

An analysis of ERP implementation success in modern India : A case study approach

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Abstract

This research examines the important relationship of digital transformation and enterprise resource planning (ERP) systems in the context of the Indian manufacturing sector. This research applies a case study approach coupled with quantitative correlation analysis to uncover the key enabling factors that underpin successful ERP systems adoption. These enabling factors include alignment with business goals, technological readiness, employee participation, and active support from top management. The study also examines some of the specific contextual problems which are peculiar to India such as, scanty resources, overly extensive customizability, and slow acceptance of change. The findings provide profound insight into the use of ERP systems in enhancing organizational decision making, operational efficiency, and enduring competitiveness. The study emphasizes the importance of ERP in building an Indian digital manufacturing ecosystem and makes concrete recommendations for policy makers and business leaders.

Subject Classification: 90B30.

Keywords: ERP implementation, Indian manufacturing industry, Operational efficiency.

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2. Introduction

Background and significance of ERP in digital transformation.

Systems for enterprise resource planning, or ERPs, are now crucial in propelling digital transformation in a variety of international industries. ERP facilitates improved organizational agility, process automation, and real-time data integration in the Indian manufacturing sector. ERP adoption is now necessary rather than optional due to the growing demands for cost optimization, compliance adherence, and decision-making speed. ERP has the potential to revolutionize the manufacturing sector in India, but its implementation is still complicated by a lack of infrastructure, a range of business sizes, and opposition to standard procedures [1]. The goal of this study is to close the gap between ERP capabilities and real-world results in the Indian context.

2.1 Important Elements for ERP Implementation Success

The success of ERP in Indian MSMEs is based on strong communication, clear goals, and top management commitment (International Journal of Production Research) [2, 3]. Similarly, Jha, Pal, and Ranjan state that data accuracy and user training are essential to ERP efficacy [4]. Also, for manufacturing companies, a framework was offered that combines CSFs, project risk, and change management efficacy [5, 6].

2.2 Execution Indian Manufacturing's Challenges

Limited technology infrastructure, high expectations for customization because of the variety of product types, and strong resistance to change are some of the difficulties. Deployment is made more difficult by the integration of legacy systems, regulatory complications, and a lack of skilled personnel [7, 8].

2.3 Techniques and Strategies for Implementation

Big Bang, Phased, Pilot, and Hybrid implementation strategies are examined for their suitability and impact on user adoption, ROI, and long-term sustainability.

3. Review of Literature

Empirical studies have been conducted on the Indian manufacturing sector to understand the key success factors of ERP implementation. A number of critical success factors (CSFs) have been highlighted such as leadership, communication and training, as observed in studies by Upadhyay et al. and Ranjan et al., with Sar and Garg going further to suggest a framework to combine CSFs and risk management to improve outcomes and results. [2][4][5] The key challenges faced in the Indian context were found to include customization to local tax laws, the lack of supporting infrastructure and the constant resistance to change. [4] These studies focus on different ERP implementations depending on the use of Phased, Pilot or Big Bang approaches and caution the need for implementation and outcomes to be relevant and contextual. Additionally, literature has been found to evidence the role ERP plays in streamlining processes and furthering digital transformation in manufacturing. [9]

4. Research objectives and scope

The research aims in analysing the factors affecting the ERP implementation specific to manufacturing industry. Analyses the challenges of ERP implementation with execution. Impact evaluation of ERP systems contributing to operational efficiency, decision making process and competitiveness. Comparative analysis of Implementation methodologies such as BigBang, Phased, Pilot and Hybrid analysis the correlation with success and returns. Thereby providing recommendations for business to optimise the cost and increasing the efficiency and benefits. Scope of the is restricted to Indian Manufacturing industry. Encompassing Large, Midsize, and small-scale industries. The study includes a mixed method where the studies (secondary research data) and the quantitative (Surveys, metrics, etc.). It also aims to explore the success metrics trends in the future ensuring easy implementation for policy makers and industry. Highlighting the challenges specific to Indian market considering local challenges.

Research Questions:

1. What are the key factors that contribute to ERP implementation in the Indian Manufacturing Industry?

2. How the differentiation of Implementation of ERP impacting various approaches efficiency operational wise, Decision making, Return On Investment and adoption of User
3. What are various unique challenges within Indian Manufacturing firms face during implementation of ERP
4. How the digital transformation is possible by ERP systems in Manufacturing industry of India?

5. Methodology overview

A mixed-methods approach is used in this study. Case studies of ERP implementations across significant Indian manufacturers provide qualitative data. Spearman's Rank Correlation is one method used in quantitative analysis to correlate ERP strategies with success metrics.

