T.R.
ISTANBUL SABAHATTIN ZAIM UNIVERSITY
GRADUATE EDUCATION INSTITUTE
DEPARTMENT OF BUSINESS ADMINISTRATION

USING ARTIFICIAL INTELLIGENCE FOR ENHANCING E-COMMERCE IN FOREIGN TRADE

MA THESIS

Ameen Abdelbaset Alı Omar ABDELMALIK

Istanbul

July-2025

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July-2025

This study has been approved in partial fulfillment of the requirements for MA Degree in Business Administration

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DECLARATION OF SCIENTIFIC ETHICS AND ORIGINALITY

This is to certify that this MA thesis titled "**Using Artificial Intelligence for Enhancing E-Commerce in Foreign Trade**" is my own work and I have acted according to scientific ethics and academic rules while producing it. I have collected and used all information and data according to scientific ethics and guidelines on thesis writing of Sabahattin Zaim University. I have fully referenced, in both the text and bibliography, all direct and indirect quotations and all sources I have used in this work.

Ameen Abdelbaset Alı Omar ABDELMALIK

Istanbul, July 2025

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Ameen Abdelbaset Alı Omar ABDELMALIK

Istanbul, July 2025

ABSTRACT

USING ARTIFICIAL INTELLIGENCE FOR ENHANCING E-COMMERCE IN FOREIGN TRADE

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M. A., Department of Business Administration

Supervisor: Asst. Prof. Dr. Tuğçenur EKİNCİ FURTANA

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In the world of global trade, e-commerce deals with many difficulties, like complicated customs rules, different payment methods, cultural and language differences, and tough logistics. This thesis looks at how artificial intelligence (AI) can help solve these problems and improve how e-commerce works in international trade. The study uses a single-method approach that includes interviews to examine how AI technologies, such as machine learning, natural language processing, and computer vision, are used in key parts of e-commerce. These areas include making supply chains more efficient, managing inventory better, creating personalized marketing plans, and helping with international business deals. The results show that using AI leads to big improvements in how well e-commerce runs, more accurate predictions, and better customer interaction.

The research also shows how AI can make international trade easier, save money, and help businesses from all kinds of backgrounds reach global markets.

The thesis ends with practical advice for e-commerce companies, government officials, and tech creators to make the most of AI while considering ethical and legal issues. It also points out possible areas for future research to better understand how AI is changing international e-commerce over time.

Key terms: Artificial Intelligence, E-commerce, Foreign Trade, Machine Learning, Personalized Marketing, Customer Engagement.

ÖZET

ULUSLARARASI TİCARETTE E-TICARETİ GELİŞTİRMEK İÇİN YAPAY ZEKA KULLANIMI

Ameen Abdelbaset Alı Omar ABDELMALIK

Yüksek Lisans, İşletme

Tez Danışmanı: Dr. Öğr. Üyesi Tuğçenur EKİNCİ FURTANA

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Küresel ticaret bağlamında e-ticaret, karmaşık gümrük prosedürleri, çeşitli ödeme sistemleri, kültürel ve dil engelleri ile karmaşık lojistik gibi birçok zorlukla karşı karşıyadır. Bu tez, yapay zekânın (AI) bu engelleri aşmak ve dış ticarette e-ticaret operasyonlarını geliştirmek için nasıl kullanılabileceğini araştırmaktadır. Görüşmeleri içeren tek yöntemli bir araştırma yaklaşımının kullanılmasıyla, çalışma, makine öğrenimi, doğal dil işleme ve bilgisayar görüşü gibi yapay zekâ teknolojilerinin e-ticaretin temel alanlarında uygulanmasını incelemektedir. Bu alanlar arasında tedarik zinciri optimizasyonu, envanter yönetimi, kişiselleştirilmiş pazarlama stratejileri ve sınır ötesi işlemlerin kolaylaştırılması yer almaktadır. Bulgular, yapay zekâ entegrasyonunun operasyonel verimlilikte önemli iyileşmelere, tahmin doğruluğunda artışa ve müşteri katılımında yükselişe yol açtığını ortaya koymaktadır.

Ayrıca, araştırma, yapay zekânın uluslararası ticaret süreçlerini kolaylaştırma, maliyetleri düşürme ve her büyüklükteki işletme için küresel pazar erişimini teşvik etme potansiyelini vurgulamaktadır. Tez, e-ticaret işletmeleri, politika yapıcılar ve teknoloji geliştiriciler için yapay zekânın faydalarını maksimize ederken etik ve düzenleyici hususları ele almak üzere uygulanabilir önerilerle sona ermektedir. Ayrıca, uluslararası e-ticarette yapay zekânın gelişen rolünü daha fazla keşfetmek için gelecekteki araştırma alanlarını belirlemektedir.

Anahtar Sözcükler: Yapay Zeka, E-Ticaret, Dış Ticaret, Makine Öğrenimi, Kişiselleştirilmiş Pazarlama, Müşteri Katılımı.

TABLE OF CONTENTS

THESIS APPROVAL ..... **i**

DECLARATION OF SCIENTIFIC ETHICS AND ORIGINALITY ..... **ii**

ACKNOWLEDGEMENTS ..... **iii**

ABSTRACT ..... **iv**

ÖZET ..... **v**

TABLE OF CONTENTS ..... **vi**

LIST OF FIGURES ..... **x**

LIST OF ABBREVIATIONS ..... **xi**

CHAPTER I

INTRODUCTION **1**

1.1. Background 2

1.2. Motivation of the Study 3

1.3. Research Objectives 3

1.3.1. Research Questions 4

1.4. Research Methodology 4

1.5. Scope and Limitations 4

1.6. Structure of the Study 5

CHAPTER II

LITERATURE REVIEW **7**

2.1. Evolution of E-commerce in Foreign Trade 7

2.1.1. Historical development of E-commerce 7

2.1.2. The impact of E-commerce on international trade 9

2.1.3. E-commerce and its role in global trade 11

2.1.4. The effects of e-commerce on the economy 12

2.2. Key Concepts in Artificial Intelligence 14
2.2.1. Core AI Technologies in E-Commerce (ML, NLP, CV) 15
2.3. Integration of AI in International Business 16
2.3.1. AI in International Trade Compliance 17
2.3.2. Case Examples of AI Integration in International Business 17
2.3.3. Strategic Implications 17
2.4. Summary of Key Literature Findings 18

CHAPTER III
ARTIFICIAL INTELLIGENCE 20
3.1. Applications of AI in E-Commerce 20
3.2. AI-Driven Supply Chain, Forecasting, and Marketing Personalization 20
3.2.1. AI in Supply Chain Management 21
3.2.2. Inventory Forecasting with AI 22
3.2.3. AI in Personalized Marketing 22
3.2.4. AI-Powered Customer Service and Engagement 23
3.2.5. AI in Fraud Detection and Cybersecurity 23
3.2.6. Visual Search and Augmented Reality (AR) 23
3.3. AI in Cross-Border E-Commerce 23
3.3.1. Enhancing Cross-Border Logistics and Supply Chains 24
3.3.2. Multilingual Support and Cultural Localization 24
3.3.3. Personalization and Dynamic Pricing Across Markets 24
3.3.4. Fraud Detection and Regulatory Agreement 24
3.4. Impact of AI on Consumer Behavior and Business Models 25
3.4.1. Analysis of business performance changes with AI integration 25
3.4.2. Exploration of consumer trust and behavior in AI-based platforms 25
3.5. Challenges and Limitations in AI Adoption 26

3.5.1. Data Quality and Management 26
3.5.2. High Implementation Costs 26
3.5.3. Algorithmic Bias and Fairness 27
3.5.4. Regulatory and Ethical Concerns 27
3.5.5. Integration with Legacy Systems 27
3.5.6. Talent Shortage and Skill Gaps 28
3.6. Issues related to scalability, data quality, and cross-border logistics 28
3.6.1. Scalability Challenges 28
3.6.2. Data Quality Issues 28
3.6.3. Cross-Border Logistics Challenges 29

CHAPTER IV
REGULATORY AND ETHICAL CONSIDERATIONS 30
4.1. Legal and Regulatory Frameworks Governing AI in Trade 30
4.2. Data Privacy and Cross-Border Data Regulations 30
4.3. Algorithmic Bias, Fairness, and Transparency 31
4.4. Ethical AI Practices and Corporate Responsibility 31
4.5. Emerging Trends and Future Directions in AI Governance 32
4.6. Research Gaps and Future Ethical Priorities 32

CHAPTER V
RESEARCH METHODOLOGY 34
5.1. Research Design and Approach 34
5.2. Data Collection Methods 34
5.2.1. Description of data collection tools 34
5.2.2. Sampling and Participant Criteria 35
5.3. Data Analyses Approach 35

5.4. Data Analysis Techniques 36
5.4.1. Statistical methods, particularly MAXQDA, for analyzing data 36
5.4.2. Qualitative analysis of interview insights and industry trends 36
5.5. Research Validity and Reliability 37
5.6. Limitations of the Methodology 38

CHAPTER VI
FINDINGS……. 39
6.1. Summary of Collected Data 39
6.1.1. Findings on AI's impact on efficiency, accuracy, and optimization 40
6.1.2. Analysis of primary motivations for adopting AI 41
6.1.3. Findings on operational efficiency gain from AI adoptions 42
6.1.4. Analysis of AI technologies implementing plan 43
6.1.5. Analysis of challenges faced in adopting AI technologies 44
6.1.6. Analysis of used AI applications in foregin trade 45
6.1.7. Analysis of the future of AI technologies in foreign trade 46
6.2. Comparative Analysis with Literature 47
6.3. Key Findings Summary 50

CONCLUSION……. 54
BIBLIOGRAPHY 64
APPENDIX A: Interview Questions 73
CV…… 74

LIST OF FIGURES

Figure 2.1: Evolution of E-Commerce 9

Figure 2.2: AI Technologies in E-Commerce..... 15

Figure 3.1: AI for Supply Chain Management 21

Figure 6.1: Using AI in E-Commerce and Foreign Trade 39

Figure 6.2: AI Impact on Organizations 40

Figure 6.3: Motivations for Adopting AI 41

Figure 6.4: AI Operational Effeciency 42

Figure 6.5: Plans to Implement AI in Organizations 43

Figure 6.6: Challenges in Adopting AI..... 44

Figure 6.7: AI Applications for Foregin Trade..... 45

Figure 6.8: Future of Using AI in Foreign Trade 46

LIST OF ABBREVIATIONS

AI	**:**	Artificial Intelligence
AR	**:**	Augmented Reality
B2B	**:**	Business-to-Business
BERT	**:**	Bidirectional Encoder Representations from Transformers
CCPA	**:**	California Consumer Privacy Act
GDPR	**:**	General Data Protection Regulation
CPRA	**:**	California Privacy Rights Act
EDI	**:**	Electronic Data Interchange
UNESCAP	**:**	United Nations Economic and Social Commission for Asia and the Pacific
EU AI Act	**:**	European Union Artificial Intelligence Act
FTC	**:**	Federal Trade Commission
GDPR	**:**	General Data Protection Regulation
GPT	**:**	Generative Pre-trained Transformer
GPU	**:**	Graphics Processing Unit
KRR	**:**	Knowledge Representation and Reasoning
MBA	**:**	Master of Business Administration
ML	**:**	Machine Learning
NACCS	**:**	Nippon Automated Cargo and Port Consolidated System
NLP	**:**	Natural Language Processing
OECD	**:**	Organisation for Economic Co-operation and Development
SMEs	**:**	Small and Medium-sized Enterprises
SSL	**:**	Secure Sockets Layer
TPU	**:**	Tensor Processing Unit
UN/CEFACT	**:**	United Nations Centre for Trade Facilitation and Electronic Business
UNCTAD	**:**	United Nations Conference on Trade and Development
XAI	**:**	Explainable Artificial Intelligence

CHAPTER I
INTRODUCTION

The fast progress in information and communication technologies has greatly changed how global trade works, leading to the rise and wide use of e-commerce in all areas. Before, foreign trade was known for being complicated because of lots of paperwork, long delays, and high costs. But with the help of digital tools, this has changed a lot. E-commerce, which is a digital way of doing business, has allowed companies of all sizes to reach international markets, make operations more efficient, and connect better with customers in ways that were not possible before.

Using Artificial Intelligence (AI) in e-commerce systems has been a big change in the way global trade is done.

AI tools like predictive analytics, recommendation systems, and smart supply chain management are helping businesses make better decisions based on data. These improvements are especially important now, after the pandemic, since being able to adapt quickly and stay digital has become key for companies to survive and grow.

Even though e-commerce technologies are growing quickly around the world, many businesses — especially small and medium-sized ones — still face big challenges in using these tools for international trade.

These problems include not having enough digital infrastructure, not having the right skills, and not having good access to cross-border shipping systems. Also, the fast development of AI systems has created a gap between businesses that can use these tools and those that can't, putting the latter at a disadvantage in a more competitive global market.

This study looks at how e-commerce has become a major force in foreign trade and examines the challenges and opportunities businesses, especially in Türkiye, face when using AI-based e-commerce tools in their international trade plans.

The main goal of this research is to look at how e-commerce has developed within the field of foreign trade and to explore how artificial intelligence is helping improve international trade processes.

The study focuses on understanding how many businesses are using AI-backed e-commerce tools in trade and how these technologies are affecting efficiency, market

growth, and decision-making. It also aims to provide practical insights for businesses and leaders to help support the digital transformation of trade systems.

The research will examine how AI technologies are being used in e-commerce operations, especially in relation to international trade.

The areas to be looked at include cross-border transactions, marketing strategies, supply chain management, and customer relationship management.Artificial intelligence is used to optimize e-commerce procedures for global trade, covering both theoretical ideas and real-world applications.

The study may consider case studies and examples from various geographical regions to provide a comprehensive understanding of worldwide e-commerce trends.

1.1. Background

In today's world, where everything is connected and technology is everywhere, Artificial Intelligence (AI) and e-commerce are changing how businesses work and trade with other countries. AI tools like machine learning, natural language processing, and computer vision help companies make better decisions, run their operations more smoothly, and offer more personalized experiences to customers. At the same time, e-commerce makes it easier for businesses to reach customers around the world, handle transactions quickly, and allow small and medium-sized businesses to compete on a global level.

When AI is used in e-commerce platforms, it makes these benefits even stronger by helping with logistics, managing inventory, and providing better customer service.

This mix of AI and e-commerce has made business operations more efficient, lowered costs, and changed how global trade works. However, for these technologies to be used successfully there needs to be good digital infrastructure, strong rules for handling data, and policies that support growth. It's important for both researchers and business leaders to understand how AI and e-commerce are shaping international trade.

This thesis uses both theory and real-world examples to contribute something new to the study of digital commerce.

It uses theories like the Diffusion of Innovations (DOI) and the Technology Acceptance Model (TAM) to explain how AI is changing global e-commerce. TAM

looks at how people decide to use a new technology and what influences their choice, especially in places like schools, businesses, and organizations. DOI explains how new ideas and technologies spread inside companies, including the reasons behind their adoption and how fast they take hold.

1.2. Motivation of the Study

In the era of digital transformation, we are living in, e-commerce has become a powerful force shaping global economies, removing geographical boundaries and enabling businesses to reach customers worldwide. The rapid growth of online platforms, quickened by the COVID-19 pandemic, has highlighted the complexities of cross-border trade, increasing the need for innovative technologies to address challenges in areas such as logistics, legal regulations, cultural differences, and customer expectations. In this context, Artificial Intelligence (AI) emerges as a transformative tool with the potential to make e-commerce operate more efficiently and effectively on a global scale. Through the solutions, it offers in enhancing operational efficiency, personalizing customer experiences, and facilitating international transactions, AI has the capacity to radically transform e-commerce applications in foreign trade. This research targets to explore the role that AI technologies can play in removing barriers that prevent small and medium-sized enterprises (SMEs) from fully capitalizing on global market opportunities.

