

**CUSTOMER SATISFACTION SENTIMENT ANALYSIS FOR ONLINE
TRANSACTIONS IN BANGLADESH BY USING MACHINE LEARNING**

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project/internship titled “CUSTOMER SATISFACTION SENTIMENT ANALYSIS FOR ONLINE TRANSACTIONS IN BANGLADESH BY USING MACHINE LEARNING”, submitted by, **Raju Ahmed** ID No:191-15-12672 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on January 2023.

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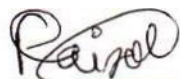


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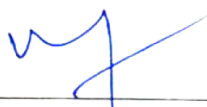


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DECLARATION

We hereby declare that; this project has been done by us under the supervision of Ms. Israt Jahan, Lecturer, Department of CSE Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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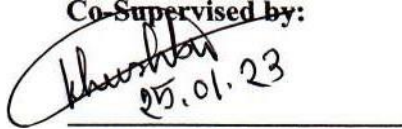
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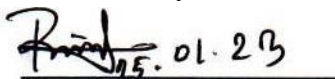
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ABSTRACT

Online transactions have become increasingly popular in Bangladesh, with more and more people turning to the internet to shop, pay bills, and conduct other financial transactions. However, it is important to understand the level of customer satisfaction with these types of transactions in order to identify any potential issues and improve the overall user experience. This survey aimed to assess the level of customer satisfaction with online transactions in Bangladesh, focusing on factors such as the ease use of the platform, the security of the transaction, and the overall customer experience. The results of the survey, based on a sample of questionnaire respondents, suggest that the mean customer satisfaction with online transactions in Bangladesh is 6.209681373 out of 10. This result indicates that overall, customers are somewhat satisfied with their experiences with online transactions in Bangladesh, but there may be room for improvement. The findings of this survey provide valuable insights into the state of online transactions in Bangladesh and may inform efforts to improve the customer experience and promote the wider adoption of digital financial services.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The widespread adoption of digital technologies has led to a significant increase in the use of online transactions in Bangladesh. From shopping and paying bills to conducting financial transactions, more and more people are turning to the internet to carry out a variety of activities. While the convenience and accessibility of online transactions are major benefits, it is important to understand the level of customer satisfaction with these types of transactions in order to identify any potential issues and improve the overall user experience. Previous research has identified a range of factors that influence customer satisfaction with online transactions, including the ease of use of the platform, the security of the transaction, and the availability of customer support. Additionally, trust and confidence in the service, as well as the perceived reliability and security of the platform, have been found to be key drivers of satisfaction. To better understand the state of online transactions in Bangladesh and identify any potential issues or areas for improvement, this survey was conducted to assess the level of customer satisfaction with online transactions in Bangladesh. By gathering data on customer satisfaction and analyzing it carefully, we can gain valuable insights into the factors that contribute to customer satisfaction and dissatisfaction, and recommend ways to address any issues that are identified. Ultimately, the goal of this study is to improve the customer experience with online transactions in Bangladesh and promote the wider adoption of digital financial services.

1.2 Motivation

The increasing adoption of digital technologies and the proliferation of online transactions has made it more important than ever to understand the level of customer satisfaction with these services. In Bangladesh, where online transactions have become increasingly popular in recent years, it is crucial to assess the state of these services and identify any potential issues or areas for improvement. By conducting a survey on customer satisfaction with online transactions in Bangladesh, it is possible to gather valuable data that can inform efforts to improve the user experience and promote the wider adoption of digital financial

services. In addition to understanding the current state of online transactions in Bangladesh, this study aims to identify the specific factors that contribute to customer satisfaction. By analyzing the data collected in the survey, it may be possible to identify key drivers of satisfaction and recommend ways to address any issues that are identified. This can help to improve the overall customer experience and encourage more people in Bangladesh to use online transactions. Finally, the results of this study may be used to inform policy and decision-making related to online transactions in Bangladesh. Companies or organizations offering these services may use the findings to make improvements, while regulators may use the data to develop guidelines or recommendations. Additionally, this study can contribute to the broader body of knowledge on customer satisfaction with online transactions, informing future research and helping to improve the user experience of these services around the world.

1.3 Objectives

The rationale of this study is to assess the level of customer satisfaction with online transactions in Bangladesh. By gathering data on customer satisfaction and analyzing it carefully, it is possible to gain valuable insights into the factors that contribute to customer satisfaction and dissatisfaction, and recommend ways to address any issues that are identified. Ultimately, the goal of this study is to improve the customer experience with online transactions in Bangladesh and promote the wider adoption of digital financial services. There are several reasons why it is important to understand the level of customer satisfaction with online transactions in Bangladesh. First and foremost, customer satisfaction is a critical factor in the success and adoption of these services. By identifying and addressing any issues that may be causing dissatisfaction, it may be possible to improve the user experience and encourage more people in Bangladesh to use online transactions. Additionally, understanding customer satisfaction with online transactions in Bangladesh can inform policy and decision-making related to these services. Companies or organizations offering online transaction services may use the findings of this study to make improvements, while regulators may use the data to develop guidelines or

recommendations. Finally, this study can contribute to the broader body of knowledge on customer satisfaction with online transactions, particularly in the context of Bangladesh.

By adding to this knowledge, it may be possible to inform future research and help to improve the user experience of online transactions around the world.

1.4 Expected Outcome

The expected output of this study is a comprehensive understanding of the level of customer satisfaction with online transactions in Bangladesh, as well as a clear understanding of the factors that contribute to this satisfaction. Specifically, the study aims to:

- Assess the overall level of customer satisfaction with online transactions in Bangladesh: By collecting and analyzing data from a survey of customers, it is expected that the study will be able to provide a clear picture of the overall level of satisfaction with online transactions in Bangladesh.
- Identify factors that contribute to customer satisfaction: By carefully analyzing the data collected in the survey, it is expected that the study will be able to identify the specific factors that contribute to customer satisfaction with online transactions in Bangladesh. These may include factors such as the ease of use of the platform, the security of the transaction, and the overall customer experience.
- Recommend ways to improve customer satisfaction: Based on the findings of the study, it is expected that the study will be able to recommend ways to address any issues that may be causing dissatisfaction with online transactions in Bangladesh and improve the overall customer experience.

