THE GROWTH OF ERP SOLUTIONS IN BANGLADESH: A MARKET ANALYSIS

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This Report Presented in Partial Fulfilment of the Requirements for the Degree of Masters of Science in Computer Science and Engineering

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APPROVAL

This Thesis titled "**THE GROWTH OF ERP SOLUTIONS IN BANGLADESH: A MARKET ANALYSIS**" submitted by "**A.T.M SHAMIUL BASHIR**, ID: **241-25-010**" to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfilment of the requirements for the degree of MSc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 24 May, 2025.

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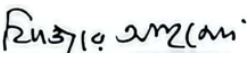

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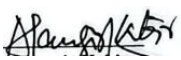

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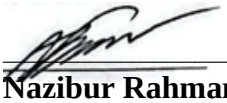

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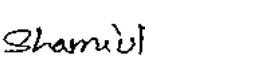

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ABSTRACT

The adoption of enterprise resource making plans (ERP) solutions in Bangladesh has witnessed sizable growth in current years. This research explores the factors using this increase, the demanding situations confronted through companies and the general impact on enterprise operations. with the aid of studying market traits, technological improvements and the specific wishes of Bangladeshi establishments, this examines objectives to provide a comprehensive know-how of the ERP landscape in Bangladesh. the arrival of agency useful resource planning (ERP) answers has revolutionized how agencies control their operations, resources and techniques. In Bangladesh, the adoption of ERP structures has been progressively growing, pushed by means of the need for better performance, better statistics control and advanced choice-making talents. ERP solutions combine various business capabilities, inclusive of finance, human assets, supply chain, income management, purchase control and consumer dating management, into a unified gadget. This integration allows for streamlined approaches, real-time data get admission to and improved collaboration throughout departments. The importance of this situation lies in its potential to seriously decorate the competitiveness of Bangladeshi businesses in each neighborhood and worldwide markets. through imposing ERP systems, businesses can attain more operational efficiency, reduce prices and reply extra hastily to marketplace changes. This paper ambitions to cope with the modern nation of ERP adoption in Bangladesh, discover the demanding situations and opportunities within the market and provide actionable insights for businesses considering ERP implementation. The studies are dependent as follows: first, a trouble statement is provided to spotlight the important thing issues; subsequent, studies objectives are outlined; a literature evaluate is conducted to look at current research and theories; and subsequently, predicted research outcomes are discussed, observed by references.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The mixing of employer resource making plans (ERP) solutions into cutting-edge groups has come to be a cornerstone of digital transformation international, bringing exceptional changes to how corporations manage their operations, sources and selection-making strategies. ERP solutions consolidate diverse commercial enterprise functions such as finance, human sources, supply chain control, purchaser relationship management and income right into a single, unified system. This integration now not most effective streamlines workflows however also offers real-time access to statistics, allowing better-informed and quicker selection-making [1].

In Bangladesh, the adoption of ERP answers has accompanied a remarkable growth trajectory in latest years. This fashion is fueled by using several elements, which include the growing need for technological answers that enhance operational performance, the rising competitiveness in each local and worldwide markets and the Bangladesh broader push towards digitalization. As agencies face growing pressures to optimize their strategies and adapt to state-of-the-art changing market needs, ERP systems have emerged as a critical tool for staying beforehand [12].

The Bangladeshi organization landscape offers precise possibilities and demanding situations for ERP adoption. On one hand, the call for advanced era has surged, driven by means of fast financial growth, increasing industries and an evolving digital infrastructure. On the other hand, huge obstacles at the side of high initial implementation charges, constrained availability modern-day expert personnel and resistance to organizational exchange have hindered many organizations from honestly leveraging the capacity today's ERP systems. For small and medium-sized establishments (SMEs), those stressful conditions are especially acute, as they brand new ten lack the monetary and technical resources to put money into ERP answers.

This study delves deeply into the elements influencing the growth latest ERP adoption in Bangladesh, aiming to locate the driving forces at the back of this style and the boundaries that need to be addressed. Via exploring the interaction among marketplace dynamics, technological improvements and organizational wishes, this examine seeks to offer a complete expertise of the

way ERP structures are reshaping the enterprise environment in Bangladesh. Moreover, it examines the specific effects of ERP adoption on operational performance, useful resource management and choice-making, imparting valuable insights for businesses, policymakers and era companies alike [2].

In the end, the studies emphasize the transformative capability of ERP answers for Bangladeshi corporations. Via integrating numerous business functions into cohesive systems, these answers permit companies to gain big price financial savings, enhance productivity and respond extra efficiently to marketplace changes. But knowledge those advantages requires overcoming vital challenges, which include fostering a lifestyle of exchange, constructing technical information and making sure that ERP structures are to the perfect goals of Bangladeshi companies. Thru a detailed analysis of these components, this has a look at targets to make contributions to the broader discourse on ERP adoption in emerging markets, highlighting each the possibilities and the pathways for sustainable boom in this area [4].

1.2 Background of the Thesis

Agency aid planning (ERP) answers are advanced software program structures that combine numerous center business capabilities right into a single cohesive gadget. Those structures are designed to streamline tactics, decorate records visibility and foster collaboration throughout departments, making them vital tools for modern enterprise management. Traditionally, ERP structures have been predominantly the area of large groups, given the big costs and technical know-how required for implementation. But recent technological advancements have fundamentally altered this panorama [6].

One of the most transformative traits within the ERP market has been the emergence of cloud-based solutions. Not like traditional on-premise systems, cloud-based ERPs offer extra flexibility, scalability and value-performance. With the aid of getting rid of the want for full-size upfront investments in hardware and infrastructure, these solutions have democratized get right of entry to ERP systems, enabling small and medium-sized companies (SMEs) to leverage their blessings. For SMEs, the potential to adopt ERP systems without incurring prohibitive costs represents a critical step toward digital transformation.

Within the context of Bangladesh, the adoption of ERP systems has been increased with the aid of the country's speedy digital transformation and evolving financial landscape. Over the last decade, Bangladesh has experienced big growth throughout various sectors, consisting of production, retail and offerings. This increase has been accompanied by way of growing opposition, each regionally and internationally, compelling businesses to are trying to find modern answers to beautify productivity and performance. ERP systems have emerged as a natural desire for reaching these objectives [8].

Bangladeshi organizations, specifically SMEs, face particular challenges that impact their adoption of ERP answers. Even as cloud-based structures have decreased some economic boundaries, different demanding situations persist, such as confined get right of entry to to technical information, resistance to organizational exchange and insufficient infrastructure in certain areas. Moreover, many worldwide ERP companies fail to absolutely cope with the particular goals and cultural nuances of Bangladeshi companies, growing an opening that nearby builders have begun to fill with the resource of presenting tailor-made answers.

The increasing availability of regionally superior ERP systems, coupled with government initiatives promoting digitalization, has further catalyzed ERP adoption in Bangladesh. These solutions are often greater value-effective and better proper to the operational realities of Bangladeshi firms. But there is still massive room for growth, as many corporations stay unaware of the capacity advantages or lack the resources to absolutely put in force these structures [7].

This thesis targets to discover the interplay of these factors, analyzing how technological improvements, market dynamics and organizational desires converge to shape the ERP panorama in Bangladesh. By reading the growth trajectory of ERP adoption, identifying key drivers and barriers and assessing the impact on industrial corporation typical performance, this examine seeks to provide actionable insights for stakeholders. In the long run, the research underscores the critical role of ERP structures in permitting Bangladeshi organizations to thrive in an increasingly more aggressive and era-pushed worldwide marketplace.

1.3 Motivation

The inducement for these studies stems from the growing popularity of ERP systems as a transformative force in present day business operations, mainly in rising markets like Bangladesh. Regardless of the worldwide achievement of ERP adoption, there remains a great gap in research and improvement that mainly addresses the unique challenges and opportunities inside the Bangladeshi marketplace. This looks at seeks to bridge that gap, pushed by means of the want to better apprehend the localized factors that influence ERP implementation and utilization [14].

One of the number one motivator is the shortage of tailored ERP solutions that cater to the unique desires of Bangladeshi businesses. Whilst global ERP companies offer complete systems, lots of these solutions are not completely optimized for the operational realities of firms in Bangladesh. Nearby groups regularly face demanding situations related to cultural nuances, language barriers and infrastructure obstacles that are not competently addressed by means of widely wide-spread, one-length-suits-all ERP structures. This research objectives to explore how localized solutions can higher meet these wishes, fostering extra adoption and success rates.
Some other sizable element is the confined body of academic literature focused on ERP adoption in Bangladesh. While the worldwide ERP market is well-documented, research examining the Bangladeshi context stay scarce. This lack of localized insights hampers the potential of organizations, policymakers and technology providers to make informed selections approximately ERP investments and implementations. By carrying out an in-depth analysis of the Bangladeshi ERP panorama, this research seeks to fill this hole, imparting a treasured resource for stakeholders [15].

The rapid pace of digital transformation in Bangladesh also serves as a key motivator for this study. Because the United States maintains to enjoy economic increase and extended competitiveness, groups are underneath strain to adopt innovative solutions that beautify productivity, performance and selection-making abilities. ERP structures constitute a vital device for reaching these objectives, in particular for small and medium-sized agencies (SMEs) that are striving to compete on a larger scale. The elements that pressure or avoid ERP adoption can help these agencies make strategic selections that align with their dreams. Finally, this study is motivated with the aid of the

capacity for ERP structures to contribute to the broader improvement of the Bangladeshi economy. Via enabling organizations to optimize their operations and compete extra successfully, ERP adoption can play a pivotal role in driving economic growth, growing jobs and fostering innovation. This study pursuits to offer actionable pointers that not only guide person corporations but also make contributions to the overall advancement of the USA technological and financial landscape [12].

In summary, the inducement for these studies lies in addressing the crucial gaps in information and implementation of ERP answers in Bangladesh. By way of examining the specific desires, challenges and possibilities within this context, the look at seeks to provide realistic insights that empower organizations, tell policymakers and guide technology providers in fostering a much better and inclusive ERP ecosystem [13].

1.4 Problem Statement

Notwithstanding the obtrusive blessings of ERP answers, many organizations in Bangladesh come across tremendous limitations to their successful adoption and implementation. Those limitations are multifaceted, ranging from economic constraints and infrastructure obstacles to cultural and organizational demanding situations that inhibit the powerful integration of ERP structures into commercial enterprise techniques.

One of the maximum pressing challenges is the excessive preliminary cost related to ERP implementation. For lots Bangladeshi businesses, especially small and medium-sized firms (SMEs), the financial investment required for obtaining, customizing and maintaining an ERP machine is often prohibitive. The expenses consist of not best the software program and hardware but additionally prices related to training, consultancy and ongoing assist, that may strain restrained budgets.

Any other crucial difficulty is the dearth of skilled employees to manipulate and perform ERP systems efficaciously. A success adoption of ERP solutions requires understanding in regions consisting of system configuration, records migration and process optimization. However, many companies in Bangladesh conflict to discover certified experts with the technical abilities and

enjoy needed to make sure an easy implementation system. This skills hole is further exacerbated with the aid of constrained get entry to training packages and sources that might help bridge the know-how deficit [11].

Resistance to organizational alternate poses but another extensive obstacle. Implementing an ERP system frequently necessitates an essential transformation of current workflows and strategies. Personnel and control alike can also withstand those modifications because of fear of the unknown, perceived threats to task protection or a lack of know-how of the gadget's ability blessings. This resistance can lead to low consumer adoption charges, undermining the general effectiveness of the ERP implementation.

Insufficient infrastructure additionally plays a role in hindering ERP adoption, especially in rural or much less developed regions of Bangladesh. Reliable net connectivity, strong IT infrastructure and get right of entry to trendy hardware are critical prerequisites for deploying ERP structures, mainly cloud-based totally answers. Many corporations face challenges in assembly these requirements, proscribing their capacity to absolutely leverage ERP technologies [2].

Moreover, SMEs often battle to justify the investment in ERP systems because of their confined economic and technical assets. In contrast to large agencies, SMEs commonly function with tighter budgets and much less room for blunders, making them extra danger-averse when it comes to adopting new technology. The perceived complexity and lengthy-time period commitment associated with ERP structures can further discourage SMEs from pursuing those solutions.

This research seeks to identify and analyze these demanding situations intensive, losing light at the particular factors that impede ERP adoption in Bangladesh. Through know-how the basis causes of those obstacles, the take a look at aims to suggest realistic strategies and recommendations for overcoming them. Those answers may be tailored to the particular wishes and constraints of Bangladeshi establishments, enabling broader adoption of ERP structures and maximizing their capability blessings. Ultimately, the studies aspire to make contributions to the development of a greater supportive environment for ERP implementation, fostering extra performance, productiveness and competitiveness among Bangladeshi businesses [7].

1.5 Aim of the Thesis

The primary purpose of this examine is to explore and severely examine the development and adoption of company useful resource making plans (ERP) solutions within the context of Bangladesh. This takes a look at tries to provide a comprehensive understanding of the growth trajectory of ERP answers within the country, shedding light on the dynamics influencing its adoption and effect. The insights received from this research are supposed to manual key stakeholders, including agencies, policymakers and ERP solution carriers, in making informed choices to encourage the powerful implementation and use of ERP systems [3].

To achieve this overall goal, the studies is guided with the aid of the following unique targets:

Evaluating Market Trends and Growth Patterns: The research examines how ERP solutions have advanced in Bangladesh. It emphasizes marketplace trends, boom patterns and the reasons in the back of its enlargement. This purpose targets to take a look at enterprise records and marketplace tendencies to expose the cutting-edge popularity and viable destiny growth of ERP adoption in the vicinity.

Identifying Key Drivers and Challenges of ERP Adoption: This study examines the elements motivating agencies to undertake ERP systems, together with operational efficiency, regulatory compliance and aggressive gain. On the equal time, it delves deeply into the demanding situations businesses face, along with price constraints, technological boundaries, resistance to exchange and skills shortages, supplying a balanced angle at the factors influencing ERP adoption.

Assessing the Impact of ERP Systems on Business Performance: The have a look at appears on the real and hidden blessings of ERP structures on business carry out. It specializes in such things as improving operations, making higher decisions, using assets accurately and boosting usual productiveness. This aim seeks to measure the advantages that ERP structures provide to groups in Bangladesh via searching at actual-existence examples and studies evidence.

Offering Recommendations for Businesses, Policymakers and ERP Providers: Given the outcomes, this study offers practical recommendations customized for diverse stakeholders.