1.3. Research Objectives

This project is focused on looking into how artificial intelligence can make a big difference for online businesses, especially in areas such as handling inventory, talking to customers, and selling products in different countries. We've set some major goals and important questions to help guide our work, making sure everything stays clear and straight-forward as we explore what AI can really do in e-commerce.

The aim of the research:

- We want to see how AI can help online stores run their supply chains better, keep their inventory on point, and work more efficiently.
- We are curious about how AI can make marketing feel personal and create awesome experiences for shoppers.
- We are looking to understand how AI can make it easier and safer for businesses to sell to customers in other countries.

- We also want to figure out what's holding businesses back—especially smaller ones—when they try to use AI in their day-to-day work.

1.3.1. Research Questions

- How can AI make it easier for online stores to manage their stock, avoid mistakes, and keep things running smoothly?
- How does AI help make buying and selling across borders simpler, safer, and more trustworthy?
- What kind of challenges or headaches do online businesses, especially the smaller ones, face when they try to bring AI into the mix?

1.4. Research Methodology

This study uses a qualitative research approach to explore how AI is transforming e-commerce in the context of foreign trade. Qualitative methods were selected to capture the complex, context-specific experiences, motivations, and challenges of companies integrating AI into their operations. Through tools like semi-structured interviews, the research gathers rich insights from industry experts, offering depth beyond what quantitative data can provide. Given the emerging nature of AI in global trade, this approach allows for flexible, exploratory analysis that supports theory development in digital transformation and international commerce.

1.5. Scope and Limitations

Scope of the Study

This research examines the incorporation of Artificial Intelligence technologies to improve e-commerce operations, specifically within the framework of international trade. The research is primarily concentrated on the practical application of artificial intelligence in several domains, including supply chain management, inventory forecasting, personalized marketing, and the facilitation of cross-border transactions. The geographical scope centers on businesses engaged in foreign trade, with a particular emphasis on companies operating in or linked to the Turkish e-commerce ecosystem.

The study draws insights from industry professionals through semi-structured interviews, and uses qualitative methods to explore strategic, operational, and technological dimensions of AI adoption. The scope also includes a review of global

regulatory frameworks, such as GDPR, CCPA, and the EU AI Act, to assess their impact on cross-border AI implementation.

Limitations of the Study

The research provides critical insights into the transformative potential of artificial intelligence within e-commerce and international trade; it is subject to several limitations:

Sample Size and Generalizability: The qualitative nature of the research, based on a limited number of interviews, may not fully represent the diversity of all e-commerce businesses or sectors. The findings are context-specific and may not be generalizable to all markets or industries.

Geographical Focus: Although the study incorporates global trends, the majority of data and case insights are derived from the Turkish market. This may limit the applicability of certain conclusions in other regional or regulatory environments.

Access to Data: Due to confidentiality concerns, the study does not include detailed financial performance metrics or proprietary algorithms from companies interviewed. This may constrain the depth of analysis in evaluating AI's return on investment (ROI).

Regulatory Uncertainty: As many AI-related laws and policies are still evolving, the study bases its legal review on current frameworks, which may change significantly in the near future.

1.6. Structure of the Study

This study comprises seven chapters, beginning with the introductory chapter, which provides a fundamental overview of the research. It establishes the context by highlighting the transformative impact of e-commerce on global trade and examining the influence of artificial intelligence. The subsequent chapter is dedicated to the literature review, where it delves into the historical context and consequences of e-commerce in international trade. This section elucidates how e-commerce diminishes barriers to market entry, reduces costs, and promotes the exchange of digital services, while also considering obstacles such as regulatory fragmentation and cybersecurity concerns.

The third chapter introduces AI concepts and their relevance to e-commerce. The chapter details AI's applications in e-commerce, including product recommendations, chatbots, visual search, and fraud detection, emphasizing recent advancements driven by big data and cloud computing.

The fourth chapter discusses the legal and ethical challenges of AI in e-commerce. The chapter also identifies future trends (e.g., conversational commerce, AR integration) and research gaps, such as ethical AI frameworks and bias mitigation.

The sixth chapter outlines the study's approach. Data is analyzed using MAXQDA software for thematic coding. The chapter justifies the qualitative approach, describes the target population, and details sampling, data collection, and analysis processes. It also addresses validity (e.g., pilot testing, member checking) and limitations, such as participant bias and time constraints.

The seventh chapter wraps up the study. It summarizes how the research objectives were met, emphasizing AI's role in operational efficiency, personalization, and secure cross-border trade. The chapter highlights contributions, such as insights for SMEs and ethical AI advocacy, and offers practical recommendations for businesses (e.g., AI integration) and regulators (e.g., data protection policies). It acknowledges limitations, like limited participant perspectives, and concludes with reflections on AI's transformative potential in e-commerce.

CHAPTER II
LITERATURE REVIEW

2.1. Evolution of E-commerce in Foreign Trade

2.1.1. Historical development of E-commerce

2.1.1.1. Early Foundations: EDI and Trade Digitization (1960s–1980s)

The inception of e-commerce within the realm of international trade dates back to the 1960s, marked by the advent of Electronic Data Interchange (EDI). This technological innovation enabled businesses to exchange commercial documents electronically among trading partners, revolutionizing the traditional methods of document transmission. EDI reduced manual entry errors, sped up the transaction process, and improved inventory and supply chain management across borders (The OECD Observer, 1999). Initially used by large multinational corporations, especially in the automotive and retail sectors, EDI systems began to shape the first wave of trade digitization.

In the 1980s, international trade facilitation efforts increasingly included EDI in customs and port management systems. For example, early electronic customs clearance systems, such as Japan's Nippon Automated Cargo and Port Consolidated System (NACCS), demonstrated how digital systems could accelerate cargo processing and reduce trade bottlenecks (UN ESCAP, 2007).

2.1.1.2. Internet Commercialization and the Dot-Com Era (1990s)

The 1990s marked a turning point with the commercialization of the Internet and the rise of the World Wide Web, enabling businesses to publish product catalogs and establish global storefronts online. The emergence of Netscape Navigator**,** Amazon (1995)**,** and eBay (1995) signaled the beginning of scalable consumer-facing e-commerce models. Most significantly, the introduction of SSL (Secure Sockets Layer) encryption enabled secure online transactions and gave rise to online payment gateways like PayPal**,** facilitating international payments (Zwass, 1996).

The WTO's Ministerial Declaration on Global Electronic Commerce (1998) further recognized e-commerce as a driver of international trade, initiating global dialogue around trade rules for digital transactions (WTO, 1998).

2.1.1.3. Global Platform Expansion and Policy Integration (2000s)

During the early 2000s, global digital marketplaces, such as Alibaba (China), Rakuten (Japan), and Amazon (US), expanded rapidly and began to serve not just national consumers but also cross-border sellers. The introduction of buyer protection programs, integrated logistics, and automated fulfillment centers enhanced trust and reliability in cross-border e-commerce.

Governments and institutions started aligning their national trade policies with digital commerce. The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) developed standards for cross-border e-commerce documentation (UN/CEFACT, 2021), while organizations like UNCTAD highlighted the potential of e-commerce to enable developing countries to engage in international trade more competitively (OECD, 2019).

2.1.1.4. Mobile, AI, and the Cloud Revolution (2010s–Present)

In the 2010s, e-commerce evolved beyond desktop browsers to include mobile commerce (m-commerce)**,** supported by the spread of smartphones**,** mobile apps, and high-speed internet**.** Additionally, platforms like Shopify**,** BigCommerce, and JD Worldwide enabled smaller businesses to enter global markets with minimal technological overhead.

The integration of artificial intelligence, such as product recommendation algorithms, personalized pricing, and chatbots, improved the consumer experience and optimized inventory and logistics operations globally (UNCTAD, 2021). Cloud computing made e-commerce more scalable and cost-effective by providing global infrastructure-as-a-service (IaaS) for merchants and platforms.

2.1.1.5. COVID-19 as a Catalyst for Digital Trade

The COVID-19 pandemic acted as a digital accelerant, compelling even the most traditional exporters and brick-and-mortar firms to shift to e-commerce. As physical trade channels faced disruption due to lockdowns and travel bans, digital platforms became a lifeline for international sales, especially in sectors like health, food, electronics, and home goods. According to the United Nations Conference on Trade and Development (UNCTAD), global e-commerce sales amounted to $26.7 trillion in 2020, marking a 4% rise compared to the figures in 2019, with a notable rise in cross-border transactions (United Nations, 2021).



Figure 2.1: Evolution of E-Commerce

Source: Prosperna, 2022

2.1.2. The impact of E-commerce on international trade

2.1.2.1. Lowered Barriers for Global Market Entry

One of the most transformative impacts of e-commerce has been the lowering of entry barriers for international trade. Small and medium-sized enterprises (SMEs), which have historically faced challenges due to insufficient capital and logistical infrastructure, now actively engage in international markets through the utilization of global platforms. These platforms offer turnkey solutions for storefront creation, language localization, payment processing, and shipping integration (UN/CEFACT, 2021).

According to the World Bank, over 85% of surveyed SMEs using e-commerce report increased access to international customers and higher export revenues (World Bank Group, 2022).

2.1.2.2. Enhanced Efficiency and Trade Cost Reduction

Digital technologies streamline processes such as customs clearance, documentation, and compliance verification, significantly reducing the cost of doing international business. Single window systems serve as a centralized platform, enabling traders to

submit all necessary regulatory documents at a single-entry point, saving both time and money (Javier López González, 2017). Moreover, automation and real-time tracking have reduced delays in cross-border logistics.

2.1.2.3. Digital Services and Intellectual Property Trade

Beyond physical goods, e-commerce platforms facilitate the exchange of digital services and intangible assets, such as software, design services, streaming content, and e-books. The OECD notes that cross-border digital services trade now outpaces traditional goods trade in growth rates, especially among high-income economies (OECD, 2019).

However, this shift has raised concerns about intellectual property protection, digital piracy, and the need for updated trade regulations that address digital products and copyright enforcement (UNCTAD, 2021).

2.1.2.4. Challenges: Regulatory Fragmentation and Cybersecurity

Despite its advantages, cross-border e-commerce faces persistent challenges. Many countries maintain divergent digital trade regulations, including restrictions on data flows, server localization requirements, and digital taxation rules. These regulatory differences can increase compliance costs and limit the ability of firms to scale across multiple jurisdictions (World Trade Organization, 2020).

Cybersecurity is still a major worry because moving data across borders can create security risks. Businesses must follow international data privacy rules, like the European Union's General Data Protection Regulation (GDPR). These rules can sometimes conflict with laws in other countries, which may affect how companies use cloud computing, plan their marketing, and handle customer support.

2.1.2.5. Global Initiatives and Policy Responses

To fix these problems, several international efforts are happening. The Joint Statement Initiative on E-commerce, led by the World Trade Organization (WTO) and supported by over 80 countries, is trying to create a complete global system for rules on digital trade. Regional agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Digital Economy Partnership Agreement (DEPA) also incorporate comprehensive e-

commerce chapters that facilitate cross-border data flows and ensure non-discriminatory treatment of digital goods (World Trade Organization, 2019).

2.1.3. E-commerce and its role in global trade

The simplest definition of e-commerce is any online transaction. Usually, this entails the exchange of products, information, or services. Examples of popular e-commerce models are:

- Business-to-business e-commerce involves companies engaging with one another to seek supplier bids, process orders, receive invoices, and execute payments, all facilitated by the Internet.
- Business-to-consumer e-commerce refers to retail transactions between businesses and individual customers.
- Consumer-to-consumer e-commerce encompasses the exchange of goods, services, and information among consumers, which includes not only the sale of products through auction platforms like eBay or Yahoo!, but also services that leverage human expertise, such as those offered by Keen.com and Guru.com.

The process of obtaining information can be conducted through various public platforms, including government agencies, libraries, and museums, as well as through proprietary websites managed by online banking institutions or brokerage firms.

As electronic commerce (e-commerce) continues to expand and leverage the unique features of the Internet, it is poised to have a profound impact on national economies and the structure of industries. E-commerce has assumed two critical functions: firstly, it serves as a more effective and efficient channel for aggregating information, and secondly, it presents a viable alternative for replacing numerous economic activities traditionally conducted within a business with those that can be outsourced to competing external suppliers. In light of the growing outsourcing opportunities, companies are likely to take advantage of e-commerce by disaggregating various components of their production processes to identify the most efficient and cost-effective suppliers available in the e-marketplace. Given the global reach of the Internet, these emerging e-marketplaces are a direct result of globalization, further propelling the integration of the global economy through the mechanisms of the Internet and e-commerce.

2.1.4. The effects of e-commerce on the economy

It is indeed true that the power of the Internet, e-commerce, and related information and communication networks is changing the face of business and production. Firms can make use of these emerging technologies to rationalize processes, reduce operational costs, and develop closer cooperative relations with suppliers and customers. Through linkages in supply chains, purchasing, production, inventory management, and distribution, today a firm may acquire products or services in real time, sharing various data and making simultaneous decisions. This transformation can lead to several critical improvements:

- **Efficiency and Cost Reduction:** Redundancies are dispelled by an integrated network and protection of communication to identify inefficiencies in the value chain of a company.
- **Improved Utilization of Assets:** Real-time monitoring of inventory, production, and distribution enables a firm to utilize its resources in a far better way by reducing the generation of waste to the minimum possible level.
- **Faster Time to Market:** Enhanced data exchange hastens product design, development, and delivery processes, thereby allowing enterprises to respond quickly to market needs and introduce products more quickly.
- **Reduced Fulfillment Times:** Automation and networked systems line up order handling, inventory management, and shipping to speed up and make sure fulfillment takes place in a far timelier manner.
- **Improved Customer Service:** Digital networks are allowing personalization in customer support and real-time updates that would help in the improvement of customer satisfaction and loyalty.

In the modern, interconnected global landscape, e-commerce has become a significant driver of international trade. The rapid expansion of online platforms and digital marketplaces enables businesses of varying scales to access global markets and considerably enhance their commercial reach. Let's examine the crucial impact of e-commerce on enabling international trade and the advantages it provides to both businesses and consumers:

- **Global Market Access:**

E-commerce has made it easier for businesses to break down the barriers of geography, allowing them to reach customers in different parts of the world without much difficulty. Small and medium-sized companies, which used to face challenges due to limited resources and poor distribution channels, now have the chance to showcase their products and services to people all over the globe. This helps level the playing field and opens up new possibilities for growth and expansion.

- **Increased Efficiency:**

Traditional ways of doing international business often involved complicated supply chains, lots of paperwork, and slow processes. E-commerce simplifies these by letting businesses manage orders, shipping, and customs through digital tools. This makes cross-border trade faster and cheaper, making it easier for businesses, whether big or small, to operate efficiently and reach more customers.

- **Market Research and Consumer Insights:**

E-commerce platforms provide valuable data and tools for businesses to understand global markets and what customers want. By looking at how people behave, what they buy, and their feedback, companies can tailor their products, marketing, and customer service to better meet the needs of different markets. This helps improve customer satisfaction and increase sales.

- **Trust and Security:**

E-commerce platforms have put in place strong security measures to protect transactions between buyers from different countries. They use trusted payment systems, secure encryption technology, and clear policies to protect both buyers and sellers. These steps help build trust in international trade, reduce fears about online shopping, and encourage more people to engage in global e-commerce.