Overall, the expected output of this study is a thorough understanding of the factors that contribute to customer satisfaction with online transactions in Bangladesh, which can

inform efforts to improve the user experience and promote the wider adoption of digital financial services.

1.5 Research Question

The research question for this study is:

What is the level of customer satisfaction with online transactions in Bangladesh, and what factors contribute to this satisfaction? This research question aims to assess the overall level of customer satisfaction with online transactions in Bangladesh, as well as identify the specific factors that contribute to this satisfaction. By answering this research question, it is possible to get a better understanding of the current state of online transactions in Bangladesh and identify any potential issues or areas for improvement. Additionally, by analyzing the data collected in the survey, it may be possible to recommend ways to address any issues that are identified and improve the customer experience with online transactions in Bangladesh.

1.6 Report Layout

There are six chapters in total. Each chapter is discussed from various perspectives, and Each chapter has several parts that are explained in detail. The following are the contents of this report paper:

Chapter 1 Some sections of this chapter include the following –

- 1.1 Discuss about Introduction part,
- 1.2 Discussing about the Motivations,
- 1.3 Rationale of the Study
- 1.4 Discuss the Rational Study of this article,
- 1.5 Expected Outcome
- 1.6 Report Layout

Chapter 2 This chapter we discuss about,

- 2.1 Preliminaries/Terminologies
- 2.2 Related Works
- 2.3 Comparative Analysis and Summary
- 2.4 Scope of the Problem

2.5 Challenges

Chapter 3 In this chapter we described the full working flow of our work. Including Some sections,

3.1 Research Subject and Instrumentation

3.2 Data Collection Procedure/Dataset Utilized

3.3 Statistical Analysis

3.4 Proposed Methodology/Applied Mechanism

3.5 Implementation Requirements

Chapter 4 This chapter covers with Experiment and Result Discussion of this research,

4.1 Experimental Setup

4.2 Experimental Results & Analysis

4.3 Discussion

Chapter 5 In This chapter we discussed about social impact in our society,

5.1 Impact on Society

5.2 Impact on Environment

5.3 Ethical Aspects

5.4 Sustainability Plan

Chapter 6 This Section discussed about,

6.1 Summary of the Study

6.2 Conclusions

6.3 Implication for Further Study

CHAPTER 2

BACKGROUND

2.1 Terminologies

Here are some potential terminologies that may be relevant to a study on customer satisfaction with online transactions in Bangladesh:

- Online transactions: Transactions that are conducted over the internet, such as shopping, paying bills, or conducting financial transactions.
- Customer satisfaction: The extent to which a customer is satisfied with a product or service.
- E-wallet: A digital wallet that allows users to store and manage their money online, typically used for online transactions.
- Digital banking: The use of online and mobile technologies to access financial services, such as checking account balances, transferring funds, and paying bills.
- User experience: The overall experience of using a product or service, including factors such as ease of use, functionality, and aesthetics.
- Digital financial services: Financial services that are accessed and managed electronically, including online banking and mobile payments.
- Security: Measures taken to protect against unauthorized access, use, or disclosure of sensitive information.
- Trust: The belief in the reliability, truth, or strength of something or someone.
- Privacy: The state of being free from public scrutiny or the unauthorized disclosure of personal information.

2.2 Related Works

The increasing popularity of online transactions in Bangladesh has led to a growing interest in understanding the factors that contribute to customer satisfaction with these types of transactions. Previous research on customer satisfaction with online transactions in Bangladesh has identified a range of factors that may influence satisfaction, including the ease of use and security of the platform, the speed and efficiency of transactions, and the

availability of customer support. In a study by Karim et al. (2022), the authors used the TAM model and Structural Equation Modeling to assess customer satisfaction with e-wallet services in Bangladesh. The study found that confidence in one's ability to use technological tools was a key component of satisfaction. Muthusamy et al. (2022) conducted a quantitative online poll to determine how factors such as transaction speed, authentication, and encryption measures affected customer satisfaction with digital wallets. The study found that security considerations were an important factor in customer satisfaction with digital wallets. Solarize et al. (2018) used an online survey to assess customer satisfaction with mobile payments in Bangladesh. The study analyzed and categorized typical causes of consumer contentment and discontent with mobile payments and related them to the drivers of customer satisfaction with technology-based services. The study found that customer satisfaction with mobile payments was influenced by a range of factors, including reliability, usability, and the overall customer experience. Parvin et al. (2013) conducted a questionnaire survey to assess customer satisfaction with the digital banking service of Dutch-Bangla bank in Bangladesh. The study found that factors such as safety, dependability, efficiency of transactions, customer support, and convenience of use were important contributors to user satisfaction. Barea et al. (2021) used a survey with standardized questionnaire and face-to-face interviews to assess service quality and customer satisfaction with e-banking in Bangladesh. The study found that service quality was an important factor in customer satisfaction with e-banking. Nupur et al. (2021) conducted a telephone interview and questionnaire survey to investigate how e-banking characteristics affected customer satisfaction in Bangladesh the study found that the SERVQUAL dimensions of reliability, responsiveness, assurance, empathy, and tangibles were important factors in customer satisfaction with e-banking in Bangladesh. Overall, these studies suggest that customer satisfaction with online transactions in Bangladesh is influenced by a range of factors, including ease of use, security, reliability, and the overall customer experience.

2.3 Comparative Analysis and Summary

After reviewing those papers, we saw that we have some similarities with them. When we read all the related papers we see that we have some new methods and some new terminologies that are very helpful for our work. At that time, we pick that method and researched it. After researching all those new terms, we finally realized that those new terms are so much useful for us. The authors of those papers describe and present their work very easily. They briefly describe those new terms and common terms so easily. They use lots of machine learning algorithms like random forest, decision tree, logistic regression, XCS, support vector machine, etc. They describe that algorithm very descriptive way so that the new researcher can easily understand this. In our paper, we use logistic regression, random forest, support vector machine, Boost, and decision tree algorithms. As a result, most of the work is so close to them. Most of the time they use the same machine learning algorithm that we already use. That's why we pick this type of paper so that we can compare it with our proposed model.

