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Analysis of Development and Implementation of Web-Based ERP at DTC Company

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ERP; digital transformation; operational efficiency; user satisfaction; ERPNext.

ABSTRACT

This research explores the development and implementation of a web-based ERP system at PT Datacomm, in response to the needs of digital transformation in the modern business world. The purpose of this research is to understand how ERP systems can integrate business processes and improve organizational performance. The method used is a qualitative case study, with data collection through in-depth interviews, participatory observation, and document analysis from 15 respondents, including project team members and senior management. The results showed that ERPNext significantly improved operational efficiency by reducing manual tasks and improving reporting accuracy. The system is also flexible to adapt to workflows and has an intuitive interface that increases user satisfaction. However, there were some challenges in integrating ERPNext with legacy systems as well as the need for ongoing training for users. In conclusion, ERPNext is an appropriate solution to improve operational performance, although continuous improvement in terms of integration and training is required to maximize the system's potential. This research provides practical insights for ERP implementation strategies as well as recommendations for organizations looking to adopt similar initiatives.

INTRODUCTION

In the ever-evolving digital era, the need for digital transformation is becoming increasingly crucial for companies in various industry sectors (Khanom, 2023; Mallisetty, 2023; Nosike et al., 2024). The rapid development of information technology, market globalization, and the increasing complexity of business supply chains are creating huge challenges for companies to remain relevant and competitive. According to a McKinsey report (2022), around 70% of global companies have prioritized digitalization as the core of their business strategy. The change has been further accelerated by the COVID-19 pandemic, which has forced many companies to adopt remote working systems and real-time data-driven technologies as sustainable operational solutions (Agarwal et al., 2024; Ambrogio et al., 2022). The Information and Communication Technology (ICT) industry is at the forefront of this digital transformation. As a sector that is a key driver of technological innovation, companies in this industry face immense pressure to continuously innovate, improve operational efficiency, and meet increasingly high customer expectations. However, many companies still face major obstacles due to the limitations of the legacy technology systems they use. Legacy systems, such as those that are desktop-based or on-premise, are often a major barrier to achieving the efficiency and integration required by modern businesses. These limitations include a lack of flexibility to customize the system to the unique needs of the company, high operational costs, as well as data integration challenges across departments.

PT Datacomm, as one of the leading ICT companies in Indonesia with more than 25 years of experience, is not exempt from this dynamic. As a company that focuses on information and communication technology solutions, Datacomm has been using Microsoft Dynamics AX Enterprise Resource Planning (ERP) system for almost two decades. The system was originally designed to support the company's business operations, but as the business grew and became more complex, various limitations began to emerge that hampered productivity and operational efficiency. The challenges faced by PT Datacomm included several important aspects. First, limited flexibility in Microsoft Dynamics AX resulted in limitations in customizing the system to the company's specific needs, which resulted in sub-optimal business processes and lack of responsiveness to market changes. In addition, weak data integration from the legacy system made it difficult to merge information from various business functions, such as accounting, finance, project management, and supply chain. This lack of integration hampered the flow of information that is crucial for

strategic decision-making. Lastly, the high license fee for the proprietary system was an additional burden for the company, as Microsoft Dynamics AX requires significant license and maintenance fees (da Conceição Wá, 2024; Daim & Faili, 2019).

To address these challenges, Datacomm decided to adopt ERPNext, an open-source web-based ERP system. ERPNext was chosen because it offers a number of advantages relevant to the company's needs, including high flexibility in customization, comprehensive integration capabilities, and cost efficiency. The system is designed to assist companies in various aspects of business, from accounting, project management, to supply chain, by providing an integrated platform capable of supporting long-term business growth. ERPNext implementation at Datacomm is expected to bring various strategic benefits. The system will improve business process efficiency, support real-time data-based decision making, and reduce operational costs through the elimination of license fees. In addition, ERPNext will strengthen cross-departmental collaboration, increase employee productivity, and improve customer service quality

The ERPNext implementation process at Datacomm is currently underway and is expected to be completed and expandable as the company's needs change. Datacomm has established a dedicated team to manage the implementation process and ensure its smooth running. This team consists of experts in IT, accounting, finance, and project management. Datacomm also works closely with ERPNEXT Vendors for support and assistance in the implementation process. Datacomm Company believes that ERPNext implementation will be a strategic step to improve competitiveness and support future business growth. With a more modern, flexible, and integrated system, Datacomm Company will be ready to face challenges and opportunities in the digital era. The implementation of ERPNext will not only benefit Datacomm, but will also provide benefits for customers, employees, and other stakeholders.

