THE IMPACT OF MACHINE LEARNING APPLICATIONS ON E-COMMERCE PERFORMANCE

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THE IMPACT OF MACHINE LEARNING APPLICATIONS ON E-COMMERCE PERFORMANCE

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2023

DECLARATION

I declare that this thesis entitled "THE IMPACT OF MACHINE LEARNING APPLICATIONS ON E-COMMERCE PERFORMANCE" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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APPROVAL

I hereby declare that I have checked this report entitled "THE IMPACT OF MACHINE LEARNING APPLICATIONS ON E-COMMERCE PERFORMANCE" and in my opinion, this thesis it complies the partial fulfillment for awarding the award of the degree of Bachelor Of Technology Management (High Technology Marketing) With Honours.

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DEDICATIONS

I would like to give thanks to my family members who give full support for my education, beloved supervisor and panel who encourage me and guided me with their knowledge throughout this research and coursemates who have shared their experience in order to help me complete this research.

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ABSTRACT

The digital economy grew dramatically in 2020 as a result of the COVID-19 pandemic, which spawned new digital businesses, prompted conventional brick-and-mortar businesses to go online, and millions of Malaysians to purchase online. E-commerce sites are reaping the benefits of this revolutionary technological improvement due to the latest developments in the digital world. Regardless of industry, machine learning can provide numerous benefits to owners of large and small businesses. Nevertheless, practically all customer interactions are digital, and while e-commerce companies have collected enormous amounts of customer data, it is difficult to bring it all together and provide actionable insights for marketing decisions. Therefore, this research aims to determine the impact of machine learning applications on e-commerce. The researcher collect data from 10 members from each of the top 20 e-commerce sites in Malaysia who are aware with the applications of machine learning in e-commerce. Then, the researcher analyze data by using Statistical Package of Social Science (SPSS) Version 26. From the results of the questionnaire was conducted the researcher can found that there were positive relationships between recommendation systems, customer relationship management, fraud detection and the impact of machine learning applications on e-commerce performance.

Keywords: E-commerce, machine learning, application, technology

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ABSTRAK

Ekonomi digital berkembang secara mendadak pada tahun 2020 akibat daripada pandemik COVID-19, yang melahirkan perniagaan digital baharu, mendorong perniagaan konvensional untuk pergi ke dalam talian, dan berjuta-juta rakyat Malaysia membeli dalam talian. Tapak e-dagang mendapat manfaat daripada peningkatan teknologi revolusioner ini berikutan perkembangan terkini dalam dunia digital. Tidak kira industri, pembelajaran mesin boleh memberikan banyak faedah kepada pemilik perniagaan besar dan kecil. Namun begitu, hampir semua interaksi pelanggan adalah digital, dan walaupun syarikat e-dagang telah mengumpulkan sejumlah besar data pelanggan, adalah sukar untuk menyatukan semuanya dan memberikan pandangan yang boleh diambil tindakan untuk keputusan pemasaran. Oleh itu, penyelidikan ini bertujuan untuk menentukan kesan aplikasi pembelajaran mesin terhadap e-dagang. Pengkaji mengumpul data daripada 10 ahli daripada setiap 20 tapak e-dagang teratas di Malaysia yang mengetahui tentang aplikasi pembelajaran mesin dalam e-dagang. Kemudian, pengkaji menganalisis data dengan menggunakan Statistical Package of Social Science (SPSS) Versi 26. Daripada hasil soal selidik yang dijalankan pengkaji dapati bahawa terdapat hubungan yang positif antara sistem pengesyoran, pengurusan perhubungan pelanggan, pengesanan penipuan dan kesan aplikasi pembelajaran mesin mengenai prestasi e-dagang.