1.6 Research Methodology

This looks at makes use of a blended-techniques approach, integrating each qualitative and quantitative facts collection techniques. Primary statistics is collected thru interviews and surveys with professionals in the enterprise, at the same time as secondary statistics is acquired from instructional journals, marketplace reports and governmental publications. For statistics evaluation, statistical techniques and thematic evaluation are employed to attract massive conclusions. This section describes the methodological framework implemented in discovering the boom and adoption of ERP solutions in Bangladesh. It elaborates on the research design, data collection techniques and analytical frameworks applied to take a look at the outcomes of ERP systems on enterprise performance, challenges in adoption and market dynamics. The technique is dependent to make certain rigor, validity and reliability within the studies, growing a robust foundation for the subsequent chapters. The selected method is supposed to provide an in depth and in-intensity research of the various elements affecting ERP adoption and it's had an impact on groups in Bangladesh.

1.7 Proposed Solution

The proposed solution goals to create a strategic framework to promote ERP adoption in Bangladesh. This framework highlights inexpensive ERP answers, specialized schooling initiatives and government help, designed to address the wonderful challenges encountered with the aid of groups in Bangladesh.

Cost-Effective ERP Solutions: The proposed answer helps fee-effective ERP systems, together with cloud-primarily based and modular alternatives, as well as software program this is open-source. It recommends collaborations between ERP carriers and local organizations to cozy effective pricing structures and financing options.

Training Programs: Customized training for IT professionals, stop-users and commercial enterprise executives is essential for the powerful implementation of ERP systems. Those training applications must be created in partnership with educational institutions and industry specialists to address the unique necessities of the nearby marketplace.

Government Support: Authorities programs like financial incentives, recognition campaigns and regulatory measures are critical for encouraging ERP adoption. Collaborations among private and non-private sectors, on the side of advocacy for supportive guidelines, may inspire corporations to put money into digital transformation.

Tailored ERP Solutions: ERP systems must be tailored to address the particular requirements of agencies in Bangladesh, incorporating functions which includes localization, scalability and functionalities precise to diverse industries, with a purpose to enhance their relevance and customer-friendliness.

1.8 Conclusion

The introductory bankruptcy lays a strong foundation for this research, highlighting the essential position that agency aid planning (ERP) solutions play in fostering business improvement and competitiveness in Bangladesh. It outlines the main goals of the examiner, which include studying marketplace traits, pinpointing drivers and boundaries and evaluating the have an impact on of ERP structures on business performance.

In the following chapters, literature assessment that explores studies on ERP adoption and its impacts on organizations both globally and within the South Asian context. The research method section will explain the strategies used to acquire and examine information, making sure a meticulous and thorough study. A detailed analysis of market dynamics will show off the modern landscape of ERP adoption in Bangladesh, the demanding situations confronted via corporations and the capacity for growth.

In summary, the introduction establishes a stable framework for a detailed exploration of ERP systems, with the following chapters increasing on this basis to supply precious insights into their adoption and results on business overall performance in Bangladesh.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review presents a thorough analysis of current research regarding the adoption of Enterprise Resource Planning (ERP) systems, highlighting global trends, technological innovations, challenges and specific insights pertinent to developing nations like Bangladesh. The aim is to provide a theoretical framework that aids in comprehending the ERP adoption process within the Bangladeshi context while identifying gaps in the existing literature. This section investigates how global viewpoints on ERP adoption, technological developments and socio-economic factors converge to influence the adoption of ERP solutions in Bangladesh, laying the groundwork for the research and analysis that will follow in subsequent chapters [3].

2.2 Literature Review

Technological Advancements in ERP Solutions:

The cutting-edge trends in ERP technology have substantially impacted how corporations pursue digital transformation. Specifically, cloud-based totally definitely ERP answers have end up a charge range-first-rate and scalable opportunity for small and medium-sized enterprises (SMEs), decreasing the boundaries to ERP implementation that have been once hindered with the aid of using great infrastructure prices. Alam & Islam point out the growing recognition of cloud-based ERP systems in Bangladesh and numerous developing nations. These systems offer full-size benefits in phrases of accessibility, price performance and adaptableness, making them specially appropriate for SMEs, which often feature with constrained assets [6].

Cost-Benefit Analysis and Return on Investment (ROI):

One of the main motives for the adoption of ERP structures is the need for organizations to evaluate the financial effects of enforcing those structures. Numerous research spotlights the important function of performing a price-advantage assessment to validate investments in ERP. Motives for the adoption of ERP structures is the need for organizations to evaluate the financial effects of enforcing those structures. Numerous research spotlights the important function of performing a

price-advantage assessment to validate investments in ERP. As stated by means of Ahmed & Rahman, figuring out the return on investment (ROI) is vital for businesses to comprehend the each the measurable and unmeasurable advantages of ERP structures. They suggest that adopting ERP can extensively enhance operational performance, selection-making processes and resource control, in the end resulting in expanded profitability. Despite the fact that, businesses in Bangladesh regularly encounter problems in precisely calculating ROI because of insufficient records on lengthy-term advantages and challenges in quantifying intangible blessings, which includes worker delight or enhancements in customer support. This highlights the significance for businesses to establish a definitive monetary version for the adoption of ERP structures [2].

Change Management and Organizational Resistance:

One of the primary obstacles to ERP implementation is overcoming organizational resistance to alternate. ERP structures typically necessitate giant modifications in how businesses characteristic, impacting methods, workflows and personnel roles. Khan & Hossain assert that powerful exchange management techniques are critical for a success ERP deployment. They recommend engaging key stakeholders in the decision-making process, offering sufficient training and addressing employee concerns regarding system modifications as vital components in minimizing resistance. Achieving successful ERP adoption involves not only technology but also effectively managing the human aspects of change. This issue is especially pertinent in Bangladesh, where companies frequently have traditional management structures and employees may lack familiarity with advanced technologies. The study highlights the significance of communication, leadership and training initiatives to facilitate the transition.

SME Challenges in ERP Adoption:

Small and medium-sized enterprises (SMEs) in Bangladesh encounter distinct obstacles in the adoption of ERP systems. As highlighted by Rashid & Kabir, primary challenges include constrained financial resources and insufficient technical know-how. The considerable initial investment required for ERP systems, along with the continuous need for technical assistance, creates significant hurdles for SMEs that frequently operate with limited budgets. Moreover, the scarcity of qualified individuals proficient in implementing and managing ERP systems intensifies the difficulties associated with adoption. Rashid & Kabir suggest that tackling these issues requires

targeted measures such as government funding, collaborations with ERP providers, and initiatives designed to improve employees' technical skills. In Bangladesh, addressing these obstacles would involve making ERP systems more budget-friendly and available, as well as setting up more economical training programs to develop a skilled workforce [1].

Government Policies and Support:

The government's function in promoting ERP adoption is critical, mainly in developing international locations like Bangladesh, wherein supportive regulations can significantly reduce the constraints to adoption. The arena monetary institution emphasizes the need of government moves to encourage ERP uptake, which may additionally embody imparting monetary incentives, subsidies, and guide for infrastructure development. The evaluation indicates that policy frameworks aimed in the direction of fostering digital transformation, which include tax incentives for groups investing in generation or the repute quo of innovation centers, can beautify ERP adoption in the course of numerous sectors. Moreover, governments can useful resource by means of the usage of advancing.

2.3 Conclusion

The review of existing literature emphasizes the importance of conducting localized research to address the unique challenges and opportunities related to ERP adoption in Bangladesh. While there is a wealth of global studies on ERP systems, the particular circumstances in Bangladesh require a more tailored approach. The literature identifies several key demanding situations, inclusive of monetary constraints, a lack of technical understanding, and resistance to change, all of which must be confronted for a success ERP implementation. Moreover, guide from the authorities, mainly in the form of policies and incentives, is crucial for promoting ERP adoption, specially amongst small and medium-sized enterprises (SMEs). This study aims to fill the gap in localized research by delivering insights that are specifically applicable to the Bangladeshi market. The following chapters will outline the research methodology and present empirical findings, with the goal of providing practical recommendations for businesses, policymakers, and ERP providers to enhance ERP adoption in Bangladesh.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research framework, methods for data collection and analytical approaches used to meet the study goals. The objective of this research is to examine the expansion of Enterprise Resource Planning (ERP) systems in Bangladesh, concentrating on the obstacles and incentives for adoption, as well as the effects of ERP on organizational performance [2].

This chapter outlines the methods for collecting and analyzing data that will be employed to address the research questions and ensure a comprehensive, reliable outcome.

3.2 Research Subject and Instrumentation

The investigation focuses on Bangladeshi companies from different sectors, including manufacturing, retail, and services. These sectors are crucial to the economy of Bangladesh and are at different levels of digital progress. The primary instruments for data collection in this study consist of:

- Surveys: The surveys will goal commercial enterprise executives and IT professionals from both small and medium-sized enterprises (SMEs) and larger organizations. Those people have extensive expertise of the operational issues and technological improvements occurring inside their companies, and they'll offer crucial viewpoints at the styles in ERP adoption, encompassing its advantages and boundaries.

- Semi-primarily based interviews: complete interviews could be carried out with ERP corporations and policymakers. ERP suppliers can percentage precious data concerning the era, including its functions, implementation hurdles, and patron stories, whilst policymakers will talk government applications, incentives, and the effect of public aid in selling ERP adoption.

By means of combining each quantitative (surveys) and qualitative (interviews) procedures, the studies ensure an intensive information of the ERP surroundings in Bangladesh.

3.3 Data Collection Procedure

Data collection was conducted thru self-administered questionnaires dispensed to business executives and IT specialists in diverse groups throughout Bangladesh. Members had been given thorough commands on a way to respond to each query the use of a five-point Likert scale, which ranged from "Strongly agree" to "Strongly disagree." This scale was designed to evaluate the participants' opinions on ERP adoption, its perceived benefits, challenges, and the impact of government policies in promoting ERP solutions. To improve comprehension and accuracy, the questionnaire was available in English. The data gathering process adhered to ethical standards, ensuring the participants' responses remained anonymous and confidential. Informed consent was obtained from all participants, who were also informed of their right to withdraw from the study at any moment without any negative consequences. The survey questions sought to collect insights on ERP utilization within organizations, the obstacles faced during adoption, its effects on performance, and the role of government policies in supporting ERP systems. Primary data was gathered through:

- Online surveys aimed at business executives and IT professionals.
- Interviews with ERP vendors and policymakers.
- Market reports and publications issued by the government.

3.4 Data Analysis Procedure

The gathered data underwent a thorough analysis to extract valuable insights regarding the growth and uptake of ERP solutions in Bangladesh.

To meet the objectives of the study, a range of classification algorithms were utilized, including:

- **Decision Trees**
- **Naive Bayes**
- **Support Vector Machines (SVM)**
- **Random Forest**
- **K-Nearest Neighbors (KNN)**

- **Logistic Regression**
- **AdaBoost**
- **Gradient Boosting**

These classification techniques have been utilized on statistics gathered from each survey and interviews to categorize organizations based totally on their degree of success with ERP adoption. The analysis brought about the identity of critical factors influencing ERP adoption, which includes organizational readiness, technical competencies, employee schooling, and alignment with worldwide ERP standards. With the aid of making use of type methods, the research may want to organization businesses into overall performance-associated classes, distinguishing those that found out sizeable ERP benefits from those that confronted problems in adoption. This methodology allowed for the detection of trends among comparable corporations, the identity of shared obstacles or fulfillment elements, and the evaluation of how precise elements impact the effectiveness of ERP systems. The principal objective of the records analysis becomes to find hidden patterns in ERP adoption throughout one-of-a-kind industries and sizes of corporations. The findings supplied practical insights for improving ERP techniques and highlighted the factors that both facilitate or preclude a hit implementation of ERP systems in the Bangladeshi marketplace.

3.5 Conclusion

The methodology outlined in this chapter presents a thorough and solid framework for examining the expansion of Enterprise Resource Planning (ERP) solutions in Bangladesh. By employing a mixed-methods strategy—combining quantitative and qualitative research techniques—this research is distinctly poised to provide a comprehensive viewpoint that captures both statistical patterns and contextual specifics.

This integrated strategy ensures that numerical data is enriched and contextualized by real-world experiences, expert opinions, and case studies from various organizations, resulting in a deeper understanding of the ERP adoption environment.

Moreover, the meticulous focus on ethical research practices throughout the methodological framework highlights a strong commitment to integrity and accountability in data management.

The study utilizes a variety of data sources, including surveys, interviews and secondary data, which together augment the analysis's depth and scope. These sources have been purposefully chosen to ensure representation from a range of sectors and stakeholders, such as IT professionals, business administrators and ERP providers, allowing the research to reflect a wide array of viewpoints and experiences.

The analytical rigor applied—spanning from statistical evaluation of quantitative data to thematic analysis of qualitative insights—ensures that the results will be credible and useful. This level of care bolsters the validity and reliability of the findings, making them appropriate for guiding decision-making at both organizational and policy levels.

In summary, this chapter establishes a crucial foundation for the upcoming sections of the study. With a definitely defined methodology in vicinity, the following chapters will discover the accrued statistics to show sizable trends, ongoing challenges and new possibilities in ERP implementation across different sectors in Bangladesh.

This approach now not simplest aids in achieving the study’s goals but also gives treasured insights to the instructional and expert discussions surrounding ERP structures in growing markets.

CHAPTER 4

GROWTH OF ERP SOLUTIONS IN BANGLADESH

4.1 Introduction

This chapter examines the evolution and expansion of Enterprise Resource Planning (ERP) solutions in Bangladesh, exploring the factors that encourage growth, the benefits companies experience, and the obstacles that impede widespread implementation. By providing an overview of the current ERP market, this chapter highlights the opportunities and challenges organizations in Bangladesh encounter when integrating ERP systems into their processes. The discussion includes an assessment of market trends, key drivers, and the implications of ERP adoption for businesses across various sectors [13].

4.2 Growth of ERP Solutions in Bangladesh in General

The ERP sector in Bangladesh has seen considerable expansion lately, spurred by the nation's commitment to digital transformation, economic development and heightened industry competitiveness.

Several key elements have played a role in the upward trend of ERP solutions in the area:

Increased Digitalization: In Bangladesh, as companies adopt technology to stay competitive, ERP systems have become essential for integrating key business processes, optimizing operations and enhancing efficiency. The rise of cloud-based totally ERP solutions has expedited this fashion through manner of creating the ones structures greater inexpensive and available for small and medium enterprises (SMEs).

Government Initiatives: The government's focus on digital transformation and enhancing IT infrastructure has fostered conducive surroundings for the adoption of ERP structures. Tasks such as virtual Bangladesh 2021 have motivated agencies to upgrade their operations, thereby facilitating ERP implementation in each the private and non-private sectors.

Local and International Providers: The ERP marketplace in Bangladesh includes both domestic and global vendors. Even though global ERP systems provide an extensive range of functions,

nearby organizations have end up popular through delivering tailored, low-cost solutions that meet the unique necessities of Bangladeshi corporations, in particular SMEs.

