Assessing the Effects of Enterprise Resource Planning on the Higher Education Sector in India

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Abstract. The higher education sector in India is growing and plays a significant role in the country's economic development and in shaping the future. Although the government has initiated programs such as the New Education Policy (NEP) across the higher education sector, shortcomings such as poor infrastructure, lack of coordination among departments, poor communication among stakeholders, inefficient processes, and issues related to decision-making still exist. Introducing the Enterprise Resource Planning (ERP) in the higher education sector can overcome these issues to a certain extent. This research focuses on the impact of ERP in the higher education sector and how it improves overall processes. Here, primary data collected from the relevant stakeholders are used to analyse the impact of ERP in the higher education sector. Overall, 250 responses were collected from the stakeholders, and performance was evaluated using basic statistical methods. The qualitative analysis is carried out to determine overall operational efficiency, data accuracy, and accessibility. Finally, an overall operational efficiency improvement of 75% was obtained, and an improvement in data accuracy and accessibility of 80%.

1 Introduction

The higher education system consists of several components and is complex. The integration of components of the higher education system is comparatively difficult. The improper integration leads to poor efficiency and underutilisation. This ultimately reduces the quality of outcomes. This will severely affect the industry due to poor workforce efficiency. This means that individuals joining the industry are not well-suited to take up the assignments appropriately. As a result, employees further lose career and job opportunities. The industries are reluctant to absorb freshers because of a lack of skills and quality. The main reason for

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poor quality outcomes is the lack of effective utilisation and outcomes from the higher education system, such as universities and colleges.

The introduction of ERP can mitigate the issues of underutilisation of the higher education sector. The ERP [1] helps to integrate all the segments of the higher education sector appropriately and enhances the effective utilisation of the system. The main challenge in the higher education subsystem is the lack of communication between teaching and administrative departments. The administrative department is not able to trace the academic-related data, while the teaching department is unable to follow up on the student fees, data related to admission, recruitment policies, documents related to accreditations, and relevant movement policies with respect to colleges or universities. The availability of timely data is essential to complete the specific task with respect to administration or teaching. ERP integrates all departmental data and makes it available to all stakeholders.

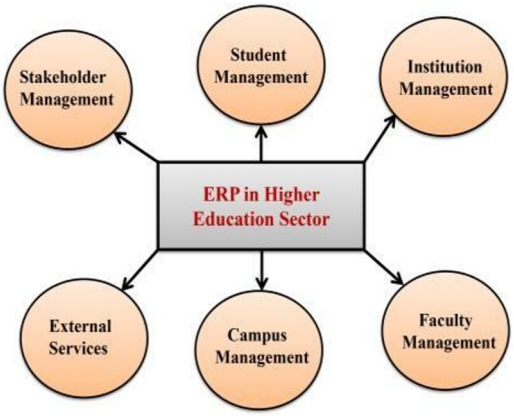

Fig. 1. Functions of ERP in HES.

The functions of ERP in the higher education sector are presented in Fig. 1. It is observed that ERP integrates the major components of subsystems in the higher education system, such as stakeholder management, student management, institutional management, external management, campus and faculty management. The information can be accessed by the concerned stakeholders at any point in time. The involvement of ERP in the higher education sector leads to the smooth flow of useful information in a timely manner, which saves time and effort. The accuracy is another challenge with respect to the information. The traditional system leads to human-based errors. The introduction of ERP mitigates such human error and ensures data accuracy. In general, attendance and marks entries are updated using traditional methods, which leads to errors and consumes a huge amount of time.

This research focuses on a qualitative approach to analyze the impact of ERP on the quality of the higher education system. Also, a comparative analysis is performed with and without ERP implementation. The following parameters are considered: data accuracy, interdepartmental communication, stakeholder satisfaction, and effectiveness of decision-making is considered in this research. The paper is divided into the following sections: A thorough review of the literature is included in Section II, the impact of ERP in the higher education sector is described in Section III, the results and discussion are presented in Section IV, and the study is concluded in Section V.

