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Feature Importance of ERP Implementation Impediments: An Analysis using Random Forest Model

M.S. Abhinandan [a], A.N. Santosh Kumar [a], P. Nagesh [b,*], Tejus Sangameshwara [b]

[a] Department of Mechanical Engineering, JSS Science and Technology University, Mysuru, Karnataka, India.
[b] JSS Centre for Management Studies, JSS Science and Technology University, Mysuru, Karnataka, India.
* Corresponding Author Email: deanmgmt@jssstuniv.in

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Abstract: The present research aims to assess the feature importance of Enterprise Resource Planning (ERP) impediments for implementation and to classify usage intention. To achieve the objective, responses were collected from 750 users. Classification model was designed using an RF algorithm which was developed for classifying intention to use the ERP system. The model has achieved 83% precision in predicting intention to use. Recall value and F1-score were noted as 0.67 and 0.74, respectively. The feature importance of Implementation Impediments of ERP systems was elicited through a correlation analysis between various features among the Implementation Impediments of ERP systems. Further, ROC curve establishes an AUC value of 0.92, representing highest discriminative power. The CV accuracy is noted as 0.798. The study outcome Firstly, it helps to explore feature importance impediments in the implementation process of ERP to comprehend and tailor the ERP features system itself drives the intention to use to enhance business performance, in turn, user satisfaction. Secondly, comprehending critical impediments and usage intentions of the system helps the organisations to effectiveness of system usage, which impacts user satisfaction. Thirdly, by integrating AI/ML, this research contributes by deploying an interpretable framework that offers data-driven decisions for planning, implementation, and evaluation of ERP performance. Fourthly, the outcome of this study is valuable to design and develop implementation strategies suitable for ERP users, which enhance stakeholders' engagement and foster sustainable growth. By integrating AI/ML, this research contributes by deploying an interpretable framework that offers data-driven decisions for design, application, and evaluation of system performance. Helps to comprehend critical impediments and to enhance usage intentions of the ERP system. Also, offers data-driven decisions for ERP successful implementation.

Keywords: Enterprise Resource Planning, Implementation Impediments, Feature Importance Analysis, Random Forest Model, Artificial Intelligence.

1. Introduction

In the era of Industry 4.0 ecosystem, the businesses process needs to be integrated to gain higher business performance through Enterprise Resource Planning (ERP) [1], which is a major driver to develop the strategic planning of the firm. Further, integration of systems with advanced analytics enables organisations to have seamless workflows, allowing for real-time visibility and process optimisation [2]. Thus, ERP usage supports the firm to unify the business functions and processes to improve the quality of reporting and decision-making [3], which helps to foster collaboration for maximising the firm's performance. The effective ERP usage positively impacts on control of product life cycle costing, which in turn significantly influences an enterprise's economic sustainability. Also, there is a need to invest in training the employees to optimise ERP usage to improve organisational performance [4]. ERP resource determinants such as human factors (individual skills and self-efficacy), operational factors (organisational support and training) and technical factors (complexity and compatibility), user acceptance (usefulness, ease and intention to use) have significant effects on ERP implementation. In addition, user participation, system customisation, competency of staff, collaborative work culture, system upgrade, customer experience, and change management are pivotal to the successful usage of ERP in organisations [5].

The user capabilities, data quality and security, and integration of ERP have a significant effect on the system, which helps for decision-making processes within the industrial. The ERP implementation is related to firms' technical, organisational, and environmental contexts, which must be evaluated to incorporate stakeholder mapping and strategies while assessing readiness to surface risks early and align stakeholder interests, to achieve ERP success. Providing comprehensive ERP training, user-top management involvement, and training satisfaction were the antecedents of effectiveness in implementing ERP [6]. Thus, effective end-user training enables ERP users a significant contribution to ensure optimal usage of ERP [7].

Further, impediments for the successful implementation were from the functional and coordination side, inadequate support and resistance of users. Achieving the attributes such as requisite skills, knowledge, self-efficacy, and willingness to accept the change were the barriers for the implementation of ERP [8]. The perceived ease of use, perceived usefulness, users' attitudes, self-efficacy, subjective norms, information quality, and user satisfaction were predictors of intention to use [9]. Human and technological factors have a direct impact on users' acceptance, which in turn significantly impacts the firm's business performance. The organisational support system, training, and user satisfaction were identified as critical success factors in the implementation process [10]. Thus, instilling compatibility, complexity, trial ability, and observability and intervention training mechanisms can ease the implementation [11]. The users' reluctance, unwillingness to adopt the system, organisational culture, tasks of workforce [12] lack of training and its quality, and untrained users (failure to build the capacity) were identified as key barriers for the successful implementation. Further, project management conflicts, communication barriers [13], change management, context and social dynamics [14], and complex and costly investments [15] will result in serious failures implementation of the ERP system.

As most of the ERP systems were designed with due consideration of business processes in Western countries, emerging economies, face challenges related to the implementation of ERPs [16]. In developing countries, the ERP systems have high failure rates and have failed to deliver the expected outcomes of ERP. Notwithstanding the acceptance of the key factors such as intention to use, user interface designs, user-friendliness, and complexity, some barriers prevent ERP use from delivering its potential benefits [17]. Thus, the agenda for researchers is to study the feature importance of ERP implementation impediments and to classify usage intention [18, 19], but the results in emerging economies are to be studied in detail. Thus, studying challenges in implementing the ERP systems becomes highly significant in developing countries. Although earlier researchers (explored key barriers (compatibility, technology readiness, management support and competitive pressure) but re-examining the same offers the current review which provides insights to develop strategies to mitigate barriers through region-specific dashboards through exploring TAM factors and their adoption for effective implementation of the ERP system. Although technological advancement is dynamic, ERP provides new challenges that need to be addressed to trigger ground-breaking changes in business processes. In developing countries, challenges (inadequate integration, ineffective use of sustainability data) confronted by firms offer a negative effect on the integration of sustainable business functions [20]. As systems implementation in emerging economies has specific difficulties [21], implementation strategies and management practices need to be re-examined in specific cultural contexts.

Further, Socio-behaviour variables and motivation also determine ERP (technology) user behaviour. The firms having adoption and utilisation issues and low maturity result in less efficient operations. Thus, researchers need to explore relevant features that directly affect the successful implementation of ERP [22]. To predict ERP users' behaviour and to classify usage intentions of the system, Random Forest (RF) is the most powerful tool and has become a standard tool to evaluate ERP users' behaviour, which supports to design of customised systems [23]. The analytical capability of RF has been proven to be the best tool that provides a higher level of classification accuracy, underpinning its precise assessment in predicting ERP usage intentions [24].