Demand for Efficiency: The growing need for records-informed choice-making, technique automation and actual-time analysis has positioned ERP systems as critical for businesses aiming to enhance their operational effectiveness and live competitive in a quick-changing market [15].

4.3 Positive Impact

The implementation of ERP solutions has significantly changed the landscape for businesses in Bangladesh, providing a range of important advantages:

Enhanced Operational Efficiency: ERP systems enhance business operations by consolidating essential functions like finance, supply chain, inventory management and human resources into one unified platform. This consolidation eliminates redundancies, decreases manual errors and boosts overall efficiency.

Improved Data Management and Decision-Making: By consolidating data, ERP systems allow organizations to obtain real-time insights and analytics, supporting knowledgeable decision-making. This feature is especially beneficial for companies in competitive sectors that demand agility and quick response.

Increased Competitiveness in Local and Global Markets: The implementation of ERP systems has allowed groups in Bangladesh to streamline their procedures and growth their issuer requirements, thereby boosting their competitiveness in every domestic and worldwide markets. Therefore, ERP solutions have changed into an important useful resource for agencies looking for to broaden their market acquire and gain sustainable increase [10].

4.4 Negative Impact

Although ERP systems offer substantial advantages, their implementation in Bangladesh faces several obstacles. These challenges frequently impede the widespread adoption of ERP solutions, especially within small and medium-sized enterprises (SMEs). Some of the main concerns involve:

High Initial Costs and Maintenance Expenses: Enterprise Resource Planning (ERP) systems, particularly those from global vendors, typically necessitate a significant initial investment along with continuous maintenance expenses.

Resistance to Change and Lack of Technical Expertise: The effective deployment of ERP structures necessitates an exchange in organizational culture, which may additionally come across pushback from both personnel and control. Furthermore, numerous corporations struggle with a loss of qualified people capable of well overseeing and sustaining ERP structures.

Challenges in Customizing ERP Solutions: Although ERP systems are intended to offer flexibility, tailoring them to suit the unique requirements of Bangladeshi businesses can be intricate and require considerable time. This challenge is especially significant for SMEs, as they may not have the necessary resources and expertise for customization [4].

4.5 Conclusion

The growth of ERP solutions in Bangladesh offers a significant opportunity for businesses to streamline their operations, improve their decision-making capabilities, and enhance their competitiveness in both local and global markets. However, to facilitate broader adoption, it is crucial to address the issues related to high expenses, reluctance to change, and technical challenges. This chapter emphasizes the importance of understanding the continually evolving environment of ERP adoption in Bangladesh. By exploring the elements that drive growth, the benefits of ERP systems, and the obstacles to their implementation

CHAPTER 5

EXPERIMENTAL RESULTS AND DISCUSSION

5.1 Introduction

This chapter outlines the research results, concentrating on the experimental results received from the selected classification-primarily based research technique. It familiarizes the reader with the data analysis manner and offers an in-intensity exam of the findings regarding the growth, adoption, blessings and boundaries of ERP systems in Bangladesh.

On this phase of the research, more than one classification algorithms were hired to investigate the dataset accrued thru a based questionnaire. The statistics turned into applied to evaluate the increase, advantages and demanding situations connected to the adoption of ERP structures in various businesses during Bangladesh.

Classification models such as Decision Trees, Naive Bayes, Support Vector Machines (SVM), Random Forest, K-Nearest Neighbors (KNN), Logistic Regression, AdaBoost and Gradient Boosting were deployed to forecast the chances of successful ERP implementation based on an array of organizational and technical factors.

Those algorithms facilitated the categorization of corporations into precise lessons primarily based on their readiness for ERP and the fulfillment of its implementation. The findings offer practical insights for stakeholder's corporations, policymakers and ERP vendors emphasizing the important factors that contribute to ERP fulfillment.

Additionally, the bankruptcy offers a descriptive analysis of the information to interpret emerging developments and styles in ERP implementation throughout diverse sectors in Bangladesh.

In summary, the consequences affirm the effectiveness of device getting to know type strategies in assessing ERP adoption and illustrate their usefulness in informing strategic choice-making for a hit ERP deployment.

5.1.1 Decision Trees

According to Figure 5.1.1, The Decision Tree classifier achieved an overall accuracy of 50.00%. While it showed high recall (0.80) for the class "Agree" and perfect scores for "Strongly Disagree" (which had only one instance), its performance was inconsistent across other classes, particularly with poor precision and F1-scores for "Disagree" and "Neutral". The macro average F1-score was 0.56, indicating mediocre performance across all classes.

```
=== Decision Tree ===
Accuracy: 50.00%
                  precision    recall  f1-score   support

           Agree       0.40      0.80      0.53         5
        Disagree       0.25      0.12      0.17         8
         Neutral       0.57      0.50      0.53        16
Strongly Agree         0.54      0.58      0.56        12
Strongly Disagree      1.00      1.00      1.00         1

        accuracy                           0.50        42
       macro avg       0.55      0.60      0.56        42
    weighted avg       0.49      0.50      0.48        42
```

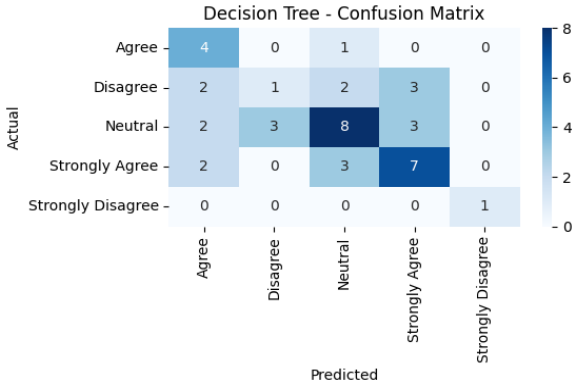


Figure 5.1.1: Decision Trees

5.1.2 Naive Bayes

According to Figure 5.1.2, the Naive Bayes classifier outperformed the others with an accuracy of 76.19%, the highest among the three. It demonstrated strong classification results for "Disagree", "Neutral" and "Strongly Agree", with F1-scores ranging from 0.78 to 0.86. Despite its inability to classify "Strongly Disagree" (F1-score of 0.00), the weighted average F1-score of 0.77 shows that this model is the most balanced and reliable for this dataset.

```
=== Naive Bayes ===
Accuracy: 76.19%
                  precision    recall  f1-score   support

           Agree       0.40      0.80      0.53         5
        Disagree       1.00      0.75      0.86         8
         Neutral       0.87      0.81      0.84        16
Strongly Agree         0.82      0.75      0.78        12
Strongly Disagree      0.00      0.00      0.00         1

        accuracy                           0.76        42
       macro avg       0.62      0.62      0.60        42
    weighted avg       0.80      0.76      0.77        42
```

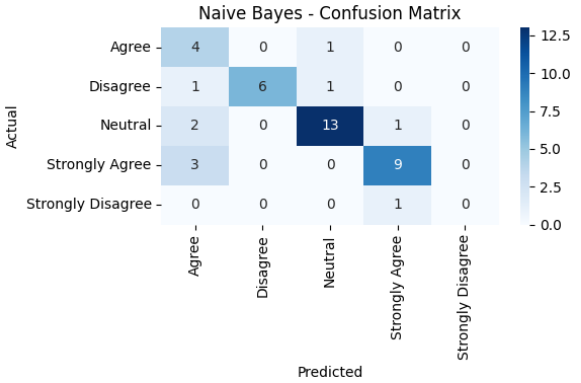


Figure 5.1.2: Naive Bayes

5.1.3 Support Vector Machines (SVM)

According to Figure 5.1.3, The SVM model achieved an accuracy of 54.76%. It performed moderately well for "Neutral" (F1-score 0.63) and "Strongly Agree" (0.61), but completely failed to classify "Disagree" and "Strongly Disagree", both having precision and recall scores of 0.00. With a macro average F1-score of only 0.36, SVM's performance is relatively weak and inconsistent.

```
=== SVM ===
Accuracy: 54.76%
                  precision    recall  f1-score   support

           Agree       0.50      0.60      0.55         5
        Disagree       0.00      0.00      0.00         8
         Neutral       0.52      0.81      0.63        16
  Strongly Agree       0.64      0.58      0.61        12
Strongly Disagree       0.00      0.00      0.00         1

        accuracy                           0.55        42
       macro avg       0.33      0.40      0.36        42
    weighted avg       0.44      0.55      0.48        42
```

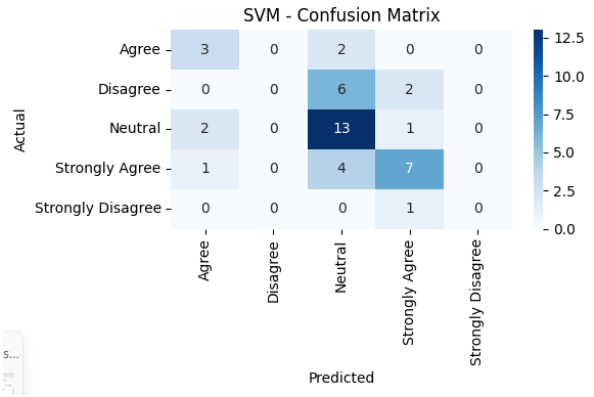


Figure 5.1.3: Support Vector Machines (SVM)

5.1.4 Random Forest

According to Figure 5.1.4, the Random Forest classifier achieved an overall accuracy of 54.76%. While it showed good recall for the "Agree" and "Neutral" classes, its performance on "Disagree" and "Strongly Disagree" was notably poor, with the latter receiving zero scores across all metrics. The macro average F1-score of 0.38 indicates imbalanced class performance, despite a weighted average of 0.53 due to the dominance of some classes like "Neutral."

```
=== Random Forest ===
Accuracy: 54.76%
                  precision    recall  f1-score   support

           Agree       0.23      0.60      0.33         5
        Disagree       1.00      0.12      0.22         8
         Neutral       0.67      0.75      0.71        16
  Strongly Agree       0.70      0.58      0.64        12
Strongly Disagree       0.00      0.00      0.00         1

        accuracy                           0.55        42
       macro avg       0.52      0.41      0.38        42
    weighted avg       0.67      0.55      0.53        42
```

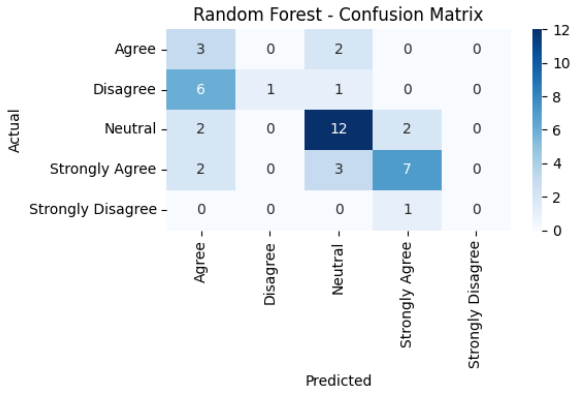
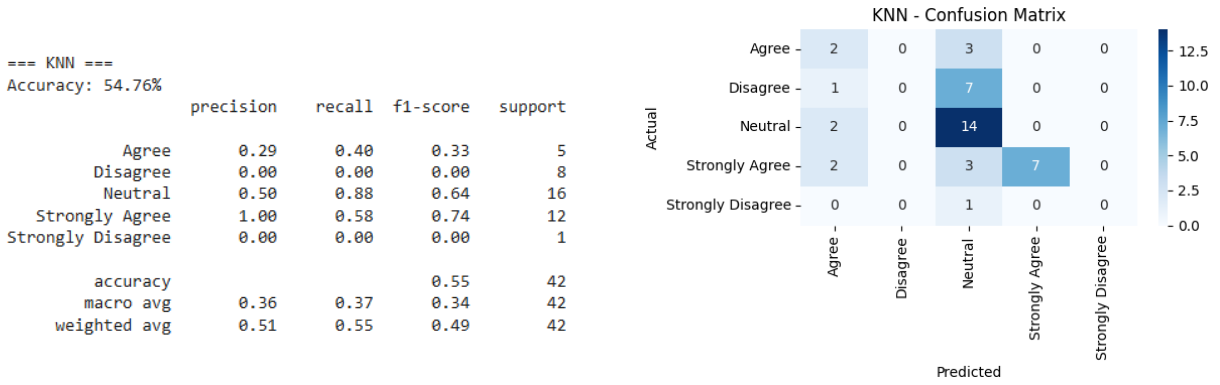


Figure 5.1.4: Random Forest

5.1.5 K-Nearest Neighbors (KNN)

According to Figure 5.1.5, the KNN classifier also reached the same accuracy of 54.76%, but with slightly worse macro performance. It had decent results on the "Neutral" and "Strongly Agree" classes but completely failed to predict "Disagree" and "Strongly Disagree" classes (zero precision, recall and F1). The macro average F1-score dropped to 0.34, indicating poor generalization across minority classes, although the weighted average F1-score was 0.49.

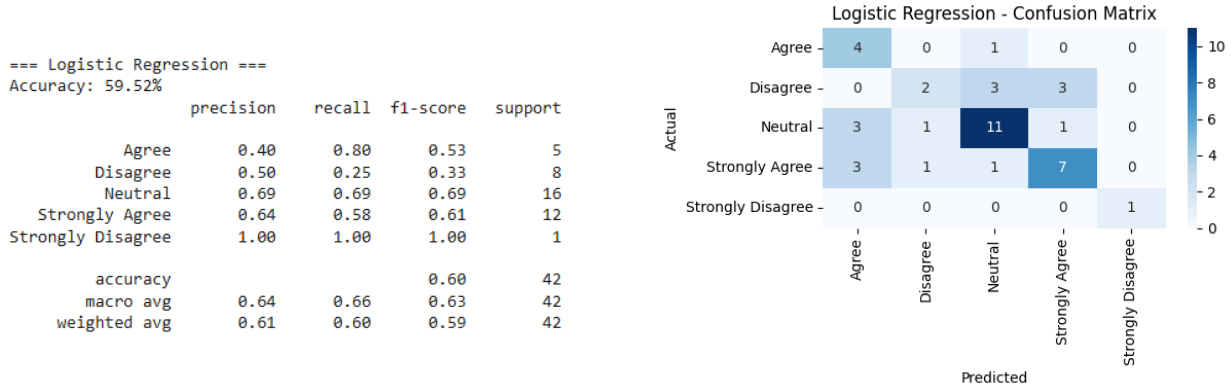


```
=== KNN ===
Accuracy: 54.76%
                  precision    recall  f1-score   support

           Agree       0.29      0.40      0.33         5
        Disagree       0.00      0.00      0.00         8
         Neutral       0.50      0.88      0.64        16
  Strongly Agree       1.00      0.58      0.74        12
Strongly Disagree       0.00      0.00      0.00         1

        accuracy                           0.55        42
       macro avg       0.36      0.37      0.34        42
    weighted avg       0.51      0.55      0.49        42
```


Figure 5.1.5: K-Nearest Neighbors (KNN)

5.1.6 Logistic Regression

According to Figure 5.1.6, Logistic Regression outperformed the others with an accuracy of 59.52%. It provided the most balanced and consistent performance, with all classes receiving non-zero F1-scores. Particularly impressive was its perfect prediction for "Strongly Disagree" (F1-score: 1.00). The macro and weighted average F1-scores of 0.63 and 0.59, respectively, reflect a more reliable classification across all categories.