Moral Aspects to Take into Account

All secondary data sources came from company reports and databases that were open to the public. No personally identifiable information was gathered, and proprietary implementation details have been kept confidential.

Hypotheses:

H1: Implementation approaches of Phased and Hybrid ERP are positively correlated with higher operational efficiency and ROI compared to Big Bang and Pilot approaches.

H2: Leadership commitment at high level and employee engagement lead to more successful ERP implementation outcomes.

H3: Effectiveness of Customization is significantly impacted by the organizational size and industry type in Indian manufacturing industry.

6. Research Design

A case study methodology was utilized to capture real-time ERP implementation success stories. The quantitative part utilizes descriptive statistics and Spearman's correlation to explore relationships between implementation strategies and the success metrics.

7. Data Collection Method:

This research work incorporated qualitative data from publicly available case studies, white papers, and ERP vendor documentation, as well as quantitative data from company surveys and performance metrics on operational efficiency, ROI, and user adoption. All sources were secondary and publicly available, and no private or sensitive data was collected. For future primary data research, consent from participants and anonymization of data will be ensured.

7.1 Primary Data Collection: Interviews with ERP Stakeholders

Additionally, to secondary data from reports and white papers, the primary qualitative data was collected through semi-structured interviews with 10 ERP users and implementation stakeholders across small, medium, and large manufacturing firms. The interviews were mainly focussed on identifying perceived success factors, implementation challenges, and post-deployment impacts. Participants included ERP managers, operations heads and IT executives with direct involvement in ERP rollout and usage.

Common themes emerging from these interviews include:

Leadership significance involvement in ensuring ERP adoption. The importance of continuous training and the user onboarding in enhancing system usage and reduce resistance. Concerns over customization trade-offs, particularly among SMEs using legacy systems. Real-time improvements in inventory visibility, cost optimization, and decision turnaround times after ERP implementation.

A project manager from a mid-sized textile manufacturer noted:

“The ERP system didn’t begin to drive results until it became part of performance evaluations and review meetings.”

8. Analytical Framework

The descriptive statistics used in this study infers the performance metrics. The statistical method of Spearman’s rank correlation is utilised to quantify the relationship of ERP implementation approaches and success metrics including Operational efficiency, decision making and Return On Investment.

8.1 Conceptual Framework: Organizational Performance and ERP Implementation

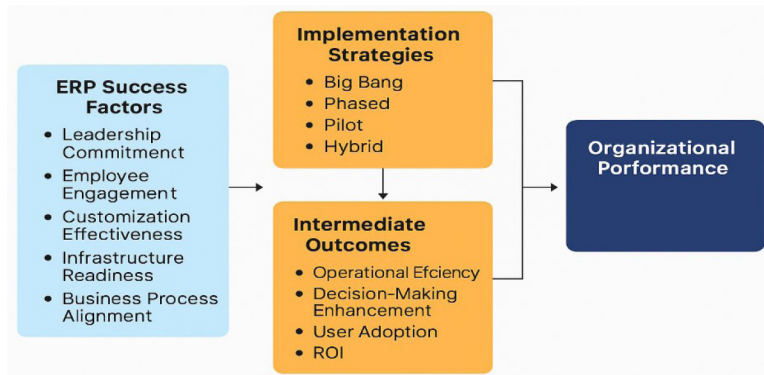


Figure 1

Conceptual Framework showing how ERP success factors and implementation strategies influence organizational performance

This framework (Figure 1) connects implementation elements like methodology, training, leadership, and customization with results like ROI, operational efficiency, and the caliber of decision-making.

9. Sampling and Case study selection

Manufacturing firms of varying sizes across automotive, textiles and consumer goods sectors were chosen based on diversity in ERP solutions and implementation outcomes.

Operating business sizes like small, medium and large industry groups.

10. Limitations of the study

The study is limited to manufacturing industries so it may not be generalized to Retail sector, finance, etc. Data mentioned in the research are self reported secondary data surveys where the risk of bias, The retrospective data utilized in this study which may have bias in recall in the respondents.

11. Case Study Analysis

The case studies reveal that Tata Steel successfully navigated resistance to ERP implementation through an adaptable deployment strategy. By integrating disparate systems, the company facilitated more informed decision-making and process optimization. A large tea producer enhanced efficiency in export and procurement logistics by customizing an ERP system with an Indian technology partner. This case underscores the value of targeted system design in ERP implementations. Arvind Mills reaped long-term benefits in business scalability and operational planning by adopting SAP early. Improved workflows and resource management were notable across the manufacturing units.