2 Related Works

2.1 Need for Enterprise Resource Planning

According to O. Ntelamo et al., ERP software [2] is a fundamental component of contemporary corporate administration, providing comprehensive integration of vital data from several organizational domains. The design and importance of ERP systems are examined in this literature study, which also highlights the hazards and benefits of these systems. ERP assists in minimizing the gap between communication and sharing information among departments. It helps in data-driven decision-making. ERP helps to coordinate finance, human resources, and other concerned departments. According to L. Anaya et al., stated that integration of scattered data [3] in a system is a tedious task when using traditional approaches. Integration of scattered data is possible using ERP efficiently. All types of data are made available using ERP integration in a particular system. In the education sector, ERP enables the smooth flow of admission data, attendance details, student performance details, fee payment details, faculty details, upcoming recruitment details, and stakeholders' details. ERP helps to streamline the overall process of the education system. It helps to notify the concerned stakeholders of the updates. Consistently, notification is sent to the stakeholders so that work will not be interrupted. ERP helps to save time and prevent interruptions in workflow. Y. Xie et al., state that Critical Success Factor (CSF) [4] is an important factor to implement ERP in any system, including the higher education sector. The resistance to change from employees is a major challenge and concern for implementing any ERP. Top management needs to convey to all employees the benefits of ERP implementation in the organization, typically in the higher education system. Before implementing the ERP in any system, the CSF should be considered. The need for introducing an induction program for the implementation of ERP is essential. A. D. Putri et al., [5] describe the significance of top management support for the successful implementation of ERP in the higher education sector. The coordination of stakeholders from different departments plays an essential role in ERP adoption in the higher education sector. The concept of Business Process Re-engineering (BPR) is applicable to each stage of ERP implementation. The support from the vendors, such as regular updates, fixing of bugs, testing the software, and customization are essential.

2.2 ERP in Higher Education Sector

F. Schwade et al., discuss the advantages of ERP implementation [6] in universities. The automation leads to the effective utilization of the ERP system. The smooth coordination among the subsystems improves the efficiency of ERP in the higher education system. The flexibility of using the ERP plays an essential role in the accepting the ERP by the employees. The complexity of the ERP significantly impacts the ERP adoption in the organization.

S. Sternad Zabukovšek et al., explain the functions of ERP in the organization with a typical example. The authors analyzed the ERP implementation in the finance sector [7] with real case studies. Also, the authors are concerned on security of data while implementing the ERP. A proper security system must be included while implementing the ERP. These are key data in the higher education system that must be systematically protected. The impact of AI in ERP will play a major role in the upcoming years.

3 Proposed Method

The preliminary studies are essential before implementing ERP [8] in the higher education sector. This research helps the stakeholders to plan and implement the ERP in their

organization. The proposed qualitative analysis provides an insight into the impact of the successful implementation of ERP in the higher education sector. In this study, the impact of parameters on ERP implementation in the higher education sector [9] is briefly discussed. The availability and accessibility of the learning management portal play an important role in ERP from the student's point of view. Also, the challenges and concerns for ERP implementation are furnished with relevant results.

Mangaluru is located in the Dakshin Kannada district of Karnataka, which is one of the biggest education hubs in Karnataka. The Mangaluru region is considered an area of study in this research. In this research, out of 250 respondents, the most relevant 48 responses are selected. Primary data were collected using a standard Google Form. In this study, the age, designation, and gender are considered as demographic parameters. In order to have a better presentation, the demographic parameters are presented in the Fig. 2, 3, and 4.

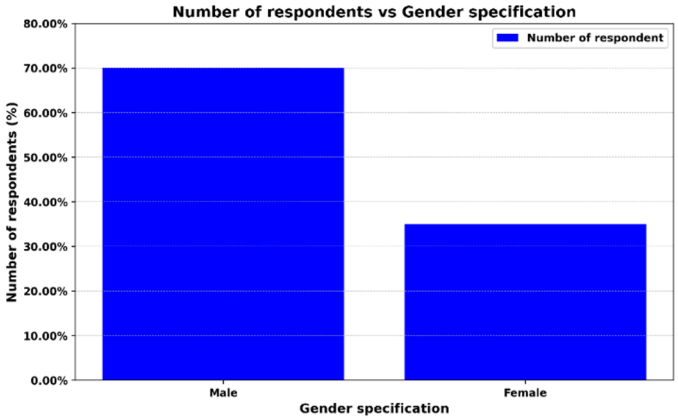

Fig. 2. Gender specification of the respondents.