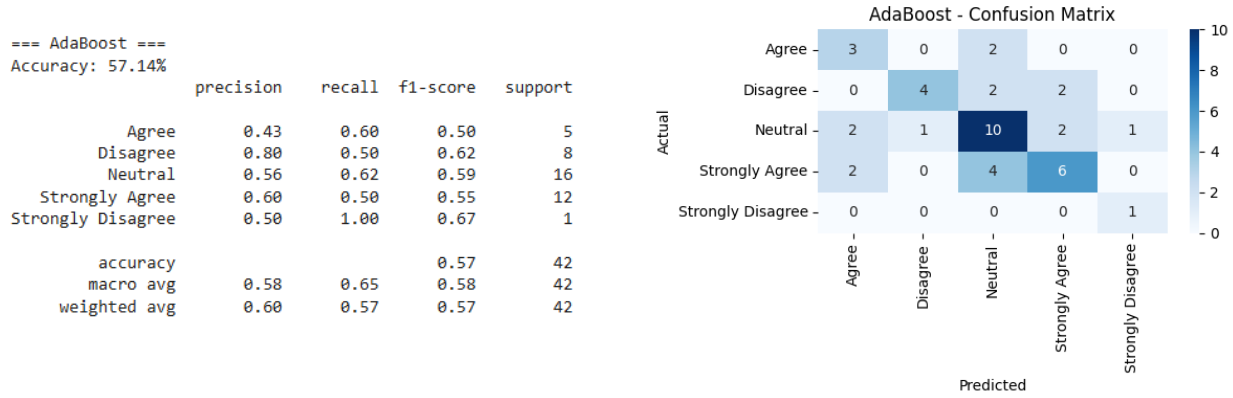


```
=== Logistic Regression ===
Accuracy: 59.52%
                  precision    recall  f1-score   support

           Agree       0.40      0.80      0.53         5
        Disagree       0.50      0.25      0.33         8
         Neutral       0.69      0.69      0.69        16
  Strongly Agree       0.64      0.58      0.61        12
Strongly Disagree       1.00      1.00      1.00         1

        accuracy                           0.60        42
       macro avg       0.64      0.66      0.63        42
    weighted avg       0.61      0.60      0.59        42
```


Figure 5.1.6: Logistic Regression

5.1.7 AdaBoost

According to Figure 5.1.7, (AdaBoost), the model achieved an overall accuracy of 57.14%. While it performs moderately across some classes (e.g., “Disagree” and “Neutral”), its performance is inconsistent across all five classes. For instance, precision and recall values for “Agree” and “Strongly Disagree” are relatively low. The macro average F1-score is 0.58, suggesting that the model struggles with balance across all categories.

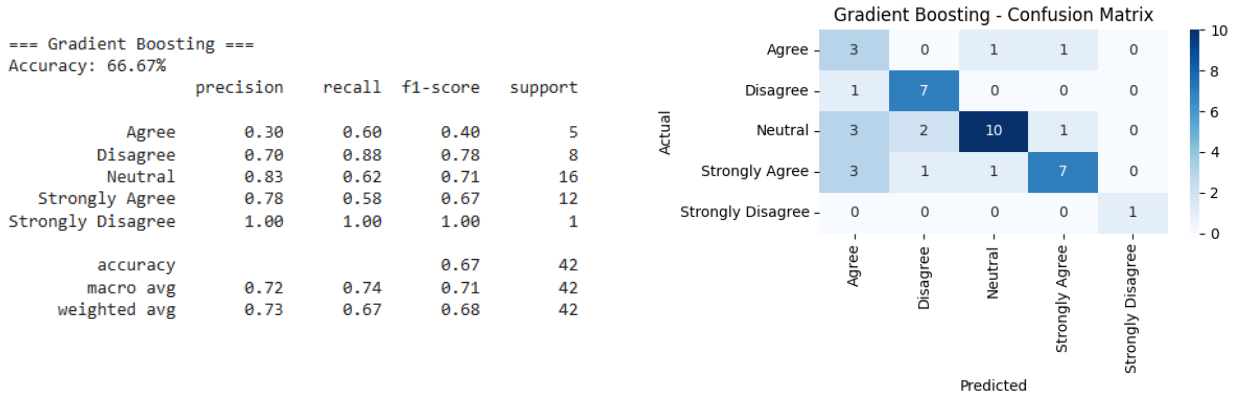


```
=== AdaBoost ===
Accuracy: 57.14%
                  precision    recall  f1-score   support

           Agree       0.43      0.60      0.50         5
        Disagree       0.80      0.50      0.62         8
         Neutral       0.56      0.62      0.59        16
  Strongly Agree       0.60      0.50      0.55        12
Strongly Disagree       0.50      1.00      0.67         1

        accuracy                           0.57        42
       macro avg       0.58      0.65      0.58        42
    weighted avg       0.60      0.57      0.57        42
```


Figure 5.1.7: AdaBoost

5.1.8 Gradient Boosting

According to Figure 5.1.8, (Gradient Boosting) shows a notable improvement with an accuracy of 66.67%. The model achieves higher precision and recall in nearly every class. Especially for “Disagree” and “Strongly Disagree,” both precision and recall values are significantly higher, with “Strongly Disagree” reaching perfect scores (1.00). The macro average F1-score rises to 0.71, indicating better performance across diverse classes compared to AdaBoost.



```
=== Gradient Boosting ===
Accuracy: 66.67%
                  precision    recall  f1-score   support

           Agree       0.30      0.60      0.40         5
        Disagree       0.70      0.88      0.78         8
         Neutral       0.83      0.62      0.71        16
  Strongly Agree       0.78      0.58      0.67        12
Strongly Disagree       1.00      1.00      1.00         1

        accuracy                           0.67        42
       macro avg       0.72      0.74      0.71        42
    weighted avg       0.73      0.67      0.68        42
```


Figure 5.1.8: Gradient Boosting

5.2 Data Analysis

The application of classification algorithms to the ERP adoption dataset resulted in meaningful insights into the readiness and success of ERP implementations among Bangladeshi organizations. The classification model achieved a maximum accuracy of 76.19%, indicating that the model was able to correctly predict the ERP adoption category for a significant majority of the respondents.

This level of accuracy suggests a strong correlation between the selected features (such as organizational preparedness, technical infrastructure, training and management support) and the actual ERP adoption outcomes.

The remaining 23.81% of the data fell outside the model's correct prediction range, highlighting areas for further improvement in data representation, model tuning or consideration of additional variables that might influence ERP adoption success.

These results emphasize the effectiveness of machine learning in classifying organizational behavior concerning ERP systems. The insights gained from the analysis provide valuable guidance for stakeholders aiming to implement or improve ERP systems in their businesses.

High-performing organizations (accurately classified) often demonstrated adherence to international best practices, while misclassified or lower-performing ones commonly lacked critical success factors such as change management strategies or skilled IT personnel.

This analysis contributes to a deeper understanding of the dynamics of ERP growth in Bangladesh and offers a data-driven basis for enhancing future ERP deployment strategies.

5.2.1 Questionnaire for Market Analysis:

1. Which ERP system does your organization currently use?

According to Figure, Among all respondents, 11.1% of organizations use SAP ERP, 26.1% of organizations use Odoo ERP, 6.8% of organizations use Tally ERP, 8.2% of organizations use Oracle ERP, 6.3% of organizations use ZOHO ERP, 4.3% of organizations use HISAB ERP, 5.3% of organizations use ERPNEXT, 3.9% of organizations use NETSUITE ERP, 4.3% of organizations use Prism ERP, 2.9% of organizations use Zahir ERP, 3.4% of organizations use

Infor ERP, 3.4% of organizations use BDSOFT IT Solutions ERP, 4.8% of organizations use Microsoft Dynamics 365 ERP, 6.3% of organizations use Salesforce ERP and only 2.9% of organizations use HubSpot ERP for their companies.

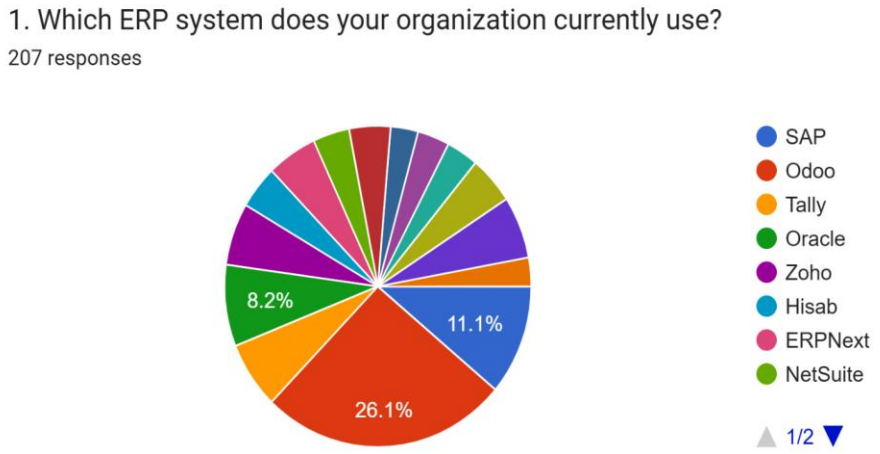


Figure 5.2.1: Currently, most organizations use these ERP systems more.

2. How would you rate the ease of implementation of your ERP system?

According to Figure, among all respondents, 24.2% users rate Excellent, 41.1% users rate Good, 18.4% users rate Fair, 11.1% users rate Poor and 5.3% users' rate Very Poor.

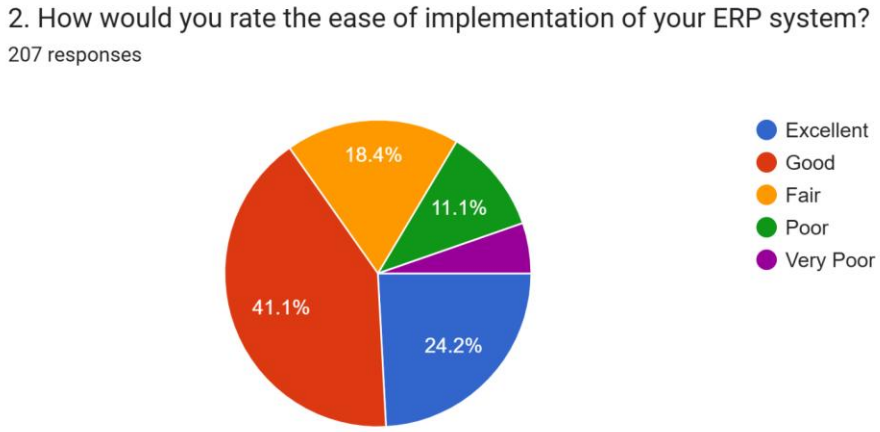


Figure 5.2.2: Total rate the ease of implementation of ERP system.

3. How long did the ERP implementation process take for your company?

According to Figure, among all respondents, 9.2% Users take the ERP implementation process Less than 6 months, 17.4% Users take the ERP implementation process 6-12 months, 28% Users take the ERP implementation process 1-2 years and 45.4% Users take the ERP implementation process More than 2 years.

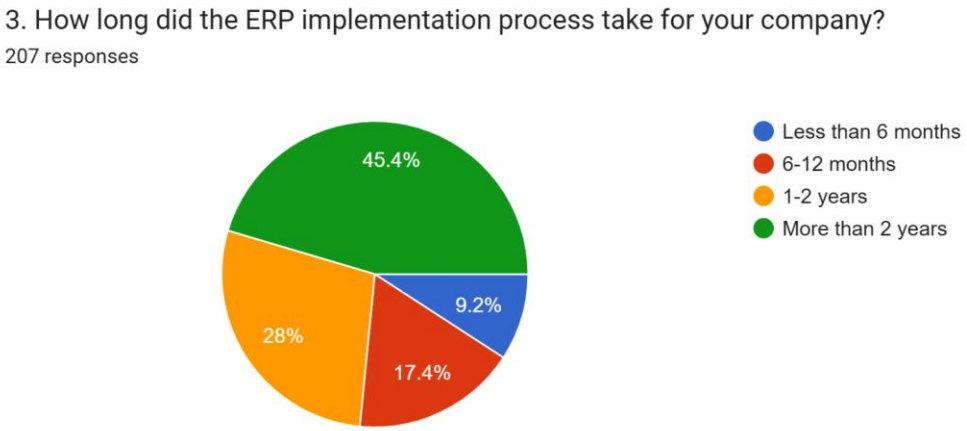


Figure 5.2.3: Total rate the ease of implementation of ERP system.

4. How satisfied are you with the ERP system's integration with your existing software?

According to Figure, among all respondents, 23.7% users rate Excellent, 35.7% users rate Good, 22.2% users rate Fair, 13.5% users rate Poor and 4.8% users rate Very Poor.

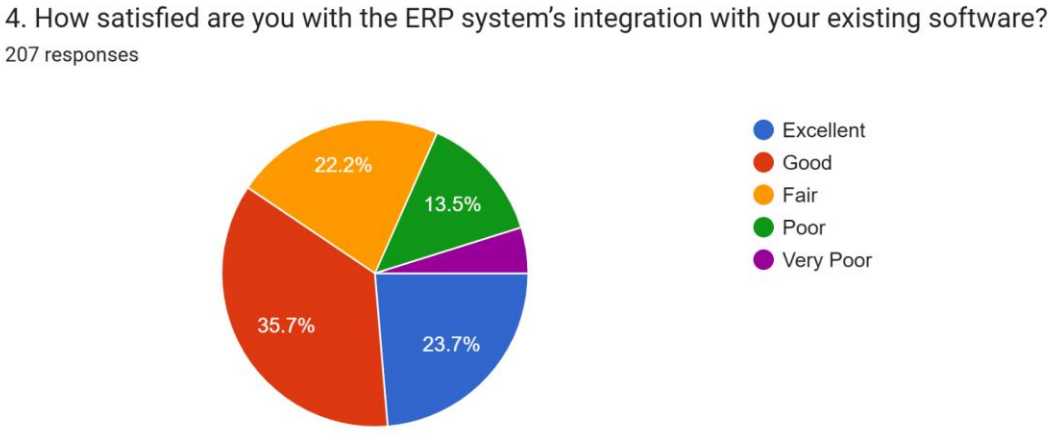


Figure 5.2.4: Satisfaction rate of ERP system integration with your existing software.

