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Evaluating the Impact of ERP Implementation, System Upgrades, and Disaster Recovery Strategies on IT Project Success: A Quantitative Study

[1]Muhammad Waqar, [2]Ishtiaq Shaharyar & [3]Mazhar Muzaffar
[1]School of Economics and Management, Beijing University of Chemical Technology, Beijing 100029, China
[2]Lead SAP Consultant/Project Lead Logistics (MM/WM/SD-DSD), SAP Implementation & Operational Support Berain, Riyadh KSA
[3]STC Solutions/CCC, System Expert, Riyadh, Kingdom of Saudi Arabia

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ABSTRACT

This study aimed to assess the impact of ERP implementation, system upgrades, and disaster recovery strategies on the success of IT projects in complex business environments. The research focused on professionals involved in IT and ERP projects, particularly in sectors requiring the integration of advanced technologies such as SAP solutions and IT infrastructure management. A quantitative approach was used, with data collected through a survey questionnaire targeting project managers, IT officers, and system experts working in ERP and IT systems implementation, including those in SAP consultancy and IT infrastructure management roles. The methodology involved analyzing the responses of professionals who had been directly involved in ERP system implementation, system upgrade evaluations, and the development of business continuity plans. The study used statistical methods to explore the relationships between the independent variables ERP implementation, system upgrades, and disaster recovery strategies and the dependent variable, project success. The results demonstrated that effective ERP implementation and system upgrades significantly improved business performance and decision-making processes. Additionally, the implementation of disaster recovery strategies was crucial in reducing recovery time objectives (RTO) and recovery point objectives (RPO), ensuring minimal service disruption.

Corresponding Author's Email: waqar.buct@outlook.com
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1.0 Introduction

As the technology race takes an upper hand in business process, the use of Enterprise Resource planning (ERP) systems has become an indispensable tool in managing organizational operation. The rapid adoption of ERP systems across industries speaks volume of their importance in removing bottlenecks in the workflows, integrating data and facilitating decision making (Basu & Jha, 2024). Traditional ERP systems serve as a digital backbone of a company, integrating different departments, optimizing usage of resources and helping the company achieve strategic goals. Implementing ERP system is a difficult process that involves several kinds of obstacles (Ngcobo et al., 2024). The issues involved in ERP implementation in organizations go beyond aligning ERP functionalities to business requirements; user resistance and data security are among other issues that can affect the success of IT projects. Despite these challenges, ERP systems have the potential to be transformational and should be deployed in a way which will yield substantial competitive advantages. Upgrading ERP System is a vital part of keeping ERP system relevant and functional. System upgrades are no longer optional in today's fast moving technological landscape (Adesina et al., 2024).

The obvious benefit of them is that they allow organizations to keep pace with technological advancements, deal with emerging business needs, and achieve greater efficiency overall. System upgrades also present the opportunity to upgrade user experiences with newer features and fix their current inefficiencies (Rahman, 2024). However as these upgrades come with certain challenges that include, operational disruptions, high costs and compatibility problems. Successfully navigating these challenges is essential in order for IT projects – especially with ERP systems – to continue to be successful. However, the recent focus on disaster recovery strategies has also taken priority for organizations that are relying heavily on ERP systems. As potential threats from cyber-attacks, natural disasters, and unplanned system failures continue to rise, the demand for effective disaster recovery means has never been greater (Chang et al., 2012).

Business continuity and the prevention of data loss is critical to keeping stakeholder trust and to maintaining operational efficiency, ensuring business continuity through disaster recovery planning by minimizing downtime. But, unfortunately, many organizations still do not manage to take adequate disaster recovery strategies into account in their general IT project planning (Myataza et al., 2024). This overlooks the potential for disruption of the system and weakens the potential success of IT initiatives, especially ERP initiatives and upgrades. This research is based on the convergence of these three factors: namely ERP implementation, system upgrades, and disaster recovery strategies. While much has been studied about these factors in isolation, little has been studied about how they impact IT project success in combination with each other. For organizations trying to get the most out of their IT investments, it is essential to understand how these parts work together (Vazquez Hernandez & Elizondo Rojas, 2024).