In summary, there is a need to develop a model to explore the feature importance of critical impediments along the side to classify usage intentions of the system. Thus, developing AI / ML algorithms to explore ERP users' behaviour towards usage and to classify usage intentions of the system becomes vital for organisations to strategize their business ecosystem through designing a customised ERP system. Given this context, the following were the research questions.

RQ1: What are key feature importance of critical impediments in ERP implementation?

RQ2: What are the perceived usage intentions of the ERP system?

Hence, this research aims to explore the feature importance of critical impediments in the successful ERP implementation, also to classify the perceived usage intentions of ERP.

Technology Acceptance Model (TAM) of Davis (1989) is one of the most widely used models for explaining the behavioural intention and usage of systems offers a sound theoretical lens for this study and provides a basis for research on IT-related behavioural and usage intentions. Perceived usefulness and ease of use were noted to be crucial in the TAM for predicting system-user acceptance behaviour. Perceived usefulness is "the degree to which individuals believe that using a particular system can enhance their job performance", and defined perceived usefulness and ease as "the degree to which individuals believe that using a particular system will be effortless." TAM is adopted in the current study to evaluate impediments for the implementation of the ERP system using the Random Forest algorithm. The mapping of TAM variables and impediments were shown in Table 1.

The remaining part of the paper details, review of the literature, followed by research design, methodology, discussion, and conclusion. Finally, managerial implications and scope for future study are proposed. The study will help to comprehend factors that vary at different stages as impediments in the process of ERP implementation. Comprehending the feature importance of critical impediments and usage intentions of the system helps the organisations to improve the user satisfaction also effectiveness of the ERP system, which impacts on business performance of the firms.

2. Literature Review

The Table 2 shows the relevant and recent summary of the literature pertains to impediments to the implementation of ERP. The table describes the various research outcome related to AI/ML techniques, Random Forest, ERP systems, prediction accuracy and user behaviour.

Table 1. TAM Variables and Impediments

Variable	Impediments
Perceived Usefulness	Skill set, implementation success
Perceived Ease of Use	Training and development
External Variables	Project Team Formation, infrastructure development, technical manpower, Culture, On- going project management
Behavioural Intention	Fear of Job Loss, Top Management approach,

Table 2. Comparative literature review analysis

Study	Objective	Methodology	Key Findings
(Jawad and Balázs, 2024) [25]	To analyse the role of AI in predicting ERP user behavioural intentions	AI/ML-based predictive modelling	AI enhances prediction accuracy and supports data-driven strategic decision-making
(Benjelloun *et al.,*) [26]	To examine challenges in ERP system implementation and integration	Conceptual and empirical analysis	ERP implementation is complex and capital-intensive; system integration remains a major challenge
(Grobler-Dębska *et al.,* 2025) [27]	To explore AI-enabled automation in ERP implementation processes	AI-based framework analysis	Automation tools are required to streamline ERP implementation and improve efficiency
(Luo, 2023) [28]	To classify ERP usage intentions in complex environments	Machine learning models (RF, DT, GBM, XGBoost)	AI/ML models effectively classify user intentions and handle multi-variable complexity
(Belwal *et al.,*2025) [29]	To evaluate the effectiveness of AI/ML techniques in ERP analytics	Comparative ML model analysis	Random Forest demonstrates superior performance in accuracy, scalability, and pattern detection
(Muntala *et al.,* 2024) [30]	To assess risks and impediments in ERP implementation	Random Forest with permutation importance	lack of management support, project risks significantly hinder implementation
(Bekiaris and Markogiannopoulou, 2023) [31] (Naidenova and Smirnov, 2025) [32]	To investigate human-related barriers in ERP adoption	Behavioural and empirical studies	Low self-efficacy, inadequate training, and user resistance are major barriers

(Ren *et al.*,2024) [33]	To analyse cultural and organisational influences on ERP adoption	Cross-country empirical study	Cultural factors, language barriers, and poor ERP assimilation negatively affect implementation
(Mamakou *et al.*, 2024) [34]	To evaluate the impact of user characteristics on ERP usage	Empirical modelling	User attitudes, education level, perceived ease of use, and performance expectancy influence adoption
(Agarwal *et al.*, 2025) [35]	To examine project management challenges in ERP implementation	Random Forest-based analysis	Project delays and ineffective management practices are critical impediments
(Parupalli *et al.*, 2024) [36] (Katragadda *et al.*, 2025) [37]	To identify technological and organisational ERP challenges	Empirical and ML-based approaches	Cultural resistance, regulatory fragmentation, and legacy system incompatibility hinder implementation
(Nagesh *et al.*, 2017) [38]	To examine ERP adoption in dynamic organisational environments	Conceptual analysis	Aligning employee competencies with changing business environments is essential for ERP success

Table 3. Items (Questions)

Number	Items
Q1	Top management approach
Q2	Change management
Q3	Training and development
Q4	Effective communication
Q5	System integration
Q6	Selection of consultants/employees/vendors
Q7	Project management
Q8	Project team formation
Q9	Team empowerment / skilled people
Q10	Data conversion / migration
Q11	Culture / language
Q12	Regulatory, legal, security risks
Q13	Infrastructure development
Q14	High implementation/hidden costs
Q15	Quality assurance
Q16	Software design misfits
Q17	Functionality limitations
Q18	Cloud awareness
Q19	Usability issues
Q20	Ongoing project management
Q21	Performance risks
Q22	Team Politics
Q23	Technical manpower
Q24	Subscription expense
Q25	Risk & conflict management
Q26	Fear of job loss
Q27	Start-up support / chartering phase issues
Q28	Turnover of key project personnel

Table 4. Reliability and validity of constructs

Construct	Items	Cronbach's Alpha	Composite Reliability (CR)
Organisational Factors	Q1, Q2, Q4, Q7, Q8, Q20, Q25, Q27	0.896	0.810
Human Factors	Q3, Q9, Q11, Q22, Q23, Q26, Q28	0.801	0.798
Technical Factors	Q5, Q10, Q13, Q15, Q16, Q17, Q19	0.813	0.803
Financial & External Factors	Q6, Q12, Q14, Q18, Q21, Q24	0.798	0.891

3. Research Design

3.1 Scale Design

The present work uses a quantitative approach. The researchers considered ERP users as the sampling unit of analysis (employees of manufacturing and IT organisations) from the southern part of Karnataka State, India. As the Mysore and Bangalore City (Silicon Valley of India) have many organisations adopted ERP, samples were considered from the selected cities through an e-mail survey (September 2024 – November 2024). Out of 900 circulated, 750 valid responses were considered (83.33 % response rate). The respondents were ERP users having graduation and post-graduation qualifications (engineering and management domains). Data were collected (e-survey). The instrument has 2 Parts; Part-A; demographic information and Part- B; impediment features which were assessed 28 items scale [39]. Table 3 indicates items (questions). Table 4 indicates Reliability and validity of constructs.