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Kata Kunci: E-dagang, pembelajaran mesin, aplikasi, teknologi

TABLE OF CONTENTS

PAGE

DECLARATION

APPROVAL

DEDICATIONS

ACKNOWLEDGEMENTS **2**

ABSTRACT **3**

ABSTRAK **4**

TABLE OF CONTENTS **5**

LIST OF TABLES **8**

LIST OF FIGURES **10**

LIST OF SYMBOLS AND ABBREVIATIONS **11**

LIST OF APPENDICES **12**

CHAPTER 1 INTRODUCTION **13**
1.1 Introduction 13
1.2 Background of Study 13
1.3 Conceptual & Operational Definition of Study 14
1.3.1 Conceptual Definition 14
1.3.2 Operational Definition 14
1.4 Problem Statement 15
1.5 Research Question 16
1.6 Research Objective 17
1.7 Scope and Limitation of Study 17
1.8 Significance of Study 18
1.9 Summary 18

CHAPTER 2 LITERATURE REVIEW **19**
2.1 Introduction 19
2.2 Technology 19
2.3 Machine Learning (ML) 20
2.4 E-commerce 21
2.5 Applications of Machine Learning in E-Commerce 22
2.5.1 Customer Relationship Management (CRM) 22
2.5.2 Recommendation Systems 23
2.5.3 Fraud Detection 24

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2.6 The Impact of Machine Learning Applications on E-Commerce Performance 24
2.6.1 For product recommendations 24
2.6.2 Improved fraud detection 25
2.6.3 For customer churn prediction 25
2.7 Proposed Conceptual Framework 26
2.8 Hypotheses 27
2.9 Summary 27

CHAPTER 3 RESEARCH METHODOLOGY 28
3.1 Introduction 28
3.2 Research Design 28
3.3 Methodology Choice 29
3.4 Primary and Secondary Data Source 29
3.5 Sampling Design 30
3.6 Research Strategy 30
3.6.1 Questionnaire Design 31
3.6.2 Pilot Test 31
3.7 Data Analysis Method 32
3.7.1 Descriptive Analysis 32
3.7.2 Pearson Correlation Analysis 32
3.7.3 Linear Regression Analysis 33
3.8 Validity and Reliability 33
3.8.1 Validity 34
3.8.2 Reliability 34
3.9 Research framework 35
3.10 Summary 36

CHAPTER 4 RESULTS AND DISCUSSIONS 37
4.1 Introduction 37
4.2 Pilot Test 37
4.3 Descriptive Analysis 38
4.3.1 Background of The Respondents 38
4.3.2 Research Question Analysis 46
4.4 Reliability Analysis 53
4.5 Pearson Correlation Analysis 54
4.6 Multiple Regression Analysis 55
4.7 Hypothesis Testing 58
4.8 Summary 60

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS 61
5.1 Introduction 61
5.2 Summary of Descriptive Analysis 61
5.3 Summary of the study 62
5.4 Discussion Of Objectives and Hypothesis Testing 62
5.4.1 Objective 1: To determine the applications of machine learning in e-commerce sites. 63
5.4.3 Objectives 3: To investigate the relationship between the impact of machine learning applications on e-commerce performance. 66

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

5.5 Implication of Study 68
5.5.1 Managerial Implication 69
5.6 Limitation of the study 69
5.7 Recommendation For Future Research 70
5.8 Conclusion 71

REFERENCES **72**

APPENDICES **80**

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

LIST OF TABLES

Table 3.1 Five-point Likert Scale 31

Table 3.2: Pearson Correlation Coefficient 33

Table 3.3: Cronbach's Alpha Coefficient 34

Table 4.1: Reliability Test For 20 Respondents 37

Table 4.2: Summary of Total Demographic Information 39

Table 4.3: Gender of Respondents 40

Table 4.4: Age of Respondents 41

Table 4.5: Job Position of Respondents 42

Table 4.6: What types of e-commerce platform 43

Table 4.7: Does the use of machine learning applications in your e-commerce sites help further improve performance 44

Table 4.8: Which machine learning applications are used on your e-commerce sites 45

Table 4.9: The impact of machine learning applications on e-commerce performance 46

Table 4.10: Recommendation System 48

Table 4.11: Customer Relationship Management 50

Table 4.12: Fraud Detection 52

Table 4.13: Reliability Statistics 54

Table 4.14 Pearson Correlation Analysis 54

Table 4.15 Model Summary 56

Table 4.16 ANOVA 56

Table 4.17 Coefficient 57

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Table 4.18 Hypotheses Results 59