In Fig. 2, it is observed that over 68% of respondents are male. The age-group details for this survey are shown in Fig. 3.

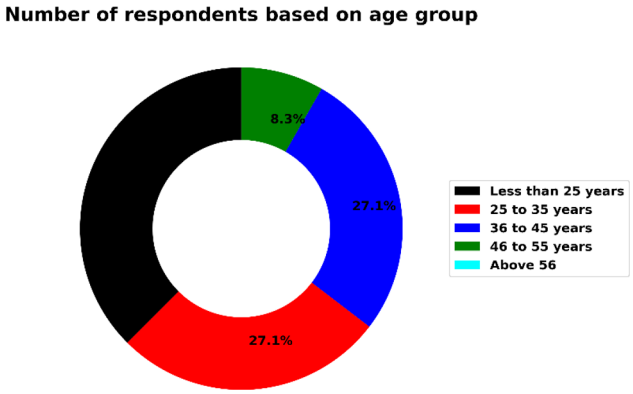

Fig. 3. Age group analysis of respondents.

In Figure 3, it is evident that the majority of the stakeholders who participated in the online survey are between 36 and 45 years old. Senior citizens were less represented compared to other age groups. The utilization of ERP is largely influenced by organizational hierarchy [10]. The respondents' roles and responsibilities are detailed in Figure 4, which shows that most of them are faculty members. A good number of students also participated

in the survey, sharing their experiences, and top management in the higher education sector also provided valuable input. It is worth noting that non-teaching staff members were also included in the survey, and their suggestions were considered in this research.

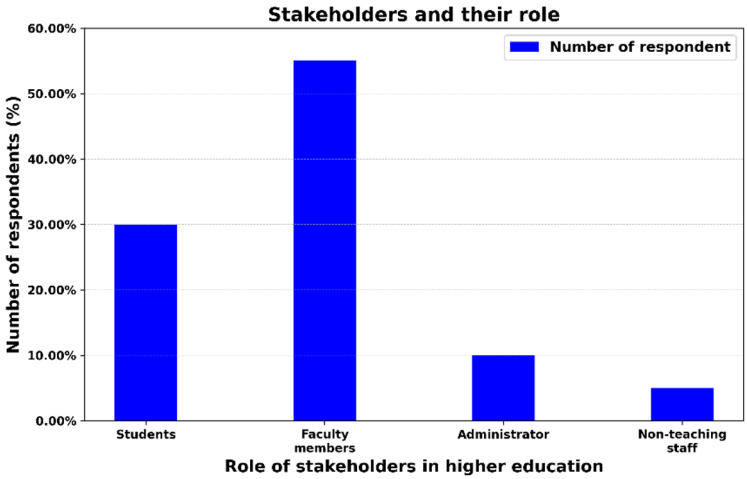

Fig. 4. Role of stakeholders in higher education.

To better understand the impact of ERP on the higher education sector, online surveys were conducted at universities, colleges, polytechnics, and higher secondary schools. The distribution of respondents by institution is illustrated in Fig. 5. It is observed that the majority of respondents are from universities and colleges, enabling a more robust analysis of the impact of ERP in the higher and professional education system from the online survey.

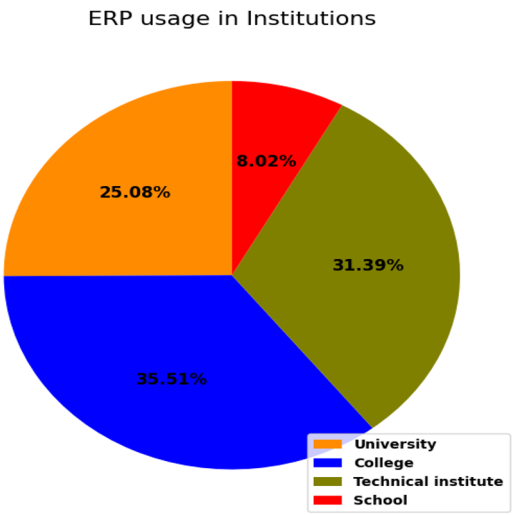

Fig. 5. Types and role of stakeholders in higher education.