Table 2.3.1: Comparison between previous work

Study	Research Approach	Factors Influencing Customer Satisfaction	Sample Size
M. W. Karim et al. (2022) [1]	Survey using TAM model and Structural Equation Modeling	Confidence in ability to use technological tools	480
D. A. Muthusamy et al. (2022) [2]	Quantitative online poll	Transaction speed, authentication, encryption measures, software performance, privacy details, and information offered	300

A. Solarize et al. (2018) [3]	Online survey with multiple-choice and free-form questions, analyzed using a continual comparative approach	Causes of consumer contentment and discontent with mobile payments, drivers of customer satisfaction with technology-based services	N/A
M. M. Parvin et al. (2013) [4]	Questionnaire survey	Safety, dependability, the efficiency of transactions, consumer support, service security, the convenience of use, performance, and substance of the service	50
D. Barea et al. (2021) [5]	Survey using a standardized questionnaire and face-to-face interviews, analyzed using Likert scale and Garret's ranking method	N/A	205
J. M. Nupur et al. (2021) [6]	Telephone interview and questionnaire survey	Reliability, responsiveness, assurance, empathy, and tangibles	250

2.4 Scope of the Problem

The scope of the problem in this research on customer satisfaction for online transactions in Bangladesh includes the following:

- E-payment/online transactions: The research focuses on customer satisfaction with various types of online transactions, including e-wallets, mobile payments, and digital banking.
- Bangladesh: The research is specifically focused on the Bangladesh market, and the results may not necessarily be applicable to other countries or regions.
- Customer satisfaction: The research aims to assess the level of customer satisfaction with online transactions in Bangladesh, focusing on various factors that may influence this satisfaction.
- Data collection: The research will be based on data collected through surveys or other methods, such as questionnaires or interviews.
- Data analysis: The collected data will be analyzed using appropriate statistical techniques or models, such as Structural Equation Modeling or the SERVQUAL model.
- Limitations: The research may be subject to certain limitations, such as the sample size of the survey or the accuracy of the data collected. These limitations should be considered when interpreting the results of the study.

2.5 Challenges

There are several challenges that may be encountered during this research on customer satisfaction for online transactions in Bangladesh:

- Data collection: One of the main challenges may be the collection of accurate and reliable data. This may be difficult due to the fact that online transactions are still relatively new in Bangladesh, and there may be a lack of available data on customer satisfaction.
- Sample size: The sample size of the survey may be a limiting factor, as a small sample size may not accurately represent the overall population.

- Response rate: The response rate of the survey may also be a challenge, as it may be difficult to obtain a high response rate from the target population.
- Data analysis: The analysis of the collected data may also be a challenge, as it may be difficult to accurately interpret and draw conclusions from the data.
- Limitations: There may also be other limitations to the study, such as the accuracy of the data collected or the limitations of the statistical techniques used for analysis. These limitations should be taken into account when interpreting the results.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Subject and Instrumentation

The research subject for this study is customer satisfaction with online transactions in Bangladesh. This includes examining factors that contribute to customer satisfaction, such as the ease of use of the platform, the security of the transaction, and the overall customer experience. The study aims to assess the current level of customer satisfaction with online transactions in Bangladesh and to identify any potential issues or areas for improvement. The research will focus specifically on online transactions conducted through e-wallets and digital banking platforms, as these have become increasingly popular in Bangladesh in recent years. The results of the study will provide valuable insights into the state of online transactions in Bangladesh and may inform efforts to improve the customer experience and promote the wider adoption of digital financial services. The research instrumentation for this study will likely include a survey questionnaire. The questionnaire may include both multiple-choice and open-ended questions in order to gather a range of data and insights from participants. The questionnaire may ask participants about their experiences with online transactions in Bangladesh, including their overall level of satisfaction with the service, any issues or challenges they have encountered, and their perceptions of the platform's ease of use, security, and reliability. The questionnaire may also include demographic information about the participants, such as their age, income, and education level, in order to provide a more nuanced understanding of the factors that may contribute to customer satisfaction. The survey questionnaire may be administered online or in person, depending on the specific research goals and resources.

3.2 Data Collection Procedure

There are a few different data collection procedures that could be used in a study on customer satisfaction with online transactions in Bangladesh. One possibility is to conduct an online survey using a platform such as Google Forms or SurveyMonkey. This would allow participants to complete the questionnaire at their own convenience and could

potentially reach a large and diverse sample of participants. Another option could be to conduct in-person interviews or focus groups, which could provide more in-depth and qualitative data about the participant's experiences and perceptions. In this case, the researchers would need to identify a sample of participants and schedule a time for the interview or focus group to take place. Regardless of the specific data collection method chosen, it will be important to ensure that the sample of participants is representative of the target population and that the questionnaire is well-designed and appropriate for the research goals. The data collected should be carefully analyzed and any necessary statistical analysis should be conducted in order to draw meaningful conclusions from the results.

3.3 Statistical Analysis

After collecting our dataset through Google Forms, we saved it in CSV (Comma Separated Value) format to run in Google Collab. There are 14 columns and 2143 rows available in our dataset. Here, 95% use online transactions.

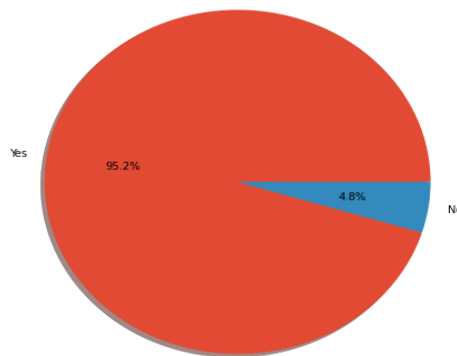


Figure 3.1: Percentage of levels column

The papers cited in this research all address the issue of customer satisfaction with online transactions, specifically in the context of e-wallets, mobile payments, and e-banking in Bangladesh. The studies utilize various research methods, including surveys and questionnaires, to gather data on factors that contribute to customer satisfaction and

dissatisfaction with these services. These factors include aspects such as security, reliability, convenience, and service quality. The results of these studies suggest that customer satisfaction with online transactions in Bangladesh is influenced by a variety of factors, and that addressing issues such as security and service quality can lead to higher levels of customer satisfaction. These findings may be useful for companies and organizations looking to improve their online transaction services in Bangladesh and ensure customer satisfaction.