Table 5.1: Summary of Descriptive Analysis of Demographic Respondents 61

Table 5.2: Mean Score Analysis 65

Table 5.3: Summary of Descriptive Analysis of Demographic Respondents 65

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

LIST OF FIGURES

Figure 2.1 Conceptual Framework 26

Figure 4.1: Gender of Respondents 40

Figure 4.2: Age of Respondents 41

Figure 4.3: Job Position of Respondents 42

Figure 4.4: What types of e-commerce platform 43

Figure 4.5: Does the use of machine learning applications in your e-commerce sites help further improve performance 44

Figure 4.6: Which machine learning applications are used on your e-commerce sites 45

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

LIST OF SYMBOLS AND ABBREVIATIONS

E-commerce	-	Electronic Commerce
ML	-	Machine Learning
AI	-	Artificial Intelligence
BI	-	Business Intelligence
CRM	-	Customer Relationship Management
IV	-	Independent Variable
DV	-	Dependent Variable
SSPS	-	Statistical Package of Social Science
IT	-	Information Technology

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LIST OF APPENDICES

APPENDIX A	GANTT CHART PSM 1	80
APPENDIX B	GANTT CHART PSM 2	81
APPENDIX C	QUESTIONNAIRE	82

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter discussed the background of the study, problem statement, research questions, research objectives, scope and limitations of the study, significant of study and summary of the whole chapter.

1.2 Background of Study

The digital economy has grown rapidly in 2020 because the COVID-19 pandemic spawned new digital businesses, forced traditional business with physical premises turn to online, and millions of Malaysians also purchase online. (Malaysia Digital Economy Blueprint, 2022). Although e-commerce has been around for several decades, its performance in today's world is based on artificial intelligence rather than business intelligence (Behgounia and Zohuri, 2022). Furthermore, with the evolution of artificial intelligence (AI) and its subfield machine learning (ML), as well as technological integration with the majority of modern e-commerce platforms, we could also see more and more physical stores are migrating to the online. Thus, e-commerce sites are reaping the benefits of this revolutionary technological improvement due to the latest developments in the digital world.

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Moreover, with the transition from traditional to modern technologies and the use of digital technologies, most e-commerce is now based on revolution and creative improvements, such as automation (Behgounia and Zohuri, 2022). Today, AI is in high demand, from AI-powered search engines to self-driving cars. It is the process by which machines, such as computer systems, can perform jobs that require human intelligence, which involves learning, reasoning and self-modification to drive the process (Yap, 2021). No matter in which industry, machine learning can provide numerous benefits to both large and small business owners. It can help produce better services, identify problems and reduce risks, better understanding of consumer behavior, and make better decisions sales and marketing.

Machine learning is an artificial intelligence (AI) application that allows systems to automatically learn and improve experiences without direct human help or intervention, and then make decisions based on that learning (Kumar, Ramachandran, & Kumar, 2021). Nowadays, customers want more personalized and better experience during their customer journey. Nevertheless, practically all customer interactions are digital, and while e-commerce companies have collected enormous amounts of customer data, it is difficult to bring it all together and provide actionable insights for marketing decisions. However, machine learning can precisely forecast what customers want and thereby increase sales by evaluating customer data. Therefore, the researcher needs to determine the impact of machine learning applications on e-commerce performance.

1.3 Conceptual & Operational Definition of Study

1.3.1 Conceptual Definition

The field of machine learning involves the design of programs that learn rules from data, adapt to changes, and improve performance based on experience. Besides, machine learning also refers to the techniques that required to operate intelligently with enormous amounts of data, such as synthesizing, classifying, or sorting this data. (Micu et al., 2021).

1.3.2 Operational Definition

Hua (2016) defined e-commerce as a sophisticated information technology (IT) process that helps in the achievement of a comprehensive consumer experience through design, communication, fulfilment, distribution and evaluation. Besides, Hua (2016) also defined e-commerce performance as the business value impact of e-commerce, which encompasses three types of benefits: marketing and competitive advantages, fundamental advantages that support strategy and development, and business efficiency advantages.

In this research, the researcher defines machine learning as an algorithm used to make an improvement to the systems in e-commerce. The systems including fraud detection, Customer Relationship Management (CRM) system, and recommendation system in e-commerce. These machine-learning algorithms will be compared in order

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to determine the best accuracy results from the e-commerce transaction dataset (Saputra et al., 2019). In addition, the researcher defines e-commerce as sites for the purchasing and selling of products and services over electronic networks.