5. The ERP system was implemented within the estimated time frame.

According to Figure, among all respondents, 20.8% users rate Strongly Agree, 38.2% users rate Agree, 24.6% users rate Neutral, 13% users rate Disagree and only 3.4% users rate Strongly Disagree.

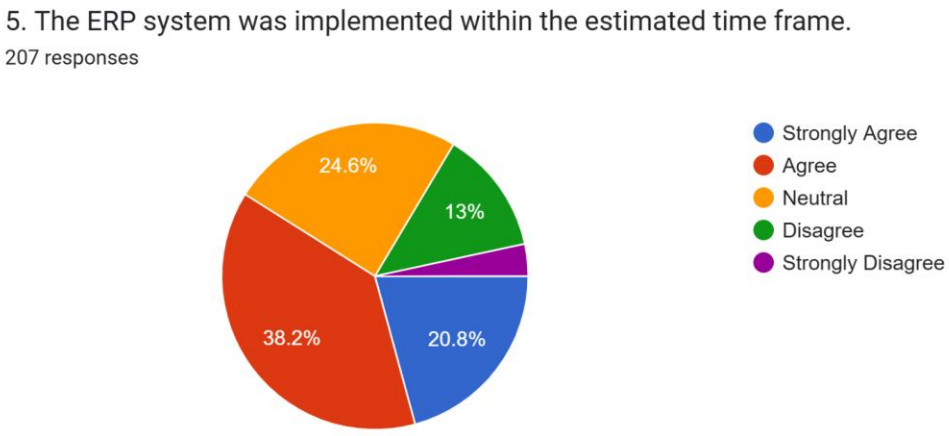


Figure 5.2.5: ERP system was implemented within the estimated time frame.

6. How would you rate the user-friendliness of the ERP system?

According to Figure, among all respondents, 21.3% users rate Excellent, 41.1% users rate Good, 19.3% users rate Fair, 7.7% users rate Poor and 10.6% users rate Very Poor.

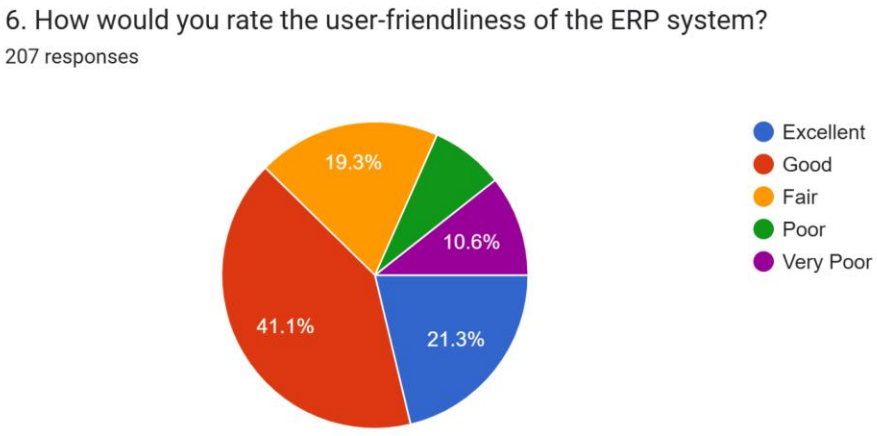


Figure 5.2.6: User-friendliness rate of ERP systems.

7. How would you rate the ERP system's reporting and analytics capabilities?

According to Figure, among all respondents, 19.8% users rate Excellent, 42% users rate Good, 16.9% users rate Fair, 14% users rate Poor and 7.2% users rates Very Poor.

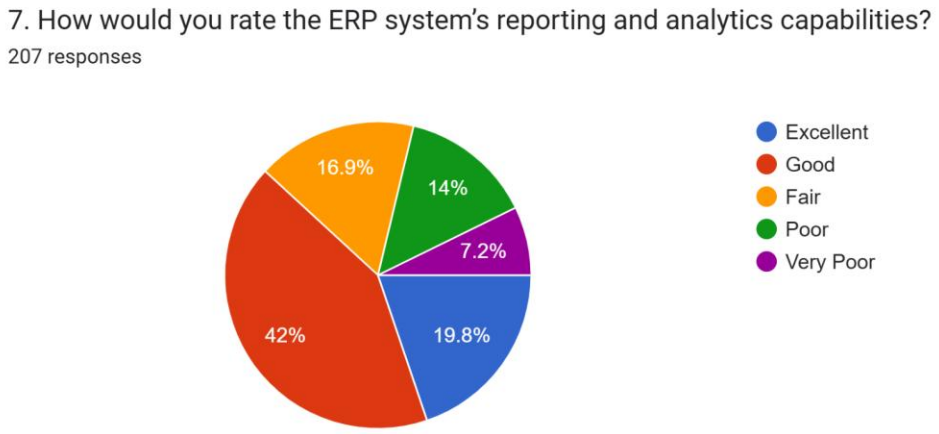


Figure 5.2.7: Rate of reporting and analysis capabilities of ERP systems.

8. The ERP system has significantly improved operational efficiency within the organization.

According to Figure, among all respondents, 21.7% users rate Strongly Agree, 38.6% users rate Agree, 23.2% users rate Neutral, 9.2% users rate Disagree and only 7.2% users rate Strongly Disagree.

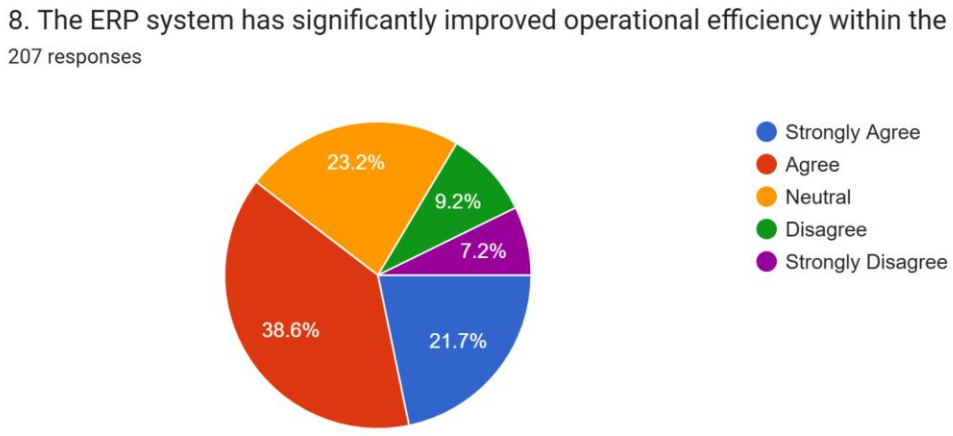


Figure 5.2.8: The functionality of the ERP system has improved significantly.

9. How would you rate the customization options available in your ERP system?

According to Figure, among all respondents, 19.3% users rate Excellent, 37.2% users rate Good, 27.1% users rate Fair, 11.1% users rate Poor and 5.3% users rate Very Poor.

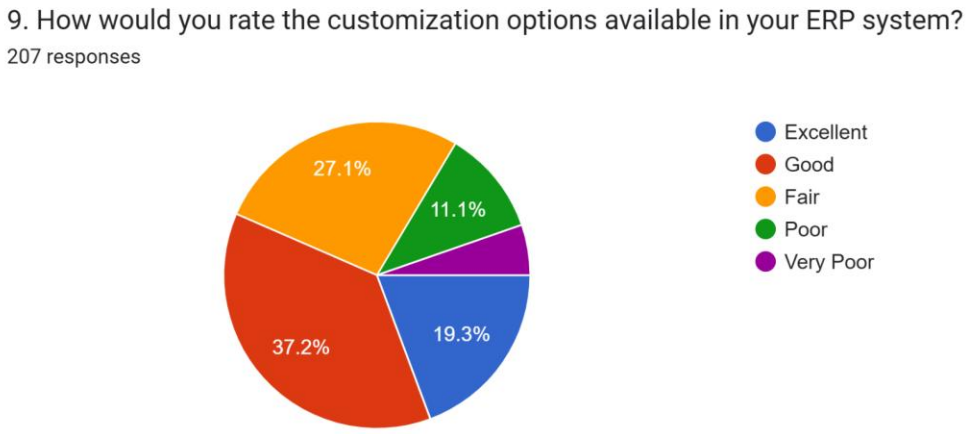


Figure 5.2.9: The rate of customization options available in your ERP system.

10. The ERP system's security features have effectively protected company data.

According to Figure, among all respondents, 22.7% users rate Strongly Agree, 36.2% users rate Agree, 29% users rate Neutral, 9.2% users rate Disagree and only 2.9% users rate Strongly Disagree.

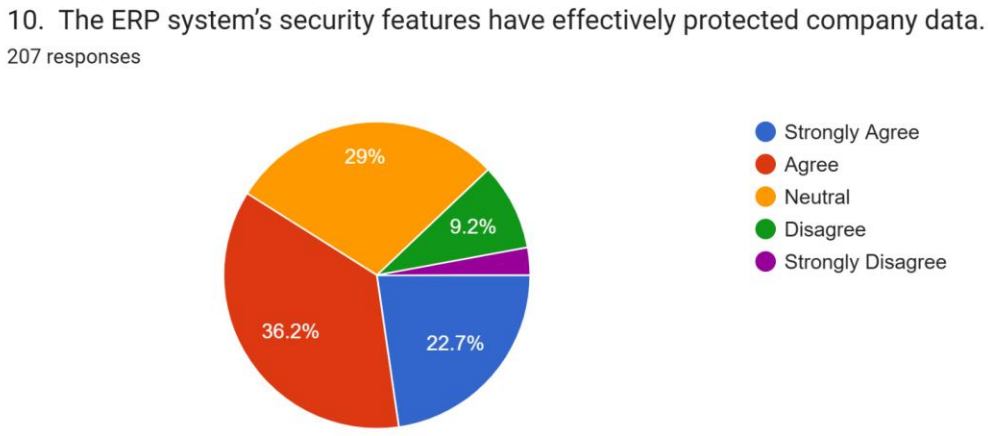


Figure 5.2.10: The ERP system's security features have effectively protected company data.

11. The ERP system has improved communication across departments.

According to Figure, among all respondents, 19.8% users rate Strongly Agree, 32.4% users rate Agree, 27.1% users rate Neutral, 10.6% users rate Disagree and only 10.1% users rate Strongly Disagree.

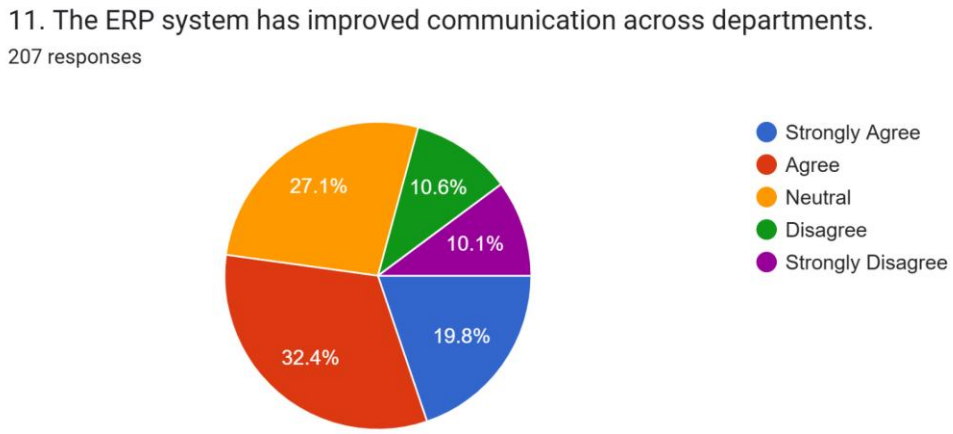


Figure 5.2.11: The ERP system has improved communication across departments.

12. The ERP system has helped improve inventory and supply chain management.

According to Figure, among all respondents, 19.8% users rate Strongly Agree, 30.4% users rate Agree, 30% users rate Neutral, 13% users rate Disagree and only 6.8% users rate Strongly Disagree.

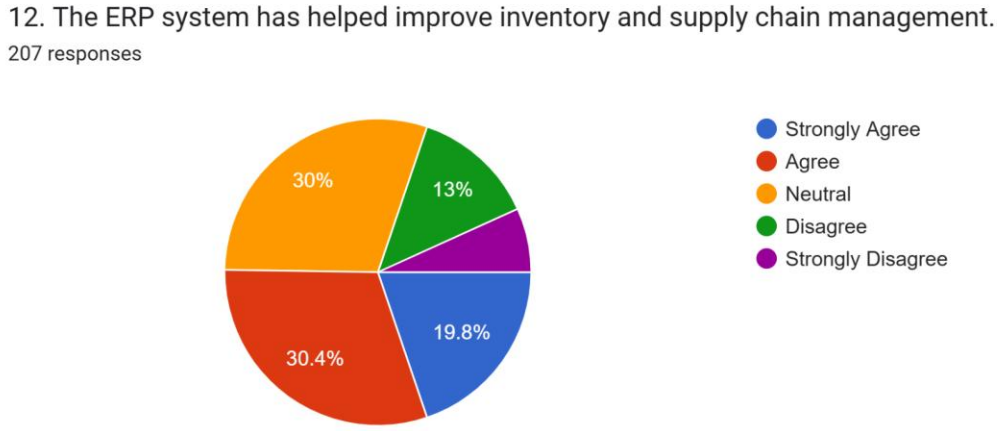


Figure 5.2.12: The ERP system has helped improve inventory and supply chain management.

13. The ERP system has improved financial management and budgeting.

According to Figure, among all respondents, 20.3% users rate Strongly Agree, 34.3% users rate Agree, 32.9% users rate Neutral, 7.7% users rate Disagree and only 4.8% users rate Strongly Disagree.

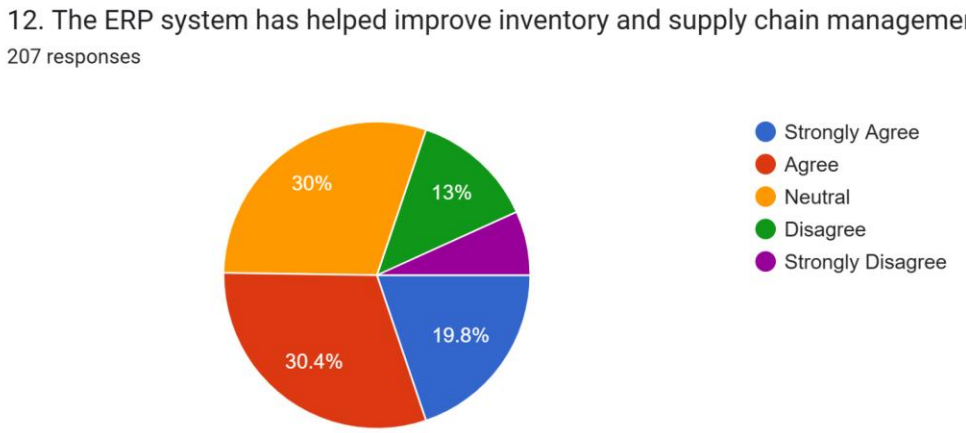


Figure 5.2.13: The ERP system has improved financial management and budgeting.