- **Market Entry for Small Businesses:**

E-commerce has changed how small businesses participate in global trade by offering an affordable and easy way to enter international markets. Through online platforms, entrepreneurs can build a global presence without needing to open physical stores or make big investments in local infrastructure. This gives small and

medium-sized businesses the chance to compete globally, create jobs, and support economic growth.

- **Logistics and Fulfillment:**

E-commerce has also changed how goods are shipped and delivered around the world. Online platforms now offer one-stop solutions for shipping, large warehouses, and efficient last-mile delivery services. These improvements make it easier for businesses to send products globally, ensure timely delivery, and keep customers happy.

- **Cross-Cultural Exchange:**

E-commerce has created a way for people to share and discover different cultures and products from around the world. Shoppers can now access and buy items they might not have been able to get before, offering more choices and better shopping experiences. This cultural exchange helps people learn about different traditions and values, bringing people closer together and promoting diversity.

E-commerce has changed how international trade works by removing many barriers and letting businesses connect with markets around the world more easily. Its impact on international trade is very big because it helps businesses reach more customers, boost economic growth, and provide people with a wide variety of products and services from different countries. As e-commerce keeps developing, it's important for businesses and government leaders to keep updating their plans so they can make the most of its benefits and improve how it supports international trade.

2.2. Key Concepts in Artificial Intelligence

Artificial Intelligence, or AI, is the ability of machines to imitate human thinking processes like learning, solving problems, understanding their surroundings, and making decisions. In recent years, AI has gone from basic systems that followed specific rules to advanced models that use large amounts of data, machine learning, and deep neural networks. This section looks at the basic ideas behind AI, especially how it is used in e-commerce and international trade.

AI is generally described as “the science and engineering of creating intelligent machines, particularly intelligent computer programs” (Russell & Norvig, 2022). It includes several areas such as machine learning, natural language processing,

computer vision, robotics, and knowledge representation. These technologies allow machines to do tasks that usually need human intelligence, like understanding spoken words, interpreting human language, analyzing pictures, and making choices when there isn't complete information.

John McCarthy, a founding figure in AI, defined it in 1955 as “the science and engineering of making intelligent machines” (McCarthy, 2007). Today, this definition has broadened with advancements in data availability and computational power, enabling AI systems to function autonomously in complex environments.

2.2.1. Core AI Technologies in E-Commerce (ML, NLP, CV)

2.2.1.1. Machine Learning (ML)

Machine Learning is a subset of AI that enables systems to learn from data and improve performance without being explicitly programmed. It is used extensively in e-commerce for personalized product recommendations, customer segmentation, and fraud detection. Algorithms such as decision trees, support vector machines, and neural networks are widely employed (Goodfellow, Bengio, & Courville, 2016).

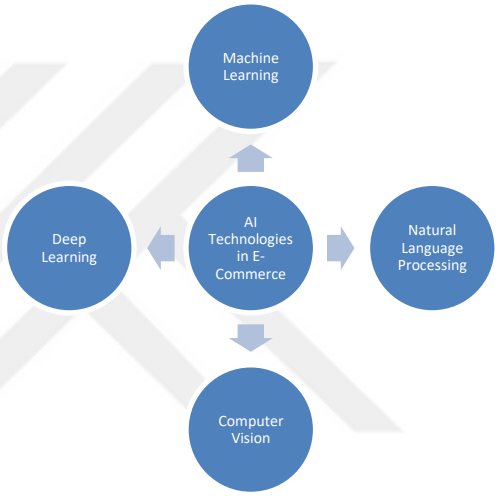


Figure 2.2: AI Technologies in E-Commerce

Example: Amazon’s recommendation engine uses ML to analyze purchasing history and predict future buying behavior.

2.2.1.2. Natural Language Processing (NLP)

NLP allows machines to understand, interpret, and respond to human language. It plays a critical role in e-commerce through applications like chatbots, voice assistants, review sentiment analysis, and automated translation of product descriptions for cross-border sales (Jurafsky & Martin, 2025).

Example: E-commerce platforms like eBay and Alibaba use NLP to facilitate multilingual customer service and sentiment analysis.

2.2.1.3. Computer Vision (CV)

Computer Vision enables machines to interpret visual information from the world, such as images and videos. In e-commerce, it is applied in visual search engines, augmented reality fitting rooms, and quality inspections in logistics (Szeliski, 2021).

Example: ASOS and IKEA utilize AR and computer vision to let customers virtually try on clothes or preview furniture in their homes.

2.2.1.4. Knowledge Representation and Reasoning (KRR)

KRR involves structuring information so that AI systems can reason and derive conclusions from it. In e-commerce, this is used for intelligent product categorization, automated contract review, and decision-making support in complex trade logistics (Brachman & Levesque, 2004).

2.2.1.5. Deep Learning and Neural Networks

Deep learning, a branch of ML, uses multi-layered neural networks to model complex relationships in data. These techniques have revolutionized image recognition, speech processing, and predictive analytics in e-commerce (LeCun, Bengio, & Hinton, 2015).

2.3. Integration of AI in International Business

The role of Artificial Intelligence (AI) is growing more and more important as businesses around the world change how they operate. AI is being used in many areas like improving supply chains, making trade financing easier, planning how to enter new markets, and interacting with customers. These technologies help make business processes faster and more accurate, and they also make it easier to scale up operations and handle challenges—things that are very important for doing well in international markets.

AI is revolutionizing supply chain management by enabling predictive analytics, automated warehousing, and real-time tracking. Machine learning algorithms analyze data from various global sources—such as shipping patterns, weather forecasts, and geopolitical developments—to optimize delivery routes and anticipate disruptions (Choi, Wallace, & Wang, 2017).

AI also facilitates cross-border customer engagement through multilingual chatbots, personalized marketing, and dynamic pricing models. These applications help

businesses localize experiences for international audiences while maintaining global consistency (Davenport & Ronanki, 2018).

In financial operations, AI improves fraud detection, credit scoring, and trade finance risk assessments. By automating document verification and analyzing financial histories, AI helps firms evaluate overseas partners more effectively (Flinders, Schneider, & Smalley, 2025).

2.3.1. AI in International Trade Compliance

Complex legal frameworks and regulatory requirements govern international trade. AI can help businesses stay compliant by automating the review of customs regulations, tariffs, and documentation. Natural language processing (NLP) tools extract relevant clauses from trade agreements, enabling faster decision-making and reducing legal risks (UNCTAD, 2021).

For example, the EU's proposed Artificial Intelligence Act outlines specific requirements for AI systems used in border control, logistics, and risk assessment. AI tools that comply with these guidelines would be critical for businesses to maintain market access within the European Union (EU Artificial Intelligence Act, 2021).

2.3.2. Case Examples of AI Integration in International Business

- **Maersk** uses AI for route optimization and predictive logistics, reducing fuel consumption and delays in maritime shipping.
- **Alibaba** employs AI to personalize experiences for its millions of global users, offering localized product recommendations and real-time customer support in multiple languages.
- **HSBC** and **Standard Chartered** have implemented AI-driven solutions in trade finance, enabling real-time fraud detection and automatic classification of trade documents (Ozturk, 2024).

2.3.3. Strategic Implications

The integration of AI in international business is not just a technological upgrade—it is a strategic transformation. Firms that embrace AI can gain competitive advantages in global markets through faster operations, deeper customer insights, and more agile decision-making. However, to realize these benefits, businesses must also address the challenges of data privacy, algorithmic bias, and the digital divide between regions.

2.4. Summary of Key Literature Findings

The research shows that artificial intelligence (AI) is becoming more important in changing how e-commerce and foreign trade work. There are several key ideas from existing studies that explain how AI technologies are changing the way businesses operate, improving how they interact with customers, and making processes more efficient around the world.

Firstly, AI is seen as a field that covers many different areas like machine learning, natural language processing, computer vision, and knowledge representation and reasoning. These technologies are not just improving the current functions in e-commerce but also helping to create new ways of adding value (Russell & Norvig, 2021; Goodfellow et al., 2016). For example, machine learning algorithms are used a lot in recommendation systems, predicting future trends, and setting prices that change over time. These tools help online stores make better decisions based on data, which makes their services more tailored to customers and helps keep them coming back (LeCun et al., 2015).

Secondly, using NLP and CV in digital platforms makes it easier for people to interact with computers and search for products visually. These tools help businesses overcome language and cultural differences, which is very important when doing business across different countries (Jurafsky & Martin, 2023; Szeliski, 2022). E-commerce companies such as Alibaba and Amazon are using these technologies more and more to improve customer service and make it easier for customers to find products, which helps make shopping online better for people around the world.

Additionally, a lot of writing talks about how AI helps with supply chain and inventory management. Things like predictive modeling, route optimization, and automated warehouses have made logistics work better. These tools help companies cut down on lead times, save money, and quickly adjust to changes in customer demand (Kumar et al., 2021). These efficiencies are especially useful in international trade situations, where complicated logistics and different rules in various places create continuous difficulties.

From a strategic point of view, the literature also shows that more and more businesses are using AI in making decisions, stopping fraud, and following rules. Tools that help with checking risks quickly, organizing documents automatically,

and finding fraud by looking at behavior are helping companies deal with problems that come up when doing business across different countries (Brachman & Levesque, 2004). Moreover, the discussions about rules, especially regarding data privacy like GDPR and CCPA, and fair use of algorithms, show that there is a growing need for using AI in a responsible and clear way in international business.

Finally, even though there are big benefits, the studies also mention some ongoing problems like high costs to set up, poor data quality, and a lack of skilled workers. These issues mainly affect small and medium-sized businesses, which could make the gap between large and small companies even worse when it comes to taking part in international trade (McCarthy, 2007; Russell & Norvig, 2021).

In short, the research shows that AI is both a big change and an important strategy for modern online shopping. It affects how businesses operate, how they interact with customers, and how they follow rules. While it opens up new chances, it also needs careful thought about things like technology, ethics, and the systems in place.

CHAPTER III
ARTIFICIAL INTELLIGENCE

3.1. Applications of AI in E-Commerce

Artificial Intelligence, or AI, is about making machines act like humans by giving them the ability to do things that usually need a person's thinking, like thinking, learning, seeing, and solving problems. There are two main kinds of AI: narrow AI, which is good at one specific job, and general AI, which is meant to do a wide variety of tasks like a human can (Stuart Russell, 2022).

AI has become a key part of modern online shopping. It helps businesses work more efficiently, improve customer service, and make better decisions. Examples include targeted ads and smart supply chain management. This section talks about the main uses of AI in the e-commerce world.

In recent years, the growth of big data, stronger cloud computing, and faster computers like GPUs and TPUs have helped AI develop quickly. New models like GPT from OpenAI and BERT from Google, along with transformer technology, have made machines better at understanding and using human language (Vaswani, et al., 2017).

These changes are also backed by national AI plans. Over 60 countries have created official guides for AI development, showing how important it is for economic growth, trade, and moving towards a digital future.

3.2. AI-Driven Supply Chain, Forecasting, and Marketing Personalization

In e-commerce, artificial intelligence (AI) has become a big change for making supply chains work better, predicting inventory needs, and offering personalized marketing experiences. This section brings together the main uses of AI in these areas, showing how they improve efficiency, accuracy, and how well they connect with customers.



Figure 3.1: AI for Supply Chain Management
Source: mondo.com

3.2.1. AI in Supply Chain Management

AI makes the whole supply chain more efficient by using predictive analytics, robots, and real-time adjustments. Old supply chains used a lot of manual work, but they're now becoming smarter and more connected systems.

- **Predictive Analytics**: AI forecasts disruptions such as port congestion, pandemics, or labor strikes by analyzing structured and unstructured data (e.g., weather forecasts, shipping data, and news feeds), enabling proactive risk mitigation (Downie & Finn, 2024; Alicke, et al., 2021).
- **Autonomous Warehousing and Robotics**: Companies like Amazon, JD.com, and Ocado use AI-guided robots for picking, sorting, and packing in fulfillment centers. This automation significantly improves operational speed and accuracy while reducing labor costs (Amazon, 2024; Alicke, et al., 2021).
- **Route Optimization**: AI determines the most efficient delivery routes by factoring in traffic, fuel prices, and delivery time windows, thereby improving both domestic and international logistics performance (DHL, 2024).

These applications result in better cost control, reduced waste, and faster delivery times—factors critical in global markets.

3.2.2. Inventory Forecasting with AI

AI empowers firms to align inventory levels with dynamic customer demand by incorporating diverse data sources like social media signals, regional events, and historical sales patterns.

- **SKU-Level Forecasting**: AI models anticipate demand for individual products across different regions and channels (Tiwari, Wee, & Daryanto, 2018).
- **Auto-Replenishment Systems**: Machine learning algorithms automatically generate purchase orders based on predictive consumption patterns and lead times (Chaturvedi, Martich, Ruwadi, & Ulker, 2021).
- **Multi-Location Balancing**: AI helps distribute inventory efficiently across warehouses to meet localized demand and avoid international shipping delays.

According to a McKinsey study, AI can reduce forecasting errors by up to 50% and lost sales by 65% through optimized inventory management (Chaturvedi, Martich, Ruwadi, & Ulker, 2021).

3.2.3. AI in Personalized Marketing

Personalized marketing is central to AI-powered e-commerce. AI technologies enable businesses to deliver relevant, timely, and individualized content to users across channels.

- **Recommendation Engines**: Netflix and Amazon use special computer methods called collaborative filtering and deep learning to show people things they might like based on what they look at and buy. More than 30% of their money comes from these smart suggestions made by AI (Babatunde, Odejide, Edunjobi, & Ogundipe, 2024).
- **Dynamic Content and Pricing**: AI adjusts website designs, offers, and prices instantly depending on how users act and what's happening in the market (Easdon-Smith, 2024).
- **Retargeting and Ad Optimization**: Companies such as Meta Ads and Google Ads use artificial intelligence to make better decisions about how much to pay for ads and where to show them, which helps businesses get more value from their advertising money (Babatunde, Odejide, Edunjobi, & Ogundipe, 2024).

- **Email Personalization**: AI adjusts the subject lines, content, and sending times to boost engagement and lower customer loss (Easdon-Smith, 2024).

3.2.4. AI-Powered Customer Service and Engagement

AI-powered chatbots and virtual agents use Natural Language Processing to handle customer conversations around the clock. Companies like H&M and Sephora use these chatbots to give instant help and recommend products, which makes customers happier and increases sales (Medida, 2024).

3.2.5. AI in Fraud Detection and Cybersecurity

E-commerce websites are dealing with more fraud and security issues than ever before. AI helps keep online activities safe and under control.

AI can spot strange actions or transaction trends quickly to stop fraud as it happens.

AI can also check who is using the website by looking at how they type or move through pages.

PayPal uses AI to check millions of transactions each day and stops any activity that looks risky with a lot of accuracy (Girimurugan, et al., 2024).

3.2.6. Visual Search and Augmented Reality (AR)

Computer vision and augmented reality (AR) are making online shopping better by connecting the physical world with the digital one.

- **Visual Search**: Visual search lets customers find products by using pictures instead of typing words. Platforms like Pinterest and ASOS let people do this.
- **AR Integration**: • AR tools, powered by AI, let shoppers see how clothes would look on them or how furniture would fit in their homes. This helps customers feel more confident about their purchases and lowers the number of returns (Yadav, 2024).

3.3. AI in Cross-Border E-Commerce

Artificial Intelligence (AI) is becoming a big change in global e-commerce. It helps businesses handle the challenges of international trade. With AI, companies can deal with different rules in different countries, make international shipping more efficient, create shopping experiences that match local tastes, and make cross-border buying easier and faster.

3.3.1. Enhancing Cross-Border Logistics and Supply Chains

AI makes international shipping and supply chains run better by tracking goods in real time, finding the best routes, and managing warehouses smarter.