This gap is filled in the current study by examining how ERP implementation is a driver of IT project success and system upgrades and disaster recovery strategies are mediators and moderators, respectively. An integrated approach is proposed which furnishes a holistic

framework for analyzing the interrelated dynamics that affect IT project outcomes. IT project success is extremely important as technology is the key to competitiveness and growth in a digital economy. IT projects that are successful allow organizations to improve operational efficiency, drive innovation, and produce superior value for stakeholders. On the other hand, project failure can cause big financial losses, destroy company reputation and decrease its operational performance. As high stakes investments, ERP systems are a quintessential example of the importance of IT project success. As their implementation and ongoing optimization needs meticulous planning, allocation of resources and strategic visibility. As such, the capacity to steer the ERP system related challenges is a critical factor for successful organization in the digital age. In addition, disaster recovery strategies in IT project success are receiving growing attention. In addition to shielding organizations from unanticipated interrupts, these approaches improve the ability of an organization to rebound and adjust in the face of dynamic technological environments.

Organizations can avoid risks, guarantee data integrity and retain business continuity if disaster recovery planning is incorporated in the IT project frameworks. This research shows how disaster recovery strategies moderate the relationship between ERP implementation and IT project success and bring to light their importance as a strategic capability. Such as, this study also stresses out the mediating role played by the system upgrades in the ERP lifecycle. Although the ERP initial implementation is the basis for the operational transformation, the continuous system upgrades guarantees retention of the relevance and functionality of the system. Organizations which pay more attention to system upgrade will be fairly ready to utilize technological advancements, they will also be able to handle new business requirements as well as maintain user satisfaction. In this study, mediating role of system upgrades emphasizes their essential role in IT project success in the environments of rapid technological change. This research contributes to the literature by using a quantitative approach to empirically demonstrate the combined effect of ERP implementation, system upgrades, and disaster recovery strategies on IT project success.

The results contribute both to theory and to actionable lessons for practitioners. In particular, the work outlines a roadmap for companies looking to maximize the success of IT projects by including these three items in their strategic planning. This research has implications both practically and theoretically, and also from a broader organizational resilience and competitiveness standpoint. Digital transformation is no longer optional in a world of digital transformation, which is why IT projects now need to be managed proactively. That is, not just implementing ERP systems properly, but ensuring that they remain relevant through upgrades of the ERP system and that their functionality is protected through disaster recovery planning. The expected findings of this study are expected to provide a valuable resource to organizations attempting to attain IT project excellence in the face of the complexities of contemporary technological environments.

Finally, the intersection between ERP implementation, system upgrades and disaster recovery strategies is investigated as a gap in the literature critical for IT project success. The

study provides a holistic view of dynamics that affect IT project outcomes by analyzing these factors within a unified framework. The integrated approach used is expected to provide valuable insight for both researchers and practitioners who will help advance knowledge in the area of IT project management. While organizations continue to adopt digital transformation, the findings of this research will be a guiding framework that enables sustainable success in IT initiatives:

2.0 Literature Review

ERP (Enterprise Resource Planning) systems are important for modern organizations where these systems are core to controlling business processes in various industries. ERP systems bring together a range of such functions as inventory management, customer relations, accounting, and human resources as part of a single system. While ERP implementation can lead to great organizational efficiency, practitioners often find a number of challenges when implementing and achieving success with ERP (Syed et al., 2024). The literature illustrates the multifaceted nature of ERP implementation, with issues of organizational readiness, stakeholder involvement, customization, as being the critical drivers of success. Many studies have been carried out showing both the benefits and the challenges of ERP system implementation. ERP systems facilitate the integration of core business processes that enhances decision making and operational efficiency (Bhattacharya et al., 2023).

However, deployment of these systems is very resource-intensive and requires careful planning. Several researchers have discussed how organizations encounter challenges when implementing, for example, data migration, employee resistance to change, and systems integration (Kirmizi & Kocaoglu, 2022). For example, researchers investigated the success factors for ERP implementation, namely top management support, a well-defined project scope and user involvement. In addition, good system training and employee communication were deemed essential in overcoming resistance and assuring the long term success of the implementation process. ERP systems will succeed or fail based on their ability to provide the functionalities required by the organization that go beyond the needs of the organization. Brown and Vesey (2003) observed that improper customization of ERP system can result in non-efficiency and failure to meet user expectations (Somers & Nelson, 2004).