3.1 Familiarization of ERP usage in Higher Education

According to an extensive online survey, over 77% of stakeholders are using ERP effectively. However, 22% of the concerned persons in the higher education sector are still unfamiliar with ERP. The Fig. 6 illustrates the rate of navigation to the ERP in the higher education sector.

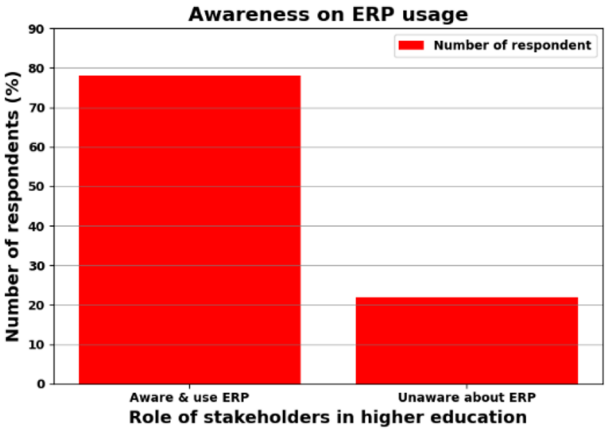

Fig. 6. Awareness on ERP in higher education.

Experience also plays a major role in the effective usage of ERP in the higher education sector. More experienced persons understand the importance of automation better than less experienced ones. Conversely, resistance to change is another hindrance to ERP implementation [11], especially in higher education. The experience details of stakeholders are illustrated in Fig.7. The ERP adoption rate is estimated using equation (1).

$$ERP\ Adoption\ rate = \frac{N_{ERP\ users}}{N_{Total\ response}} \times 100 \quad (1)$$

The equation (1) gives the information about the percentage of institutions adopted ERP. $N_{ERPusers}$ is the number of respondents and $N_{Total\ respondent}$ is the total number of respondents.

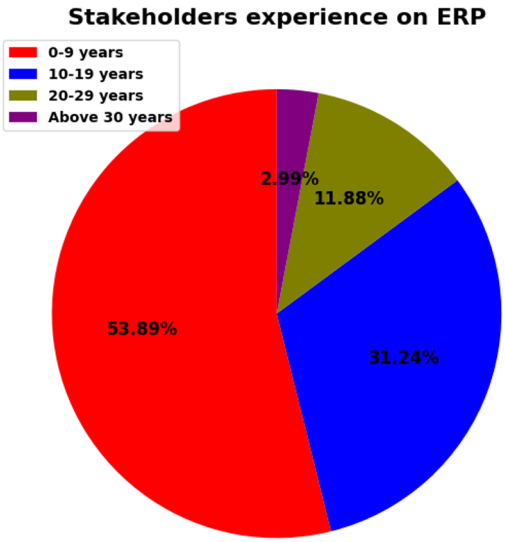

Fig. 7. Work experience details of respondents.

It is found that most respondents have 0 to 9 years of experience in the selected sample. Among this group, 66.7% of the stakeholders are directly involved in using ERP.

3.2 Measurement of ERP effectiveness in Higher Education

ERP systems have transformed the administrative and operational facets of higher education, refining processes and improving data accuracy. The benefits are clear, with evident improvements in student registration, financial aid processing, and faculty workload management. Furthermore, the exhaustive reporting capabilities of ERP systems empower higher education administrators to make well-informed decisions. The details of ERP usage, with respect to the number of years, from the respondents are shown in Table 1.

Table 1. Experience of ERP.

Sl. No	Types of technical institute	Number of respondents
1	Less than one year	16.7%
2	1-2 years	20.8%
3	2-5 years	12.5%
4	Above 5 years	31.30%
5	No ERP	18.80%
Total number of responses		100%

It is observed that a major portion of stakeholders are well familiar with ERP usage in the higher education sector. A few stakeholders are still unfamiliar with ERP and its impact on their organization. Feedback from stakeholders in the higher education sector has been collected. Effectiveness was measured using a five-point Likert scale. On the five-point scale, the ratings are very effective, somewhat effective, neutral, not effective, and a burden to the educational institution. In the survey, 54.2% of stakeholders explicitly conveyed the positive impact of ERP in the higher education sector. ERP systems have been instrumental in simplifying administrative procedures in the higher education sector, thereby improving accuracy and efficiency in tasks such as financial aid administration and student registration. Better data management and reporting have been made possible by the centralized nature of ERP platforms, allowing organizations to make data-driven decisions [12]-[14]. Moreover, ERP systems have enhanced communication and collaboration among departments, fostering a more cohesive, integrated administrative structure within higher education institutions. About 10.4% of stakeholders claimed that ERP hampered their organizations in terms of complexity, cost, inflexibility, and resource allocation challenges. The measurement of ERP effectiveness is shown in Table 2.

