution. Both tests reveal AI Customer Service Solutions, AI Inventory Management Systems, AI Driven Data Analytics, and SME Success in E-commerce Sector deviating from normalcy with p-values less than 0.05. These results show that all variables contradict the premise of normality, necessitating non-normal distribution statistical methods for further study.

This research examined independent-dependent relationships using Pearson correlation analysis. SME success (DV1) was Pearson-correlated. AI Driven Data Analytics (IV4) had the highest R value, 0.660, followed by AI Inventory Management Systems (IV3), 0.657, AI Customer Service Solutions (IV2), 0.647, and AI Recommendation Systems, 0.540 Thus, SME performance dependent variable DV1 is substantially associated with IV4, IV 3, and IV 2.

This research used multiple regression and got 0.533 R Square. Independent factors explain 53.3% of dependent variable variability.

Analysis of variance's F test finds mean equivalence. Table 4.21 shows 52.817 F and 0.000 p. Thus, all independent factors affect SME performance with significance levels below 0.001.

5.2 Discussions of Major Findings

The objective of current study is to determine the impact of the independent variables; AI Recommendations Systems, AI Inventory Management Systems, AI Customer Service Solutions and AI Driven-Data Analytics with dependent variable of Success of SMEs. Based on the detailed findings disclosed in previous chapter, it portrayed that the research team had met the objectives set in the study.

5.2.1 Relationship between AI recommendation systems and the overall success of SMEs in the e-commerce sector

The regression model's positive coefficient (0.053) for AI recommendation systems demonstrates their association with SMEs' e-commerce success. This coefficient is tiny, but it shows a favourable association between AI recommender systems and SME success.

This suggests that AI recommendation systems may improve consumer experience and sales, but other variables may limit their impact (Mori, 2023).

5.2.2 AI customer service solutions are closely connected with small and medium enterprises in the e-commerce sector.

AI customer service solutions are strongly correlated with small and medium-sized e-commerce firms (0.332) in the regression model.

The extremely significant p-value suggests that AI customer service solutions improve customer management and service quality, according to Mohanty, Lingam, and Acharya. This may include quicker responses, more accurate answers, and better service.

5.2.3 The role AI inventory management plays in the success of SMEs in the e-commerce sector.

AI inventory management helps SMEs succeed in e-commerce, as shown by the regression model's positive coefficient (0.231). Despite being smaller than the AI customer service solution, this coefficient is statistically significant ($p = 0.030$).

AI-optimized inventory management improves manufacturing efficiency and supply chain management, boosting company success (Colehower, 2023).

5.2.4 The link between AI-based data analytics and the overall success of SMEs in the e- commerce sector

In the regression model, AI-driven data analysis has a positive coefficient (0.321) that is highly significant ($p = 0.003$) and links to SMEs' e-commerce performance.

Data analytics may help firms understand market demands, identify trends, and create better strategic strategies, according to a high p-value.

5.3 Implications of the Study

5.3.1 Practical Implications for Policy Makers and Practitioners

This study underlines the transformational power that AI algorithms carry for small and medium-sized enterprises (SMEs) in the e-commerce field where AI technologies can have a significant impact on operation efficiency and competitiveness. For the policymakers and practitioners, the implications of the present body of knowledge are manifold. For the policymakers, the outcome of the study underscored the need to put in place supporting policies which ease the adoption of AI by the SMEs, through reinforcing the provision of funding, training and infrastructure development. For the business world, this research represents the reminder that performing AI integrated model into their business will increase service and products quality as well as adaptability to the market. Such a research is an ideal SMEs guideline to integrate intelligence and thus come up with the most optimized processes and effective market entrance.

5.3.2 Theoretical Implications from Academic Perspective

In reality, the given study enriches the body of knowledge via applying the Technology-Organization-Environment (TOE) framework within the SME framework and looking at AI impact on e-commerce in more detail. It is an original contribution, by documenting data-driven evidence on the impacts of AI adoption to SME performance, customer satisfaction, and organizational adaptability. This research however, open new directions for further theoretical discussions as it interlink the AI advancement and organizational development. This research adds to the existing theory in this field substantiating and exploring the concept of technology adoption and business performance in the digital era on the basis of evidence.

5.4 Limitations of the Research

This research project recognized several limitations that emerged during its execution. The main limitation of the study is the nature of the data collection, which is based on self-reported data from representatives of SMEs, which may lead to bias or misunderstanding when determining the impact of AI. Therefore, in the next collection of data, face to face can be used to obtain more accurate primary data. Beyond this, the emphasis on Malaysian SMEs may narrow the scope of global differences in AI adoption and implementation, which in turn reduces the generalizability of the results. Therefore, the entire scope of the investigation can be expanded in the future, not just limited to Malaysia or SMEs companies. As with any research, this study is not without certain limitations, but it is still valuable because there is always another angle to look at a given phenomenon. The study's limitations have been widely used as context for future research efforts to improve the reliability of the study using longitudinal data or cross-cultural comparisons.

5.5 Recommendations for Future Research

Given this study's findings and acknowledgement of their limitation, future research is advised to broaden the horizons both in terms of topic of study and its methodology. The future studies should consider longitudinal designs as they can investigate the short- and long-term impacts of AI on SMEs for extended periods. This would set out the continuous and progressive nature of AI technology and stimulate new approaches in business and consumer behavior.

The implications of AI on SMEs e-commerce could be widened to encompass the different influences of AI on distinctly various e-commerce business models and sizes of SMEs. Therefore, a comparative analysis would be there to address the diverse impacts and prevalent trends that could apply to the niches in e-commerce.