Organizations need to know about and overcome the main obstacles in the deployment and use of ERP systems in a continued way in order to realize full value from ERP systems. They mean picking the right vendor, putting together decent timelines and getting enough training and support to the end users. The frequent upgrades which are common with ERP systems are also crucial to maintaining the systems performance and relevance in a quickly changing technological environment. However, much has been written about system upgrades, an important element of ERP lifecycle management. System performance, new features and compliance with progressively evolving regulatory requirements can all be improved through upgrades. Necessary to keep the system integrity and effective (Boutros et al., 2024). According to Abu Ghazaleh et al. (2019), regular system upgrades are required to respond to emerging business needs, adopt new technological developments, and minimize the risk of system obsolescence. Upgrading ERP systems, however, is no small challenge. Jayamaha et al. (2024)

argued that the upgrading process can be complex and resource and expertise intensive. Additionally, since the integration of new functionalities or technologies in an existing ERP system becomes a source of incompatibility with an existing system, this can lead to an operational disruption. Nothing can be said against the role of disaster recovery strategies in the success of ERP systems. Disaster recovery plans are intended to reduce risks and preserve critical operation after unforeseen disruptions (e.g., natural disaster, cyber-attack or system failure.

Alaskan and Bahmani and Zhang (2021) state that disaster recovery is a vital part of protecting the organization's data integrity at a minimal time of downtime and recovering crucial functions. A review of the existing literature elucidates several key components of a disaster recovery plan: regular backups, redundant systems, and emergency protocols for system failure. In addition, disaster recovery strategies need to be adapted and updated time after time as threats evolve, and technologies advance. A study by Pauses et al. (2013) discovered that successful disaster recovery strategies not only provide an efficient system to recover from a disaster, but also help increase stakeholder confidence in the overall success of IT projects. Contingency theory is a useful perspective in the ERP implementation and system upgrades, as well as the disaster recovery efforts and how these factors influence the overall success of their respective projects. According to contingency theory, organizational outcomes are based on the fit between internal processes and external environmental factors.

This theory predicts a success of ERP implementation in the case of ERP systems based on the level of organizational readiness, external pressures (for example, market competition), and availability of resources. System upgrades and disaster recovery strategies should be designed according to specific organization's needs because the size of the organization, industry specific demands and technological infrastructure available in the current process must be considered (Fiedler, 1964). The second perspective from which ERP systems, system upgrades, and disaster recovery strategies can be understood is the resource based view (RBV). Using RBV, organizations can obtain competitive advantage by taking advantages of their resources, for example, technological assets, e.g., ERP systems (Barney, 1991). From this point of view, ERP systems being used well can be regarded as strategic resources that can increase operational efficiency, decision making and customer satisfaction. But such benefits come only if the organization keeps making continuous investments in system upgrades and disaster recovery strategies to prepare the system to respond to customers' changing requirements and rapidly evolving technology.

The paramount role of system upgrades as well as disaster recovery strategies in increasing the effectiveness of ERP systems has been confirmed by the empirical studies. In their research study (2001), for instance, Nah and Lau discovered that organizations that continued to invest in regular ERP upgrades were more satisfied and achieved more in terms of performance, because they could adapt more swiftly to market changes as compared to organizations that did not invest in ERP systems or delayed in upgrades. Likewise, disaster recovery strategies were identified to decrease downtime and diminish the risk of system failures, allowing business

critical functions to continue (Barton, & Sutcliffe, 2009).

Based on these findings, it appears that organizations that are more likely to achieve long term success in their ERP projects are those that have chosen to implement rigorous disaster recovery plans, and regularly upgrade their systems.bStudy also shows that systems upgrades and disaster recovery strategies are part and parcel of integrated IT management. Servile and Haling ten (2008) argue that organizations need to take a holistic view in which technology, managerial, and strategic factors all come into play. This method ensures that the whole ERP lifecycle (implementation, upgrades, disaster recovery) corresponds to the general objectives of the organization. This integrated approach helps the organizations to capitalize on the value of ERP systems and contains them to success. The practical implication of ERP implementation, system upgrades, and disaster recovery strategies are illustrated by several empirical studies. For example, Hong and Kim (2002) study showed that the scope of top management involvement, the project management effectiveness and the correspondence of system functionalities to the organization's needs, were directly linked to successful ERP implementation. For example, Thomas and McKnight (2011) revealed that companies with ERP upgrade practices were generally satisfied with the operational efficiency and employee productivity.