Table 2. Measurement of ERP Effectiveness

Sl. No	Attributes	Number of respondents
1	Very effective	54.2%
2	Somewhat effective	25%
3	Ineffective and burden	5%
4	Not effective	8%
5	Burden to education system	7.8%
Total number of responses		100%

3.3 Department wise utilization of ERP

ERP systems are widely used in higher education to manage admissions, financial aid, academic affairs, and student records. They streamline enrolment processes, aid in course scheduling, faculty workload management, and curriculum planning, and maintain accurate student data for reporting and compliance purposes. ERP systems integrate and optimize administrative processes across departments in higher education. The respondents' use of ERP [15] is shown in Table 3.

Table 3. Department-wise Utilization of ERP.

Sl. No	Functions of ERP	Number of respondents
1	Admission	10.4%
2	Fee collection	12.8%
3	Learning portal	27%
4	Workload management	11.9%
5	Curriculum planning	2.6%
6	Database management	31.3%
7	Strategic management	4%
Total number of responses		100%

It is observed that ERP can ensure an effective learning management system in the higher education sector. In addition, ERP can influence all relevant areas of an educational institution.

4 Results and Discussion

To determine the effectiveness of ERP systems in improving the administrative and operational functions of technical education institutions, an investigation of ERP's impact in the Indian technical education sector was conducted. The main objective of the study is to determine whether ERP helps streamline the higher education system. This study also focuses on difficulties and challenges for ERP implementation in the higher education sector. An extensive literature review is conducted to identify the parameters that affect ERP performance in the higher education sector. A detailed Google Form was prepared to collect primary data from the stakeholders. Microsoft Excel 2019 is used for data analysis. The system configuration is as follows: Intel Core i5 processor, 8 GB of RAM, a 256 GB SSD, and Windows 10.

4.1 Impact of ERP in Higher Education Department

As many as 75% of respondents claim that the most significant impact of ERP is improved administrative processes. As a result, the following processes, such as financial management for the institute, course and subject scheduling, and student enrollment, are streamlined accordingly. Moreover, the ERP system offered a unified platform for communication and data exchange, and around 60% of respondents said it had increased collaboration among academics, staff, and students. More than 80% of respondents concurred that the ERP system had increased data accessibility and accuracy, enabling better decision-making. The performance metrics of ERP deployment in the higher education sector in the sample chosen from Mangaluru, India, are shown in Fig. 8.

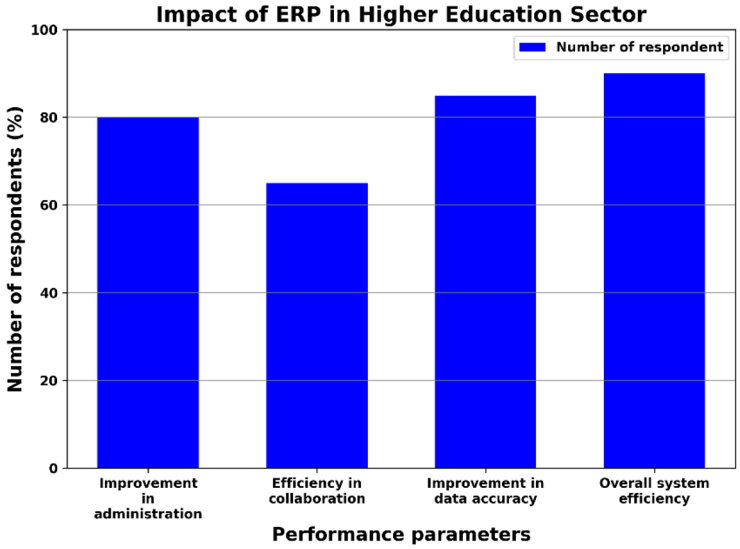

Fig. 8. Impact of ERP in the Higher Education.