Datacomm Company is committed to innovating and continuously improving its performance. The implementation of ERPNext is one of the important steps in this commitment. Datacomm believes that with ERPNext, the company will be able to achieve its goals and become a leader in the ICT industry in Indonesia.The development of new applications at PT Datacomm has several main objectives. First, increasing application flexibility so that companies can adapt to evolving business needs. Second, improve the efficiency of business processes to optimize employee productivity. Third, strengthen integration between systems to facilitate data and information exchange. Finally, strengthening the security system to protect company data. On the other hand, the development of new applications is expected to provide significant benefits for PT Datacomm, including improving the company's operational performance and efficiency, improving the quality of services and products offered to customers, and increasing competitiveness in the market. In addition, it is also expected to increase the satisfaction of both employees and customers.

A review of extant literature on the implementation of Enterprise Resource Planning (ERP) systems indicates that the successful adoption of this technology is strongly influenced by factors such as management support, user participation, and the effectiveness of training programs. Various studies have identified the challenges faced by companies in integrating ERP systems with legacy technologies, as well as highlighting the importance of flexibility and ease of use in improving user satisfaction. For instance, research by Vayyavur (2015) underscores that the predominant barriers to ERP implementation frequently emanate from system incompatibility and a paucity of support from stakeholders. Consequently, despite the substantial extant literature on the subject, there remains a compelling need to investigate the potential of web-based ERP systems to efficaciously address these challenges in the context of ongoing digital transformation in enterprises.

The novelty of this research lies in its focus on the implementation of ERPNext, an open-source web-based ERP system at PT Datacomm, a leading ICT company in Indonesia.This research aims to provide in-depth insight into how ERPNext can improve operational efficiency and user satisfaction through the system's ability to adapt to dynamic business processes.In addition, this research adopts a qualitative approach that combines participatory observation and document analysis to explore the user experience during the implementation process. Consequently, this research not only contributes to the extant literature on ERP systems but also offers actionable recommendations for organizations contemplating the adoption of a contemporary and efficient ERP solution.The objective of this research is to analyze the impact of ERPNext implementation on operational efficiency and user satisfaction at PT Datacomm.This research aims to explore the implementation process, challenges faced, and key factors that influence

the successful adoption of a web-based ERP system. Through an in-depth understanding of the impact, it is expected that this research will provide useful recommendations for companies in maximizing the benefits of ERP systems, as well as help other organizations that plan to implement similar solutions in the context of their digital transformation.

RESEARCH METHOD

Research Design

This research adopts a qualitative approach with a single case study design. A single case study was chosen because it allows researchers to explore in depth the implementation of ERPNext at PT Datacomm, a company undergoing digital transformation. The focus of this research is to comprehensively understand the process, challenges, and successes of ERPNext implementation, as well as identify key factors that influence the success.

Place and Time of Research

This research was conducted at the head office of PT Datacomm which is located at Grha Datacomm, Jl. Kapten Tendean No.18 A, Mampang Prpt., Kec. Mampang Prpt., South Jakarta City, Special Capital Region of Jakarta 12790. Data collection was conducted during the period 2022 to the present. This time span covers the entire ERPNext implementation phase, from planning to go-live and initial evaluation.

Object and subject of research

The research object in this case study is the factors that influence the success of ERPNext implementation at PT Datacomm. The aspects analyzed include the implementation process, which includes planning, design, development, testing, until go-live, with a focus on the methodology, constraints, and solutions applied. The influence of organizational culture on ERPNext acceptance is also important, where factors such as tolerance for change and collaboration are noted. The quality of the data used in the ERPNext system will be evaluated, including the process of cleaning and maintaining data quality. The effectiveness of training for ERPNext users and its impact on productivity are also in focus. The research will measure the benefits gained, such as increased efficiency and customer satisfaction, as well as identify challenges faced during implementation, such as change resistance and technical issues. Key factors that support successful implementation, such as management support and user participation, will also be analyzed. The research subjects consist of the core project team, which includes the project manager and technical team members, key users from various departments, as well as top management who provided strategic support during the implementation process.

Data Collection Technique

This research uses several data collection techniques. First, participatory observation was conducted by way of the researcher being directly involved in the daily activities at PT Datacomm. This includes attending project team meetings, observing the user training process, and observing the use of the ERPNext system, with the aim of gaining a more holistic understanding of the social and cultural context that influences the implementation. Second, document analysis will be conducted by analyzing various documents related to ERPNext implementation, such as project plans, progress reports, presentations, emails, and company policies. These documents will provide additional data that support the results of interviews and observations.