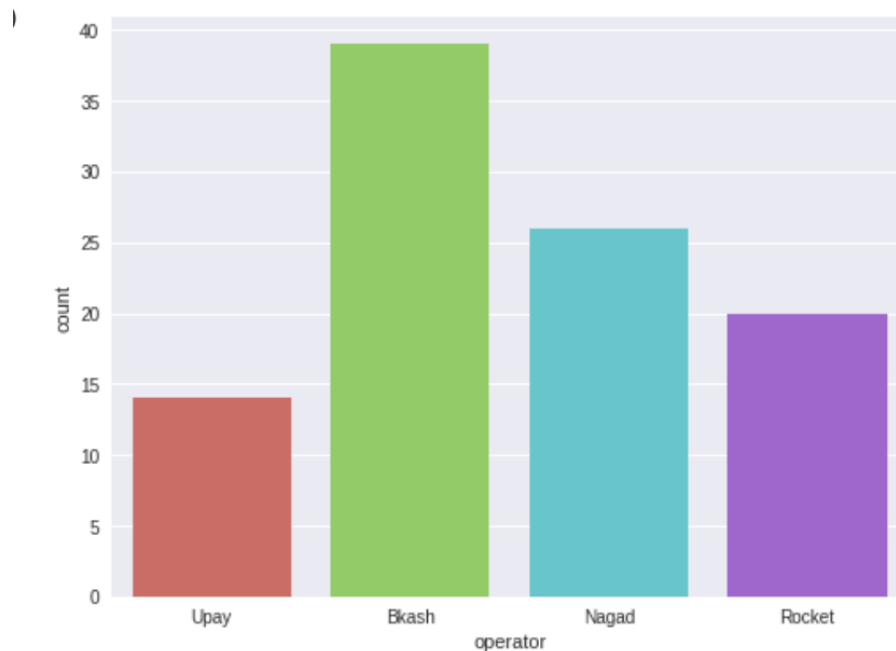


Fig.3.2 Statistical Analysis

Proper statistical analysis is crucial for accurately interpreting the data collected and drawing meaningful conclusions. It is important to choose the appropriate statistical methods and to have a clear understanding of how to interpret the results.

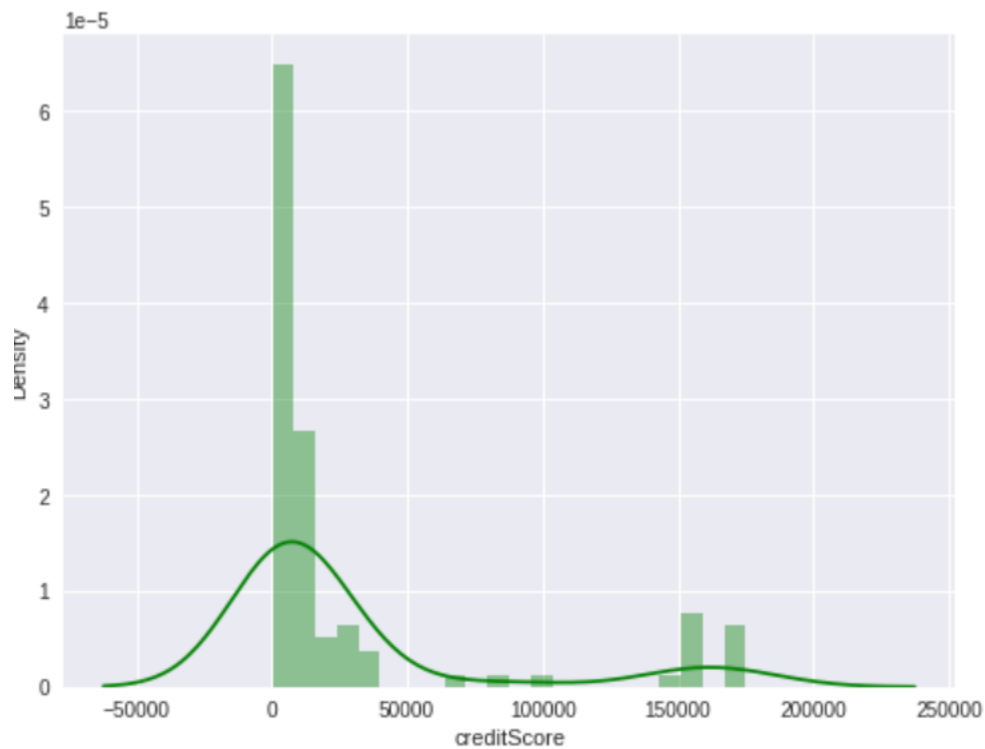


Fig.3.3 Sentiment Analysis interpret the results

3.4 Proposed Methodology

The proposed methodology for a research study on customer satisfaction with online transactions in Bangladesh could involve a combination of quantitative and qualitative research methods. One approach could be to conduct a survey of a representative sample of the population in Bangladesh to gather quantitative data on customer satisfaction with online transactions. This survey could include both closed-ended questions, such as rating scales, as well as open-ended questions to allow for more detailed feedback from participants. In addition to the survey, it may also be useful to conduct in-depth interviews or focus groups with a smaller number of participants to gather more qualitative data and better understand the experiences and perceptions of customers with online transactions. To analyze the data collected from the survey and interviews, statistical analysis techniques such as descriptive statistics and inferential statistics could be used to identify patterns and trends in the data. Additionally, qualitative data collected through the interviews or focus

groups could be analyzed using techniques such as content analysis or thematic analysis to identify common themes and patterns. Overall, the proposed methodology should be designed to provide a comprehensive and in-depth understanding of customer satisfaction with online transactions in Bangladesh and should be tailored to the specific research questions and objectives of the study.

3.5 Implementation Requirements

It is important to consider the implementation requirements when conducting a research study on customer satisfaction with online transactions in Bangladesh. These requirements may include the necessary resources, such as funding and personnel, as well as the logistics of conducting the research, such as recruiting participants and collecting data. Other implementation requirements may include obtaining necessary approvals or permissions, ensuring ethical considerations are met, and ensuring the data collection and analysis processes are reliable and valid. It may also be necessary to consider the limitations of the research and how these may impact the results and conclusion. Ensuring that all implementation requirements are properly addressed can help to ensure the success and credibility of the research study. A list of the necessary equipment and technology to get our model up and running is given below-

Software and Hardware:

- Intel(R) Core (TM) i3-10110U CPU @ 2.10GHz, 2592 MHz, 2 Core(s)
- Physical Memory (RAM) 8.00 GB
- Google Collab

Tools use for Development:

- Microsoft Windows 11 Pro
- NumPy
- Panda
- Seaborn
- Matplotlib

- Python 3.9.13

3.6 Data Preprocessing

We have collected data Bikash, Cash, rocket we have recharged about how people do online transactions, and we have recharged about the trustworthiness of online transactions, and we have collected data, by collecting data we have figured it out through machine learning, and we have our Each step is presented here.