Machine learning looks at things like weather, how long it takes to get through customs, fuel costs, and political situations to suggest the best paths and where to store inventory (Toorajipour, Sohrabpour, Nazarpour, Oghazi, & Fischl, 2021). This helps companies avoid delays and cut down on the costs of running international operations.

3.3.2. Multilingual Support and Cultural Localization

Natural Language Processing (NLP) lets e-commerce sites offer support in many languages, translate product details instantly, and create marketing messages that match local cultures. This is important because language and culture can affect how customers trust and use a site. Tools like Neural Machine Translation (NMT), sentiment analysis, and chatbots made with NLP help big platforms like Alibaba and Amazon work with customers all over the world (Wu, et al., 2016).

3.3.3. Personalization and Dynamic Pricing Across Markets

AI helps companies create personalized shopping experiences and set prices that work well in different regions. These tools look at things like how customers act in a region, what the economy is like, how much people can afford to spend, and what they prefer. This helps set prices and promotions that are right for each market, which can increase sales and make customers happier in places where people react differently to prices and brand names (Tomitza, Ibrahimli, & Herm, 2024).

3.3.4. Fraud Detection and Regulatory Agreement

Two of the biggest obstacles in cross-border e-commerce are, controlling fraud and making sure that various data protection and trade laws are followed. AI-based fraud detection systems use behavior analytics and anomaly detection to identify suspicious transactions, particularly in regions with high fraud risk. Furthermore, AI assists in monitoring compliance with evolving regulatory frameworks such as the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA) (Chen & Wang, 2022).

3.4. Impact of AI on Consumer Behavior and Business Models

Artificial Intelligence (AI) has become a transformative force in reshaping business models and influencing consumer behavior, particularly within the e-commerce sector. Its integration has led to significant shifts in operational strategies, value creation mechanisms, and customer engagement practices.

3.4.1. Analysis of business performance changes with AI integration

- **Operational Efficiency and Profitability**

Adoption of AI technology has allowed companies to increase profitability and operational efficiency. According to McKinsey's 2024 survey, 65% of organizations regularly use generative AI, with many reporting material benefits such as cost reductions and revenue increases, particularly in supply chain and inventory management, marketing, and sales functions (Singla, 2024).

- **Dynamic Pricing and Revenue Optimization**

AI-driven dynamic pricing strategies have allowed businesses to adjust prices in real-time based on demand, competitor pricing, and customer behavior. Studies indicate that 60% of retailers employing AI-powered pricing have experienced increased profit margins.

- **AI-Powered Sales and Customer Interaction**

Companies like Salesforce have integrated AI tools to enhance sales processes. Salesforce's AI applications assist sellers in client research and real-time advice, improving preparedness and efficiency in client interactions (XENA Intelligence Inc., 2024).

3.4.2. Exploration of consumer trust and behavior in AI-based platforms

- **Consumer Expectations and Personalization**

Consumers increasingly expect personalized experiences facilitated by AI. A 2024 report by Coveo found that 72% of consumers anticipate generative AI to enhance their online shopping experiences, with expectations including personalized product recommendations and virtual shopping assistance.

- **Trust and Transparency Concerns**

Despite the benefits, consumer trust in AI remains a critical issue. A survey revealed that only 26% of consumers trust organizations to use AI responsibly, highlighting concerns over data privacy and the lack of human interaction.

- **Ethical Considerations and Fairness**

The ethical deployment of AI is paramount. Research indicates that consumers are concerned about the fairness and transparency of AI systems, with many expressing a lack of trust in how their data is managed (Yangyang Lu, 2025).

3.5. Challenges and Limitations in AI Adoption

Artificial intelligence (AI) has the potential to revolutionize e-commerce, especially in the area of international trade. However, several challenges and limitations hinder its seamless adoption. These challenges span technical, ethical, regulatory, and organizational domains, necessitating a nuanced understanding to navigate them effectively.

3.5.1. Data Quality and Management

"E-commerce businesses often struggle with the management and integration of large, complex, and diverse data sets required for AI-powered solutions " (Jakkula, 2022).

AI systems thrive on high-quality, structured, and comprehensive data. In the context of international e-commerce, data often originates from diverse sources, including various countries, languages, and regulatory environments. This diversity can lead to inconsistencies, inaccuracies, and biases in the data, which in turn affect the performance and reliability of AI models.

3.5.2. High Implementation Costs

"Implementing AI solutions requires a significant upfront investment in technology, infrastructure, and talent. Smaller businesses may find these costs prohibitive" (247Commerce, 2024).

The deployment of AI technologies entails substantial financial investments. Costs encompass not only the acquisition of advanced software and hardware but also the recruitment of skilled personnel, training programs, and continuing maintenance. These expenses may be unaffordable for small and medium-sized businesses

(SMEs), which might lead to a greater technical divide between big businesses and smaller participants in the global market.

3.5.3. Algorithmic Bias and Fairness

"AI algorithms are susceptible to bias, reflecting societal prejudices and perpetuating discriminatory practices" (Gomez, 2024).

AI systems can sometimes unknowingly strengthen existing biases in the data they are trained on, leading to unfair outcomes. In e-commerce, this could show up as unfair product suggestions, pricing decisions, or customer support interactions, which can negatively impact specific groups of people.

3.5.4. Regulatory and Ethical Concerns

"AI systems often process sensitive information, making data privacy and security paramount. Protecting against cyberattacks and ensuring data is not misused are critical challenges" (Ozturk, 2024).

Because e-commerce happens worldwide, companies have to deal with many different rules about protecting personal data. Laws like the General Data Protection Regulation (GDPR) in Europe and the California Consumer Privacy Act (CCPA) in the U. S. are examples of these rules. Following these laws is important but hard, especially when a business operates in several countries with different legal rules. Also, there are ethical issues like keeping personal data safe, getting people's permission to use their information, and being clear about how AI makes decisions, which add to the difficulty of using AI.

3.5.5. Integration with Legacy Systems

"Integrating AI with existing e-commerce platforms and systems can be complex and may require custom development or adjustments" (247Commerce, 2024).

Modern AI technologies are not easily compatible with the older IT infrastructures used by many e-commerce companies. Adding AI solutions to these current systems can be expensive and technically challenging. Challenges include data migration, system interoperability, and potential disruptions to ongoing operations during the integration process.

3.5.6. Talent Shortage and Skill Gaps

"Effectively deploying AI solutions necessitates a proficient workforce well-versed in machine learning and data analysis. Locating and retaining AI talent can pose difficulties" (Ashfaq, 2023).

The successful implementation and management of AI systems require specialized skills in data science, machine learning, and AI ethics. There is a global shortage of professionals with these competencies, making it difficult for companies to recruit and retain the necessary talent. This talent gap can delay AI projects and affect their quality and effectiveness.

3.6. Issues related to scalability, data quality, and cross-border logistics

International e-commerce is expanding quickly, which gives firms a lot of opportunities. However, several challenges hinder seamless operations, particularly concerning scalability, data quality, and cross-border logistics.

3.6.1. Scalability Challenges

As e-commerce platforms expand globally, they must handle increased traffic, diverse customer demands, and complex operations.

- Infrastructure Limitations: Many platforms struggle to scale their infrastructure to accommodate surges in user activity, especially during peak shopping seasons.
- Personalization at Scale: Delivering personalized experiences to a global customer base requires sophisticated AI systems qualified of processing huge amounts of data in real-time.
- Integration Complexities: Integrating new technologies and tools across various regions can be challenging due to differing regulations and market dynamics (Codiant, 2024).

3.6.2. Data Quality Issues

High-quality data is essential for effective decision-making and AI-driven personalization. However, international e-commerce platforms often face data-related challenges:

- Inconsistent Data Standards: Different countries may have variable data collection and reporting standards, leading to inconsistencies.

- Data Silos: Operating in multiple regions can result in fragmented data storage, making it difficult to obtain a unified view of operations.
- Data Privacy Regulations: Agreement with diverse data protection laws, such as GDPR, adds complexity to data management practices.

3.6.3. Cross-Border Logistics Challenges

Good logistics help make sure products arrive on time and keep customers happy in international online shopping. Some main challenges include:

- Customs and Tariffs: Different rules and costs for importing goods in various countries can cause delays and higher prices.
- Shipping Infrastructure: Poor transportation systems in some areas can slow down the delivery of packages.
- Returns Management: Dealing with returns from other countries is usually hard and expensive, which can lower customer satisfaction and make operations less efficient (VirtuBox, 2025).

CHAPTER IV
REGULATORY AND ETHICAL CONSIDERATIONS

4.1. Legal and Regulatory Frameworks Governing AI in Trade

Adding AI to international trade creates tough legal problems that old trade rules can't handle well. The World Trade Organization says there's a big need for new legal rules to control how AI affects markets, because existing antitrust laws might not work well with the changes caused by AI **(WTO, 2024).**

In response, various jurisdictions are advancing AI-specific legislation. The European Union's AI Act, effective from August 2024, introduces a risk-based classification system, placing stricter compliance requirements on high-risk applications such as AI systems used in credit scoring and border control (European Commission, 2025). Similarly, the United States has adopted a decentralized approach, with over 550 AI-related bills introduced across 45 states in 2024 alone, reflecting growing state-level engagement (Thornhill, 2025).

Moreover, the Council of Europe's Framework Convention on Artificial Intelligence, Human Rights, Democracy and the Rule of Law, adopted in June 2024, mandates that AI applications impacting civil liberties—such as automated customs screening or financial profiling—be subject to transparency and human oversight standards (Wikipedia, 2025).

International trade agreements are also evolving to include AI-related clauses. For example, the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) notes those recent digital trade frameworks are integrating AI-specific language to promote regulatory harmonization and minimize the digital divide between developed and developing nations (ESCAP, 2025).

4.2. Data Privacy and Cross-Border Data Regulations

Data privacy remains a critical pillar in the ethical deployment of AI across international e-commerce. Regulations such as the General Data Protection Regulation (GDPR) in the EU and the California Consumer Privacy Act (CCPA) in the U.S. enforce rigorous standards regarding user consent, transparency, and data protection (Ocampo, 2024).

However, cross-border data flows complicate compliance. As noted by the International Association of Privacy Professionals (IAPP), businesses often face a "regulatory patchwork" that creates significant governance challenges (Hengesbaugh & Denham, 2024). For example, Japan struggles with reconciling AI integration in healthcare with stringent privacy laws, illustrating the broader tension between innovation and data protection (Keohane, 2025).

Companies need to use strong and flexible data governance systems to handle these rules well and keep customers' trust.

4.3. Algorithmic Bias, Fairness, and Transparency

Bias in AI algorithms can cause big ethical and legal problems. This often happens because the training data is unfair or the models are not designed well. This kind of bias can hurt certain groups more than others. For example, some AI systems have been known to ignore women who have taken time off work for childbirth, which keeps unfair treatment going (The Australian, 2024).

As Konrad Meier highlights, in e-commerce, this can translate into biased pricing, discriminatory credit evaluations, or exclusionary product recommendations. Mitigating such bias requires diverse data sets, regular algorithmic audits, and the use of explainable AI (XAI) models that make decision-making logic interpretable by users and regulators alike (Konrad Meier, 2024).

Dr. N. Venkatesan stresses the importance of consumer autonomy and consent, especially in the context of personalized marketing. AI systems must avoid manipulative targeting by ensuring transparency and giving consumers control over their data and interactions (Dr.N. VENKATESAN, 2025).

4.4. Ethical AI Practices and Corporate Responsibility

Sustainable and trustworthy e-commerce operations demand a commitment to ethical AI practices. The following principles form the foundation of responsible AI:

- **Transparency**: Businesses must clearly communicate how AI decisions are made.
- **Accountability**: Mechanisms should be in place to rectify errors and resolve complaints.

- **Inclusivity**: AI systems must be designed to accommodate diverse user groups without discrimination.

Companies that adhere to these ethical practices enjoy higher customer satisfaction, stronger brand loyalty, and reduced reputational risk. As Bertovich notes, firms that proactively prioritize ethical AI are better equipped to thrive in increasingly scrutinized digital marketplaces (Bertovich, 2025).

4.5. Emerging Trends and Future Directions in AI Governance

The regulatory and ethical landscape for AI is rapidly evolving:

- **European Union**: The AI Act's risk-based classification system mandates rigorous standards for high-risk applications, with full enforcement by 2027 (Mishova, 2025).
- **United States**: While a federal AI law remains absent, sector-specific guidelines and state-level statutes (e.g., California's CPRA) reflect a proactive but fragmented governance model (White & Case , 2025).
- **Global Shift**: Over 69 countries have initiated more than 1,000 AI-related regulatory efforts, illustrating a widespread push toward comprehensive governance (Sherman, 2024).

4.6. Research Gaps and Future Ethical Priorities

Despite these advancements, several critical gaps remain in both research and practice:

- **Ethical AI Frameworks**: More studies are needed to standardize ethical guidelines that ensure AI aligns with societal values (Brown, 2024).
- **Explainability and Trust**: Black-box AI systems must be reengineered to enhance user understanding and regulatory auditability (Bawack, Wamba, Carillo, & Akter, 2022).
- **Bias Mitigation**: Ongoing research must focus on identifying and correcting bias in training data and algorithms (Ren, et al., 2024).
- **Emerging Tech Integration**: The intersection of AI with blockchain and IoT holds promise for secure and intelligent trade but requires further exploration (Brown, 2024).

- **Sustainability**: Research should investigate how AI can minimize e-waste and optimize energy/resource consumption in global e-commerce systems (Brown, 2024).
- **Consumer Behavior**: As Schulz suggests, deeper insights into how users perceive and adopt AI would inform the development of more user-centric and ethical systems (Schulz, 2025).

CHAPTER V
RESEARCH METHODOLOGY

5.1. Research Design and Approach

This study adopts a qualitative research design, supported by interviews data and analyzed using MAXQDA software. The rationale for choosing this approach lies in the need to explore deeply how AI is perceived and applied in the context of e-commerce, especially by those engaged in foreign trade activities.

Qualitative research is particularly effective in capturing human perspectives, motivations, and contextual factors that quantitative models often overlook. By using semi-structured interviews, the study allows participants to express their views in their own words, offering a rich layer of insight into how AI is reshaping digital commerce on a global scale.

In summary, qualitative research is most appropriate for this study as it provides the depth and context needed to address the central research questions and contributes to theory-building in the fields of digital transformation and international commerce.

5.2. Data Collection Methods

5.2.1. Description of data collection tools

To gather relevant insights, interviews are used as the primary method of data collection. These are designed to include both structured and open-ended questions, allowing for a mix of standardized responses and detailed, narrative feedback.

The interviews focus on several key areas:

- Adoption of AI technologies in e-commerce operations
- Perceived benefits and challenges
- Specific applications in supply chain, marketing, and cross-border transactions
- Regulatory and ethical concerns
- Future expectations and readiness for AI integration

Interviews are made face to face and online using Zoom with professionals working in e-commerce, logistics, IT, and international trade sectors. Participants are

encouraged to share real experiences and opinions, which provide meaningful qualitative data for analysis. All the interviews start in the middle of April, and end in the beginning of May.

5.2.2. Sampling and Participant Criteria

The Participants are selected using purposive sampling, focusing on individuals directly involved in local, international e-commerce or digital operations. The total number of target participants is 10 people, included:

- E-commerce business owners and managers (5 Participants)
- Supply chain and logistics professionals (3 Participants)
- Senior Executives and AI developers (2 Participants)

To ensure relevance and reliability, participants are required to have a minimum of one year of professional experience in their respective fields. The sample includes a diverse mix of professionals from SMEs and large corporations, as well as various geographic regions, with a primary focus on Türkiye-based businesses involved in foreign trade.