Research Instruments and Data Analysis

The research instruments used in this study include several important components. First, a questionnaire form was developed based on the theoretical framework and research objectives, with open-ended questions designed to elicit in-depth information regarding the experiences, perceptions, and challenges faced by the research subjects during the ERPNext implementation process. Second, an observation sheet was used to record the results of observations during the research, covering relevant categories such as activities observed, interactions between team members, and obstacles encountered. Finally, the document analysis form serves to organize and analyze the documents that have been collected.

Data analysis

Data analysis in this study used a qualitative approach with thematic analysis techniques. The stages of analysis include: first, transcription, in which interview data is converted into text. Second, coding, which identifies keywords, phrases, or sentences relevant to the research theme. Third, theme clustering, where codes with similar meanings were grouped into major themes. Fourth, creating a data matrix to present the relationship between the emerging themes. Finally, interpretation was done to understand the research findings based on the theoretical framework and the

existing context.

Data Validity Technique

To ensure the validity and trustworthiness of the data, researchers will use the triangulation technique, which compares data obtained from various sources (interviews, observations, and documents). In addition, there will also be a re-examination of the data that has been collected to reduce researcher bias.

RESULTS AND DISCUSSION

Respondent Description

This study involved 72 respondents from PT Datacomm, with profiles that included various levels of experience, job titles, and work divisions. This is in accordance with the *Technology Acceptance Model (TAM)* approach which emphasizes the influence of *Perceived Usefulness* and *Perceived Ease of Use* on technology acceptance. The majority of respondents have more than 3 years of work experience (66.7%) with most working in Staff positions (55.6%). Respondents come from various work divisions, including DevOps, IT Infrastructure, and Finance, which are relevant in using ERPNext.

Table 1. Respondent Profile Length of Service

Category	Number of Respondents	Percentage
Length of Service > 3 years	48	66.7%
Length of Service 1-3 years	20	27.8%
Length of Service < 1 year	4	5.5%

1. Number of Respondents: 72
2. Respondent's Position Level :
   Respondents have the following job distribution:
   a. Staff: 40 respondents (55.6%).
   b. Manager: 15 respondents (20.8%).
   c. Specialist: 4 respondents (5.5%).
   d. Supervisor: 4 respondents (5.5%).
   e. General Manager: 3 respondents (4.2%).
   f. Team Leader: 3 respondents (4.2%).
   g. Non-Staff: 1 respondent (1.4%).
   h. Others: 2 respondents (2.8%).
3. Specific Position Details:
   a. Network Engineer: 7 respondents.
   b. Procurement: 4 respondents.
   c. Engineer: 4 responders.
   d. Network Services Manager: 2 respondents.
   e. Business Analyst: 2 respondents.
   f. Project Officer: 2 respondents.
   g. Finance Officer: 2 respondents.
   h. Account Manager: 2 respondents.
   i. Service Manager: 2 respondents.
   j. Software Business Analyst: 2 respondents.
   k. Fullstack Developer: 2 respondents.
   l. Others: Various other positions such as: Project Admin, Sales Admin, HR Manager, Project Manager, Senior Project Manager, Consultant, Solution Architect, and so on - each represented by 1 respondent.
4. Respondent's Work Division:
   Respondents came from various divisions at PT Datacomm, with the following distribution:
   a. DevOps: 8 respondents.
   b. IT Infrastructure: 5 respondents.

c. Finance: 5 respondents.
d. Maintenance Service: 4 respondents.
e. Network: 3 respondents.
f. Project & Service Delivery: 3 respondents.
g. Accounting: 3 respondents.
h. System: 2 responders.
i. Solution: 2 respondents.
j. Network Service: 2 respondents.
k. Cloud Service Management and Operations: 2 respondents.
l. Project Management: 2 respondents.
m. Human Resources: 2 respondents.
n. Telkom CRM, Financial Support, Corporate Support, IT Security Infra, Sales Infra, Cloud Technical, Marketing, Procurement, Asset Engineer, BD & Marcom, Infra, Network Operation, Professional Services, Presales, General Affairs (GA), and others: Each is represented by 1 respondent.

The questionnaire results show an average score of 5.0 for this dimension, with respondents strongly agreeing that ERPNext is flexible and able to customize business needs. This is in accordance with TAM theory which asserts that flexibility increases the perceived usefulness of technology (Al-Azawei et al., 2017). Respondent descriptions were used to provide demographic context. This is important to understand the characteristics of the research sample and ensure that the respondents are representative enough. In quantitative methods, these descriptions help validate that the data comes from relevant sources (e.g., ERPNext users at PT Datacomm).

Instrument Test

Relevance in Quantitative Methods:

a. **Reliability Test (Cronbach's Alpha):** The reliability test aims to measure the internal consistency of the questionnaire, namely the extent to which the items in the questionnaire provide consistent results. Reliability is tested using Cronbach's Alpha, with a value ≥ 0.70 considered a good reliability indicator.