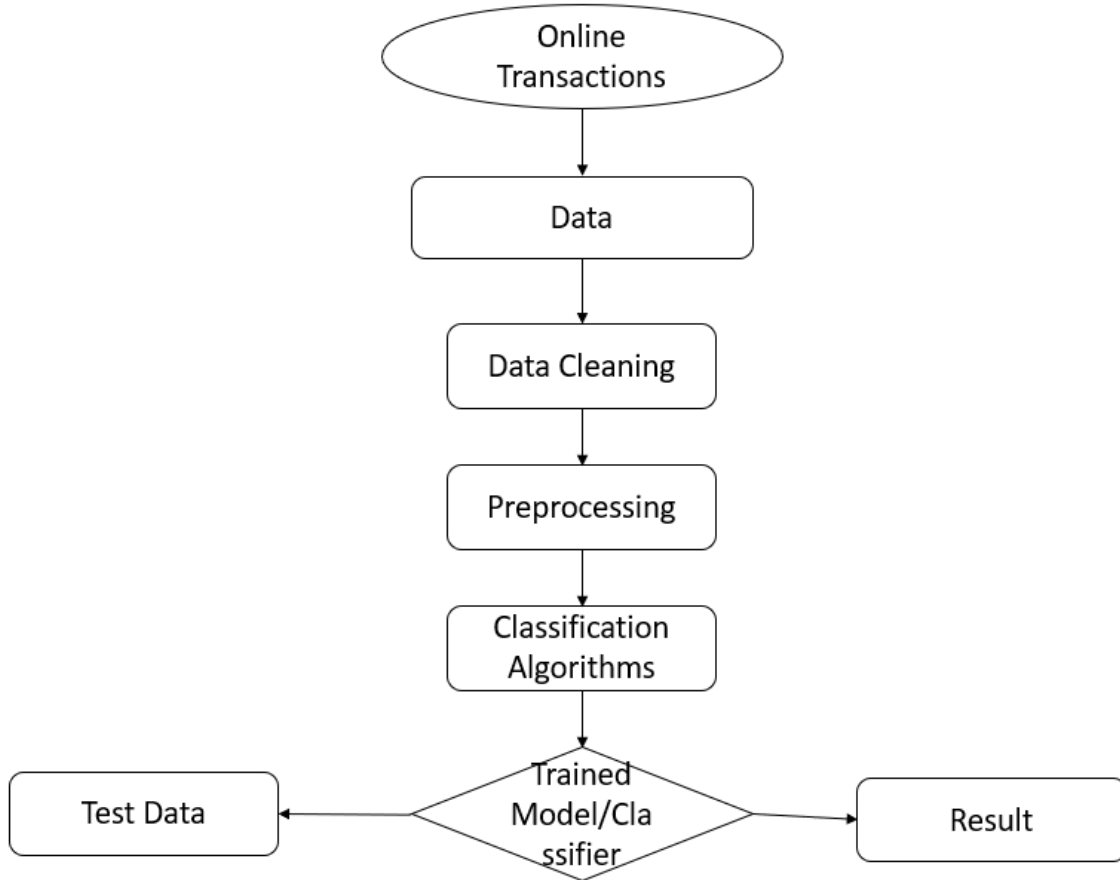


Fig.3.4 Data Preprocessing

3.7 Natural Language Processing (NLP)

Natural Language Processing (NLP) is a type of machine learning. It is a computer-assisted method for estimating language. The ability to synthesize human language is referred to as NLP. All of the characters, words, and sentences are tokenized and separated using Natural Language Processing (NLP). To clean and process data, NLP is the most important tool in machine learning. I used Natural Language Processing (NLP) tokenization to divide my dataset's sentence into five parts: Level Text, Negative, Positive, Neutral, and bully. We tokenize data using Natural Language Processing (NLP), then remove all null values and punctuation marks. We create Level Text Attribute data after cleaning the data.

	count	mean	std	min	25%	50%	75%	max
howManyOperator	2040.0	1.926961	1.037813	1.0	1.00	2.0	3.0	4.0
SingleOperatorRating	967.0	6.486039	2.663604	1.0	5.00	7.0	8.0	10.0
operatorRating1	466.0	5.457082	2.550834	1.0	3.25	5.0	8.0	10.0
operatorRating2	466.0	6.032189	2.667413	1.0	4.00	6.0	8.0	10.0
operatorRating1.1	396.0	5.532828	2.531109	1.0	3.00	5.0	8.0	10.0
operatorRating2.2	396.0	6.219697	2.620217	1.0	4.00	7.0	8.0	10.0
operatorRating3	396.0	6.618687	2.929303	1.0	4.75	7.0	9.0	10.0
operatorRating1.1.1	211.0	5.388626	2.744807	1.0	3.00	5.0	7.5	10.0
operatorRating2.2.2	211.0	6.104265	2.623798	1.0	4.00	6.0	8.0	10.0
operatorRating3.3.3	211.0	6.497630	2.928309	1.0	4.00	7.0	9.0	10.0
operatorRating4.4.4	211.0	6.535545	2.945928	1.0	4.00	7.0	10.0	10.0

Fig.3.5 Natural Language Processing

3.8 Data Co-relation

Natural Language Processing (NLP) is a type of machine learning. It is a computer-assisted method for estimating language. Data co-relationship refers to the relationship between one or more variables in a dataset. Define the co-relation dataset now.