4. Methodology

The measuring (Likert 1-5 point) scale was adopted and Intention to Use ERP was defined as dependent variable. The responses greater than 4 were coded was considered as 1 indicating high intention and responses lesser than 3 were coded as 0 indicating low/no intention. This threshold values ensures clear interpretability and aligns with prior user-behavioural research. The stratified sampling was adopted during train-test splitting and class distribution was approximately balanced. Structured methodology was employed to design a classification model using the RF algorithm which has 4 stages: data and analysis, feature selection, model development through optimising, and Grid Search Cross-Validation (3-fold) was developed by Hyperparameter tuning. The parameter grid included n_estimators (100, 200), max_depth (None, 10, 20), min_samples_split (2, 5), and min_samples_leaf (1, 2). To ensure reproducibility, a fixed random seed (42) was used.

The valid samples for the present study was 750 valid responses. Out of 750 valid responses, 80% (n=600) were used for training and 20% (n=150) for testing. Performance metrics were reported on the test dataset. The stratified sampling was adopted during train-test splitting and class distribution was approximately balanced. AUC of 0.92 was obtained from the hold-out test set. The training set-data was used for training the model also utilised for performance evaluation of the model. The precision, accuracy and recall, F1-score were used as key metrics for the validation. Also visualisation of the model was done using ROC curves, heat maps, and confusion matrix. RF operates by building multiple-decision trees. Thus, If $T1$, $T2$..., Tn are the individual decision trees, RF prediction ŷ for an input x is:

$$\hat{y} = mode\,\{T1(x), T2(x), Tn(x)\} \quad (1)$$

Subsequent to model training, performance was validated using key fitness metrics. These metrics collectively ensure model performance and generalise to the given dataset. Mathematically, key metrics were described below along with algorithm is in the below section.

$$\text{Accuracy} = \frac{\{(\text{TP+TN})\}}{\{(\text{TP+TN+ FP+FN})\}} \quad (2)$$

(TP= True positives, TN= True negatives, FP = False positives and FN= False negatives)

$$\text{Precision} = \frac{\text{TP}}{\{(\text{TP+TN+ FP+FN})\}} \quad (3)$$

$$\text{Recall} = \frac{\text{TP}}{(\text{TP+FN})\}} \quad (4)$$

$$\text{F1} = \frac{2\,(\text{Precision} \times \text{Recall})}{(\text{Precision +Recall})} \quad (5)$$

Algorithm 1. Random Forest Classification with Permutation Importance and PDP

Input:

Dataset D with feature matrix X and target variable Y (ERP_Satisfaction)

Output:

Classification model, performance metrics, feature importance, interpretability insights

Step 1: Data Preparation

1.1 Remove non-feature columns

1.2 Select feature variables X

1.3 Select target variable Y

1.4 Convert all feature values to numeric format

Step 2: Train-Test Split

2.1 Split dataset into:
- Training set (80%)
- Testing set (20%)

2.2 Apply stratified sampling to maintain class balance

Step 3: Model Initialization

3.1 Define Random Forest classifier

3.2 Define hyperparameter grid:
- n_estimators = {100, 200}
- max_depth = {None, 10, 20}
- min_samples_split = {2, 5}
- min_samples_leaf = {1, 2}

Step 4: Hyperparameter Optimization

4.1 Apply Grid Search Cross-Validation (3-fold)

4.2 Train model on training data

4.3 Select best model based on accuracy

Step 5: Model Prediction

5.1 Predict class labels using test data

5.2 Predict class probabilities

Step 6: Model Evaluation

6.1 Compute classification metrics:
- Accuracy
- Precision
- Recall
- F1-score

6.2 Generate confusion matrix

6.3 Compute ROC curve and AUC

Step 7: Feature Importance (Model-Based)

7.1 Extract feature importance using Random Forest

7.2 Rank features based on importance scores

7.3 Select top contributing features

Step 8: Permutation Importance (Model-Agnostic)

8.1 Randomly shuffle each feature

8.2 Measure decrease in model performance

8.3 Rank features based on performance drop

Step 9: Partial Dependence Analysis

9.1 Select top important features

9.2 Generate partial dependence plots (PDP)

9.3 Analyze relationship between features and target

Step 10: Correlation Analysis

10.1 Compute correlation matrix among predictors

10.2 Visualize inter-feature relationships

End Algorithm

5. The Methodological Framework

The Methodological Framework is depicted in Figure 1.

6. Discussion

6.1 Classification Model (Intentions to use ERP System)

An RF algorithm for classifying intention to use the ERP system (or otherwise) was designed across 2 classes: intention to use (0) and no intention to use (1). The model has shown a precision of 0.83 for the intention to use (0) class (83% of the users predicted to have the intention to use were intended to use). The recall was 0.67 (the model correctly identified 67% of users are intended to use). The F1-score was noted as 0.74. The intention to use (0) class has a support of 67 (actual cases of 67; intentions to use in the dataset). Table 5 shows the performance metrics (Random Forest Model) of the present study. Table 6 shows the comparison of ERP impediments with different base models. Although, to predict ERP users' behaviour and to classify usage intentions of the system, Random Forest (RF) is the most powerful tool and has become a standard tool to evaluate ERP users' behaviour, current study attempts to compare the RF results with Logistic regression and decision tree as baseline models. Random Forest provided interpretability through feature importance, Logistic Regression achieved the highest predictive performance (Accuracy: 0.960 AUC: 0.998 for ERP Impediments), indicating a predominantly linear relationship while Decision Tree showed comparatively lower performance.