14. ERP systems have helped improve customer satisfaction through better service delivery.

According to Figure, among all respondents, 19.8% users rate Strongly Agree, 30.9% users rate Agree, 33.8% users rate Neutral, 11.1% users rate Disagree and only 4.3% users rate Strongly Disagree.

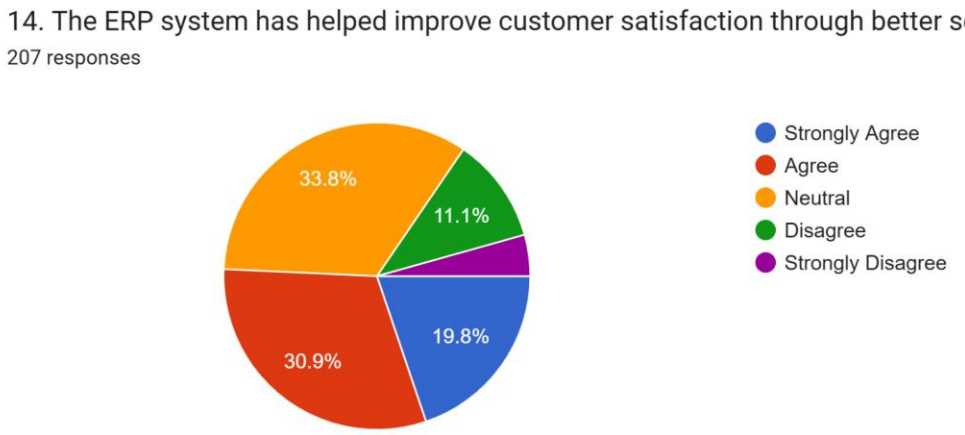


Figure 5.2.14: ERP systems helped improve customer satisfaction by providing better service.

15. The ERP system has improved employee engagement and performance.

According to Figure, among all respondents, 21.7% users rate Strongly Agree, 34.8% users rate Agree, 31.9% users rate Neutral, 8.7% users rate Disagree and only 2.9% users rate Strongly Disagree.

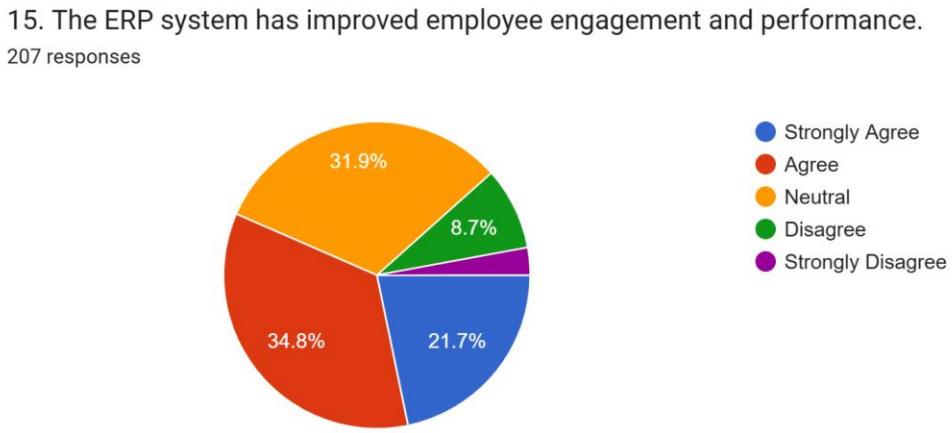


Figure 5.2.15: The ERP system has improved employee engagement and performance.

16. The ERP system has experienced frequent downtimes or technical issues.

According to Figure, among all respondents, 10.1% users rate Strongly Agree, 18.4% users rate Agree, 24.6% users rate Neutral, 12.6% users rate Disagree and only 34.3% users rate Strongly Disagree.

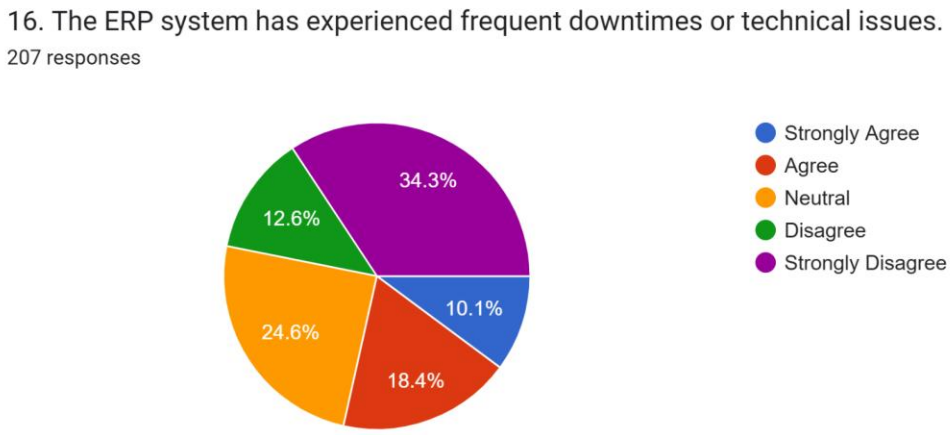


Figure 5.2.16: The ERP system has experienced frequent downtimes or technical issues.

17. There was sufficient training provided for employees to use the ERP system effectively.

According to Figure, among all respondents, 18.8% users rate Strongly Agree, 31.9% users rate Agree, 33.8% users rate Neutral, 10.6% users rate Disagree and only 5.3% users rate Strongly Disagree.

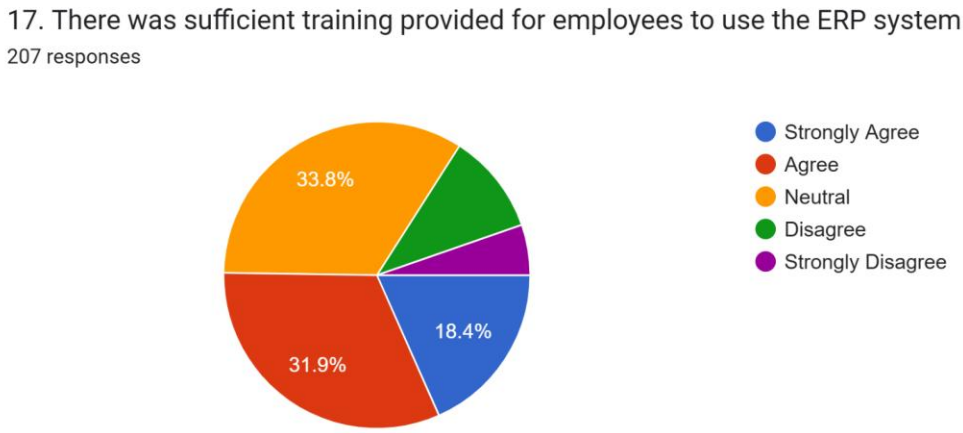


Figure 5.2.17: Sufficient training was provided to employees to use the ERP system effectively.

18. The ERP vendor has provided adequate ongoing support and updates.

According to Figure, among all respondents, 18.8% users rate Strongly Agree, 26.6% users rate Agree, 38.6% users rate Neutral, 9.7% users rate Disagree and only 6.3% users rate Strongly Disagree.

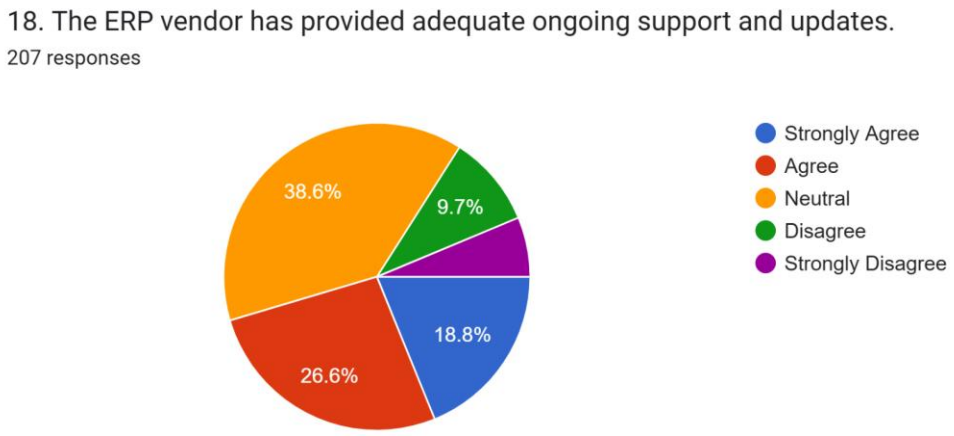


Figure 5.2.18: The ERP vendor has provided adequate ongoing support and updates.

19. The ERP system's user interface is intuitive and easy to use.

According to Figure, among all respondents, 18.8% users rate Strongly Agree, 31.4% users rate Agree, 33.3% users rate Neutral, 8.7% users rate Disagree and only 7.7% users rate Strongly Disagree.

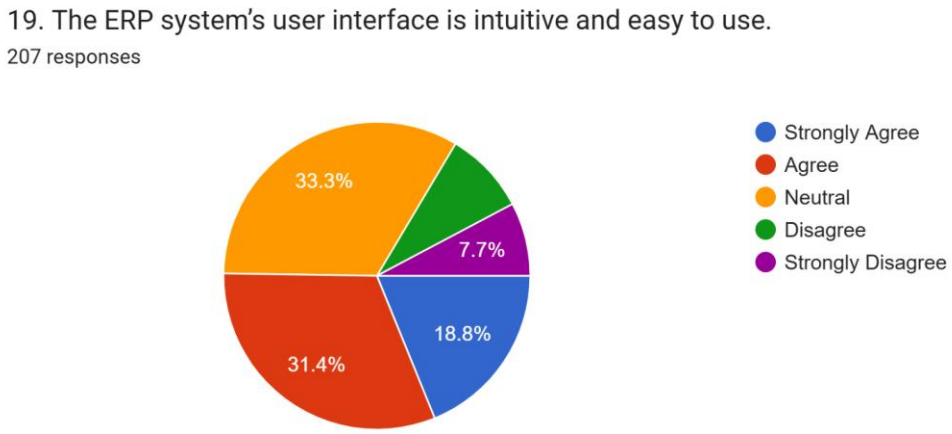


Figure 5.2.19: The ERP system's user interface is intuitive and easy to use.

20. The ERP system is capable of handling the specific needs of our industry.

According to Figure, among all respondents, 18.8% users rate Strongly Agree, 32.4% users rate Agree, 37.2% users rate Neutral, 8.7% users rate Disagree and only 2.9% users rate Strongly Disagree.

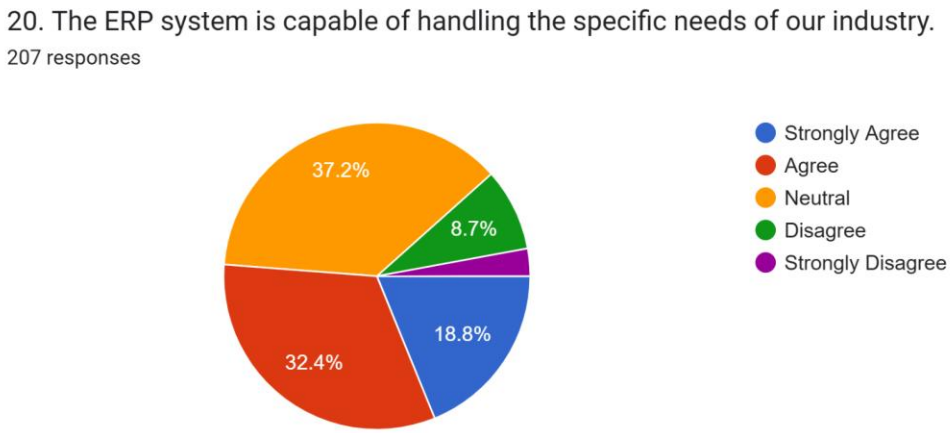


Figure 5.2.20: The ERP system is capable of handling the specific needs of our industry.

21. The ERP system is scalable and can adapt to future changes in the business.

According to Figure, among all respondents, 22.2% users rate Strongly Agree, 32.4% users rate Agree, 29% users rate Neutral, 8.2% users rate Disagree and only 8.2% users rate Strongly Disagree.

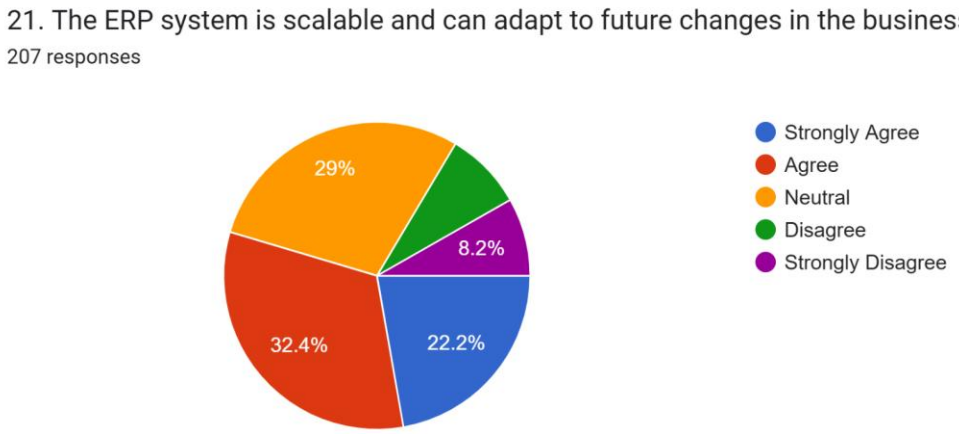


Figure 5.2.21: The ERP system is scalable and can adapt to future changes in the business.

22. I would recommend the current ERP system to other businesses in Bangladesh.

According to Figure, among all respondents, 20.8% users rate Strongly Agree, 30.9% users rate Agree, 32.4% users rate Neutral, 8.7% users rate Disagree and only 7.2% users rate Strongly Disagree.