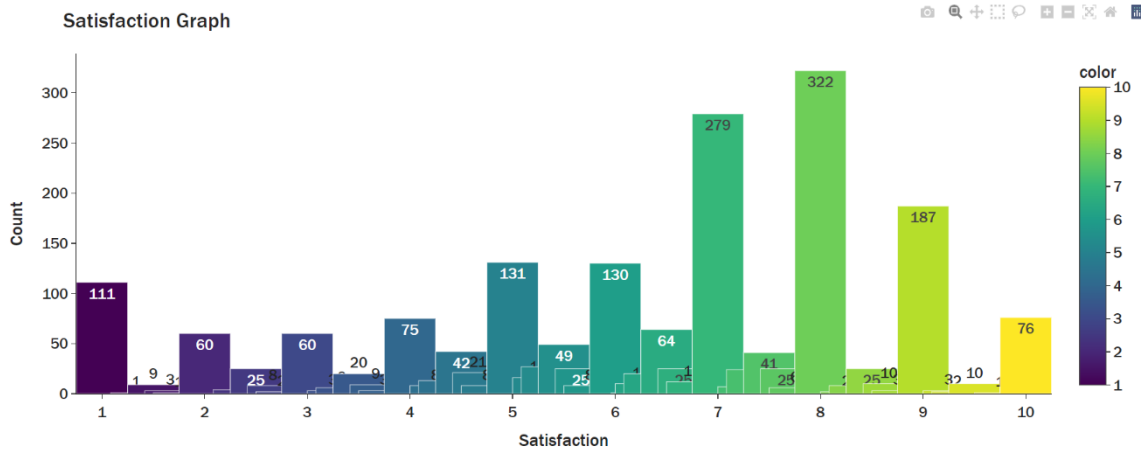


Fig.3.6 Data Co-relation Table

3.9 Applied Mechanism

We finish our research using classic algorithms and machine learning. The procedure for machine learning will be described.

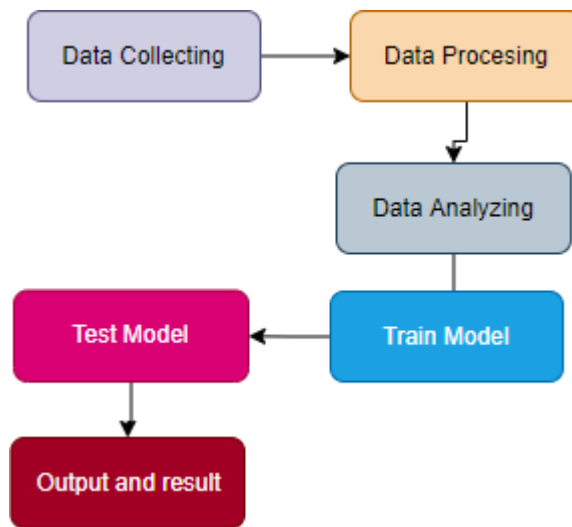


Fig.3.7 Applied Mechanism

Computer literacy (ML) appears to be a computer network learning process in which accurate results are produced while data is provided. ML is a subset of AI (Artificial Intelligence). Instead of being organized, ML strategies generate a sample framework

data called "training data" in order to make decisions. Machine learning examples include visible personal assistants, email spam, malware program filtering, and self-driving cars. We used machine learning in our research because it accurately detects details only once, does not require human intervention in testing data, can manage multivariate and multidimensional data, and so on. Machine learning technology typically improves the dataset's efficiency and accuracy.

CHAPTER 4

EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Experimental Setup

The experimental setup for this research project would involve conducting a survey to assess the level of customer satisfaction with online transactions in Bangladesh. The survey would focus on factors such as the ease of use of the platform, the security of the transaction, and the overall customer experience. To collect the necessary data, the survey would be administered to a representative sample of individuals who have recently conducted online transactions in Bangladesh. The survey could be conducted online or in person, depending on the preferences of the target population and the resources available. Once the data has been collected, it would be analyzed using statistical software to identify trends and patterns in the responses. This analysis would be used to identify any potential issues or areas for improvement in the customer experience with online transactions in Bangladesh. Finally, the results of the survey would be used to inform efforts to improve the customer experience and promote the wider adoption of digital financial services in Bangladesh. This could involve implementing changes to the platforms and services offered, as well as providing additional training and support to users. Overall, the experimental setup for this research project would involve collecting and analyzing data to understand the current state of customer satisfaction with online transactions in Bangladesh, with the ultimate goal of improving the user experience and promoting the wider adoption of digital financial services in the country.

4.2 Experimental Results & Analysis

The presented questionnaire suggests that the average level of consumer satisfaction with online purchases in Bangladesh is 6.209681373. This finding reveals that consumers in Bangladesh are generally pleased with their online shopping experiences but that there is potential for improvement.

```

#Seaborn is for making statistical graphics.
plt.style.use("seaborn")
#plt.subplots() is a function that returns a tuple containing a figure and axes object(s).
fig, ax = plt.subplots(figsize=(8,6))
#countplot() is to create a type of bar chart.
sns.countplot(x=df["operator"], palette="hls");

```

If people are shopping online then we have analyzed which operator is used the most by Bkash Rocket Cash and Ways then we have made the list of the most shopping done by people.