6.2 Visualisation of model (Implementation Impediments of ERP system)

Figure 2 shows the feature importance of Implementation Impediments of the ERP system. The correlation between various feature interrelationships among Impediments of ERP Implementation has been depicted (Figure 3) with the help of correlation heat map. The implementation impediments (28 items pairwise) were shown in figure 2. the positive (low to moderate) correlations between (performance risks and ongoing project management, r = 0.13), (functionality limitations and software design misfits, r = 0.12), (technical manpower and system integration, r = 0.10) (start-up support issues and turnover of key personnel, r = 0.10) (infrastructure development and cloud awareness, r = 0.10) were noted. Thus, performance risks, technical manpower, start-up support issues, and infrastructure development negatively affect quality, design, integration, and turnover issues in the ERP implementation stage.

Figure 3 indicates a confusion matrix which illustrates model's classification performance (intention to use). Model predicted correctly; true positives (74) (ERP users having no intention to use: class 1); true negatives (45) (ERP users have no intention to use:- class 1); false positives (22) (Users were incorrectly predicted as users having no intention to use while they were having intention to use); false-negatives (9) (9 users incorrectly predicted as having intention to use while they are not). Figure 4 illustrates the receiver operating characteristic (ROC) curve. Model's ability to distinguish between two classes were: intention to use and no intention to use). The current study has an AUC value of 0.92, representing excellent discriminative power (92% chance of correctly distinguishing two classes). Further, performance of RF across various hyperparameter settings is assessed by Grid Search Cross-Validation (CV), enabling to plotting hyperparameter region. Figure 5 shows the Grid CV Heatmap which has a highest CV accuracy was noted as 0.798 and Figure 6 shows Correlation Heatmap.

The factors such as infrastructure readiness, data of quality, security- access control, user self-efficacy and training-integration of ERP also play key role in the critical success factors of ERP implementation. These results are in line with earlier researchers [4]. The key features such as lack of support from functional heads resistance to change in business process were also noted as major challenges in the implementation process. As indicated in the findings using permutation importance method, human soft sides of implementations issue such team politics, fear of job loss, result in challenges in achieving quality and team empowerment. In total, implementation impediments vary from organisational (top management support, project leadership), technical (integration, design misfits, functionality limits), and human capital issues (training, empowerment, job loss fears).

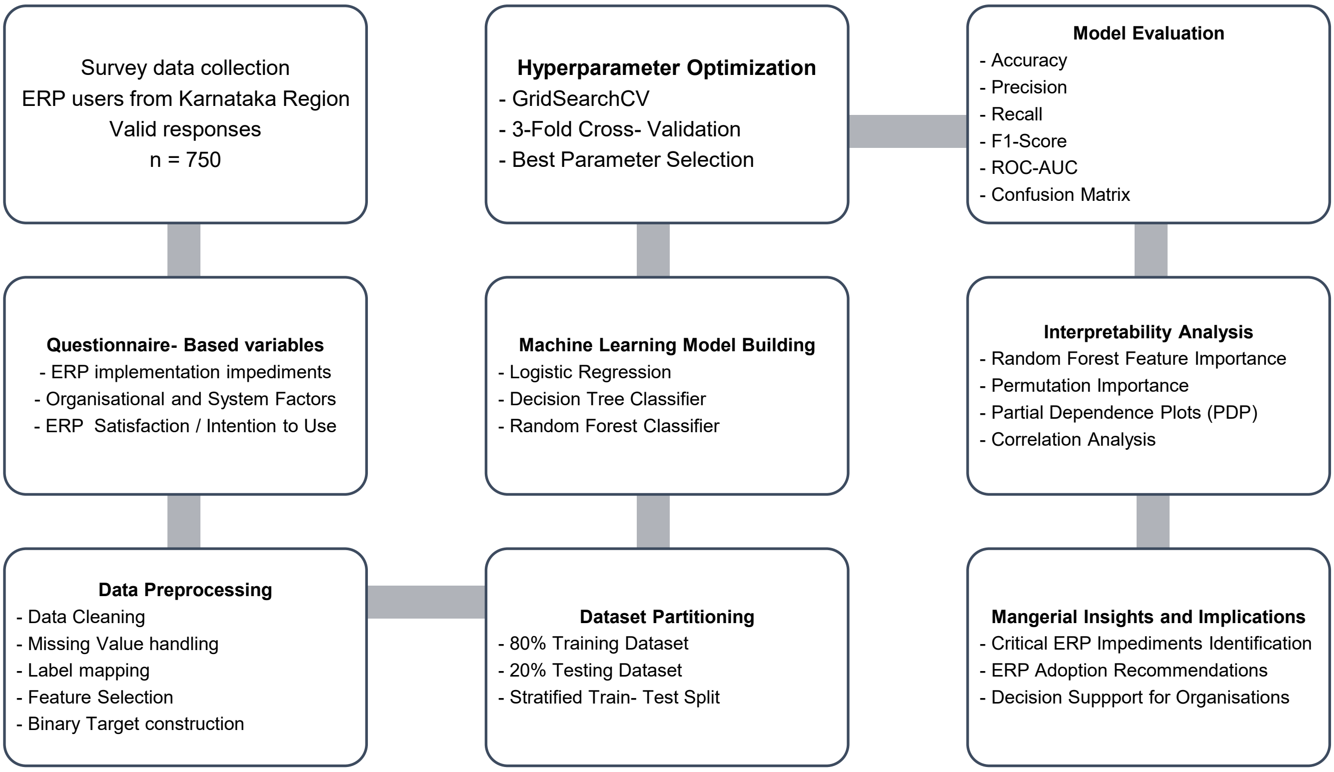

Figure 1. Methodological Framework

Table 5. Performance Metrics (Random Forest Model)

Performance Metrics (Buyers behaviour)				
Class	**Precision**	**Recall**	**F1-Score**	**Support**
intention to use (0)	0.83	0.67	0.74	67
No intention to use (1)	0.77	0.89	0.83	83
Accuracy			0.79	150

Table 6. Model Comparison: ERP Impediments

Model	Accuracy	AUC
Logistic Regression	0.960	0.998
Random Forest	0.833	0.921
Decision Tree	0.580	0.581