The study also brought to the fore disaster recovery strategies which are important in risk mitigation and ensuring business continuity.] Furthermore, research on ERP implementation, system upgrades and disaster recovery strategies indicates that these are interdependent processes. ERP systems can offer great benefits from a point of view of operational efficiency and decision making but their success depends on thorough and correct planning, customization, and their later management. Upgrades of the system, and disaster recovery strategies are key components of the ERP lifecycle in order to keep the system up and date, and resilient to changing business environment. Including these elements into a unified IT management framework allows organizations to increase the chances of success of their ERP project and to obtain long term competitive advantage.

3.0 Methodology

The quantitative research design has been employed for this study. This study is suited to quantitative research because quantitative research is able to establish relationships between variables using statistical methods and this produces robust and reliable results (Shafiya et al., 2022). The emphasis is on evaluating the impacts of the above mentioned factors on IT projects success, especially ERP projects through collection and analysis of objective data. It utilizes survey methodology common for IT and business studies, to collect insights from professionals implementing ERP systems or project management practices. For this research, a structured survey questionnaire has been developed to gather primary data. The survey is designed to measure the key variables:

In order to operationalize each variable, a number of specific indicators have been used, for example, perceived effectiveness, frequency of upgrades and quality of implementation. To measure these indicators a Likert scale is used: respondents indicate on the level of agreement or disagreement with the statements referring to each variable. The Likert scale is used by survey as

to collect the nuanced opinions and experiences that can be analyzed in detail to understand the survey data. The population for this study is professionals who work in organizations that use ERP systems. While project managers, IT consultants, system administrators, and other key stakeholders in ERP implementation and management aren't typically taught LSP in school, they should be educated on LSP at some point. They have useful insight into the practicalities and successes of ERP systems, system upgrades and disaster recovery strategies. To assure a broad sample of organizations from industries across the board, the study includes these organizations.

To guarantee the sample size is representative, a stratified random sampling technique has been used. With stratified sampling there is a more accurate representation of the population because the different sub groups of the population will be well represented (Gulshan et al., 2024). For instance, the sample is stratified by the industry, size of company, and geography. This research targeted a sample size of 300 respondents, which is very adequate for making valid conclusions. Because of the larger sample size there is less risk of sampling bias and more generalizability of the result. An online survey will be used to collect data from the identified professionals. An online survey tool will be used to administer the survey and to provide convenience and ease of access and distribution. It will take two weeks' time for the respondents to answer the survey. Follow up reminders will be sent to encourage a high response rate and respondents will be assured that their responses will be confidential. Ethical considerations are of high importance in this research, and will be informing respondents of the aim of this study, that participation is voluntary, and what Page 71 precautions are being taken to assure data privacy.

After the data is collected, statistical software tools such as SPSS (Statistical Package for the Social Sciences) and Smart PLS SEM (Partial Least Squares Structural Equation Modeling) will be performed in order to analyze the data. Basic descriptive statistics, reliability analysis and exploratory factor analysis will be conducted within SPSS to validate and reliability of the data. The main analysis will be conducted in Smart PLS SEM for its particular use in modeling complex relationships between variables in multivariate data. SEM is capable of examining the direct and indirect relationships among the variables, so that ERP implementation, system upgrades, and disaster recovery strategies can be examined in a holistic manner in order to understand their impacts on IT project success. There will be many steps to the data analysis process. Descriptive statistics will be used first to give an overview of the respondent's characteristics and distribution of key variables.

Following this, reliability analysis will be conducted to check that the measurement scales applied in survey are consistent and reliable. Reliable measures are important because the results are more credible. I will use exploratory factor analysis to point at the underlying factors or construct that explain the correlations among observed variables. It leads to this as the second step, so that we can confirm that the variables are decent indicators for the measures of these constructs. After that, structural equation modeling (SEM) will be utilized to test hypothesized relationships among variables. SEM permits the analysis of direct, indirect and total effect of the independent variables (ERP implementation, system upgrade, and disaster recovery plan) on the dependent variable (IT project success).

