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Evaluating Digital Transformation Effectiveness in Plantation Operational Administration Using a Framework Based Information System Approach

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ABSTRACT

This study presents an empirical evaluation of the effectiveness of digital transformation of plantation operational administration, through the implementation of the LintraMax Plantation Director (LPD) system at PT. Tolan Tiga Indonesia – Pelabian Estate uses the Digital Transformation Framework (DTF). Different from previous research, which tended to be conceptual, this study was based on the implementation of real systems used operationally by five main administrative functions, namely Payroll Clerk, Material Clerk, Accounting Clerk, Production Clerk, and General Clerk. This study uses a descriptive qualitative method with data collection through observation, in-depth interviews, and documentation, which is analyzed using the Miles and Huberman model. The results of the study show that the application of LPD is able to increase work time efficiency, speed up the reporting process, and increase the consistency and accuracy of administrative data. Based on the assessment using the Digital Transformation Framework, the level of effectiveness of digital transformation is in the Good category, with the main strength in the technology and strategy dimensions, but still requires strengthening in the aspects of work culture and human resource development. The findings of this study provide an academic contribution in the form of empirical evidence of the application of the Digital Transformation Framework in plantation operational administration, as well as practical implications for plantation organizations in designing sustainable digital transformation.

KEYWORD: Administrative Effectiveness, Digital Transformation, Digital Transformation Framework, LintraMax Plantation Director (LPD), Plantation Operations

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1. INTRODUCTION

Digital transformation has become a key strategic agenda for organizations in various industry sectors in facing the dynamics of an increasingly competitive and technology-based business environment. This concept is understood as a comprehensive change process that not only focuses on the application of digital technology, but also includes changes in organizational strategies, business processes, organizational structures, as well as work culture and human resource competencies [1]. This approach emphasizes that technology only acts as an enabler, while the success of digital transformation is largely determined by the overall readiness of the organization [2].

Recent research shows that organizations that successfully carry out comprehensive digital transformation are able to improve operational efficiency and the quality of managerial decision-making [3]. In addition, digital transformation also contributes to increasing organizational flexibility in responding to changes in the dynamic external environment [4]. Therefore, digital transformation is seen as a long-term strategic investment that must be aligned with the organization's vision and goals [5].

In the context of the plantation sector, digital transformation is becoming increasingly important due to its complex operational characteristics and heavy reliance on daily data, such as production, labor, material, and operational cost data [6]. Digitalization in the agribusiness sector has been proven to be able to improve the

accuracy of recording and transparency of operational data [7]. In addition, digital systems also help speed up the reporting process so that information can be used in a timely manner in management decision-making [8].

However, without the support of an integrated digital system, plantation companies still face various problems, such as delays in reports, data inconsistencies between work units, and high potential for manual recording errors [9]. These problems can have a direct impact on operational efficiency and the quality of management control [10]. Therefore, the use of integrated information systems is an unavoidable need for modern plantation companies [11].

PT. Tolan Tiga Indonesia – Perlabian Estate is one of the plantation companies that has initiated digital transformation through the implementation of the LintraMax Plantation Director (LPD) application as the main operational administration system [12]. The LPD application is used by several key roles, namely Payroll Clerk, Material Clerk, Accounting Clerk, Production Clerk, and General Clerk in carrying out the process of recording, processing, and reporting data digitally [13]. The implementation of this system is expected to be able to reduce reliance on manual recording and improve data consistency between departments [14].

Various studies state that the application of integrated information systems in administrative functions can significantly reduce work process time [15]. In addition, digital systems have also been proven to be able to reduce the rate of data input errors that often occur in manual processes [16]. The consistency and reliability of the data generated by digital systems is an important factor in supporting data-driven decision-making [17].

However, the adoption of digital technology alone does not automatically guarantee the success of digital transformation [18]. The success of digital transformation is greatly influenced by the alignment between digital strategies, business processes, organizational structures, as well as work culture and human resource readiness [19]. Many organizations have implemented digital systems, but have not received optimal benefits because the transformation is still partial [20].