Furthermore, the researchers defined e-commerce performance as how e-commerce sites serve shoppers more effectively and thus increase sales. Machine learning models can help CRM systems analyze customer personal and behavioral data to give companies a competitive advantage by improving customer retention. These models can forecast which consumers will churn and reasons why they churn (Sahar, 2018). According to Tahir et al. (2021), machine learning algorithms have been used to improve prediction accuracy and solve data sparseness and cold start problems when creating recommendation systems. Therefore, machine learning can help in increasing sales and optimizing many features of e-commerce operations, such as product selection and ordering. According to Areiqat et al (2021), machine learning in e-commerce will have an impact on transactions, customer retention, and satisfaction.

1.4 Problem Statement

Malaysia's e-commerce revenue increased 17.1 percent year on year to RM279 billion in the third quarter of 2021, up from RM238.2 billion in the previous quarter. According to the finding of the Malaysia Digital Economy (2021), e-commerce revenue surged by 4.3 percent quarter on quarter. Chief statistician Datuk Seri Dr Mohd Uzir Mahidin responded to this finding by stating that the improved performance was due to the adoption of the new normal during the COVID-19 pandemic, which increased digital usage in Malaysia. As online shopping becomes increasingly widespread, one of the possible problems for many e-commerce platforms is customers information overload. Therefore, e-commerce companies must implement machine learning recommendation systems to improve the accuracy of predictions that best meet customer demands and preferences (Tahir et al., 2021). Besides, Sharma (2021) pointed out that artificial intelligence is the foundation of e-commerce development, and machine learning is a sub-field of artificial intelligence, has been widely used in e-commerce to collect data from customer. This is because by collecting the data from customer, enabling e-commerce to predict customer behavioral pattern and recommend products that meet their needs and preferences

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(Sharma, 2021). Therefore, the development of e-commerce business highlights the necessity of establishing an effective recommendation system in this era.

According to InMobi research, 26 percent of Southeast Asian consumers have determined what categories they want to shop for but have not yet narrowed down on specific products or brands during shopping journey (Saurabh Madan, 2022). Thus, Customer Relationship Management (CRM) is required for the companies to get a better understanding of their customers and gain customers' satisfaction. CRM is the supporting systems that support a strategy aimed at developing profitable long-term relationships and interactions with customers and potential customers. Consequently, CRM is crucial for any company because acquiring new customers is more expensive than retaining existing customers (Vlačić et al., 2021). By utilizing business intelligence and analytical models, CRM systems may identify the most profitable set of customers and target them in order to achieve higher customer retention rates. Furthermore, many types of machine learning techniques have been widely employed to assess the probability of customer churn (Sabbeh, 2018).

Furthermore, it is critical to improve customers' transaction experience when shopping online by utilizing machine learning to prevent fraudulent transactions on e-commerce (Raiter, 2021). As of October 31, Malaysia had recorded 8,162 cases of e-commerce fraud with a total loss of 57.73 million ringgit (Mahalingam et al., 2021). Fraudsters simply require a few bits of information, such as security codes, credit card numbers, expiration dates, and so on, to conduct fraudulent transactions using online payment methods. As a result, the development of fraud detection algorithms is important in order to avoid losses, and a rising number of algorithms rely on advanced machine learning technology to assist fraud detectors (Kumar et al., 2021). Thus, this research aims to investigate the relationship between the impact of machine learning applications on e-commerce performance.

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1.5 Research Question

RQ1: What are the applications of machine learning in e-commerce sites?

RQ2: What is the impact of machine learning applications on e-commerce performance?

RQ3: What is the relationship between the impact of machine learning applications on e-commerce performance?

1.6 Research Objective

RO1: To determine the applications of machine learning in e-commerce sites.

RO2: To examine the impact of machine learning applications on e-commerce performance.

RO3: To investigate the relationship between the impact of machine learning applications on e-commerce performance.