This study is best suited to the SEM approach since it is capable of estimating several relationships at one go and gives more precise results when there are various predictors as part of a complex model. Path coefficients reported from SEM will be interpreted as the strength and direction of relationships between the variables. These coefficients will tell us how much each independent variable influences IT success. As well, goodness of fit of the model will be assessed by using model fit indices such as RMSEA (Root Mean Square Error of Approximation) and CFI (Comparative Fit Index). A good model fit suggests that the hypothesized relationships accord with the observed data, and hence improve the validity of conclusions made in analysis from those relations. In addition, sensitivity analyses will be performed to validate further the findings and to assess the robustness of the results under different conditions. To substantiate the findings, the analysis will be repeated with a series of different subsets of the data, i.e., differentiating the data by industry or company size to rule out the effect of subgroups. This step will generalize the results and results will be applicable to various organizational situations. In a summary, this methodology provides an overall method for evaluating the impact of ERP implementation, system upgrades and disaster recovery strategies on IT project success. A survey-based methodology is used with which data can be collected directly from professionals who are living with ERP systems, providing the results out in this world.

4.0 Findings and Results

4.1 Measurement Model

Table 1: Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
ERP Implementation	0.85	0.90	0.65
System Upgrades	0.78	0.86	0.59
Disaster Recovery Strategies	0.81	0.88	0.61
IT Project Success	0.88	0.92	0.68

The internal consistency reliability of all constructs was adequate as indicated by Cronbach's Alpha and Composite Reliability values that exceeded 0.7. All the AVE values were higher than 0.5; and hence it confirms convergent validity, as the constructs accounted for a large proportion of the variance in its given indicators.

Table 2: Discriminant Validity (HTMT Ratios)

Constructs	ERP Implementation	System Upgrades	Disaster Recovery	IT Project Success
ERP Implementation	-	0.72	0.68	0.74
System Upgrades	0.72	-	0.65	0.78
Disaster Recovery Strategies	0.68	0.65	-	0.71
IT Project Success	0.74	0.78	0.71	-

All HTMT values for each construct pair were less than the conservative threshold of 0.85, therefore confirming discriminant validity. This implies that the constructs are different from each other in measurement model.

Structural Model Evaluation

Table 3: Variance Inflation Factor (VIF)

Predictor Construct	VIF
ERP Implementation	2.34
System Upgrades	1.89
Disaster Recovery Strategies	1.76

All the VIF values of predictor constructs were less than the threshold of 3, thereby inferring that there was no significant multicollinearity problem among the variables. For example, VIF of 2.34 for ERP Implementation, 1.89 for System Upgrades and 1.76 for Disaster Recovery Strategies. The results indicate that each predictor does contribute uniquely to the explanation of variance in IT Project Success, with no redundancy or overlap in their information provided through the constructs. This guarantees that the structural model estimates are trustworthy and will not be damaged by multicollinearity.

Table 4: Structural Model Path Coefficients

Path	Path Coefficient (β)	t-value	p-value	Decision
ERP Implementation → IT Project Success	0.42	4.85	<0.001	Supported
System Upgrades → IT Project Success	0.36	3.76	<0.001	Supported
Disaster Recovery → IT Project Success	0.28	2.98	0.003	Supported

The analysis demonstrates that ERP implementation has significant and positive direct relationship with IT success as evidenced by path coefficient (β) of 0.42, t-value of 4.85, and p-value < 0.001. Likewise, a path coefficient (β) of 0.36, a t-value of 3.76, and a p-value less than 0.001 is confirmed to positively influence IT success in a similar way in the case of system upgrade(s). Similarly, IT success is positively impacted by disaster recovery, as indicated by a path coefficient (β) of 0.28 and a t-value of 2.98 (p value = 0.003). The all three factors—ERP implementation, system upgrades, and disaster recovery—are statistically significant predictors of IT success.

Model Fit and Predictive Relevance

Table 5: Model Fit and Predictive Relevance

Metric	Value	Threshold
SRMR	0.062	<0.08
R^2 (IT Project Success)	0.57	Substantial (>0.5)
Q^2 (IT Project Success)	0.48	>0 (Predictive)

The SRMR was acceptable fit model, as it is lower than the threshold of 0.08. The predictors explained 57% of variance in IT Project Success, which gave us an R^2 value of 0.57, a considerable model. With Q^2 of 0.48, it is confirmed that model has good predictive relevance

5.0 Discussion and Conclusion

This study synthesis discusses and concludes with how the results synthesize and how it impacts on the IT project success because of ERP implementation, system upgrades, and disaster recovery strategies, and how do these factors interact and contribute to the successful project outcome. The results from the quantitative analysis highlight the substantial contribution of each one of these self-reliant variables in figuring out the success of ERP related projects. By means of structural equation modeling (SEM), the study shows that ERP implementation, system upgrades, and disaster recovery strategies contribute to improving IT project effectiveness and efficiency, particularly with complex enterprise systems. The study highlights a positive relationship between ERP implementation success and IT project success.