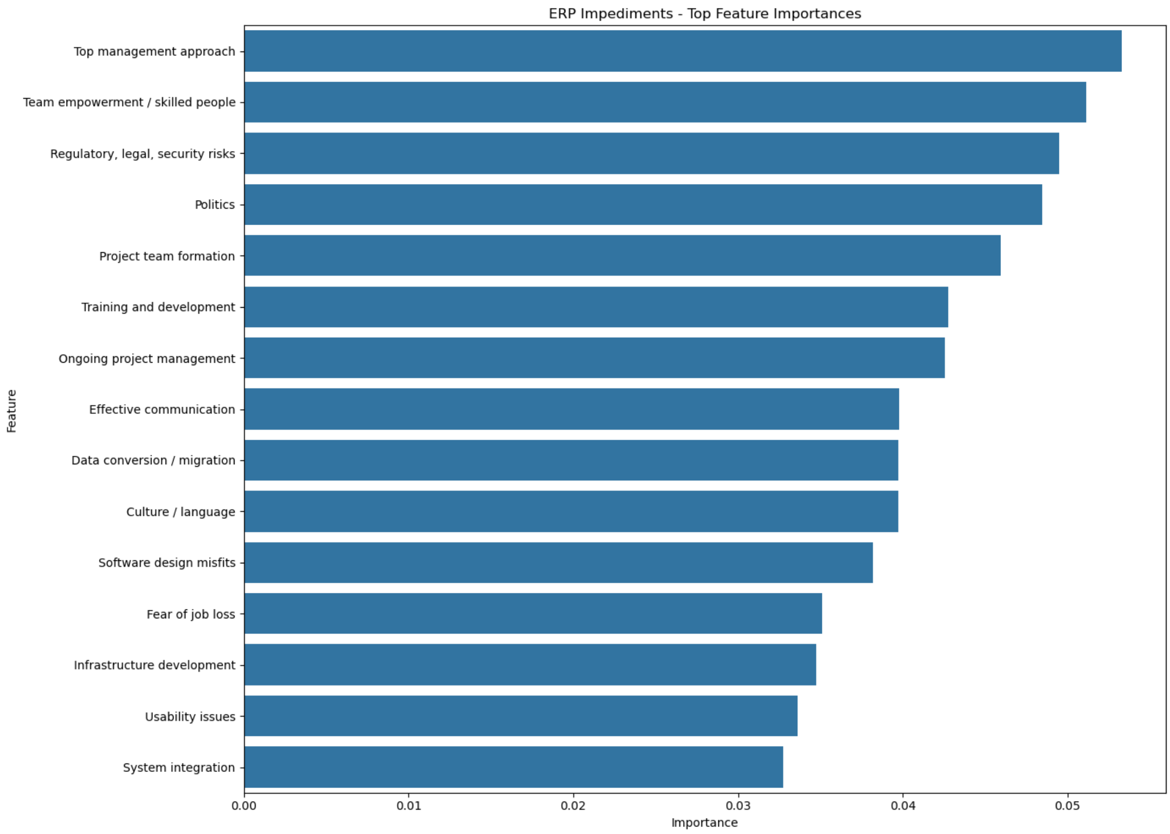

Figure 2. Feature importance of Implementation Impediments

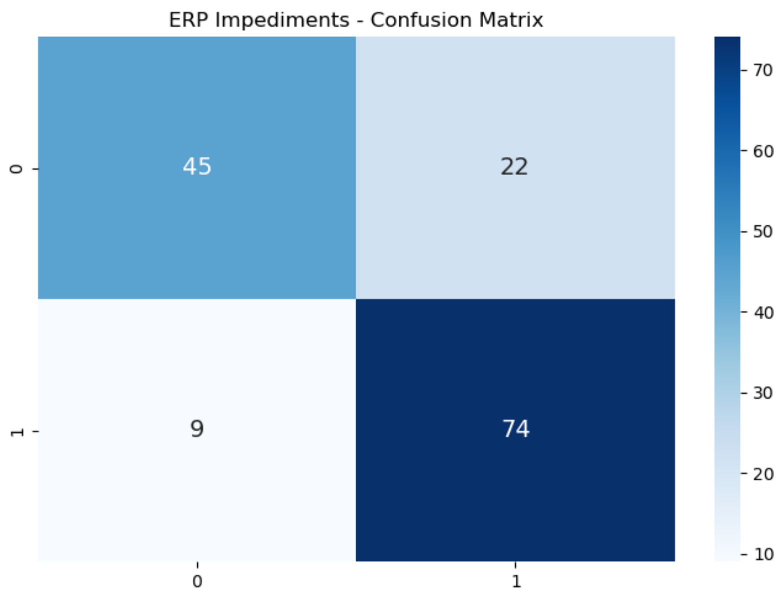

Figure 3. Confusion matrix (classification model's performance)