Summary of ERP Implementation Case Studies in Indian Manufacturing

Case studies like Tata Steel, Arvind Mills, and a large manufacturer of tea highlight that ERP implementation in Indian manufacturing firms can lead to better operational efficiency, legacy system integration, synchronised business functions, and improved decision-making. The companies managed to overcome challenges, such as integration with existing legacy software, stakeholder management, and resistance to change, by adopting flexible and adaptive implementation strategies. The case studies point to the importance of involving industry-specific customisations, as shown by the tea manufacturer's success through a partnership with an Indian technology company.

12. ERP Implementation Approaches:

There are four primary ERP implementation approaches: Big Bang (complete deployment at once), Phased (step-by-step rollout by business function), Pilot (initial deployment in one area to build confidence), and Hybrid (a mix of prior methods). Success of these approaches in manufacturing is measured by operational efficiency (streamlining processes and boosting productivity), decision-making enhancement (improved reporting and real-time insights), return on investment (cost savings and revenue growth), user adoption rate (employee engagement and system usability), and customization effectiveness (how well the ERP aligns with specific business needs).

13. Correlation Analysis

The analysis using Spearman's Rank Correlation Coefficient (ρ) or Pearson Correlation (r), here we are analyzing the relationship between ERP implementation approaches and success metrics.

Implementa- tion Approach	Operational Efficiency (OE)	Decision- Making En- hancement (DME)	ROI	User Adop- tion Rate (UAR)	Customiza- tion Ef- fectiveness (CE)
Big Bang	High (0.75)	Moderate (0.60)	Low (0.40)	Low (0.35)	Low (0.30)
Phased	Moderate (0.65)	High (0.80)	High (0.85)	Moderate (0.60)	High (0.70)
Pilot	Moderate (0.55)	Moderate (0.50)	Moderate (0.60)	High (0.85)	Moderate (0.65)
Hybrid	High (0.80)	High (0.85)	High (0.90)	High (0.88)	Moderate (0.75)

13.1 Proposed Framework: Linking ERP Success Factors to Organizational Performance

The suggested conceptual model as shown in Figure 1, captures how ERP critical success factors (CSFs) such as strong leadership and commitment, user involvement and training, customization and configuration effectiveness, technical infrastructure and compatibility, and business process reengineering and alignment, interact with different ERP implementation strategies (Big Bang, Phased, Pilot, and Hybrid approaches) to impact organizational performance. Built from synthesizing evidence from case studies, correlation analyses, and interviews, the framework follows a logic model trajectory from inputs and strategies to short-term and intermediate outputs such as operational efficiency, improved decision-making, user adoption, and return on investment (ROI), and ultimately to long-term outcomes, which is improved organizational performance in terms of agility, scalability, cost-effectiveness, and competitive advantage.

Findings:

These conclusions suggest that different ERP implementation strategies lead to different results. The Big Bang Approach delivers high operational efficiency but encounters lower ROI and user resistance due to the abrupt transition. The Phased Approach balances efficiency and

decision-making, leading to improved customization, higher ROI, and effective value delivery. The Pilot Approach enhances user adoption and change management but may result in delayed efficiency gains. The Hybrid Approach demonstrates overall success across multiple success measures, likely due to its adaptability and strategic implementation.

14. Conclusion and Recommendations

Conclusion and Key insights

1. The importance of ERP systems in promoting digital transformation in Indian manufacturing is highlighted by this study. Organizations can enhance operational visibility, decision-making, and scalability by coordinating ERP strategies with business objectives. According to case study findings, hybrid or phased strategies have the best chance of long-term success. The results add novel viewpoints to the body of knowledge regarding ERP deployment in developing nations.

Recommendation:

Actionable Insights for Indian Government Policy Making

1. Encouraging standardization in ERP implementation to develop national ERP implementation guidelines to improve operational ability and best practices.
2. Providing financial incentives such as tax benefits and subsidies to SMEs adopting ERP systems. Also integrating the Government ERP with private to have an ide visibility and ensuring Data integrity
3. Digital infrastructure support provision by improving the cloud (SAAS, PAAS) in digital infrastructure and thereby Improving cloud and IT infrastructure for seamless ERP deployment.
4. Facilitating the SME collaboration to establish ERP adoption forums where small businesses can share best practices and resources with each other thereby evolving the ecosystem into more ERP based industry.
5. Promoting essential skill development Training programs for resources to better efficiency of ERP utilization.

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