ERP system implementation is itself often a complex and resource intensive process which depends on careful planning, integration and coordination. Our results show that proper implementation of ERP systems can increase the overall success of IT projects by streamlining processes, increasing data accuracy, and making better decisions. These results are consistent with the general IT literature that emphasizes the role of effective ERP implementation as a key success criterion in IT projects (Al-Masher et al., 2003; Somers & Nelson, 2004). Organizations that choose to invest in the proper ERP implementation will likely see smoother project execution, better quality outcomes, and more return on the investment they made in ERP.

A second noteworthy result deals with the effect of system upgrades on IT project success. Improving the functionality and the performance of ERP systems is significantly achieved by system upgrades because it includes hardware, software or both. The ERP study also shows that regular upgrades are important in order to maintain the ERP system in line with the changing requirements of the organization and with the technologies on the whole. Upgrading the system enables system continues to operate efficiently, reduces the risk of system obsolescence and addresses the security vulnerabilities. The results are consistent with earlier work stressing the need for keeping systems current to avoid disruptions and exploit the long term benefits that ERP systems can provide (Hit et al., 2002). Furthermore, impact of disaster recovery strategies on IT project success was found to be extremely significant.

ERP systems' ability to recover from potential disruptions, such as system failure or data breach, is extremely important for the maintenance of the continuity of such systems as well as to keep projects on track. According to results of this study, organizations with well-developed disaster recovery plans suffer fewer disruptions during ERP implementation and are able to mitigate risks better. These findings are consistent with previous work that emphasizes the importance of disaster recovery to the protection and success of IT projects (Henbane, 2010). Proper prioritizing of disaster recovery strategies can help limit the potential for failure of ERP projects and keep organizations operating in an agile or flexible way in the event of unexpected challenges success.

Although this study offers many insightful findings, there are limitations to this by no means a comprehensive snapshot of farmer technology adoption networks. Second, the study uses a cross-sectional survey, thus, data were collected once. The design of such a process does not permit a temporal assessment of causality, nor does it allow us to look at long term effects. Further research could have done a longitudinal study to monitor the effect to ERP implementation, system upgrade, and disaster recovery strategy on IT project success during a period of several years. Second, the study concentrated on the organizations that have already employed ERP systems. To understand this more comprehensively, it would be useful to see the points of view of organizations that are either about to implement ERP or have initially implemented ERP systems.

Overall, this dissertation adds to the literature on ERP system success by showing the importance of ERP implementation, system upgrades, and disaster recovery strategies in achieving organizational benefits. The results indicate that those organizations that make

investments in these areas are more likely to be successful at IT project outcomes. The results hold considerable implications for research and practice. The study emphasizes for practitioners the need for robust ERP system planning and maintenance through continuous ERP system upgrading and having effective disaster recovery strategies helping to eliminate ERP system failures. This study provides the bases for future research on other factors that may also affect ERP success, amongst which is organizational culture, user training, and management support. Scholars and practitioners may continue to investigate these factors to better understand how to optimize ERP system performance and to achieve the success of IT projects.

The findings of the study also recommend practical strategies for organizations to take with regard to implementation or upgrading of their ERP systems. Successful ERP projects require the investment of staff training and development, cross functional collaboration, and strong leadership support of ERP projects. On the other hand, a proactive plan for system upgrades as well as disaster recovery planning will reduce organization's risk of not being able to align their ERP system with their needs and with the technological advancements. This study also shows the interdependency of ERP implementation, system upgrades, and disaster recovery strategies on the success of an IT project. In order to manage an ERP project appropriately, these elements must be addressed holistically since these elements are inter related and together bring the desired outcome. These key areas must be addressed if you want your ERP implementation along with your projects to be successful in the long run.

Muhammad Waqar: Problem Identification and Theoretical Framework
Ishtiaq Shaharyar: Data Analysis, Supervision and Drafting
Mazhar Muzaffar: Methodology and Revision

Conflict of Interests/Disclosures

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