Notwithstanding the advantages, there were several difficulties with implementing ERP systems, including technical problems (reported by 45% of respondents), resistance to change (reported by 35% of respondents), employee attrition (10% of respondents), and the requirement for further training (reported by 25% of respondents). Fig. 9 illustrates the main ERP problems.

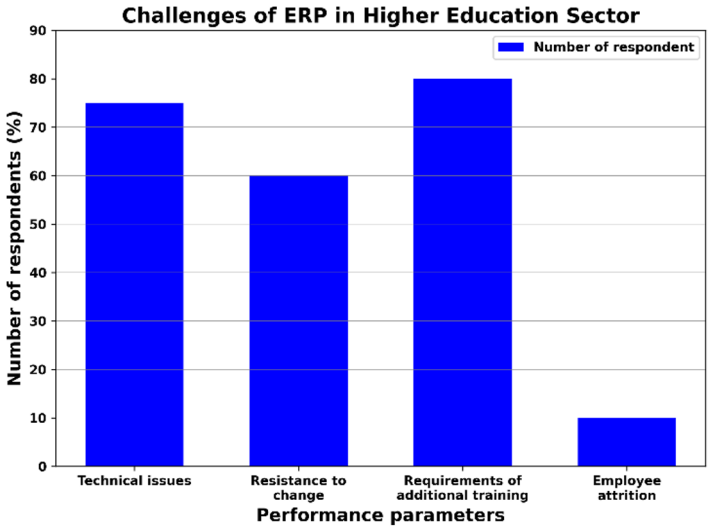

Fig. 9. Challenges of ERP in Higher Education.

The use of ERP in higher education institutions is shown in Fig. 10. Stakeholders mostly depend on ERP for an effective learning management system.

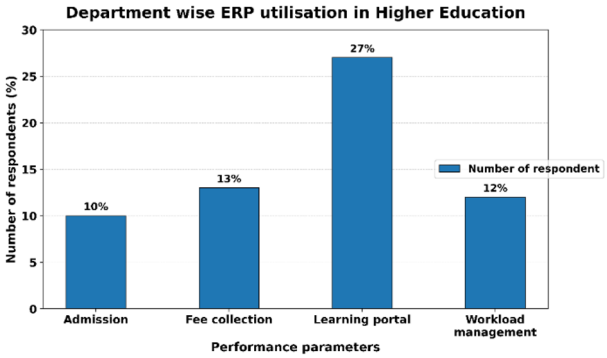

Fig. 10. Department wise ERP utilization.

4.2 Stakeholders concern on ERP in Higher Education

ERP systems in higher education have multiple stakeholders, including faculty, students, administrative staff, and IT departments. These stakeholders are concerned with various aspects of the ERP system, including usability, reliability, security, and support. They are also concerned about the possible effects on administrative and academic procedures, as well as how the ERP system interacts with other systems. To improve the overall educational experience, stakeholders want to ensure the ERP system enhances efficiency, data accuracy, and decision-making capabilities. Fig. 11 summarizes stakeholders' concerns and opinions. The majority of offices are now paperless as a result of ERP's impact, reducing unnecessary administrative and clerical work. This has improved overall quality in both academic and administrative areas. However, stakeholders have raised concerns about the difficulty of using ERP tools and the cost of implementation and upgrades in higher education. Some stakeholders in the administrative section have also claimed that data leaks and manipulation can occur with the use of ERP, and have suggested implementing certain protocols to address these issues.

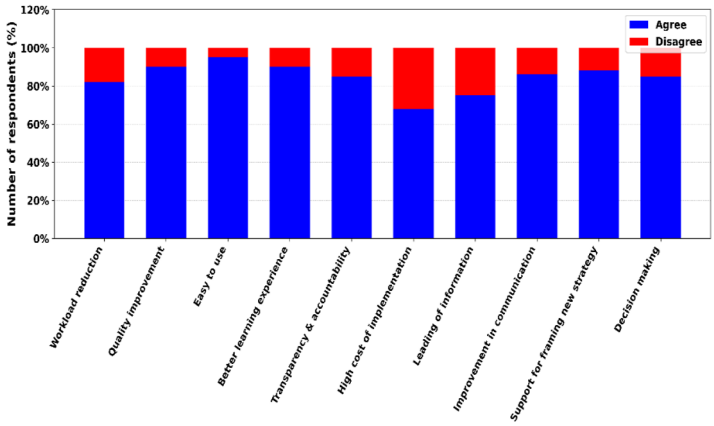

Fig. 11. Stakeholders perspectives of ERP in the Higher Education Sector.