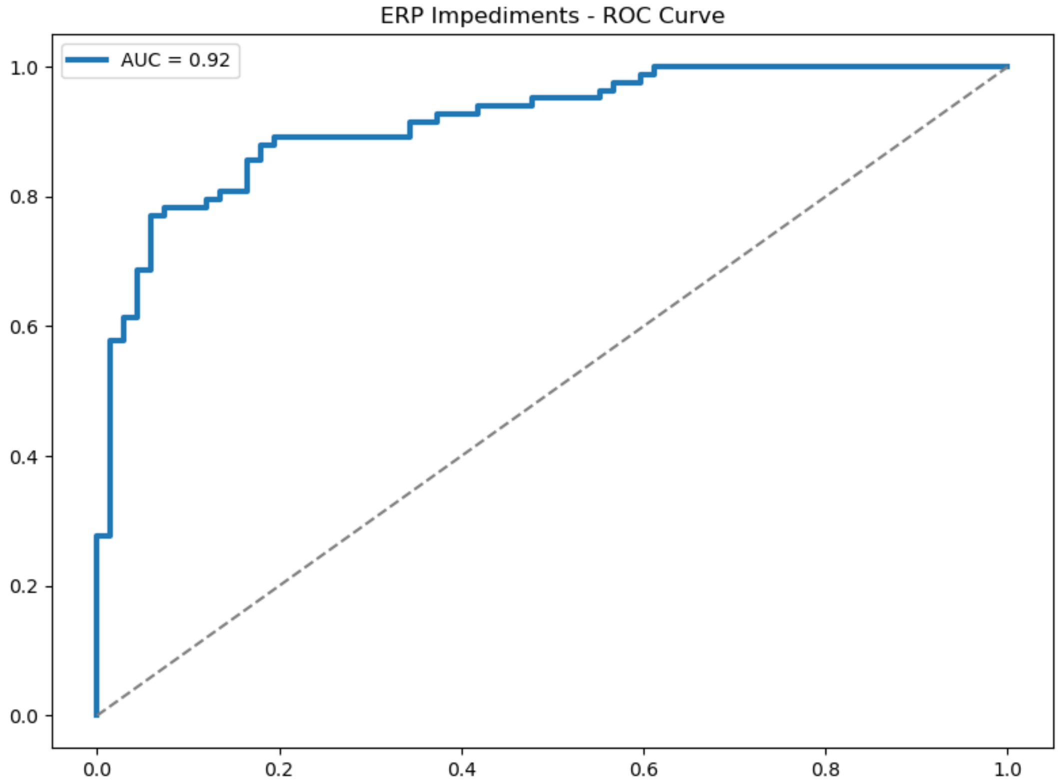

Figure 4. Receiver operating characteristics (ROC) curve

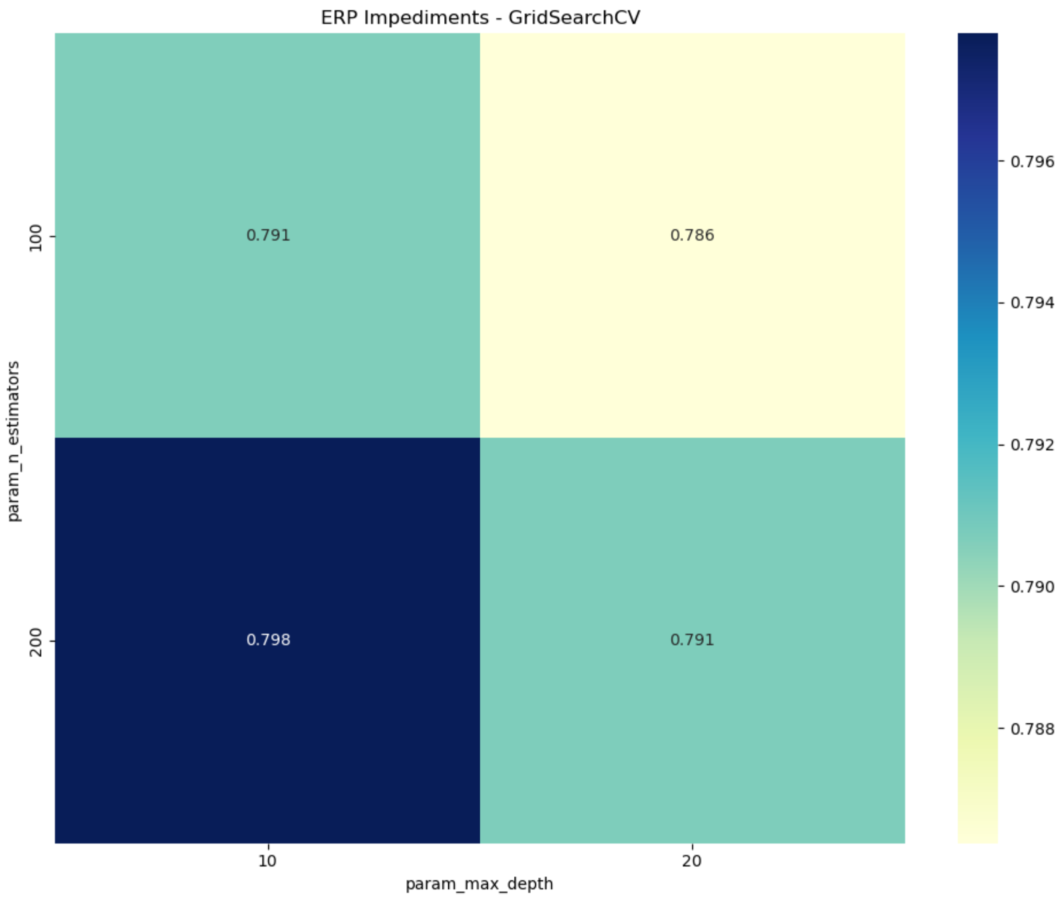

Figure 5. Grid Search Cross-Validation (CV) Heatmap

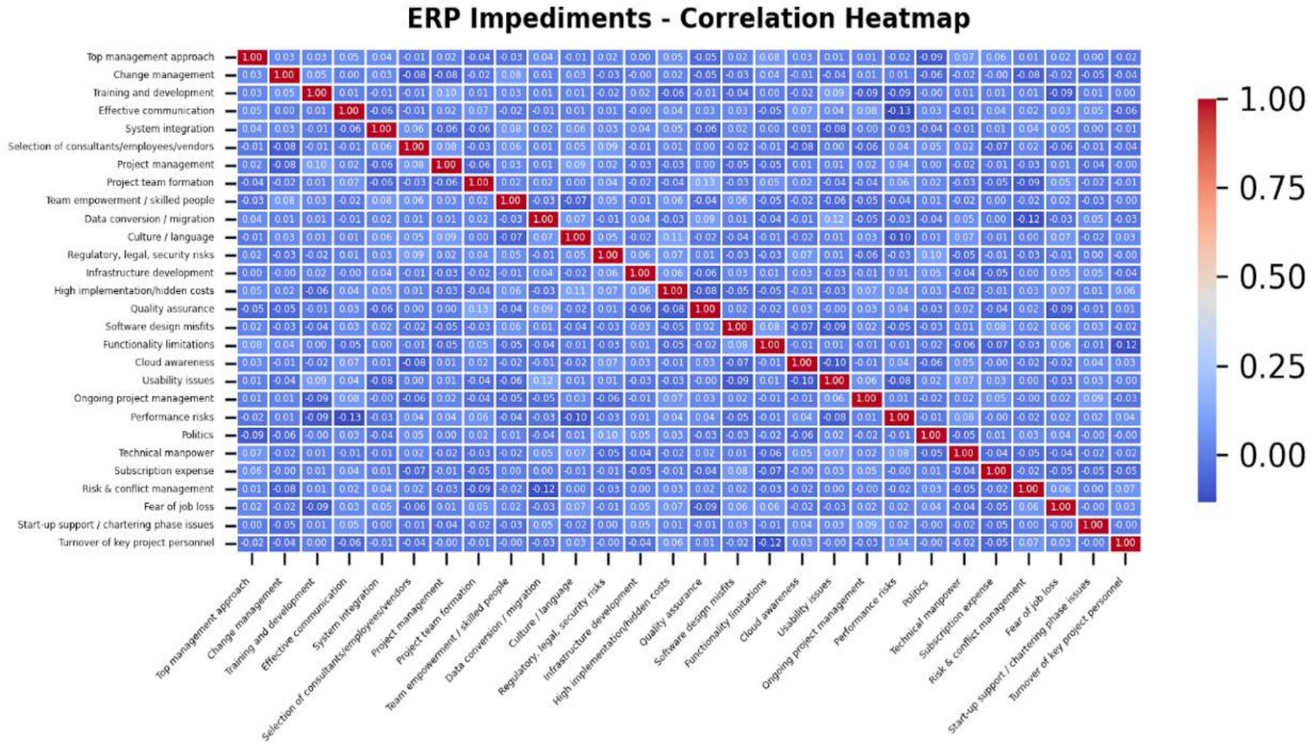