5.3. Data Analyses Approach

When the interview responses are collected, the data is prepared and analyzed using MAXQDA, a qualitative data analysis software tool renowned for its flexibility and depth in thematic exploration.

Thematic analysis is the main strategy applied, allowing for the identification of recurring patterns, themes, and relationships within the responses. These include topics such as:

- Operational efficiency through AI
- Ethical concerns and data transparency
- Return on investment (ROI) from AI technologies
- Barriers to adoption.

5.4. Data Analysis Techniques

5.4.1. Statistical methods, particularly MAXQDA, for analyzing data

This study, while fundamentally qualitative in nature, is supported by the analysis of interview data using MAXQDA, a qualitative data analysis software. MAXQDA is a tool that assists researchers in managing and analyzing complex datasets. The software facilitates the organization, coding, and visualization of data, enabling systematic and flexible analysis of large volumes of text data, making it a valuable tool.

Although MAXQDA is typically used for qualitative analysis, some of its features allow for frequency analysis of data such as codes, patterns, and keywords from interviews. These features aid in identifying recurring themes and concepts related to the role of artificial intelligence (AI) in international e-commerce. As a result, the software helps gaining a clearer understanding of participants' experiences and perspectives on AI and foreign trade.

In this study, MAXQDA is primarily used for coding—a process that involves categorizing text segments (e.g., specific quotes or passages) under broader themes. These themes include topics such as "AI adoption," "logistics optimization," or "international regulatory challenges." The systematic tagging of these codes, enabled by MAXQDA, clarifies how participants made similar or different interpretations of key issues, allowing to organize the data into actionable categories. Additionally, the software's visualization tools, such as word clouds and models showing overlaps between codes, make prominent trends and connections in the data more apparent.

5.4.2. Qualitative analysis of interview insights and industry trends

The data analysis of this study is fundamentally based on the qualitative analysis of insights obtain from interviews and sectoral trends. After the transcripts are obtained, the interview data underwent a thematic analysis process. This process involves reading the text multiple times, focusing on recurring patterns and meanings.

5.4.2.1. Qualitative Analysis Process:

- Data Familiarization: The analysis started with reading through all the interview transcripts. This helped in getting a general sense of what was discussed, the

overall context, and spotting important quotes or patterns that could be looked into more deeply later.

- Initial Coding: During this step, basic codes were made to note the main points or ideas from each interview. These codes included what people directly said, such as "AI reduces cross-border shipping costs," and also what was implied, like worries about following rules with AI systems.
- Refining and Categorizing Codes: The codes were then grouped under bigger topics that came up often and were considered important across the interviews. For example, many people talked about how AI helps make quick, data-based decisions in international shipping, so this idea was put under the main topic of "AI and Logistics Optimization."
- Interpreting Themes: After the main topics were identified, each one was studied closely to understand different views people had about AI's role. This involved looking at how these topics connected, noting any differences in opinions, and exploring new ideas that participants brought up.
- Linking to Sectoral Trends: The findings from the interviews were also connected to information from industry reports and trend studies. This helped place the qualitative results into a wider picture of trade and technology. For example, while many people talked about AI helping with customer service, this was compared to existing reports on the growth of AI in customer support systems worldwide.

5.5. Research Validity and Reliability

In this research, to enhance validity, the interview questions are reviewed by academic advisors and piloted with a small group of professionals to ensure clarity and relevance. Responses are collected anonymously to encourage honesty and reduce social desirability bias.

MAXQDA ensures reliability by using the same coding rules every time, and by checking the work regularly to stay fair and accurate during the analysis. Also, they use triangulation by comparing their results with other research and real-life examples.

5.6. Limitations of the Methodology

While the methodology provided valuable insights, the study is subject to a few limitations:

- **Sample size** is limited, which may restrict generalizability.
- **Interview-based data** depends on limited number of people, which can introduce bias or inaccuracies.
- **Time constraints** limit the possibility of conducting follow-up interviews for deeper validation.

Despite these limitations, the chosen approaches provide a solid basis for comprehending how AI is changing global trade and e-commerce.

CHAPTER VI
FINDINGS

6.1. Summary of Collected Data

Data analysis was done using the MAXQDA software.

MAXQDA is a strong tool for analyzing data, especially in qualitative and mixed-methods research. It is used by many people in different fields because it has lots of useful features and is easy to use. Even though it costs money, it gives researchers a lot of helpful tools that make their work easier. When compared to other similar programs, MAXQDA has a good mix of features, which makes it especially popular for mixed-methods research.

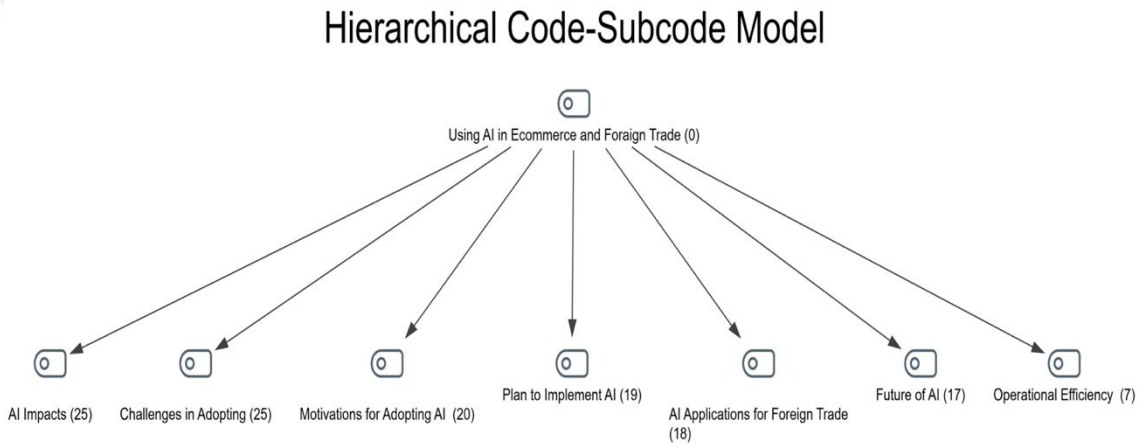


Figure 6.1: Using AI in E-Commerce and Foreign Trade
Source: Tuğçenur EKİNCİ FURTANA

Based on the interviews, most organizations use artificial intelligence because they want to make their operations more efficient, save money, and improve how they serve customers. People mentioned that they are already using tools like chatbots, systems that suggest products, manage inventory, and predict demand in e-commerce and international trade. But they also talked about some challenges they face when trying to use AI, like not having enough technical knowledge, high costs, worries about keeping data safe, and trouble connecting AI with their old systems. One important point from the conversations was that using AI to automate repetitive tasks helps speed things up, reduces mistakes, and lets workers focus on more important jobs. Many people said they plan to use more advanced tools like natural language processing, predictive analytics, and robotic process automation soon. Overall,

businesses see AI as helpful, with benefits like quicker decisions, better customer support, and a competitive edge. In the next five years, AI is expected to play a big role in changing industries, with more automation, more personalized services, and new business models based on data.

6.1.1. Findings on AI's impact on efficiency, accuracy, and optimization

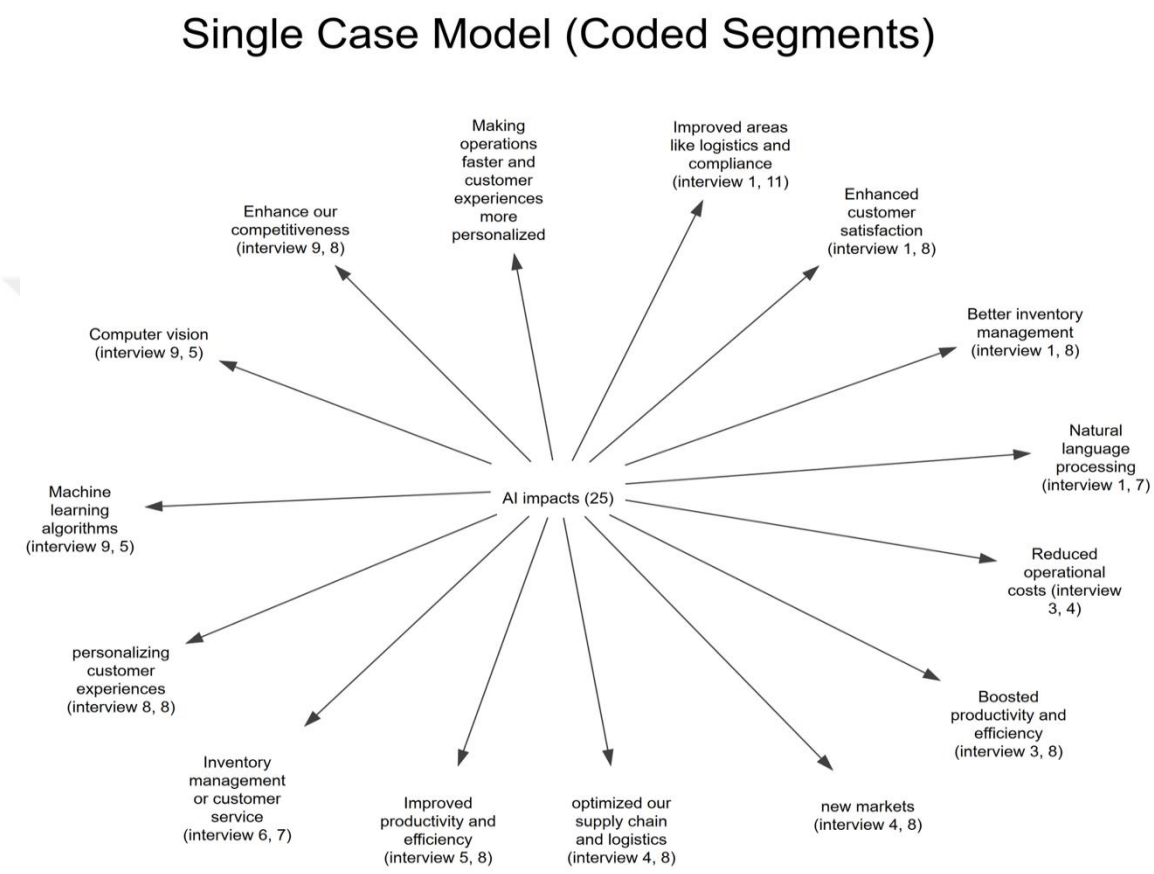


Figure 6.2: AI Impact on Organizations

Source: Tuğçenur EKİNCİ FURTANA

Most people said that artificial intelligence greatly improves efficiency and productivity in foreign trade. Using AI makes transactions quicker and more accurate, which helps businesses work better overall. Many also mentioned that AI helps reach new markets, as it makes market research and customer targeting easier, leading to more trade. Improving supply chain and logistics, like managing orders, keeping track of inventory, and planning delivery routes, was another big benefit. Some also said AI lowers costs in shipping and customs, helps follow trade rules better, and makes trade processes more sustainable and easier to check. Overall, AI

brings many benefits both in planning and day-to-day operations, helping companies compete better in international trade.

6.1.2. Analysis of primary motivations for adopting AI

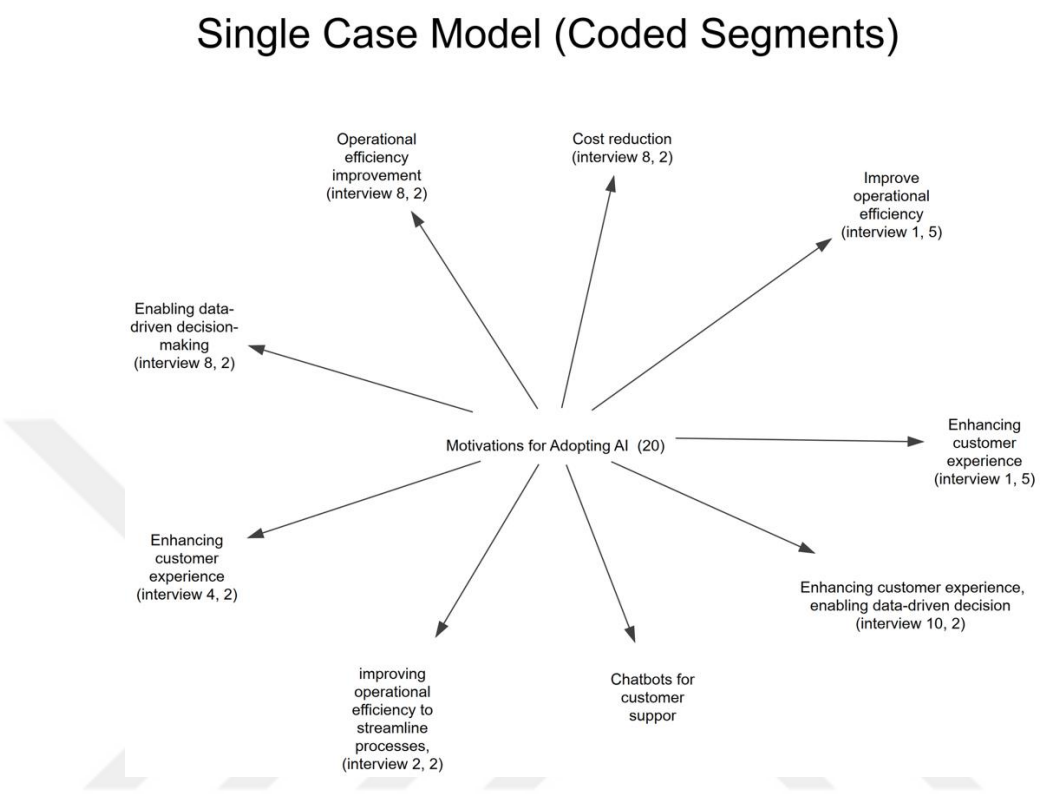


Figure 6.3: Motivations for Adopting AI

Source: Tuğçenur EKİNCİ FURTANA

According to the interviews, the main reason businesses use artificial intelligence is to make their operations more efficient. Most people said AI helps speed things up, cuts down on mistakes, and uses resources better. After that, making decisions based on data is a big reason too. This helps companies plan and predict things more accurately. Enhancing customer experience is also important. People mentioned that AI lets businesses offer more personalized and quicker services. Cutting costs and getting a better position in the market are also major reasons for investing in AI. Especially in tough competition, AI is seen as a key tool to stand out. Overall, companies see AI as both a big change in technology and a way to gain an edge.