To overcome these problems, an evaluation approach is needed that is able to assess digital transformation comprehensively and systematically [21]. The Digital Transformation Framework (DTF) is one of the frameworks that is widely used in recent research because it is able to evaluate digital transformation through five main dimensions, namely strategy, business processes, technology, organizational structure, as well as work culture and human resources [22]. This framework allows organizations to identify the strengths and weaknesses of digital transformation that have been implemented [23].

The use of the Digital Transformation Framework in this study is also supported by empirical findings that show that a framework-based approach is able to provide a more objective picture of the level of effectiveness of digital transformation [24]. Thus, this study aims to analyze the effectiveness of the digital transformation of plantation operations through the application of the LintraMax Plantation Director (LPD) application at PT. Tolan Tiga Indonesia – Perlabian Estate uses the Digital Transformation Framework as the main analysis tool [25].

Although studies on digital transformation continue to develop, most previous research has focused on conceptual aspects or general technology adoption. In the plantation sector, especially in operational administration, empirical studies evaluating the effectiveness of digital transformation based on the implementation of real systems are still relatively limited. In addition, there are not many studies that use the Digital Transformation Framework approach comprehensively to assess the integration between strategies, business processes, technology, organizational structure, as well as work culture and human resources in the context of plantation administration.

Based on these gaps, this study provides a scientific contribution by presenting an empirical evaluation of the application of the Digital Transformation Framework in plantation operational administration based on the LintraMax Plantation Director (LPD) system. This research not only assesses the technological aspect, but also analyzes the linkages between the dimensions of digital transformation, thereby providing a more comprehensive understanding of the factors that affect the effectiveness of digital transformation in the plantation sector.

Therefore, this study aims to evaluate and analyze the effectiveness of the digital transformation of plantation operational administration through the implementation of the LintraMax Plantation Director (LPD) system at PT. Tolan Tiga Indonesia – Perlabian Estate uses the Digital Transformation Framework.

2. METHODOLOGY

This research uses a descriptive qualitative approach with the aim of gaining an in-depth understanding of processes, user experience, and organizational dynamics in the implementation of digital transformation. This approach is considered most appropriate to evaluate the effectiveness of digital transformation involving non-technical aspects, such as organizational strategy, work culture, and human resource readiness, which cannot be measured quantitatively.

The research was carried out at PT. Tolan Tiga Indonesia – Perlabian Estate in the period July-August 2025. The research informants were selected using the purposive sampling technique, namely employees who are directly involved in operational administration and are active users of the LintraMax Plantation Director (LPD) system, consisting of Payroll Clerk, Material Clerk, Accounting Clerk, Production Clerk, and General Clerk.

Data collection was carried out through participatory observation, in-depth interviews, and documentation. Observations are focused on data input activities, verification flows, and the process of preparing reports using the LPD application. The interviews were conducted to explore the user experience, perception of the benefits of the system, and obstacles faced during implementation. Documentation includes production reports, attendance recaps, material reports, and other digital documents generated by the system.

Data analysis was carried out using the Miles and Huberman model, which included the stages of data reduction, data presentation, and conclusion drawn. Data reduction is carried out by selecting and grouping information relevant to the research objectives. The presentation of data is carried out in the form of a narrative and thematic matrix to facilitate understanding of the pattern of findings. Conclusions are drawn repeatedly to ensure consistent interpretation and in accordance with field data. The validity of the data is strengthened through triangulation of sources, techniques, and time.

The evaluation of the effectiveness of digital transformation is carried out using the Digital Transformation Framework (DTF) which includes five main dimensions, namely strategy, business processes, technology, organizational structure, as well as work culture and human resources. Each dimension was evaluated using an assessment scale of 1–5, where scores were obtained through the synthesis of observational results, in-depth interviews, and documentation analysis. The assessment is carried out based on indicators adjusted to the context of plantation operational administration, such as the level of strategic alignment, the efficiency of the work process, the stability and ease of use of the system, the clarity of the division of roles, and the adaptability of users to the digital system.