On the methodological side, the application of qualitative approaches in in-depth face-to-face interviews or practical cases could contribute to the insight into the extraordinary local aspects of the small and new businesses' AI integration in their everyday operations. The

integration of mixed-methods research approaches would instead synthesize the multi-dimensional nature of AI application in e-commerce by giving a richer understanding of the role.

5.6 Conclusion

In the preceding chapter, the researcher provided a summary of all the analyses and conclusions. The discussion in this chapter indicates that, with the exception of AI recommendation systems, all independent variables (AI customer service solutions, AI inventory management system, and AI driven-data analytics) have a direct relationship with the dependent variable (Success of SMEs in E-commerce Sector). These relationships are also related to some prior studies. Furthermore, researchers might provide management implications for institutions, society, and future researchers modelling the viewpoints covered in the study. Lastly, a platform and set of suggestions are given to upcoming scholars.

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(APPENDIX A)

Questionnaire

UNIVERSITU TUNKU ABDUL RAHMAN
FACULTY OF ACCOUNTANCY AND MANAGEMENT
DEPARTMENT OF INTERNATIONAL BUSINESS

Research Questionnaire

Instructions:

1. This questionnaire consists of **FOUR** (6) sections. Please answer **ALL** questions in **ALL** sections.
2. It will only need approximately 15-20 minutes to complete the entire questionnaire.
3. The contents of this questionnaire will be kept **strictly confidential**.

SECTION A: GENERAL QUESTIONS

Please tick (✓) the following answer box for each question given below.

1. How familiar are you with the concept of artificial intelligence (AI) ?

Very familiar ☐ Somewhat familiar ☐

Not very familiar ☐ Not familiar at all ☐

2. Have you used artificial intelligence (AI) technology?

Yes, extensively ☐ Yes, to some extent ☐

No, but considering ☐ No, never ☐

3. What is the main reason for you to use artificial intelligence (AI) technology?

To improve work efficiency ☐ For the convenience of tasks ☐

To automate repetitive tasks ☐ To obtain more accurate results ☐

Other ☐

4. How many years have you been using artificial intelligence (AI) technology?

1-2 Years ☐ 3-4 Years ☐

More than 5 Years ☐

SECTION B: DEMOGRAPHIC BACKGROUND

Please tick (√) according to the answers in the boxes that best represents you.

1. Age:

17-26 Years	☐	27-36 Years	☐	37-46 Years	☐
47-56 Years	☐	57-66 Years	☐	Above 67 Years	☐

2. Gender:

Male ☐ Female ☐

3. Educational Background:

- Secondary ☐
- Bachelors ☐
- Masters ☐
- PhD ☐

4. Marital Status:

Married ☐ Unmarried ☐

SECTION C: MEASUREMENT FOR INDEPENDENT VARIABLE

A Likert Scale will be used in this section where 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree), and 5 (Strongly Agree).

I. Recommendation System

	Measurement	1	2	3	4	5
1	The recommendation systems have led to better understanding of customer behaviours					
2	The recommendation system has helped in filtering the products consumers will like					
3	The recommendation system I use has helped in predicting the products consumers will like					
4	The recommendation system has helped in rating the products based on consumers' preferences					
5	The recommendation system has helped in the personalized products for consumers in the market					
6	The recommendation system has helped me in effective approach to the market					

II. Customer Service Solutions

	Measurement	1	2	3	4	5
1	The customer service solution has been responsive					
2	The customer service solution led to increased customer support workflows					
3	The customer service solution reduced the response and handle times used on customers and consumers					
4	The customer service solutions led to better predictions of customer behavior					
5	Augmented messaging identified better opportunities and helped in better routine processes					
7	The use of chatbots in SME led to increased sales in the market					
8	The customer service solution used led to increased customer engagement and interactions					

III. Inventory Management System

	Measurement	1	2	3	4	5
1	The inventory management I use has led to better records management					
2	Better stock taking was enhanced through the system					
3	I started vendor managed inventory from the inventory management system implemented					
4	Orders were got in time as a result of the inventory management system					
5	I reduced resources wastages as a result of implementing inventory management system					
6	I have increased continuous production from the inventory management I use					
7	The delivery lead time has decreased from using AI inventory management system					

IV. AI-Driven Data Analysis

	Measurement	1	2	3	4	5
1	Data analytics has helped me in decreasing expenses in the organization					
2	Data analytics has helped me in launching new products and services to consumers					
3	Data analytics has helped in transforming the business for the future					
4	Use of data analytics has helped in finding new innovative avenues					
5	Data analytics has enabled me predict consumer demand and stopped shortage					
6	Data analytics has helped in the accurate prediction of change in customer preferences and needs					
7	Use of data analytics has enabled me forecast demand in the market					
8	I have been able to increase my supply chain agility as a result of data analytics					

SECTION D: MEASUREMENT FOR DEPENDENT VARIABLE

A libertarian Scale will be used in this section where 1 (Strongly Disagree), 2 (Disagree), 3 (Neutral), 4 (Agree), and 5 (Strongly Agree).

I. Success of SMEs

	Measurement	1	2	3	4	5
1	The recommendations system has help me to succeed in the market					
2	The use of customer service solutions has helped in better customer management					
3	Using inventory management has enabled me succeed in increasing production and supply chain					
4	Data analytics has helped me in succeeding to produce new products and services in the market					
5	I have succeeded as a result of data analytics I employed.					

(APPENDIX B)

5 Point Likert Scale

Table 3.1: 5-point Likert Scale

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

THE END