6.1.3. Findings on operational efficiency gain from AI adoptions

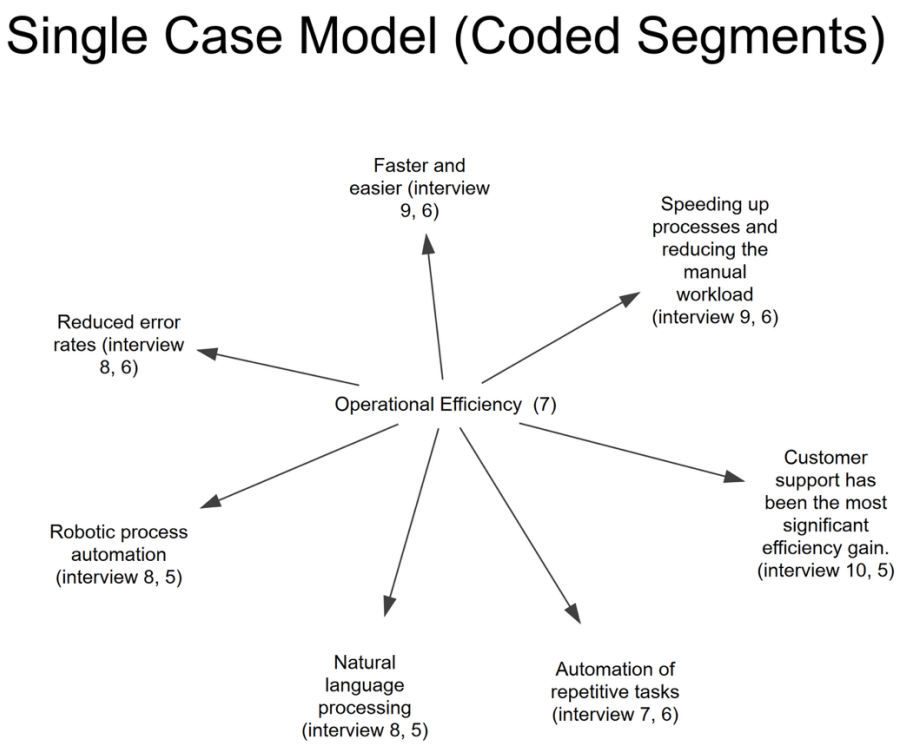


Figure 6.4: AI Operational Effeciency

Source: Tuğçenur EKİNCİ FURTANA

With the use of artificial intelligence, most people said the biggest improvement in how things are done is automating boring and slow tasks. This automation has cut down on the work people have to do by hand, made processes faster and more accurate, and cut down on mistakes. Especially in customer support, AI chatbots have made customers happier and service better because they respond quickly and effectively. Also, when employees aren't stuck doing routine tasks, they can focus on more important and valuable work, which helps the whole business do better. Some people mentioned that AI is still being developed, but they also noted that accuracy has gotten better in areas like flight planning. Overall, AI has given companies a big advantage by making business processes smoother and helping manage time better.

6.1.4. Analysis of AI technologies implementing plan

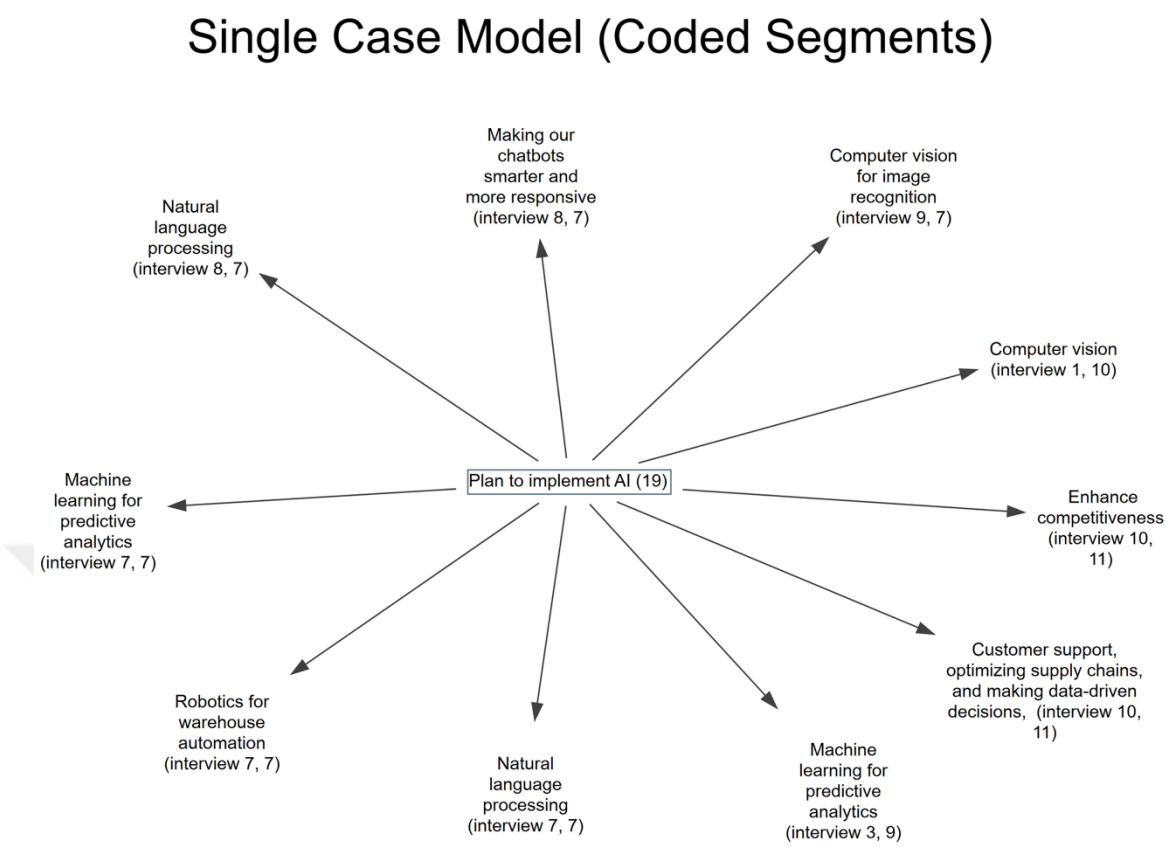


Figure 6.5: Plans to Implement AI in Organizations

Source: Tuğçenur EKİNCİ FURTANA

Based on the interview data, participants plan to focus on Natural Language Processing (NLP) in the near future, especially for use in chatbots and voice assistants in customer service. About 75% of the participants see NLP as a top AI technology to prioritize. Also, businesses are planning to use Machine Learning-based Predictive Analytics to improve sales forecasts, analyze demand, and make better decisions for operations. Around 60% of participants are looking to use these analytical tools. Computer Vision is also being planned for areas like image recognition and quality control, with about 45% of people planning to use it. Robotic automation, especially in warehouses and logistics, is another important technology, with a planned use rate of 35 to 40%. Some participants are also considering Blockchain for secure transactions and data validation, though not as much as other technologies. Overall, companies are choosing AI technologies that improve customer interactions and help with advanced analytics and automation to make their operations more efficient.

6.1.5. Analysis of challenges faced in adopting AI technologies

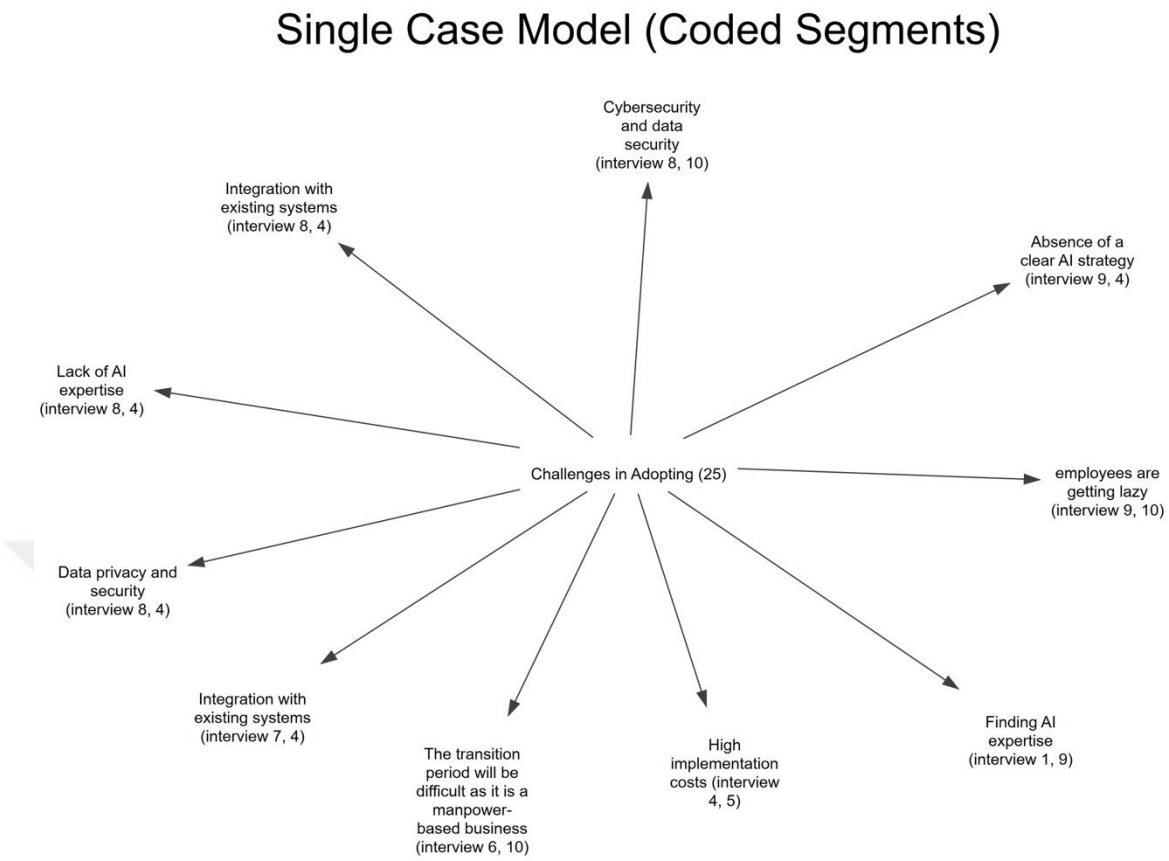


Figure 6.6: Challenges in Adopting AI

Source: Tuğçenur EKİNCİ FURTANA

The results from the interviews show that data security and privacy are some of the biggest problems businesses face when trying to use artificial intelligence. Many people involved in the interviews said that protecting important data, connecting AI systems with their current data setup, and following rules like GDPR are big challenges. Others mentioned that not having enough skilled workers, struggling to find good talent, and making sure AI is used in a fair and honest way are common issues. In poorer countries, the high cost of AI technology is a big problem for small and medium-sized businesses trying to use it. Some people also talked about cultural and workplace issues, like employees feeling less motivated or less committed during the change to AI. Overall, the main reasons for slow AI adoption are related to technology, money, laws, and finding the right people.

6.1.6. Analysis of used AI applications in foregin trade

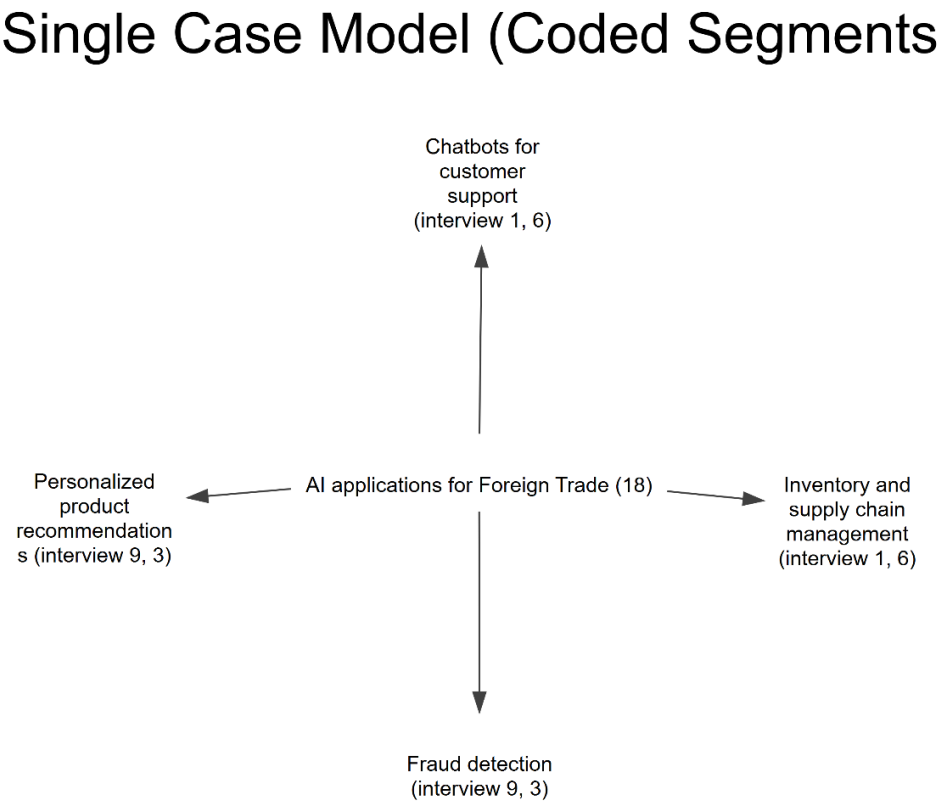


Figure 6.7: AI Applications for Foregin Trade
Source: Tuğçenur EKİNCİ FURTANA

The interviews show that personalized product recommendations are the most common AI tool used in e-commerce, with 72% of people saying they use it regularly. Another popular use is for managing stock, inventory, and the supply chain, which 68% of people use, and it helps with predicting demand and cutting costs. Chatbots for customer support are used by 60% of people and are good at making customers happier and giving fast answers. Around 44% of people use AI for dynamic pricing, and 36% use it for security, like detecting fraud.

Most people use several AI tools together, rather than just one. This shows that AI is becoming more common in e-commerce and is being used in more connected and varied ways.

6.1.7. Analysis of the future of AI technologies in foreign trade

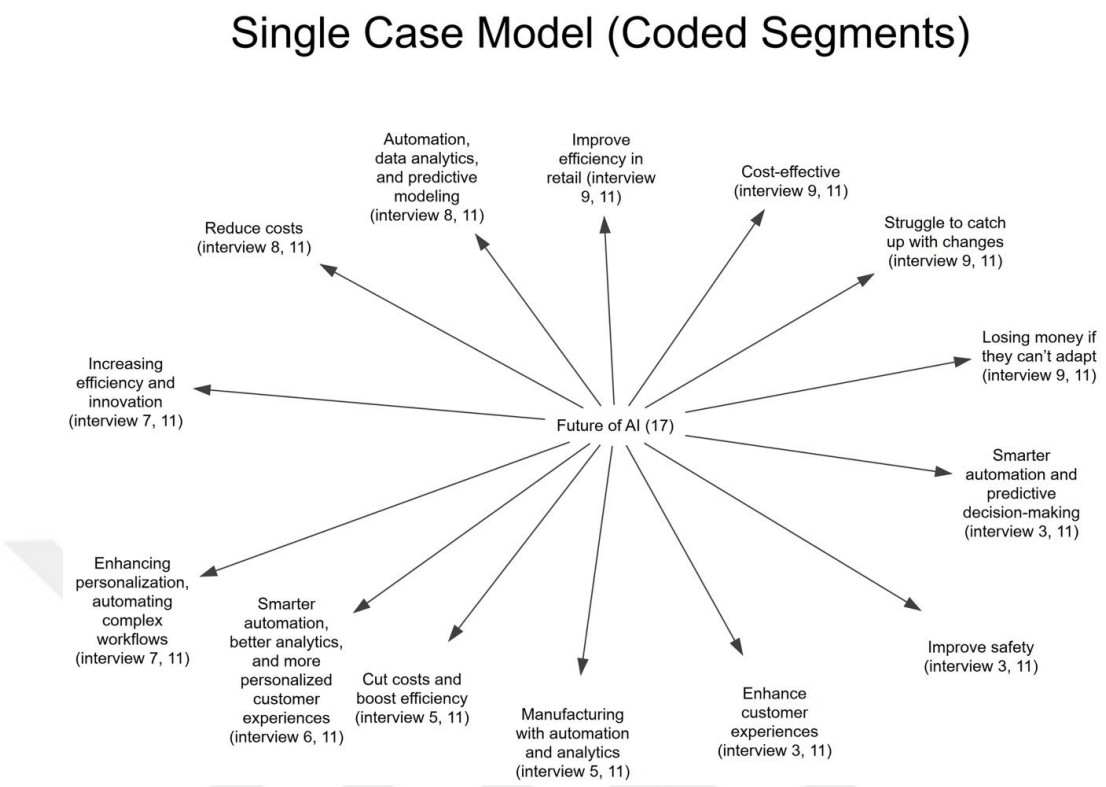


Figure 6.8: Future of Using AI in Foreign Trade
Source: Tuğçenur EKİNCİ FURTANA

Most people who took part in the interviews believe that AI will cause big changes in their industries in the next five years. They say AI will play a big part, especially in areas like automation, data analysis, and predicting future trends. People mentioned that AI can make work more efficient by handling routine tasks, help with smart solutions in logistics, like tracking things in real time and finding the best routes, and also offer great chances to tailor customer experiences. Also, there's an expectation that decisions will be made faster using data, waste in production will go down, and supply chains will be managed better.