Technical support is available from dedicated teams, particularly from popular ERP vendors like Microsoft. Most respondents are comfortable using Microsoft Teams for academic and non- academic activities. Additionally, ERP can aid in making crucial decisions regarding admission strategies and future institutional expansion. The anticipation of ERP impact in the higher education sector, according to the stakeholder's point of view, is summarized in Fig.11 and 12. Stakeholders rated the effectiveness of ERP implementation using a five-point Likert scale (Very Effective, Somewhat Effective, Neutral, Not Effective, Burden). To quantify this data, the responses were converted into numerical scores: Very Effective = 5, Somewhat Effective = 4, Neutral = 3, Not Effective = 2, and Burden = 1

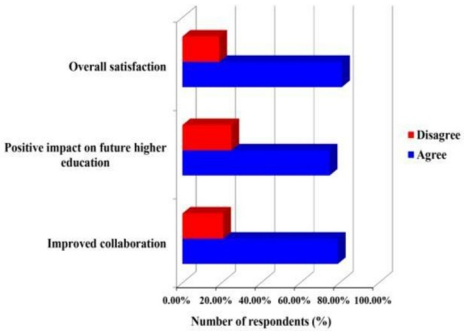

Fig. 12. Stakeholders perspectives on future anticipation on ERP in higher education.

Using the above-mentioned scores, the mean satisfaction score and variance were calculated:

- Mean Satisfaction Score = 3.91
- Variance = 1.02

Summary of ERP Impact is presented here

The obtained values suggest that stakeholders generally view ERP implementation positively, with a moderately tight spread of responses around the average.

The main areas where ERP had an influence were:

• Data Accuracy (real-time and centralized data access)
• Administrative Efficiency (improved workflow, less paperwork).
• Support for Making Decisions (Improved Analytics and Reporting)

Table 4 presents an overview of efficacy ratings. The conclusion that ERP systems improve institutional operations is supported by these results.

Table 4. An overview of efficacy.

Sl. No	Effectiveness rating	Percentage of respondents
1	Very Effective	54.2%
2	Somewhat Effective	25.0%
3	Neutral	8.0%
4	Not Effective	5.0%
5	Burden to Institution	7.8%

However, a small percentage of consumers remain concerned about issues such as complexity, cost, and reluctance to change.

The use of ERP in higher education is deemed satisfactory by more than 80% of stakeholders. The results emphasize improvements in inter-departmental collaboration. To improve ERP effectiveness, stakeholders must receive suitable, recurring training. Furthermore, data security is a major challenge in ERP implementation. A suitable data security system needs to be included in the ERP system of the higher education system. Consistent vendor support is essential for the successful implementation of ERP in the higher education system.

5 Conclusion

Higher education plays a significant role in shaping the country's future. The successful implementation of ERP can, to a certain extent, minimize the gap between academia and industry through effective utilization and improved collaboration between departments. The ERP implementation enables a smooth flow of data across departments and allows workflows to run uninterrupted. One of the popular education hubs, Mangaluru, is selected to study the impact of ERP in higher education. Over 77% of respondents conveyed a positive impact on the successful implementation of ERP in their organization. ERP assists both teaching and administrative departments in streamlining processes. From the teaching department's perspective, ERP helps in academic planning, faculty workload allocation, course allocation and scheduling, an automated attendance system, result analysis, and decision-making. In the administration of the education system, student enrollment, fee payment details, scholarship allocation, and admission details are handled efficiently using an ERP. Upon effective ERP implementation, the top management of the higher education system needs to ensure data security. In the upcoming years, Artificial Intelligence will play a major role in ERP. In the future, researchers can choose another geographic region and analyze the impact of ERP.

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