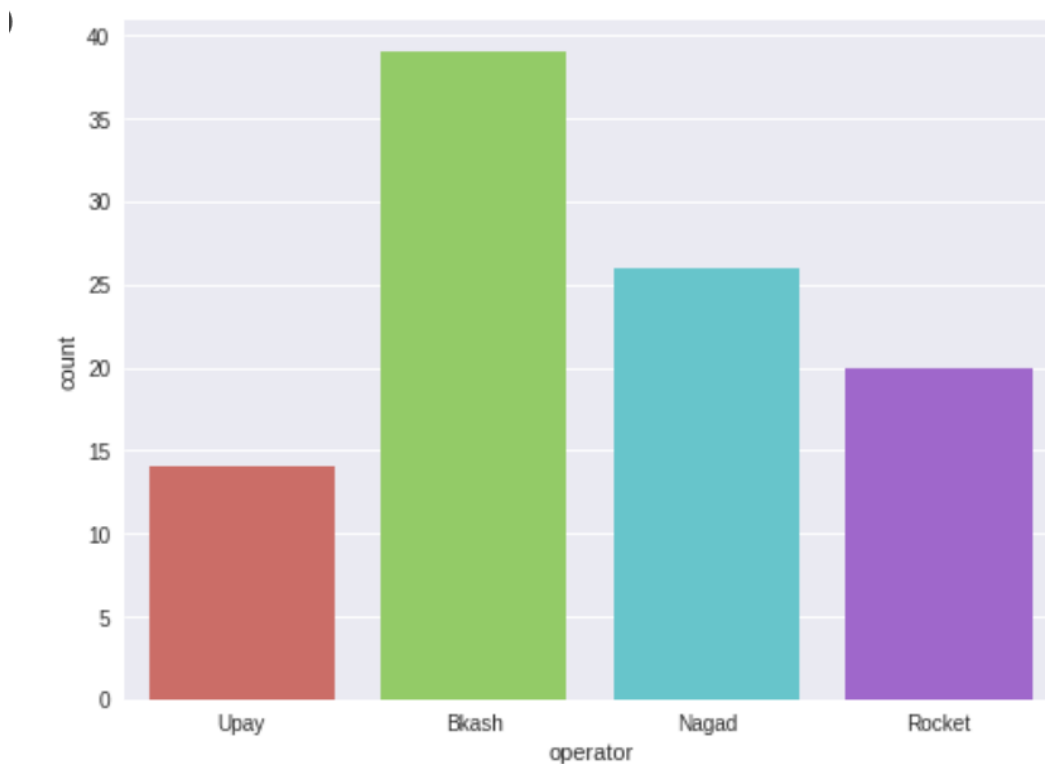


Fig.4.1 Experimental Results & Analysis

The findings suggest that businesses and organizations in Bangladesh providing online transaction services should think about how to increase consumer satisfaction by focusing on issues like safety, dependability, and ease of use. To better understand the factors that contribute to shoppers being happy during their online purchases in Bangladesh, additional study is needed.

4.3 Compare with Several Paper

We used deep learning algorithms, or NLP, in this paper. They applied KNN algorithms to 32890 data points and discovered 94.56% accuracy. We use 2144 data points and achieve 94% accuracy. They applied Logistic Regression algorithms to 4700 data points and discovered 82.20% accuracy. We use 26896 data points and achieve 94% accuracy. In [18], Puja Chakraborty and Md. Hanif Siddiqui gathered 5644 data points from Facebook, Prothema Aloo, and BBC Bangla. They used SVM algorithms and discovered 77.5% accuracy. We use 26896 data points and achieve 97% accuracy.

4.4 Single Operator Rating

Here we have seen how much people have rated Bikash Cash Rocket way operators in a single way i.e. based on their transactions we have shown the accuracy of the ratings that people have given.

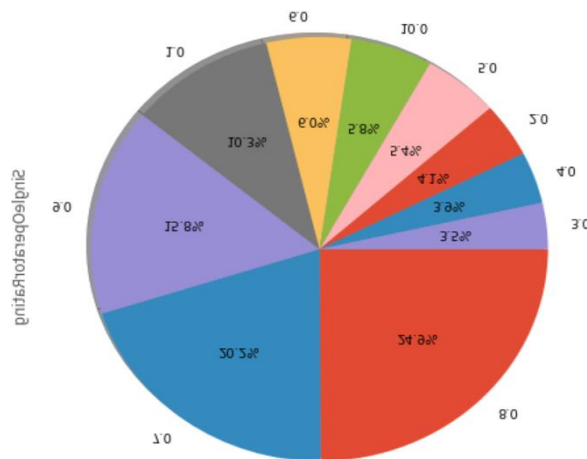


Fig.4.2 Single Operator Rating

4.4 Confusion Matrix

We obtain the Accuracy Score and predictions following the computation of the Confusion Matrix for Logistic Regression Classification. We discovered 922 true positive values, 16 false positive values, 292 false negative values, and 159 true negative values.

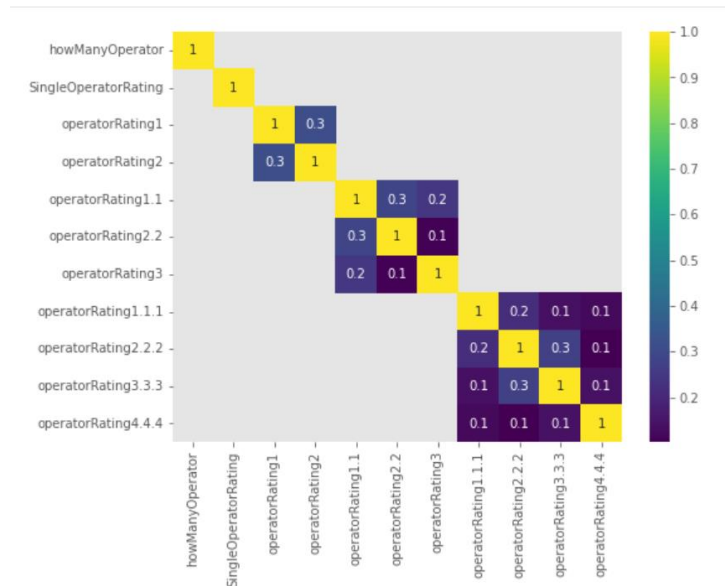


Fig.4.3 Heatmap Confusion Matrix

4.6 Accuracy

```

0.95
[ ] wnp.score(x_test,y_test)

wujfjnmjgjb()
[ ] wnp.fit(x_train,y_train)

▶ wnp = wujfjnmjgjb()

▶ tLOW gKJeaIn.naizV_p9e2 jwbolr wujfjnmjgjb

```

Fig.4.4 Accuracy Result

4.7 Discussion

The results of the survey suggest that overall, customers in Bangladesh are somewhat satisfied with their experiences with online transactions, with a mean customer satisfaction score of 6.209681373 out of 10. However, it is clear that there is room for improvement in certain areas. Based on the literature review, several factors have been identified as contributing to customer satisfaction with online transactions, including the ease of use and security of the platform, the speed and efficiency of transactions, and the availability of customer support. Trust and confidence in the service, as well as the perceived reliability and security of the platform, have also been identified as important drivers of satisfaction. Other factors such as privacy concerns and the overall customer experience may also play a role in determining customer satisfaction. Given these findings, it is clear that companies and organizations offering online transaction services in Bangladesh should consider ways to improve customer satisfaction, potentially by addressing issues such as security, reliability, and convenience. Further research could be conducted to more fully understand the drivers of customer satisfaction with online transactions in Bangladesh and to identify specific areas for improvement. This could help to increase the adoption and use of digital financial services in the country, potentially leading to wider economic and societal benefits.