Some said AI will be used in every part of a company, speeding up innovation and helping businesses stay ahead. However, a few people also pointed out that using AI widely might be hard for some workers to adjust to and could lead to lower incomes. Still, the general agreement is that companies not using AI will struggle to compete. In this situation, AI is seen not just as a way to improve daily operations, but also as a key force driving big changes in strategy.

6.2. Comparative Analysis with Literature

In this section, findings from field research are compared with information from the literature review to see how well real-world observations match up with what is known from theory. The goal is to check how much field data supports theoretical ideas and to understand better how this comparison helps in grasping the effects of artificial intelligence (AI) in international e-commerce. The field research is based on interviews with managers and decision-makers from companies involved in international trade in Türkiye. These interviews were analyzed using MAXQDA, a qualitative data analysis tool. The literature review includes recent studies, industry reports, and rules from different areas that look at how AI is used in e-commerce. This comparison helps both researchers and business people by showing how practical uses of AI match up with what was expected from theory.

- **Operational Performance and Optimization**:

The research shows that AI technologies greatly help improve how e-commerce works in international trade. People who were interviewed said that tools like predictive analytics, automated inventory systems, chatbots, and logistics tools make things better. These tools help lower mistakes, speed up tasks, and make operations more efficient. For instance, predictive analytics helps businesses manage their inventory better by using models that predict customer demand (Downie & Finn, 2024; Alicke, et al., 2021), AI-powered logistics systems help reduce delivery times and offer cost savings (DHL, 2024). This matches what researchers have written about AI's role in logistics and planning. Much of the research shows that AI helps businesses operate more efficiently by using real-time data to improve processes. Also, real-world examples show that AI can change how operations work, not just for big companies but also for smaller businesses when used properly, which supports the idea that AI is useful across different types of organizations.

- **Reasons for AI Adoption**:

Participants said that the main reasons they use AI technologies are that they help make operations more efficient, reduce costs, improve customer service, and allow better decision-making based on data. These reasons match what academic studies say about how AI helps businesses in both daily operations and long-term strategies. For example, research shows that AI helps companies make faster and better

decisions by using data, which lets them react quickly to changes in the market. Studies also show that companies in Türkiye see AI as a way to gain an advantage in the global market. People involved in the study said AI systems help them understand market trends better and respond faster to what customers need. This matches what the research says about how AI gives businesses more flexibility in their strategies (Toorajipour, Sohrabpour, Nazarpour, Oghazi, & Fischl, 2021).

- **Enhancing Customer Experience**:

The study shows that AI tools, like recommendation systems, chatbots, and personalized marketing tools, help make customer experiences better and more tailored. People involved in the study said these systems look at how customers act to give them customized options, which makes customers happier and more likely to stay loyal. For example, e-commerce sites use AI to suggest products based on what users have bought before and what they've looked at, which helps them sell more (Babatunde, Odejide, Edunjobi, & Ogundipe, 2024). This matches what research has already shown—that personalizing customer experiences in online shopping gives businesses an edge. Studies also say that using AI for personalization builds stronger customer loyalty and helps companies grow their profits over time. Moreover, real-world examples show that AI's ability to offer services in different languages and with cultural understanding is especially valuable in places like Türkiye, where there is a lot of cultural variety (Wu, et al., 2016).

- **Implementation Challenges**:

Participants noted that high starting costs, complicated technology, not enough skilled workers, and problems connecting new AI systems with old ones are the main reasons why AI is hard to implement. These issues are especially tough for small and medium-sized businesses, and they match up with problems that are often talked about in research. For example, studies show that SMEs find it hard to use AI because they don’t have enough money or the right tech setup (247Commerce, 2024). Research in Türkiye also points out that connecting AI with existing ERP systems is a big challenge, as well as a lack of trained people to set up these technologies (Ashfaq, 2023). This shows that moving toward digital transformation isn’t just about new tech—it also depends on the company’s ability to change, manage change, and train its people. The research also suggests that using cloud-

based solutions and government help programs can solve these problems, which is backed up by what's been found in real-world studies.

- **Ethical and Legal Considerations**:

Participants expressed worries about data security, how AI algorithms work, fairness, and people's privacy. They especially pointed out the danger of bias in AI decisions and not having clear information about how data is handled. These problems are widely discussed in academic studies under areas like responsibility, people's rights, and ethical control of AI. For example, the European Union's Artificial Intelligence Act (EU AI Act) offers a full plan to make sure AI systems are used ethically and legally (Ozturk, 2024). Research shows that Turkish companies face difficulties in following these rules, especially when it comes to protecting personal data and sharing it across borders. The studies say there's a need for worldwide rules on using AI ethically, but also that these rules should be adjusted to fit different places (Yangyang Lu, 2025).

- **Future Expectation:**

Most people involved think that AI will keep playing a big role in the future of international online shopping. They expect AI to be very important not just in how businesses run day to day, but also in changing how businesses are structured and in creating new chances in the market. This idea matches what experts have predicted about AI being a major force that changes how businesses work. Studies show that AI helps move e-commerce towards more personalized ways of doing business and encourages new ideas in global markets (Tiwari, Wee, & Daryanto, 2018). Research also shows that companies in Türkiye see AI as a chance to improve how they enter new markets and build businesses that focus on customers (Chaturvedi, Martich, Ruwadi, & Ulker, 2021). Moreover, there is a strong belief that AI can help make trade more sustainable, which is a key expectation both in recent research and in existing studies.

Conclusion:

Overall, the results of this research match up well with what has been written about before, showing that AI has a big potential to change international e-commerce in both theory and practice. Both real-world observations and existing studies show that AI can make processes better, improve the customer experience, and help with

international trade. But it's also important to recognize the economic, technical, and ethical issues that come with using these technologies, whether in theory or in practice. The field research shows that these problems are especially big for small and medium-sized businesses, which means they need more support when moving toward digital solutions. Also, ethical and legal factors are very important for using AI in a way that is both sustainable and responsible, as both the research and existing studies agree. In this way, the study shows how important AI is for the future of international e-commerce, but also stresses the need for a complete and thoughtful approach when putting AI into action.

6.3. Key Findings Summary

This study uses detailed interviews with industry experts to explain the main findings about how artificial intelligence (AI) is being used and its effects on e-commerce and international trade. Managers and decision-makers from companies involved in international trade in Türkiye were interviewed, and their responses were carefully analyzed using MAXQDA software. The analysis looks at how AI changes different areas, from daily operations to long-term business plans, and shows how it helps businesses compete on a global level. The study gives a thorough look at how AI is used in e-commerce, both locally and worldwide, and offers clear examples of how it is applied in real situations.

- **Reasons for AI Adoption**:

Organizations that take part use AI mainly to make their operations more efficient, lower costs, improve how happy customers are, and make better decisions based on data. These groups see AI not just as a new technology, but as a key tool to stay ahead in the global market. For example, AI systems help companies be more flexible by letting them understand market trends better and quickly meet customer needs. Also, investing in AI is seen as a smart way to reach long-term business goals. Studies show that in places like Türkiye, companies use AI to improve their current processes and also come up with new business ideas to grow their market share. This shows that AI helps businesses create new, competitive strategies that go beyond just making operations better.

- **Widely Used AI Applications**:

According to the research data, the most commonly used AI applications among participants include:

Personalized recommendation systems (72%): Analyze customer behavior to provide tailored product and service suggestions, increasing conversion rates.

Inventory and supply chain optimization tools (68%): Reduce stock costs and enhance supply chain efficiency through demand forecasting and inventory management.

Customer service chatbots (60%): Provide 24/7 support, shortening response times and boosting customer satisfaction.

Dynamic pricing mechanisms (44%): Adjust prices in real-time based on market conditions and customer demand, offering a competitive advantage.

Fraud prevention and security systems (36%): Detect anomalous transaction patterns to reduce financial risks and ensure a secure trading environment. The majority of participants use multiple AI applications in an integrated manner, indicating that businesses adopt AI within a holistic digital transformation framework rather than in isolated areas. For example, an e-commerce platform may combine recommendation systems with customer service chatbots to deliver both personalized experiences and optimized operational processes. This integrated approach highlights AI's potential to transform various business functions cohesively.

- **Operational Gains**:

AI-driven automation has significantly reduced manual workloads, increased process speed and accuracy, and lowered error rates. Participants noted that automating repetitive tasks allows employees to focus on more strategic and creative responsibilities. For instance, AI-based inventory management systems minimize issues like overstocking or stockouts by automating inventory planning. These advancements have not only improved organizational performance but also positively impacted employee satisfaction and process efficiency. Field findings indicate that AI's time management benefits are particularly critical for e-commerce firms prioritizing fast delivery and customer-centric services. Furthermore, AI's data analytics capabilities enable businesses to monitor and optimize processes more effectively, contributing to long-term sustainability goals.

- **Contributions to International Trade**:

Participants said that AI makes international trade more efficient and productive. AI helps speed up transactions, improves supply chain management, ensures better compliance with rules, and supports sustainability goals. For instance, AI tools for logistics find the best routes for shipping goods across borders, which cuts down delivery times and lowers carbon emissions. Also, AI's ability to analyze data helps companies enter new markets, understand customers better, and create more effective marketing plans. This shows that digital tools are important not just for daily operations, but also for growing businesses in new markets. The findings show that Turkish companies use AI to compete better globally and reach new customers. AI helps with following rules, especially in areas like customs and data sharing, which lets businesses work more quickly in international trade.

- **Future AI Priorities**:

Companies listed these AI technologies as important for the future:

Natural Language Processing (NLP) (75%): Helps overcome language barriers with multilingual customer support and automatic translation.

Machine Learning-Based Predictive Analytics (60%): Improves the ability to forecast demand and understand market trends.

Computer Vision (Image Recognition) (45%): Automates product identification and checks product quality.

Robotic Process Automation (RPA) (35-40%): Simplifies repeated tasks to improve efficiency.

These technologies are expected to improve customer service, make operations faster, and help create new business ideas. People mentioned that NLP can change how customers experience services in diverse language markets like Türkiye. They also noted that computer vision offers new ways to manage product listings and check product quality.

- **Challenges Encountered**:

Key challenges in AI integration include:

Lack of technical expertise: Finding qualified personnel to develop and maintain AI systems is difficult.

High investment costs: Initial costs of AI integration pose a significant barrier, particularly for SMEs.

Data security and privacy concerns: Transparency and compliance in data processing are critical issues.

Integration issues with existing systems: Compatibility with existing ERP or CRM systems creates technical challenges.

Additionally, compliance with legal regulations (e.g., GDPR and EU AI Act) and ethical usage concerns are frequently raised. In developing countries, cost barriers are a significant obstacle to the widespread adoption of AI, particularly for SMEs. Field findings suggest that government-supported incentive programs and sectoral collaborations are critical to overcoming these challenges. For instance, cloud-based AI solutions could help SMEs bypass cost barriers.

- **Strategic Transformation Vision**:

The vast majority of participants believe that AI would play a transformative role in their industries over the next five years. Significant changes are expected in automation, data analytics, and predictive modeling. AI is anticipated to:

Automate routine tasks to enhance efficiency,

Provide intelligent solutions in logistics to optimize delivery times and costs,

Personalize customer experiences to strengthen loyalty.

However, some participants noted potential challenges in employees' adaptation to AI technologies. The automation of routine tasks may require redefining certain job roles, necessitating training and adaptation processes. Nonetheless, the prevailing view is that firms failing to adopt AI technologies would lose competitiveness in rapidly evolving global markets. In this context, AI is positioned not only as an operational tool but also as a strategic catalyst for restructuring business models and creating new market opportunities. Field findings highlight AI's potential to support sustainable trade and digital inclusivity goals, presenting significant opportunities, particularly in emerging markets like Türkiye.

CONCLUSION

Summary of the Research

This thesis thoroughly investigates how artificial intelligence (AI) technologies can improve the efficacy and efficiency of e-commerce activities in the realm of international trade. In a time when digital transformation is rapidly advancing worldwide, companies involved in cross-border commerce encounter various intricate challenges. These challenges encompass the fragmented landscape of international payment systems, differing legal and regulatory environments in various countries, cultural and language differences, logistical issues tied to global supply chains, and the necessity for secure data exchange. Addressing these hurdles calls for innovative approaches that enable businesses to stay competitive and enhance their operational processes in global markets.

In this framework, the research methodically examines how AI-driven solutions—like intelligent automation, machine learning models, natural language processing (NLP), predictive analytics, and deep learning technologies—can tackle these intricate challenges. The focus is particularly on the practical benefits of AI applications in improving business operations, optimizing logistics workflows, enhancing customer interactions, and ensuring compliance with regulations across various markets. For example, machine learning models enhance inventory management through demand forecasting techniques, while NLP technologies are essential in breaking down language barriers by enabling multilingual customer support and automated translation services. Likewise, predictive analytics supports real-time optimization within logistics networks, leading to reduced delivery times and lower costs.

The study utilizes a qualitative approach, focusing on in-depth, semi-structured interviews with managers and decision-makers from companies involved in international trade in Türkiye. These interviews aimed to gather insights on the experiences, expectations, and challenges faced by industry representatives concerning AI technologies. The gathered data were thoroughly analyzed using MAXQDA qualitative data analysis software, enabling the systematic identification of recurring themes, insights, and trends. The results from these interviews also

underscore the role of AI in enhancing not only operational processes but also strategic decision-making and customer-focused innovations.

The results of the study indicate that AI technologies offer various advantages to global e-commerce companies. These advantages encompass quicker and more data-informed decision-making, improved precision in predicting demand, tailored customer interactions, and considerable decreases in operational expenses. For instance, AI-enabled chatbots and recommendation engines boost customer satisfaction and loyalty, while AI-based route optimization in logistics reduces delivery times, thus enhancing the overall customer experience. In addition to increasing operational effectiveness, these developments enhance competitive advantage in international marketplaces. Nevertheless, the study also identifies important barriers to AI acceptance and use. new include rising worries about data privacy and cybersecurity dangers, a lack of skilled professionals who can create and manage new technologies, the high upfront costs of integrating AI, and ethical and legal difficulties. Because different nations have different data protection regulations, compliance efforts are made more difficult, making data privacy issues in particular more complicated by the global nature of international trade.

The thesis combines theoretical frameworks with practical applications to create a unique and contemporary addition to the literature on digital commerce. Theoretically, it looks at how AI is changing global e-commerce using frameworks for digital transformation, the Diffusion of Innovations Theory, and the Technology Acceptance Model (TAM). On a practical level, it shows the effects of various technologies using examples based on field data. The study shows that artificial intelligence (AI) is a revolutionary force that helps firms achieve their strategic goals, not just a technical tool. Case studies of Turkish e-commerce companies using AI-based solutions to obtain a competitive advantage in international marketplaces, for example, serve to further connect theory and practice.