Figure 6. Correlation Heatmap

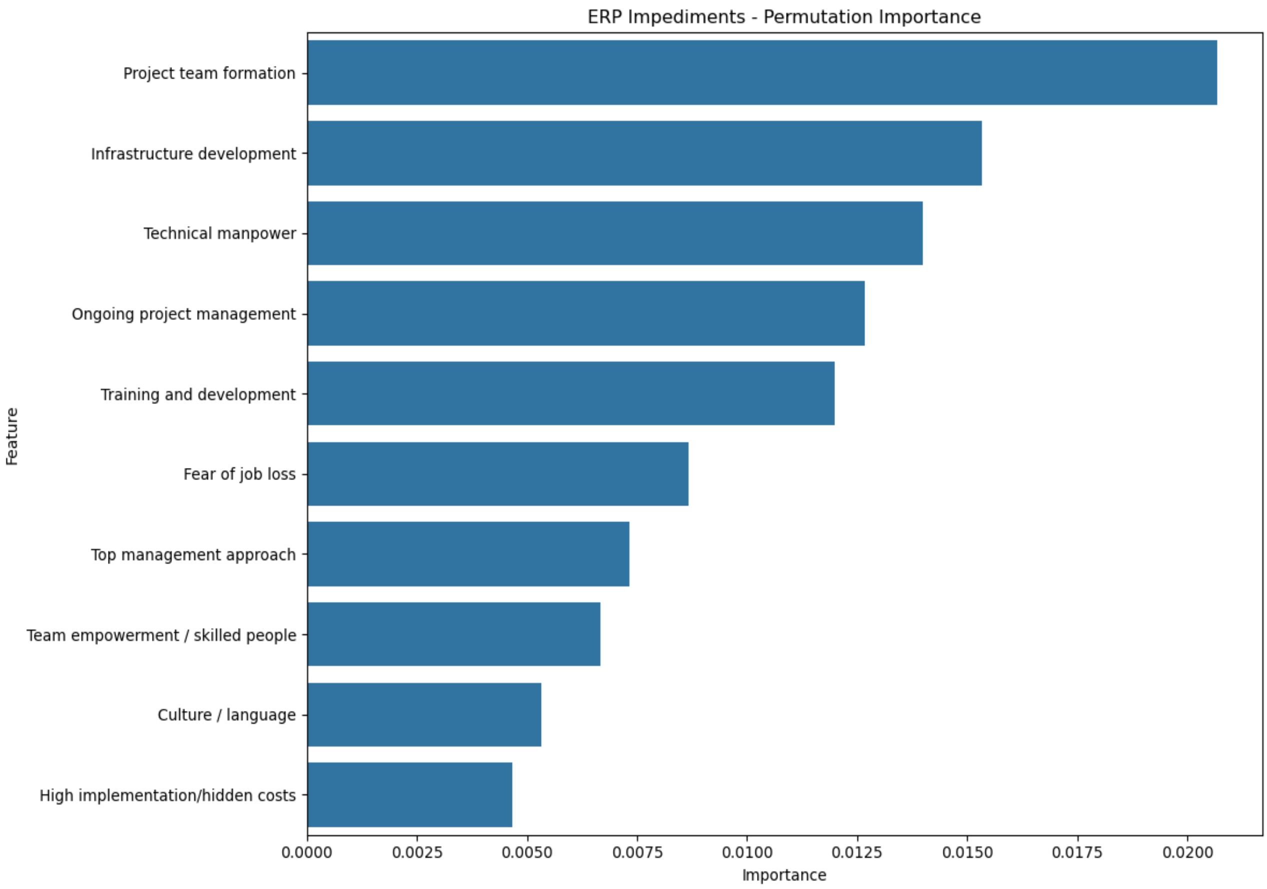

Figure 7. ERP Impediments' permutation importance

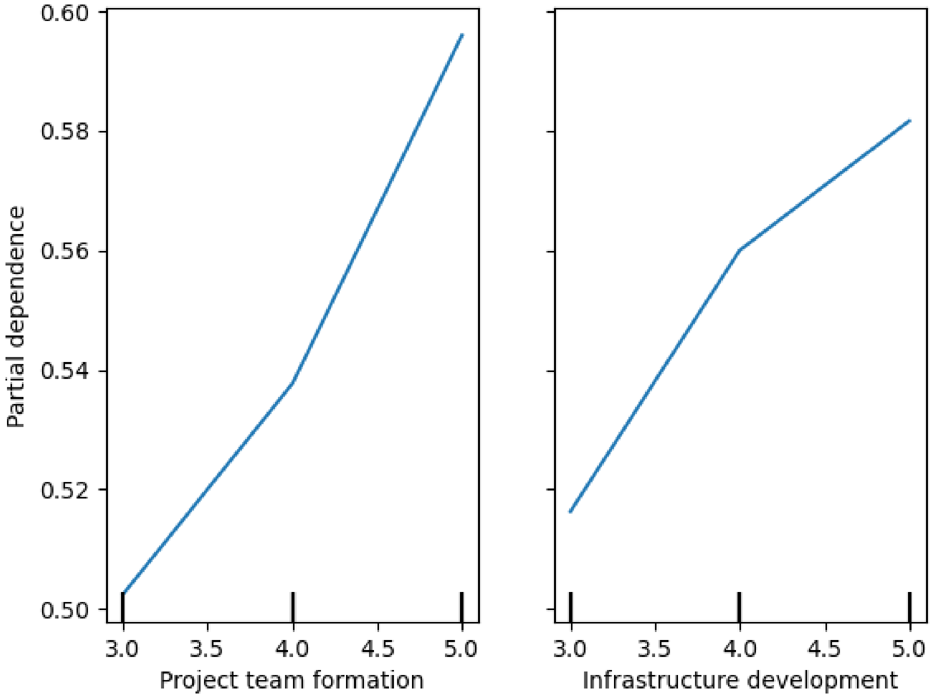

Figure 8. Partial Dependence Plots

Table 7. Performance metrics of contextual variables (RF Model)

