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Machine Learning-Based Impact Assessment of ERP System Implementation in Business Process Re-engineering

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Master of Science in Computer Science

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Thesis submitted in partial fulfillment of the requirements for the degree
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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

Signature:

Date: 01.06.2025

The above candidate has carried out research for the Masters thesis under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of the supervisor: Eng. Prof. Indika Perera

Signature of the supervisor:

Date: 09.06.2025

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I would like to express my deepest gratitude to my supervisor, Eng. Prof. Indika Perera of the Department of Computer Science & Engineering, Faculty of Engineering, University of Moratuwa, for his invaluable guidance, supervision, and advice throughout this study. I am especially thankful for the generous time and effort he dedicated to supporting my research.

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I hope the research and conclusions presented herein will provide meaningful insights to readers.

ABSTRACT

Purpose - The purpose of this study is to predict the impact of Enterprise Resource Planning (ERP) implementation on Business Process Reengineering (BPR) in Sri Lankan organizations using machine learning algorithms. By applying the CRISP-DM framework, the research aims to develop and evaluate a predictive model that identifies patterns and relationships between ERP implementation and business process changes, providing actionable knowledge for improving organizational processes.

Methodology - The study will apply the Cross-Industry Standard Process for Data Mining (CRISP-DM) framework, integrating data collection, preprocessing, model development, and evaluation to effectively structure and analyze the impact of ERP implementation on BPR in Sri Lankan organizations. Machine learning algorithms will be employed to develop a predictive model, which will be refined and assessed for accuracy and reliability to achieve the research objectives.

Findings - This study analyzes the impact of ERP implementation on BPR in Sri Lankan organizations using the developed model and multiple machine learning techniques. The results indicate that machine learning techniques can effectively predict ERP implementation outcomes, with varying accuracy depending on the algorithm used. Notably, Naive Bayes and Decision Tree models demonstrated high classification accuracy, particularly for responses indicating strong agreement on ERP's impact on BPR. The Gradient Boosting Machines (GBM) model further reinforced these findings, exhibiting exceptional predictive capability, as evidenced by its near-perfect R-squared value.

These findings suggest that ERP implementation significantly influences process transformation by streamlining operations, enhancing efficiency, and achieving reengineering goals. The strong predictive performance of GBM confirms the reliability of these assessments, making it a valuable tool for evaluating ERP impact on business processes.

Potential Implications - This study will facilitate informed decision-making and strategic planning regarding ERP implementation and BPR, thereby enriching the body of knowledge in this field. The findings will serve as a valuable resource for practitioners, managers, and researchers in enhancing ERP implementations and driving successful business process transformations.

Keywords: Machine Learning Algorithms, ERP, BPR, ERP Implementation, Sri Lankan Organizations

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LIST OF ABBREVIATIONS

Abbreviation	Description
ERP	Enterprise Resource Planning
BPR	Business Process Reengineering
CRISP-DM	Cross-Industry Standard Process for Data Mining
ANN	Artificial Neural network
KNN	K-Nearest Neighbor