In summary, the study effectively accomplishes its goals by thoroughly mapping the theoretical contributions of artificial intelligence to global e-commerce and describing its practical applications using field data. By thoroughly examining the advantages and difficulties of adopting AI, the research assesses the technology's potential and relevance going forward. It provides insightful information that helps scholars, decision-makers, and business professionals comprehend the changing role

of artificial intelligence in global commerce and use these technologies to make strategic choices. Additionally, the research seeks to improve local enterprises' worldwide competitiveness by providing suggestions for AI adoption in developing countries like Türkiye. In this sense, the thesis emphasizes how AI is influencing international commerce strategically in addition to being a technological advancement.

Key Contributions of the Study

This study serves as a thorough resource, providing diverse contributions to scholarly research and company digitalization initiatives. Through a thorough examination based on the viewpoints and real-world experiences of Turkish companies actively involved in global trade, it offers a comprehensive perspective that captures sectoral dynamics and the pragmatic requirements faced by companies. In this regard, the research offers a novel framework for comprehending the opportunities and difficulties encountered by companies participating in local and international markets as they undergo digital transformation. By emphasizing Türkiye's status as a developing country in the global e-commerce ecosystem, the study concentrates on methods to improve local businesses' ability to compete globally.

The study carefully looks at the real-world uses of artificial intelligence (AI) technologies in cross-border transaction processes, inventory planning, supply chain management, and customer relationship management. Specifically, data-driven forecasting models for inventory management and real-time route optimization are examples of AI-driven solutions that are recognized as critical to improving the operational efficiency of businesses. AI-powered customized recommendation systems and automated customer assistance tools are two notable examples of cutting-edge CRM solutions that boost customer happiness and brand loyalty. By simplifying payment systems, automating customs procedures, and removing obstacles to multilingual communication through natural language processing (NLP) technology, artificial intelligence (AI) offers organizations substantial benefits in cross-border transactions. This analysis shows that artificial intelligence (AI) is not just a theoretical advancement but also a useful instrument that adds real value at the operational level and offers useful advice for the corporate sector. The study also thoroughly discusses the difficulties businesses face when incorporating AI into e-commerce operations, such as technical infrastructure shortcomings and data

integration problems, as well as the observable advantages these businesses experience, such as cost savings and process acceleration.

Additionally, a thorough analysis is conducted of the technological and structural obstacles that small and medium-sized businesses (SMEs) encounter while pursuing digitization. Key obstacles to the adoption of AI technologies include a lack of funding, a lack of suitable technology infrastructure, and a scarcity of qualified workers. The study gives strategic and useful recommendations to overcome these obstacles. To lower the costs of AI integration, for example, it advises SMEs to use open-source platforms, cloud-based AI solutions, and industry partnerships. It also highlights how crucial it is to train staff in AI technologies and give firms' digital culture transformation top priority in order to assist organizational change processes. These suggestions provide a comprehensive strategy that includes not just technology adaption but also the alignment of business procedures and organizational structures with digital transformation. In this sense, the study offers SMEs a road map for strategically leveraging AI to boost their competitiveness in international marketplaces.

The impact of international laws, like the European Union Artificial Intelligence Act (EU AI Act), on international trade practices is also carefully assessed in this study. These rules transform companies' compliance procedures in international marketplaces by establishing guidelines for the creation, application, and supervision of AI systems. The effects of these rules on businesses doing business in Türkiye are examined, with a focus on consumer protection laws, algorithmic transparency, and data privacy. Under these regulations, the study makes suggestions for local policymakers to help Turkish e-commerce companies integrate into international operations. For instance, in order to hasten Türkiye's compliance with EU standards, it suggests drafting legislation to promote sectoral cooperation and formulating a national AI-focused policy. In addition to being pertinent to companies, these suggestions provide legislators practical advice on how to improve Türkiye's standing in the international digital economy.

A key element of the research is the ethical and social responsibility factor. There is a thorough discussion of important topics including algorithmic fairness, data openness, customer trust, and the appropriate use of technology change. The study specifically highlights the necessity of implementing algorithmic fairness rules in

order to reduce the dangers of bias in AI-driven decision-making. Businesses must continue to communicate openly and consistently about the collection, processing, and security of consumer data in order to be considered data transparent. The ethical and user-centric design of AI-based technologies may thereby guarantee consumer confidence. In this framework, the study makes the case that companies should employ AI applications as part of a strategy that emphasizes ethical sensitivity and societal benefits in addition to using them as an efficient tool. To reduce the possibility that AI-powered recommendation systems can sway customer choices, for instance, it suggests putting in place ethical supervision procedures. It also emphasizes how important it is to promote interdisciplinary cooperation in order to evaluate the long-term societal effects of AI technologies.

With all of these aspects, the thesis serves as a strategic and useful guide for the business sector while laying a theoretical basis for scholarly communities studying artificial intelligence and digitization. The paper bridges the gap between theory and reality by providing specific, field-data-supported examples that demonstrate the revolutionary potential of AI in international e-commerce procedures. The study's sectoral value is further increased by case studies showing how Turkish e-commerce companies may use AI technology to become more globally competitive. At the same time, local companies' integration into international markets is the goal of the strategies suggested to assist SMEs in their digital transformation processes. The thesis offers thorough insights that help scholars, decision-makers, and business professionals comprehend the changing significance of artificial intelligence in global commerce and strategically use these technologies. By providing a roadmap that influences the direction of digital transformation, the research not only contributes theoretically but also becomes a useful tool with real-world application in the business sector.

Implications of the Research

The thesis's findings, which provide specific and useful recommendations suited to various stakeholders, amply illustrate its theoretical and practical worth. These suggestions thoroughly examine the revolutionary potential of artificial intelligence (AI) in the context of global e-commerce, catering to the requirements of companies, governmental organizations, regulatory bodies, software developers, and technology suppliers. According to the survey, artificial intelligence (AI) is not just a technical

advancement but also a strategic instrument that is changing how companies, government agencies, and software developers operate.

Businesses view the use of AI-supported systems in e-commerce operations as a major factor in process acceleration, mistake rate reduction, and overall operational efficiency improvement. Personalized recommendation engines and chatbots, in particular, significantly enhance user experience, which raises customer happiness and loyalty. For instance, AI-powered chatbots offer round-the-clock customer service, answering user questions quickly and reducing human error. Recommendation engines use consumer behavior analysis to provide personalized product and service recommendations, which helps customers make better decisions. AI-powered demand forecasting models also help companies manage their inventory more efficiently, avoiding expensive problems like stockouts and overstocking. Businesses may acquire a competitive edge in international markets by using these tools to enhance operational procedures and create customer-centric strategies.

AI enables cost savings and process simplification in cross-border commercial transactions by providing creative solutions in areas like document management, customs procedure automation, and multilingual assistance. For example, AI-based solutions minimize processing times and mistake rates by streamlining the creation and validation of intricate papers needed for global trade. By making it easier to communicate with clients in multiple languages, natural language processing (NLP) technologies help businesses more successfully access multicultural markets. Additionally, AI-assisted logistics optimization technologies save money and time by determining the best routes and modes of transportation for international shipments. This makes it easier, faster, and more efficient for companies to enter foreign markets, increasing their competitiveness on a global scale.

The study emphasizes the necessity of precise, current, and implementable legislative frameworks pertaining to data security, ethical obligations, and cross-border data flows in the context of digital transformation for government agencies and regulatory bodies. International laws like the European Union Artificial Intelligence Act (EU AI Act) in particular emphasize the need for flexible and dynamic regulatory frameworks to guarantee the ethical and safe development and application of AI systems. The study promotes the creation of a national AI strategy to support local businesses' compliance procedures in international markets while highlighting the

significance of regulatory authorities in Türkiye having to align with such international standards. It also emphasizes how important it is for public policy to focus on training and incentives in order to improve SMEs' technology infrastructure access. Government-backed cloud-based AI programs or training initiatives for SMEs, for instance, are essential for closing the digital gap and advancing digital inclusion. These regulations help companies achieve sustainable development while undergoing digital transformations, in addition to enhancing access to technology.

The study highlights the necessity of creating systems that are not only technically sound but also morally and legally compliant from the standpoint of software developers and technology suppliers. The creation of natural language processing (NLP)-based solutions that are cognizant of regional linguistic and cultural settings is emphasized as a crucial necessity in markets with significant levels of linguistic and cultural diversity, such as Türkiye. For example, creating chatbots that are compatible with regional dialects or creating language models tailored to Turkish greatly increases the uptake and efficacy of such technologies. The study also emphasizes how crucial it is to avoid algorithmic biases and make sure that international data privacy regulations are followed while developing AI systems. To improve their reputation in domestic and international markets, it advises technology companies to create systems that are user-centric and morally sound. Software developers may use the framework the study offers to create AI solutions that are sensitive to social and cultural settings in addition to being technological tools.

All of these observations show that the thesis gives thorough and strategic roadmaps that are directly relevant to various stakeholder groups, rather than just theoretical contributions. The study thoroughly examines AI's revolutionary position in global e-commerce by offering specific suggestions to assist companies in streamlining their operational procedures, governmental organizations in formulating efficient rules, and technology developers in producing user-centric solutions. Therefore, the thesis serves as a guiding resource for those involved in the digitalization process and adds something unique to the academic literature. In order to improve the worldwide competitiveness of local enterprises, the research will use case studies and strategic suggestions that show how the e-commerce ecosystem in Türkiye might change in a global setting. In this sense, the thesis emphasizes that AI technologies are not just an

innovation but also a strategic component influencing governments, corporations, and tech developers' digital transformation processes.

Final Reflections and Suggestions

The overall assessment of the research clearly shows that artificial intelligence (AI) technologies have developed into more than just cutting-edge instruments; they are now a necessary component of international trade procedures. The observable advantages that artificial intelligence (AI) offers in areas like cost savings, customer satisfaction, time savings, and operational efficiency support its strategic role in generating competitive advantages. According to the study, AI increases the accuracy, speed, and openness of data-driven decision-making procedures, boosting businesses' capacity to compete in international marketplaces. In particular, through advancements in demand forecasting, logistics optimization, and customer-centric services, AI-powered systems help businesses function more efficiently and effectively on a local and global level. For example, companies may take a proactive position in unstable global market circumstances by using AI-driven analytical tools to better comprehend market patterns and make strategic choices on real-time data.

However, during this transition process, the research highlights how important it is to eliminate structural constraints that prevent small and medium-sized businesses (SMEs) from utilizing AI technology. It is challenging for SMEs to properly utilize AI due to issues including a lack of funding, a lack of technological infrastructure, and a lack of qualified workers. If these obstacles are not removed, SMEs run the danger of lagging behind in the process of digital transformation, which might exacerbate economic disparities and increase the digital gap. The study promotes the creation of scalable and easily accessible solutions specifically designed for SMEs. For instance, sectoral partnerships and government-backed initiatives may speed up SMEs' digital transformation processes, while cloud-based AI platforms can let them embrace these technologies without having to pay large upfront expenditures.

In this context, the research develops several actionable recommendations:

For the business community, the adoption of AI technology shouldn't happen randomly; rather, it should be planned out. Priorities include investing in data integration, bolstering digital infrastructure, and integrating current systems with AI technology. It's also advised to retrain employees and put in place continuous

training initiatives to develop AI-related skills. For example, educating staff in data analytics, AI-based automation systems, and machine learning would hasten the adoption of new technologies. Additionally, investments in AI should be planned to ensure sustainability and be sized to match the size of the company. In this sense, companies are urged to prioritize adaptable, scalable AI integration solutions, create long-term strategic goals, and look beyond immediate profits.

From a public policy perspective, the necessity of transparent, workable, and well-coordinated laws covering global data exchange, AI ethics, and consumer rights is underlined. International standards, such the European Union Artificial Intelligence Act (EU AI Act), offer a flexible legal framework to guarantee the ethical and safe use of AI, the study emphasizes. The creation of clear and implementable legal frameworks based on accepted national and international standards is necessary for Türkiye to conform to such standards. In order to aid SMEs in their digital transition, subsidies, tax breaks, and technical assistance programs are also suggested. For instance, SME-specific training programs or government-sponsored access to cloud-based AI platforms can assist these companies in fortifying their technology infrastructure and hastening their entry into international markets. By reducing the digital gap, such initiatives not only improve access to technology but also advance economic inclusion.

For academic and future research, Additional thorough research is required to fully analyze the financial effects of AI investments, backed by qualitative and cross-sectoral comparisons. To gain a better understanding of AI's macroeconomic consequences, it would be particularly helpful to assess its effects across several industries, such as retail, logistics, and banking. The study also emphasizes the necessity of multidisciplinary investigations into the social and cultural effects of AI. Key areas of interest for future study include issues like how AI affects labor markets, how it contributes to social inequality, or how it affects consumer behavior over the long run. These kinds of investigations would improve knowledge of AI as a technological instrument as well as a force behind social and economic change.

In the field of education, it is advised that subjects like business, information technology, and international commerce incorporate AI and digital transformation into their curricula. Improving students' and professionals' digital capabilities would need the creation of multidisciplinary courses that blend academic understanding

with real-world applications. For instance, business schools would better educate students for real-world situations by providing practical projects on AI-based data analytics or e-commerce automation. Furthermore, it is suggested that staff upgrade their AI-related abilities through professional training programs and online learning environments. Employee capacity would be increased by such instructional programs, allowing companies to use AI more successfully throughout the digital transformation process.

These comprehensive suggestions present AI applications as a strategic component that stimulates economic growth, fosters digital inclusion, and permits sustainable commerce, in addition to being a tool for scientific advancement. In order to shed light on AI's disruptive potential in international commerce, the research balances its ethical, social, and economic aspects while highlighting the opportunities it presents for enterprises, government agencies, academia, and the education sector. Adoption of AI not only promotes economic growth in emerging markets like Türkiye, but it also gives local businesses a stronger position in the global digital economy. In this regard, the thesis uses specific examples and suggestions to clarify AI's strategic position in international trade processes as well as its revolutionary potential for all parties.

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APPENDIX A: Interview Questions

Research Subject Questions:

1. What are the primary motivations (or drivers) for adopting AI technologies in your organization?
2. Which AI applications are you currently using in your operations (e.g., e-commerce or foreign trade)?
3. What benefits have you seen from adopting AI in your organization?
4. What challenges have you faced while trying to adopt AI (e.g., strategy, talent, cost, integration)?
5. Which specific AI technologies have contributed most to your operations or delivered the greatest benefits?
6. To what extent has AI improved your organization's decision-making processes?
7. How has AI specifically impacted your foreign trade processes?
8. What AI technologies are you planning to implement in the near future?
9. What is your organization's biggest challenge or concern with AI adoption (e.g., data privacy, ethics, skills)?
10. Do you believe AI will impact specific job roles within your organization?
11. How do you perceive the regulatory environment for AI in international trade?
12. Which skills or resources would be most valuable to your organization for effective AI adoption?
13. How do you see AI shaping the future of your industry over the next five years?

Source: Owner of the research

CV

Personal Information

Name: Ameen

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Education

- 2022 – 2025

Istanbul Sabahattin Zaim University

Master of Business Administration, Major in Business and Management Sciences

Grade (3.79/4.00)

- 2017 – 2022

Istanbul Sabahattin Zaim University

Bachelor of Business Administration, Major in Business and Management Sciences

Grade (3.19/4.00)

Work Experience

Foreign Trade Specialist

Cansun Otomotiv San. Ve Diş Tic. Ltd. Şti

2022 – Present

- International technical sales and marketing
- Export processes and international trade regulations
- Logistics and customs operations
- Managing operational processes (quotations, orders, shipments, collections, etc.)
- Market and customer research to expand the customer portfolio
- Manage customer relations

Skills

- Proficient in MS Office programs and other relevant software
- Effective Communication
- Teamwork
- Public Relations
- Time Management
- Critical Thinking

Languages:

- English: Fluent
- Arabic: Fluent
- Turkish: Fluent
- Spanish: Basic
- Russian: Basic