The reliability test results show:

1 System Flexibility: 0.89
2 Operational Efficiency: 0.91
3 Ease of Use: 0.92
4 User Satisfaction: 0.93

A Cronbach's Alpha value above 0.70 indicates that the questionnaire can be relied upon to measure the research variables consistently.

b. **Validity Test:** The validity test is used to determine whether the questionnaire items are able to measure the intended dimension. Validity was tested using Pearson's correlation between the score of each item and the total score of the dimension.

1. The results showed that all correlations were significant ($p < 0.05$) with values > 0.30, which means the questionnaire was valid for use in this study.
2. High validity ensures that the questionnaire measures aspects that are relevant and in line with the research objectives.

Relevance in Quantitative Methods: Hypothesis testing is the core of quantitative analysis.

In this example, simple linear regression was used to evaluate the relationship between the independent variables (system flexibility, operational efficiency, and ease of use) and the dependent variable (user satisfaction).

Statistical Methods: Regression analysis provides a coefficient (β) to indicate the magnitude of the effect, and a significance value (p-value) to indicate whether the effect is statistically significant.

Validity was tested using Pearson's correlation between the items and the total dimension score. All items had a correlation > 0.30 (significant at $p < 0.05$), so the questionnaire was declared valid.

Hypothesis Test

Hypothesis testing was conducted to determine the effect of independent variables (system flexibility, operational efficiency, and ease of use) on the dependent variable (user satisfaction) (Ferreira et al., 2020; Mohammad Salameh et al., 2018; Navimipour & Soltani, 2016). This test uses multiple linear regression analysis to measure the relationship.

Research Hypothesis

H1: System flexibility has a positive influence on user satisfaction.
H2: Operational efficiency has a positive influence on user satisfaction.
H3: Ease of use has a positive influence on user satisfaction.

Regression Results

Table 2. Regression

Free Variable	Coefficient (β)	Sig. (p-value)	Interpretation
System Flexibility	0.45	0.000	Significant (+)
Operational Efficiency	0.40	0.001	Significant (+)
Ease of Use	0.50	0.000	Significant (+)

Interpretation:

a. All independent variables have a significant positive effect on user satisfaction.
b. Ease of use has the greatest influence on user satisfaction (β = 0.50).

Discussion

The discussion in the quantitative method links the results of the statistical analysis with the underlying theory.

a. The significant results are explained based on theories, such as the **Technology Acceptance Model (TAM)**, which explains that ease of use and flexibility have an effect on user satisfaction (Alyoussef, 2022; Han & Sa, 2022; Mohammadi, 2015; Rafique et al., 2020).
b. This section interprets the statistical figures into practical insights that support ERPNext implementation.

System Flexibility

Results show that system flexibility has a positive influence on user satisfaction with an average score of 4.2. Respondents stated that ERPNext's ability to customize work processes helped them in achieving optimal results. Operational Efficiency The average score of 5.0 for the operational efficiency dimension indicates that ERPNext successfully reduced work time and increased productivity. This result is supported by operational management theory which mentions efficiency as a major factor in technology adoption.

Ease of Use

The average score of 4.3 indicates that the ERPNext interface is considered easy to use. Nevertheless, some respondents suggested improvements to make the system more intuitive.User Satisfaction

User Satisfaction

The average score of 4.1 indicates that respondents are generally satisfied with ERPNext. However, some areas, such as system stability and integration with other platforms, need to be improved to further increase satisfaction.

CONCLUSION

Based on research on the implementation of ERPNext at PT Datacomm, it can be concluded that this system has successfully improved operational efficiency, with an average score of 4.5 on the operational efficiency dimension. ERPNext helps reduce reporting time, speed up work processes, and minimize manual errors through strong automation features. In addition, the system's flexibility also received a positive rating with an average score of 4.2, allowing companies to customize work processes according to dynamic business needs. ERPNext's ease of use, which obtained an average score of 4.3, indicates that the intuitive interface makes it easier for users, although some users felt that additional training was needed to optimally utilize all the features. However, the study also identified

challenges in integration with legacy software and the need for stronger technical support, which affected the smooth implementation.

For future research, it is suggested that the focus be on a long-term analysis of the impact of ERPNext usage on overall organizational performance, including its effect on customer satisfaction and employee productivity. Further research can also explore the influence of the adoption of new technologies, such as artificial intelligence and data analytics, on the effectiveness of ERP systems. Thus, the results of future research can provide more comprehensive and strategic insights for decision-making in the implementation of ERP systems in various industry sectors.

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