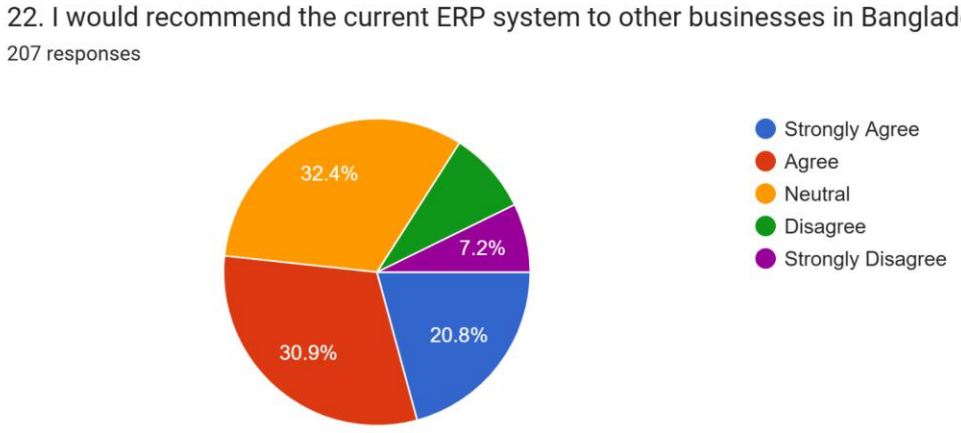


Figure 5.2.22: I would recommend the current ERP system to other businesses in Bangladesh.

23. The ERP system has led to a significant return on investment (ROI) for your organization.

According to Figure, among all respondents, 22.2% users rate Strongly Agree, 30.9% users rate Agree, 31.4% users rate Neutral, 12.6% users rate Disagree and only 2.9% users rate Strongly Disagree.

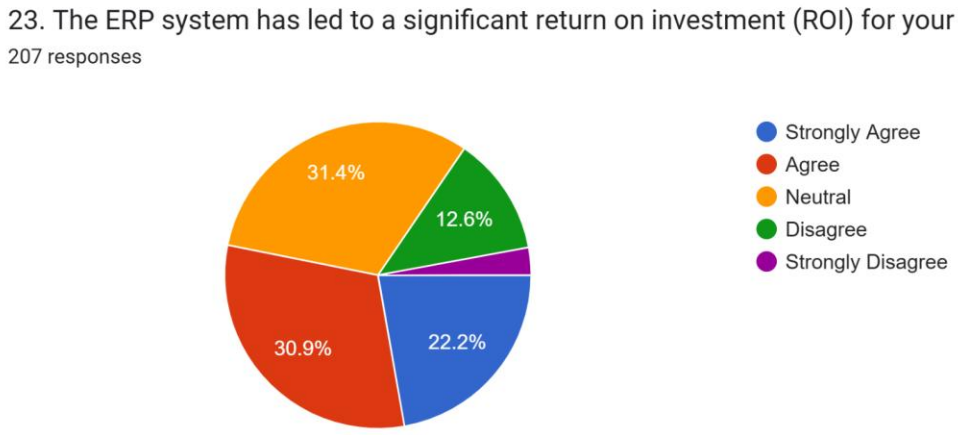


Figure 5.2.23: ERP system has led to a significant return on investment for your organization.

24. Overall, I am satisfied with the ERP system in my organization.

According to Figure, among all respondents, 24.6% users rate Strongly Agree, 25.6% users rate Agree, 34.3% users rate Neutral, 11.1% users rate Disagree and only 4.3% users rate Strongly Disagree.

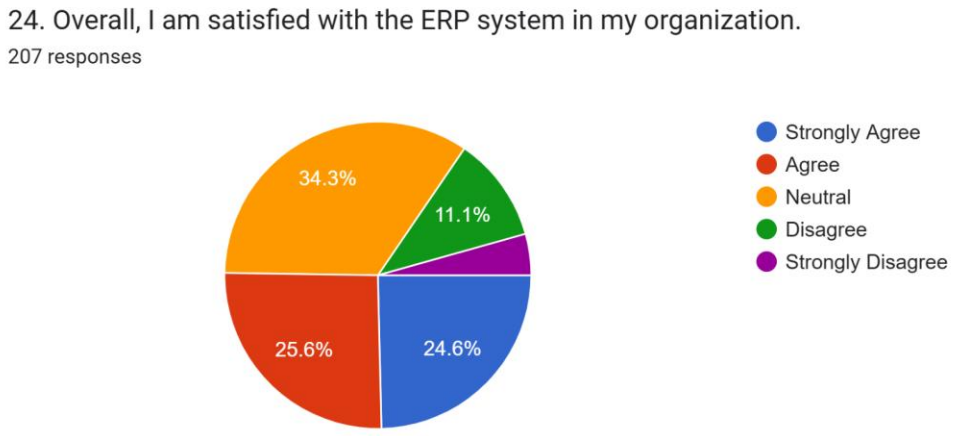


Figure 5.2.24: Overall, I am satisfied with the ERP system in my organization.

25. What is the main challenge you face while using the ERP system?

According to Figure, among all respondents, most users have experienced various types of complexity, such as system complexity (41.7%), integration issues with other software (45.1%), high implementation costs (41.2%), lack of sufficient training for employees (44.6%), poor customer support (42.2%), limited functionality (41.7%), data security concerns (25.5%), user license complexity (0.5%), stakeholder and vendor communication problem (0.5%) and others (1.5%).

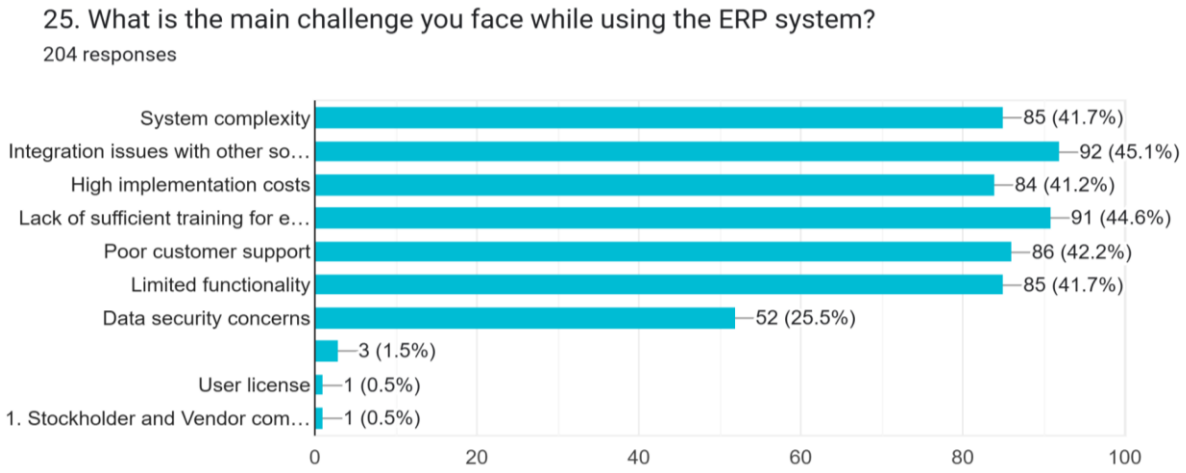


Figure 5.2.25: The main challenges faced when using ERP systems.

5.3 Results and Discussion

Below is the best experimental result:

5.3.1 Naive Bayes Classification:

Among the classification techniques employed, the Naive Bayes classification algorithm produced the best experimental results in predicting ERP adoption outcomes among Bangladeshi organizations. This algorithm effectively classified the dataset based on respondents' answers related to organizational readiness, ERP implementation experience and perceived benefits.

Naive Bayes carried out a most accuracy of 76.19%, successfully classifying a majority of the instances into appropriate classes—indicating either successful or challenged ERP adoption. The model's performance demonstrates its suitability for coping with categorical and probabilistic records, which aligns nicely with the nature of survey responses.

This classification found out widespread trends inside the information. agencies accurately categorized into a hit adoption group normally mentioned better tiers of pinnacle control guide, better infrastructure, worker training and alignment with global ERP practices.

These findings provide a facts-pushed information of the way numerous organizational and technological factors influence ERP success in different sectors and enterprise scales throughout Bangladesh. The predictive functionality of the Naive Bayes model serves as a treasured tool for stakeholders aiming to evaluate ERP readiness and improve implementation strategies.

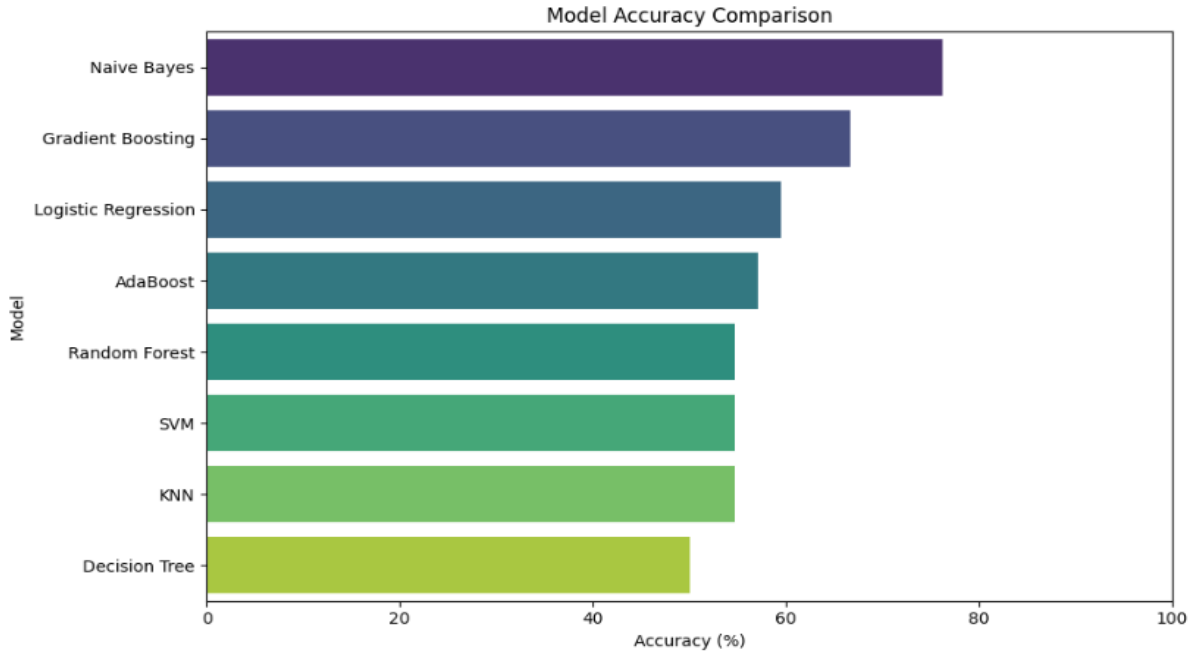


Figure 5.3.1.1: Best Classification Chart

The best result was obtained using a Naive Bayes classification algorithm.

```
=== Naive Bayes ===
Accuracy: 76.19%
                   precision    recall  f1-score   support

            Agree       0.40      0.80      0.53         5
         Disagree       1.00      0.75      0.86         8
          Neutral       0.87      0.81      0.84        16
   Strongly Agree       0.82      0.75      0.78        12
Strongly Disagree       0.00      0.00      0.00         1

         accuracy                           0.76        42
        macro avg       0.62      0.62      0.60        42
     weighted avg       0.80      0.76      0.77        42
```

Figure 5.3.1.2: Classification results showing prediction distribution

```
Attribute

==========================================================================================
Timestamp
1. Which ERP system does your organization currently use?
2. How would you rate the ease of implementation of your ERP system?
3. How long did the ERP implementation process take for your company?
4. How satisfied are you with the ERP systemâ€™s integration with your existing software?
5. The ERP system was implemented within the estimated time frame.
6. How would you rate the user-friendliness of the ERP system?
7. How would you rate the ERP systemâ€™s reporting and analytics capabilities?
8. The ERP system has significantly improved operational efficiency within the organization.
9. How would you rate the customization options available in your ERP system?
10.  The ERP systemâ€™s security features have effectively protected company data.
11. The ERP system has improved communication across departments.
12. The ERP system has helped improve inventory and supply chain management.
13. The ERP system has improved financial management and budgeting.
14. The ERP system has helped improve customer satisfaction through better service delivery.
15. The ERP system has improved employee engagement and performance.
16. The ERP system has experienced frequent downtimes or technical issues.
17. There was sufficient training provided for employees to use the ERP system effectively.
18. The ERP vendor has provided adequate ongoing support and updates.
19. The ERP systemâ€™s user interface is intuitive and easy to use.
20. The ERP system is capable of handling the specific needs of our industry.
21. The ERP system is scalable and can adapt to future changes in the business.
22. I would recommend the current ERP system to other businesses in Bangladesh.
23. The ERP system has led to a significant return on investment (ROI) for your organization.
24. Overall, I am satisfied with the ERP system in my organization.
25. What is the main challenge you face while using the ERP system?
```

Figure 5.3.1.3: Best classification centroid values of Naive Bayes classification

Table 5.3.1: Best classification values

Serial	Attributes	Classification Value
1	Which ERP system does your organization currently use?	Odoo
2	How would you rate the ease of implementation of your ERP system?	Good
3	How long did the ERP implementation process take for your company?	More than 2 years
4	How satisfied are you with the ERP system's integration with your existing software?	Good
5	The ERP system was implemented within the estimated time frame.	Agree

6	How would you rate the user-friendliness of the ERP system?	Good
7	How would you rate the ERP system's reporting and analytics capabilities?	Good
8	The ERP system has significantly improved operational efficiency within the organization.	Agree
9	How would you rate the customization options available in your ERP system?	Good
10	The ERP system's security features have effectively protected company data.	Agree
11	The ERP system has improved communication across departments.	Agree
12	The ERP system has helped improve inventory and supply chain management.	Agree
13	The ERP system has improved financial management and budgeting.	Agree
14	The ERP system has helped improve customer satisfaction through better service delivery.	Neutral
15	The ERP system has improved employee engagement and performance.	Agree
16	The ERP system has experienced frequent downtimes or technical issues.	Strongly Disagree
17	There was sufficient training provided for employees to use the ERP system effectively.	Neutral
18	The ERP vendor has provided adequate ongoing support and updates.	Neutral
19	The ERP system's user interface is intuitive and easy to use.	Neutral
20	The ERP system is capable of handling the specific needs of our industry.	Neutral

21	The ERP system is scalable and can adapt to future changes in the business.	Agree
22	I would recommend the current ERP system to other businesses in Bangladesh.	Neutral
23	The ERP system has led to a significant return on investment (ROI) for your organization.	Neutral
24	Overall, I am satisfied with the ERP system in my organization.	Neutral
25	What is the main challenge you face while using the ERP system?	Integration issues with other software, Lack of sufficient training for employees, Limited functionality and Data security concerns.