1.7 Scope and Limitation of Study

This research focused on the impact of machine learning applications on e-commerce performance. Additionally, it also focused on the applications of machine learning in e-commerce sites. Moreover, the research scope is to identify the applications of machine learning that affect e-commerce performance. The researcher's target respondents in this research are employers and employees that used machine learning applications in their ecommerce platform. The researcher distributed the questionnaire to the target respondents via an online survey, such as Google Form.

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The limitation of this study is only focusing on the applications of machine learning in e-commerce. Therefore, this study cannot cover all the other industries because the research is only limited to the e-commerce industry, so the outcomes of literature, theoretical proposition, data analyzed, and conclusions made can only be generalized to the e-commerce industry. In addition, the applications of machine learning in other industries have different impacts, therefore, the results of this study cannot be considered as the impact of the applications of machine learning on all industries.

1.8 Significance of Study

First, by conducting this research, the researcher can understand clearly on the impact of machine learning applications on e-commerce performance. Moreover, the researcher also can clarify the relationship between the impact of machine learning applications on e-commerce performance. Thus, this study would help more and more e-commerce comprehend the impact of machine learning applications on its performance. Through the applications of machine learning can improve the business performance and it indirectly increase the profit of companies. In addition, this research can act as future reference for other researcher that plan to conduct research that relate with the impact of machine learning applications on e-commerce performance.

1.9 Summary

The framework of this chapter is a general introduction to the research. The topic selection of this research is introduced, including research background, research concept and operational definition, problem statement, research question and research purpose, research scope and limitations, and research significance.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discussed the literature review of this research. The researcher explained the definition of machine learning (ML) and e-commerce, the applications of machine learning, and the impact of machine learning applications towards e-commerce. In addition, the dependent and independent variables are defined in order to develop the hypotheses. At the end of this chapter, the researcher developed a conceptual framework to explain the research.

2.2 Technology

According to Christiansen et al. (2011), Technologies are divided into three broad categories: hardware, software, and orgware. Hardware refers to physical tools and devices; Software refers to the skills, knowledge and processes involved and required to use technology; Orgware (or organizational technology) refers to the ownership of technology or the institutional arrangements by which organizations or communities will use technology.

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Besides, Miao et al. (2022) also stated that the emergence and development of artificial intelligence and other emerging technologies have not only created new industries and changed the global competitive landscape, but also changed people's lives and the way of social and economic production. Technology is an enabler and motivator of change, but change must be driven by business drivers who leverage technology. E-commerce technology has brought about significant changes in the way business operates (Bajaj et al., 2005).

According to Geum, Kim, & Lee (2017), technology in service businesses differs from technology in manufacturing businesses. Manufacturing technologies are directly applied to new product development, either to provide goods with more and

diverse features or to contribute to faster and more efficient new product development operations. However, service technologies vary in purpose, role and application area, and act as facilitators for employees and consumers to provide customized services that enable service operations to be more efficient, thereby increasing customer satisfaction.

2.3 Machine Learning (ML)

According to Kumar et.al (2019), machine learning is an application of artificial intelligence that enables computers automatically to learn and improve from experience without explicit programming. It also focuses on the creation of computer programmes capable of accessing data and using it to learn for themselves. Furthermore, it is a method of training an algorithm to learn how to make decisions. Machine learning has grown dramatically in recent years in the context of data analysis and computation, allowing applications to work intelligently (Sarker, 2021).

Besides, Athey (2019) also stated that the field of machine learning is concerned with the development of algorithms for application in data sets, with the key areas of concentration being prediction (regression), clustering, classification, and grouping tasks. Machine learning is classified into four types, involving supervised learning, unsupervised learning, reinforcement learning, and semi-supervised learning (Hua, 2008). In addition, machine learning can be defined as a theory that allows a computer to learn how to accomplish a task. Meanwhile there is no need for the computer to be programmed. Machine learning is concerned with the analysis and development of algorithms. These algorithms can learn any skill and make predictions based on data (Medar, Rajpurohit & Rashmi, 2017).

According to Wang, Ma, & Zhou (2009), Machine learning is the study of using computers to simulate human learning processes. It is also the study of computer self-improvement strategies, including the acquisition of new knowledge and capabilities, the discovery of existing knowledge, and the continuous improvement of performance and achievement. Machine learning is faster than human learning because it is easier to gather knowledge and disseminate learning results. Therefore, every