The scores in each dimension were then categorized into levels of effectiveness, namely very low (1.0–1.9), low (2.0–2.9), adequate (3.0–3.4), good (3.5–4.4), and excellent (4.5–5.0), to provide a more objective interpretation of the success rate of digital transformation.

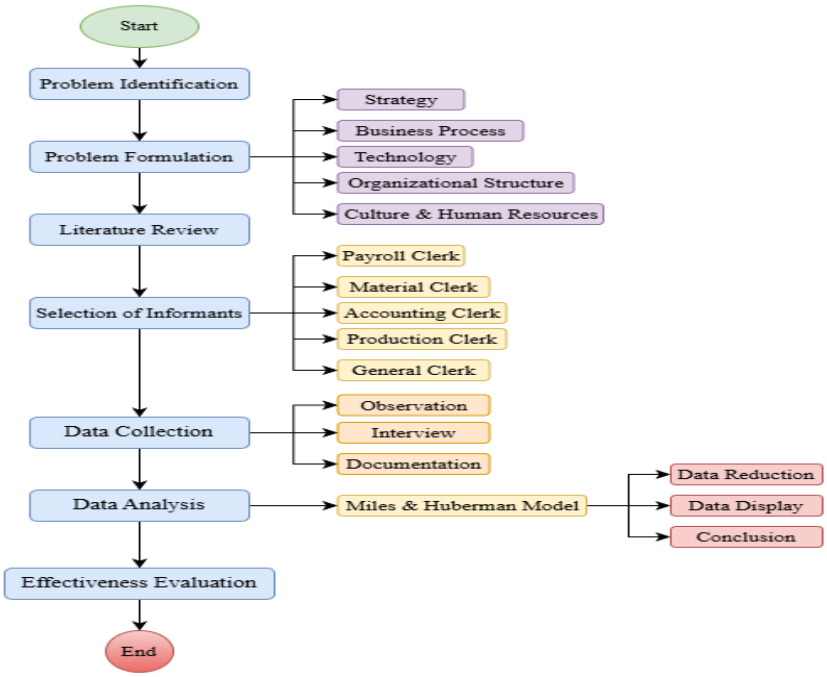

Figure 1. Research method flow

Figure 1 shows the stages of research starting from problem identification, data collection, analysis using DTF, to drawing conclusions.

3. RESULTS AND DISCUSSION

3.1 Results of Role-Based Digital Transformation Implementation

The implementation of the LintraMax Plantation Director (LPD) application is carried out in five main roles, namely Payroll Clerk, Material Clerk, Accounting Clerk, Production Clerk, and General Clerk. The evaluation was carried out by comparing administrative performance before and after the implementation of the system based on indicators of processing time, input error rate, and data accuracy.

Table 1. Comparison of Administrative Performance Before and After LPD Implementation

Role	Indicator	Before	After	Changes
Payroll Clerk	Payroll processing time (hours)	6	2	↓ 66%
Material Clerk	Data input error (%)	12	4	↓ 67%
Accounting Clerk	Report time (days)	3	1	↓ 67%
Production Clerk	Data accuracy (%)	85	97	↑ 14%
General Clerk	Archive search time (minutes)	20	5	↓ 75%

Based on Table 1, the implementation of the LintraMax Plantation Director (LPD) application showed a significant improvement in administrative performance in all work functions. The decrease in processing time for Payroll Clerks and Accounting Clerks shows that digitalization is able to accelerate the administrative work cycle that previously relied on manual record-keeping.

The decrease in the rate of data input errors in the Material Clerk indicates an increase in recording accuracy due to more structured system and workflow validation. Meanwhile, the increase in production data accuracy from 85% to 97% in Production Clerk reflects the increased consistency and reliability of the operational data generated by the system. Overall, these findings show that the implementation of the LPD system not only has an impact on work time efficiency, but also contributes to improving the quality of administrative data that is the basis for managerial decision-making.

3.2 Implementation Analysis Based on Digital Transformation Framework

To ensure that digital transformation is not only technical, the evaluation is carried out using the Digital Transformation Framework (DTF) which includes five main dimensions: strategy, business processes, technology, organizational structure, as well as work culture and human resources.