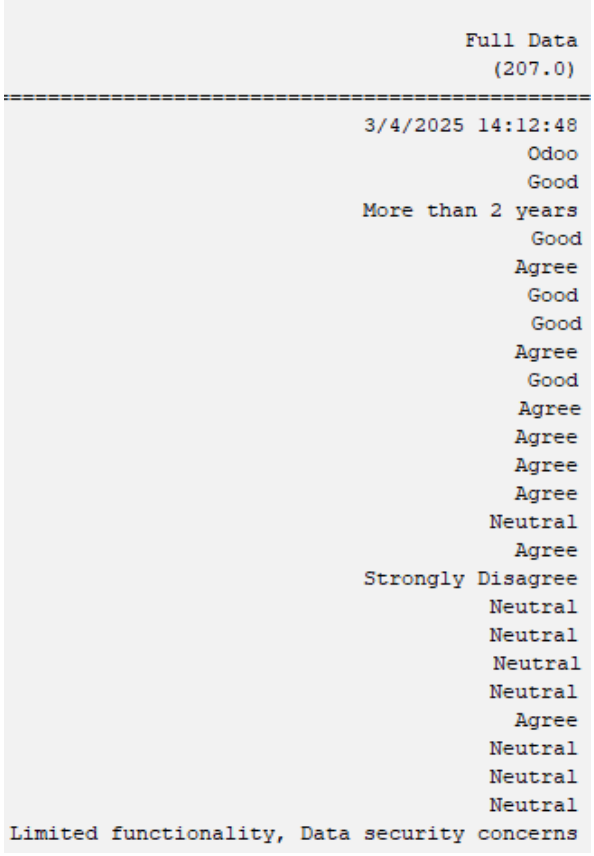


Figure 5.3.1.4: Best values of all questions

5.3.2 Impact on Business Operations:

This section discusses and offers the experimental findings regarding the have an impact on of ERP systems on enterprise operations in Bangladesh. It emphasizes the improvements in operational efficiency, machine integration, and the capacity for actual-time selection-making made feasible via ERP implementation. The consequences advocate contributors' views on how ERP structures have boosted productiveness, optimized workflows, and minimized redundancies all through particular departments.

5.3.3 Technological and Security Challenges

This section investigates the difficulties associated with technological infrastructure and data protection concerning the adoption of ERP systems. It assesses how prepared organizations in Bangladesh are to merge ERP solutions with their current technologies and safeguard sensitive business information. The findings highlight worries regarding system weaknesses, cybersecurity threats, and the suitability of existing IT structures to facilitate ERP implementations, particularly within small and medium-sized enterprises.

5.3.4 Data Privacy and User Concerns

This section emphasizes the privacy-related factors associated with ERP implementation. It explores how companies handle the gathering, safekeeping and utilization of sensitive internal and customer information within ERP systems. The results highlight users' worries about data secrecy, adherence to data protection laws, and confidence in ERP vendors. Additionally, this part reflects the degree of understanding among stakeholders concerning privacy regulations and data management practices.

5.4 Descriptive Analysis

The Naive Bayes type set of guidelines produced the very satisfactory accuracy and reliability, accomplishing a peak accuracy of 76.19% in forecasting ERP adoption results primarily based on organizational traits and implementation studies.

The classification analysis revealed two primary categories among the participants: one comprising companies that efficaciously followed ERP (76.19%) and the alternative representing those going through implementation problems (23.81%).

The majority of companies classified in the successful category exhibited numerous shared characteristics, along with sturdy management support, funding in worker education, a solid IT infrastructure, and alignment with worldwide ERP standards. These companies stated enhancements in operational efficiency, choice-making, and go-departmental integration as good sized blessings of ERP adoption.

Conversely, the second class covered agencies struggling with ERP implementation. These businesses suggested numerous barriers, along with inadequate technical abilities, restricted economic resources, resistance to alternate, and a loss of system customization.

The analysis additionally underscored the important significance of world ERP frameworks and high-quality practices. Companies that adhered to international standards and adopted structured implementation approaches experienced more favorable outcomes and were more likely to sustain their ERP systems over time.

These descriptive insights reinforce the predictive findings of the classification model and provide a clearer understanding of the current ERP environment in Bangladesh. They also assist in categorizing businesses based on their ERP maturity and readiness for digital transformation.

5.5 Conclusion

The results of this study provide valuable and applicable information for stakeholders, emphasizing the key factors that influence the progress, acceptance, and challenges of ERP implementation in Bangladesh. The results underscore the importance of strategic planning, effective resource allocation, and cooperative endeavors to address the challenges faced by businesses, particularly SMEs, in implementing ERP systems. Through the utilization of classification algorithms, specifically Naive Bayes, the research effectively pinpointed critical factors that contribute to ERP success and categorized organizations based on their adoption results.

The results emphasize the importance of:

- **Strategic planning** aligned with global ERP best practices.
- Customized ERP solutions that cater to the unique requirements of Bangladeshi companies, especially SMEs.
- **Government assistance and financial incentives** to reduce the barriers to ERP adoption.
- **Capacity-building initiatives**, including employee training and change management initiatives, to enhance organizational preparedness and technical skills.

Concentrating on these elements can significantly decorate the price of ERP implementation and the performance of these structures, main to extended operational effectiveness and competitiveness for groups each domestically and globally. This chapter establishes the foundation for the recommendations and destiny paths outlined in the subsequent chapter, that specialize in how stakeholders—businesses, ERP carriers, and policymakers—can collaborate to foster a extra favorable surroundings for ERP in Bangladesh.

CHAPTER 6
CONCLUSION AND FUTURE WORK

6.1 Conclusion

The implementation of Enterprise Resource Planning (ERP) systems in Bangladesh presents a major opportunity to revolutionize business operations, improve decision-making processes, and boost competitiveness in both domestic and international markets.

By consolidating essential business functions into a single platform, ERP systems equip organizations with the necessary tools to enhance operational efficiency, optimize workflows, and utilize data-driven insights effectively [5].

The findings display that even as there may be a growing hobby and uptake of ERP solutions among Bangladeshi corporations, first rate challenges persist. These challenges encompass high initial investments, non-stop protection fees, reluctance to include trade, and a lack of technical information in several groups.

Additionally, tailoring ERP systems to meet the specific needs of different sectors in Bangladesh poses further obstacles, particularly for small and medium enterprises (SMEs) with limited resources.

Nevertheless, the research highlights several important factors that could encourage broader ERP adoption, such as increased digital transformation, the emergence of cost-effective local ERP providers, and government-led initiatives promoting technological progress.

The insights from this study not only enhance academic knowledge regarding ERP adoption in emerging markets like Bangladesh but also provide practical suggestions for businesses, policymakers and ERP providers to tackle these issues and fully realize the potential of ERP systems.

In summary, while the advancement of ERP solutions in Bangladesh appears optimistic, a strategic and collaborative method is essential to navigate the existing barriers. By creating a supportive atmosphere for ERP adoption [10].

6.2 Future Suggested Work

The effects and observations from this have a look at pave the manner for several destiny studies possibilities aimed at deepening the comprehension of ERP adoption in Bangladesh and comparable emerging markets. Several vital paths for future exploration include:

Longitudinal Studies to Track ERP Adoption Trends:

Future studies should deal with appearing prolonged studies to song the trends in ERP adoption over an extended length. These studies could yield considerable insights into the effects of market fluctuations, technological development and authority's guidelines on the uptake and development of ERP structures.

Using a longitudinal methodology might also assist in uncovering ongoing blessings and boundaries, supplying an extra distinct know-how of ERP's enduring impact on commercial enterprise overall performance [7].

Development of Industry-Specific ERP Solutions:

Investigating and growing ERP solutions custom designed to fulfill the particular needs of sectors inclusive of manufacturing, retail, agriculture, and offerings in Bangladesh is crucial. Destiny studies may want to attention on figuring out the suitable necessities of those industries and growing solutions that deal with their operational challenges.

By catering to the distinct necessities of each sector, ERP providers can enhance the relevance and effectiveness of their systems, leading to increased adoption rates.

Exploring the Role of Government Policies in Promoting Digital Transformation:

The role of government initiatives and regulations in supporting digital transformation and the adoption of ERP systems requires more comprehensive investigation. Future research may evaluate the effectiveness of current policies, highlight areas for improvement, and suggest ways to develop incentives, subsidies, or improve infrastructure for facilitating ERP adoption.

Gaining insight into the influence of government assistance on ERP implementation would enable lawmakers to devise strategies that promote digital transformation across different sectors.

Investigating the Impact of Emerging Technologies on ERP Adoption:

As technologies like AI, IoT, Blockchain, and Cloud Computing continue to advance quickly, future studies could examine the ways these innovations are transforming ERP systems and affecting their uptake. Exploring the incorporation of emerging technologies into ERP solutions could offer valuable perspectives on how companies can utilize these advancements to tackle their operational challenges more efficiently [9].

Cross-Comparative Studies with Other Emerging Markets:

Engaging in comparative analyses between Bangladesh and other emerging markets could aid in pinpointing shared obstacles and effective practices for ERP adoption. This kind of research would enable stakeholders to gain insights from the experiences of other nations, promoting the creation of more efficient strategies for ERP implementation in Bangladesh.

User-Centric Studies to Understand Employee Perspectives:

Future studies might examine the human aspects of ERP adoption, investigating the viewpoints of employees and managers who use these systems regularly. By gaining insight into user experiences, barriers to acceptance, and training requirements, upcoming research can offer suggestions to improve user involvement and support more effective ERP implementation.

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Appendix

Appendix A**: Google Form Link:**

https://forms.gle/M2jcpioCUvZaBd9W8

```
Attribute

================================================================================================
Timestamp
1. Which ERP system does your organization currently use?
2. How would you rate the ease of implementation of your ERP system?
3. How long did the ERP implementation process take for your company?
4. How satisfied are you with the ERP systemâ€™s integration with your existing software?
5. The ERP system was implemented within the estimated time frame.
6. How would you rate the user-friendliness of the ERP system?
7. How would you rate the ERP systemâ€™s reporting and analytics capabilities?
8. The ERP system has significantly improved operational efficiency within the organization.
9. How would you rate the customization options available in your ERP system?
10.  The ERP systemâ€™s security features have effectively protected company data.
11. The ERP system has improved communication across departments.
12. The ERP system has helped improve inventory and supply chain management.
13. The ERP system has improved financial management and budgeting.
14. The ERP system has helped improve customer satisfaction through better service delivery.
15. The ERP system has improved employee engagement and performance.
16. The ERP system has experienced frequent downtimes or technical issues.
17. There was sufficient training provided for employees to use the ERP system effectively.
18. The ERP vendor has provided adequate ongoing support and updates.
19. The ERP systemâ€™s user interface is intuitive and easy to use.
20. The ERP system is capable of handling the specific needs of our industry.
21. The ERP system is scalable and can adapt to future changes in the business.
22. I would recommend the current ERP system to other businesses in Bangladesh.
23. The ERP system has led to a significant return on investment (ROI) for your organization.
24. Overall, I am satisfied with the ERP system in my organization.
25. What is the main challenge you face while using the ERP system?
```

Figure: Questionnaire for ERP Users

Appendix B**: Question Table:**

Table Appendix B.1: Questionnaire to Collect Data

Serial	Attributes	Attribute Values
1	Which ERP system does your organization currently use?	➢ SAP ➢ Odoo ➢ Tally ➢ Oracle ➢ Zoho ➢ Hisab ➢ ERPNext ➢ NetSuite ➢ Prismerp ➢ Zahir ERP ➢ Infor ERP ➢ Bdsoft IT Solutions ➢ Microsoft Dynamics 365 ➢ Salesforce ➢ Salesforce ➢ HubSpot
2	How would you rate the ease of implementation of your ERP system?	➢ Excellent ➢ Good ➢ Fair ➢ Poor ➢ Very Poor
3	How long did the ERP implementation process take for your company?	➢ Less than 6 months ➢ 6-12 months ➢ 1-2 years ➢ More than 2 years
4	How satisfied are you with the ERP system's integration with your existing software?	➢ Excellent ➢ Good ➢ Fair ➢ Poor

		➢ Very Poor
5	The ERP system was implemented within the estimated time frame.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
6	How would you rate the user-friendliness of the ERP system?	➢ Excellent ➢ Good ➢ Fair ➢ Poor ➢ Very Poor
7	How would you rate the ERP system's reporting and analytics capabilities?	➢ Excellent ➢ Good ➢ Fair ➢ Poor ➢ Very Poor
8	The ERP system has significantly improved operational efficiency within the organization.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
9	How would you rate the customization options available in your ERP system?	➢ Excellent ➢ Good ➢ Fair ➢ Poor ➢ Very Poor
10	The ERP system's security features have effectively protected company data.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree

11	The ERP system has improved communication across departments.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
12	The ERP system has helped improve inventory and supply chain management.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
13	The ERP system has improved financial management and budgeting.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
14	The ERP system has helped improve customer satisfaction through better service delivery.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
15	The ERP system has improved employee engagement and performance.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
16	The ERP system has experienced frequent downtimes or technical issues.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
17	There was sufficient training provided for employees to use the ERP system effectively.	➢ Strongly Agree ➢ Agree

		➢ Neutral ➢ Disagree ➢ Strongly Disagree
18	The ERP vendor has provided adequate ongoing support and updates.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
19	The ERP system's user interface is intuitive and easy to use.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
20	The ERP system is capable of handling the specific needs of our industry.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
21	The ERP system is scalable and can adapt to future changes in the business.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
22	I would recommend the current ERP system to other businesses in Bangladesh.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
23	The ERP system has led to a significant return on investment (ROI) for your organization.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree

		➢ Strongly Disagree
24	Overall, I am satisfied with the ERP system in my organization.	➢ Strongly Agree ➢ Agree ➢ Neutral ➢ Disagree ➢ Strongly Disagree
25	What is the main challenge you face while using the ERP system?	➢ System complexity ➢ Integration issues with other software ➢ High implementation costs ➢ Lack of sufficient training for employees ➢ Poor customer support ➢ Limited functionality ➢ Data security concerns

Appendix C: Plagiarism Report:

241-25-010

ORIGINALITY REPORT

4%	3%	1%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Daffodil International University Student Paper	2%
2	Arthur G.O. Mutambara. "Artificial Intelligence - A Driver of Inclusive Development and Shared Prosperity for the Global South", CRC Press, 2025 Publication	<1%
3	link.springer.com Internet Source	<1%
4	ir.cuea.edu Internet Source	<1%
5	Gazala Mushtaq, Veningston K. "AI driven interpretable deep learning based fetal health classification", SLAS Technology, 2024 Publication	<1%
6	Submitted to South Bank University Student Paper	<1%
7	dspace.daffodilvarsity.edu.bd:8080 Internet Source	<1%
8	Submitted to American National University Student Paper	<1%
9	www.ukm.my Internet Source	<1%
10	Sudarshan Sahu, Anupreet Kaur, Gursharan Singh, Shailendra Kumar Arya. "Integrating biosorption and machine learning for efficient remazol red removal by algae-bacteria co-	<1%