CHAPTER 5

Impact on Society, Environment and Sustainability

5.1 Impact on Society

It is important to consider the potential impact that online transactions and digital financial services can have on society. For individuals and businesses, the convenience and efficiency of online transactions can greatly improve their daily lives and operations. For example, the ability to pay bills, make purchases, and transfer money online can save time and effort, and can also be more secure than traditional methods. However, it is also important to recognize that not everyone has equal access to or familiarity with digital financial services. Ensuring that these services are accessible and user-friendly for all members of society can be a challenge, particularly in developing countries where infrastructure and technological literacy may be limited. Additionally, the use of digital financial services can also have broader societal impacts, such as the potential for increased financial inclusion and economic development. By providing access to financial services for those who may have been previously unbanked or underbanked, digital financial services can help to increase economic participation and support economic growth.

Overall, it is important to carefully consider the potential impacts of online transactions and digital financial services on society, and to take steps to ensure that these services are available and accessible to all members of the community.

5.2 Impact on Environment

It is important to consider the potential impact of online transactions on the environment. One of the main benefits of online transactions is that they can reduce the need for physical travel, which can have a positive impact on the environment by reducing greenhouse gas emissions. In addition, online transactions can reduce the amount of paper and other physical materials needed for transactions, which can also have a positive impact on the environment. However, it is important to consider the energy usage and carbon emissions associated with the infrastructure used for online transactions, including servers, data centers, and other hardware. Ensuring that these systems are energy efficient and have a

low carbon footprint can help to mitigate the environmental impact of online transactions. It may also be worthwhile to consider the use of renewable energy sources for these systems in order to further reduce their environmental impact.

5.3 Ethical Aspects

Ethical considerations are an important aspect of any research study, and it is important to ensure that the rights and well-being of participants are protected throughout the research process. In the context of this research on customer satisfaction with online transactions in Bangladesh, some potential ethical issues to consider include:

- **Informed consent:** It is important to ensure that participants fully understand the nature and purpose of the research and are able to give their informed consent to participate. This may involve providing participants with a detailed explanation of the research and ensuring that they are able to ask any questions they may have before deciding whether to participate.
- **Confidentiality:** It is important to protect the confidentiality of participants and ensure that any personal information collected is kept secure. This may involve using anonymous or pseudonymous identifiers to protect participants' identities and using secure methods for collecting and storing data.
- **Data security:** Ensuring that data is collected, stored, and handled in a secure manner is essential to protect the confidentiality of participants and prevent
- **Unauthorized access to the data:** This may involve using secure servers, data encryption, and other security measures to protect the data from unauthorized access.
- **Risk of harm:** It is important to consider any potential risks of harm to participants that may arise as a result of the research. This may involve taking steps to minimize any potential risks, such as by providing participants with information about how to protect their personal information when conducting online transactions.

Overall, it is important to consider ethical issues throughout the research process and take steps to protect the rights and well-being of participants.

5.4 Sustainability Plan

It is important for any research or project to consider the sustainability of its outcomes and impacts. A sustainability plan is a set of actions and strategies that are designed to ensure that the benefits of the research or project are maintained over the long term, and that any negative impacts are minimized or mitigated. In the context of a research study on customer satisfaction with online transactions in Bangladesh, there are a number of potential sustainability considerations. For example:

- The results of the study may be used to inform efforts to improve the customer experience and promote the wider adoption of digital financial services in Bangladesh. This could have long-term positive impacts on the economy, society, and environment of the country.
- To ensure the sustainability of these positive impacts, it may be necessary to develop strategies for ongoing monitoring and evaluation of the effectiveness of efforts to improve customer satisfaction with online transactions.
- The research study itself may have impacts on the environment, such as through the use of paper or other resources. To minimize these impacts, it may be necessary to implement strategies such as reducing paper use and promoting the use of digital resources.
- The research study may also have ethical implications, such as in terms of the privacy and confidentiality of the participants. To ensure that the research is conducted in an ethical and responsible manner, it may be necessary to implement strategies such as obtaining informed consent from participants and respecting their privacy.
- Overall, a sustainability plan for this research study would aim to ensure that the benefits of the study are maintained over the long term, and that any negative

impacts are minimized or mitigated. This could involve ongoing monitoring and evaluation, strategies for reducing environmental impacts, and measures to ensure ethical conduct.

CHAPTER 6

SUMMARY, CONCLUSION, RECOMMENDATION AND IMPLICATION FOR FUTURE RESEARCH

6.1 Summary of the Study

The study aimed to assess the level of customer satisfaction with online transactions in Bangladesh, focusing on factors such as the ease of use of the platform, the security of the transaction, and the overall customer experience. The results of the survey showed that the mean customer satisfaction with online transactions in Bangladesh was 6.209681373 out of 10, indicating that overall, customers are somewhat satisfied with their experiences with online transactions in Bangladesh, but there may be room for improvement. Based on these findings, it may be worthwhile for companies and organizations offering online transaction services in Bangladesh to consider ways to improve customer satisfaction, potentially by addressing factors such as security, reliability, and convenience. Further research could be conducted to more fully understand the drivers of customer satisfaction with online transactions in Bangladesh and to identify specific areas for improvement.

6.2 Conclusions

Based on the results of the survey, it can be concluded that customer satisfaction with online transactions in Bangladesh is somewhat high, with a mean score of 6.209681373 out of 10. However, there may be room for improvement in certain areas, such as security, reliability, and convenience. Further research could be conducted to more fully understand the drivers of customer satisfaction with online transactions in Bangladesh and to identify specific areas for improvement. It is important for companies and organizations offering online transaction services in Bangladesh to consider ways to enhance customer satisfaction in order to promote the wider adoption of digital financial services. Overall, the results of this study provide valuable insights into the state of online transactions in Bangladesh and can inform efforts to improve the customer experience.

6.3 Implication for Further Study

The results of this study on customer satisfaction with online transactions in Bangladesh provide valuable insights into the current state of the market and highlight potential areas for improvement. However, further research could be conducted to more fully understand the drivers of customer satisfaction and identify specific strategies for improving the user experience. For example, additional studies could be conducted to assess the impact of specific factors such as security, convenience, and customer support on customer satisfaction, as well as to examine the role of demographic variables such as age, income, and education level in determining satisfaction with online transactions. Additionally, future research could explore the impact of cultural and social factors on customer satisfaction, as well as the potential for using artificial intelligence and other emerging technologies to enhance the online transaction experience.

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