Contextual variables	Performance Metrics (Random Forest Model)			
Risk assessment in ERP [30]	Class	Precision	F1-Score	Recall
	Risky	0.83	0.81	0.80
Forecast to delayed delivery [35]	Class	Recall	F1-Score	AUC
	late deliveries	0.995	0.997	0.997
ERP (Employee performance) classification [36]	Accuracy	Precision	Recall	F1-Score
	0.978	0.999	0.999	0.9866
ERP based quality classification [37]	Accuracy	Precision	Recall	F1-Score
	0.964	0.981	0.926	0.922

Also, the impediments collectively negatively affect the implementation. As noted by the present research the soft sides of users such as self-efficacy of individuals, inadequate learning and development, resistance of users acts as key barriers which were also endorsed by earlier researchers [31-32]. As indicated in the top permutation importance, culture and local language of employees, and lack of assimilation of ERP within an organisation, and reluctance to accomplish the task were the notable barriers for the ERP implementation, which also observed in the other country scenarios [33]. The quality of technical-user team (attitudes towards use, ease of use, performance expectancy, education level, lack of self-efficacy) were significant predictors of impediments in the implementation of ERP which also noted in the other country situations [34]. Human-technological factors have a significant impact on acceptance and ERP usage, which in turn significantly impacts the firm's business performance.

Further, as many ERP models were developed in Western developed countries based on regional business processes, serious failures occur in the implementation of the ERP if a misfit occurs in the cultural context. Features such as cultural resistance, localisation needs, and legacy system incompatibilities also lead implementation of ERP. Further, in emerging economies (India), as socio-economic and organisational dynamics vary comparatively, the present study outcome (feature importance) offers an actionable framework for effective ERP implementation strategies that align with region-specific culture. As noted many ERP models were developed in Western developed countries based on regional business processes, serious failures occur implementation of the ERP system if a misfit occurs in the local-regional-country specific cultural context. Features such as cultural resistance, localisation needs, regulatory fragmentation, and legacy system incompatibilities also lead implementation of ERP. In emerging economies, in-group collectivism culture (high-power distance countries) and within the IT dynamics, firms must respond to the volatile business environment by matching employees' competencies to the business environment [30] by establishing effective ERP system.

The RF method has been successfully adopted by earlier researchers to determine and classify the impediment importance features such as project risk assessment [30], external variables other than TAM elements such as on- going project management delay [35] which play as critical impediment in implementing the ERP system which is also noted by other researchers using RF method. The relevant examples of previous researches [36-37] related to ERP and impediments study mentioning the key variables, methods, contexts, and principal findings were presented in Table 7.

To enhance interpretability, permutation importance was used to assess the contribution of each predictor by measuring the decrease in model performance when feature values are randomly shuffled. Additionally, partial dependence plots were used to analyse the directional impact of key predictors on ERP usage intention. Also, permutation importance was used to assess the feature contributions. The project team formation (0.020) and infrastructure development (0.015) were the major impediments in implementing the ERP. Figures 7 and 8 were depicted in the manuscript (partial dependence plots and Permutation importance).

Further, as many ERP models were developed in Western developed countries based on regional business processes, serious failures occur implementation of the ERP system if a misfit occurs in the cultural context. Features such as cultural resistance, localisation needs, regulatory fragmentation also lead implementation of ERP. Further, in emerging economies (India), as socio-economic and organisational dynamics vary comparatively, the present study outcome (feature importance) offers an actionable framework for effective ERP implementation strategies that align with region-specific culture. As noted many ERP models were developed in Western developed countries based on regional business processes, serious failures occur implementation of the ERP system if a misfit occurs in the local-regional-country specific cultural context. Features such as cultural resistance, localisation needs, regulatory fragmentation, and legacy system incompatibilities also lead implementation of ERP. In emerging economies, in-group collectivism culture (high-power distance countries) and within the IT dynamics, firms must respond to the volatile business environment by matching employees' competencies to the business environment by establishing effective ERP system.

7. Conclusion

The study explores the feature importance of critical impediments in the implementation of the ERP system and assesses the perceived usage intentions of the system. The findings indicate that critical impediments that were noted were skill set, lower implementation success under the perceived usefulness category, lack of training and development under the perceived ease of use. Further, external variables other than TAM elements (project team formation, infrastructure development, technical manpower, organizational culture, on- going project management) play as critical impediments in implementing the ERP system. Also, human side of elements such as fear of job loss, top management approach also plays as key impediments in the successful implementation of the ERP system. Further, the project team formation and infrastructure development were the major impediments in implementing the ERP which were endorsed by the study findings using partial dependence plots and Permutation importance methods. In addition to top permutation feature importance, features such as support system, training-user satisfaction were identified as critical success factors in ERP implementation in Indian also in other countries. Study suggests to reduce negative attitude, project management conflicts, communications barrier, user satisfaction issues, change management crisis and social dynamics related to technical team and users were noted to be key barrier for successful implementation of ERP system. Also, the impediments collectively negatively affect the implementation. Thus, performance risks, technical manpower, start-up support issues, and infrastructure development negatively affect quality, design, integration, and turnover issues in the ERP implementation stage in the IT scenario of Karnataka State.

8. Practical Implications

The current work has practical implications. Firstly, helps to explore feature importance impediments in the implementation of ERP, which helps organisations to comprehend and tailor the ERP design and features such that ERP users may be attracted with the intention of using it. Secondly, comprehending the feature importance of critical impediments of the system helps the organisations to improve user satisfaction. Thirdly, findings (permutation feature importance) suggest that designing the ERP implementation strategy with focus on project team formation and infrastructure development will help the IT firms in smooth implementation of the ERP. Fourthly, the outcome of the study is valuable to design and develop implementation strategies considering human sides of implementations issue such team politics, fear of job loss, result in challenges in achieving quality and team empowerment to mitigate major challenges in the implementation process. Although, the study has an adequate accuracy in the prediction, the number of samples considered for the study is limited. Thus, prediction accuracy can be further enhanced with larger sample sets. Also, LASSO regression and gradient boosting method of classification may be adopted for better predictions.

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Authors Contribution Statement

M.S. Abhinandan: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing - Original Draft. A.N. Santosh Kumar: Supervision, Methodology, Validation, Writing - Review & Editing. P. Nagesh: Methodology, Validation, Formal analysis, Data interpretation, Writing - Review & Editing. Tejus Sangameshwara: Investigation, Data curation, Methodology, Formal analysis, Writing - Review & Editing. All the authors have read and agreed to the published version of the manuscript.

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Data Availability

The data supporting the findings of this study can be obtained from the corresponding author upon reasonable request.

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