Table 2. Digital Transformation Framework Mapping to LPD Implementation

Dimensions	Evaluation Indicators	Findings
Strategy	Management Support	Aligned with the digital vision
Business Process	Efficiency & Integration	Faster workflows
Technology	Stability and Usability	Integrated system
Organizational Structure	Role Clarity	Clear division of tasks
Culture & HR	User Adaptation	Adaptive, needs improvement

Based on Table 2, the results of the mapping based on the Digital Transformation Framework show that the implementation of LPD has covered most of the dimensions of digital transformation. In the strategic dimension, management's support for administrative digitalization shows that there is alignment with the direction of organizational development.

The business process dimension shows the simplification of workflows and increased integration between parts, which has a direct impact on operational efficiency. In terms of technology, the stability and ease of use of the system support the sustainability of the use of LPD in daily administrative activities. However, in the dimension of work culture and human resources, there is still a need to improve digital competencies through continuous training. This shows that the success of digital transformation is not only determined by technological readiness, but also by human readiness as system users.

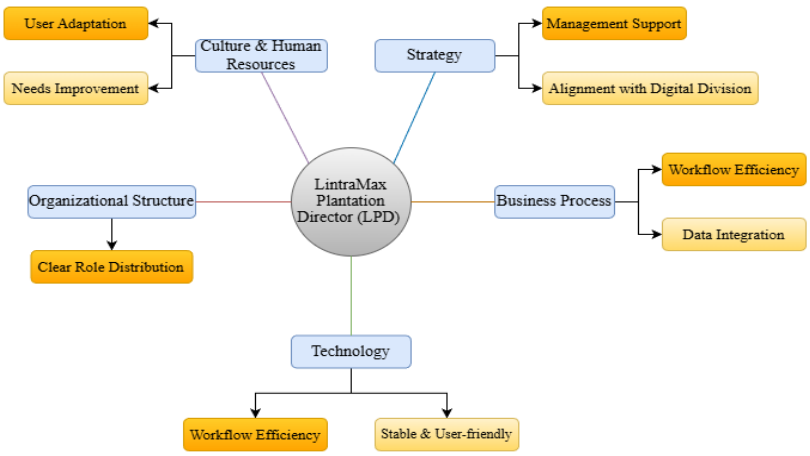

Figure 2. Implementation of Digital Transformation Framework in LPD Applications

Based on Figure 2, the implementation of the LintraMax Plantation Director (LPD) application shows that the digital transformation carried out does not only focus on technological aspects, but also includes strategic, operational, and human resource dimensions. The strategic dimension can be seen from the management's support for administrative digitalization that is in line with the company's digital vision. In the business process dimension, LPD is able to simplify workflows and improve data integration between departments.

In terms of technology, the LPD system is considered stable and easy to use so that it can support administrative activities in a sustainable manner. The organizational structure also shows a clear division of roles in each of the clerical functions. However, in the dimensions of work culture and human resources, competency improvement is still needed through continuous training so that digital transformation can run optimally and sustainably.

3.3 Evaluation of the Effectiveness Level of Digital Transformation

To evaluate the extent of the success of digital transformation in a quantitative way, effectiveness measurement was carried out in each dimension in the Digital Transformation Framework using an assessment scale.

Table 3. The Effectiveness Rate of Digital Transformation Based on DTF

Dimensions	Score (1-5)	Category
Strategy	4,5	Aligned with the digital vision
Business Process	4,2	Faster workflows
Technology	4,6	Integrated system
Organizational Structure	4,1	Clear division of tasks
Culture & HR	3,8	Adaptive, needs improvement

Based on Table 3, the assessment of the level of effectiveness of digital transformation based on the Digital Transformation Framework showed that the technology and strategy dimensions obtained the highest scores, indicating that the LPD system has been able to support digital transformation technically and in line with the direction of the organization.

On the other hand, the dimensions of work culture and human resources received the lowest score even though they were still in the good category. These findings indicate that the human aspect is a key factor that needs to be strengthened so that digital transformation can run sustainably and have a maximum impact on the company's operational performance.

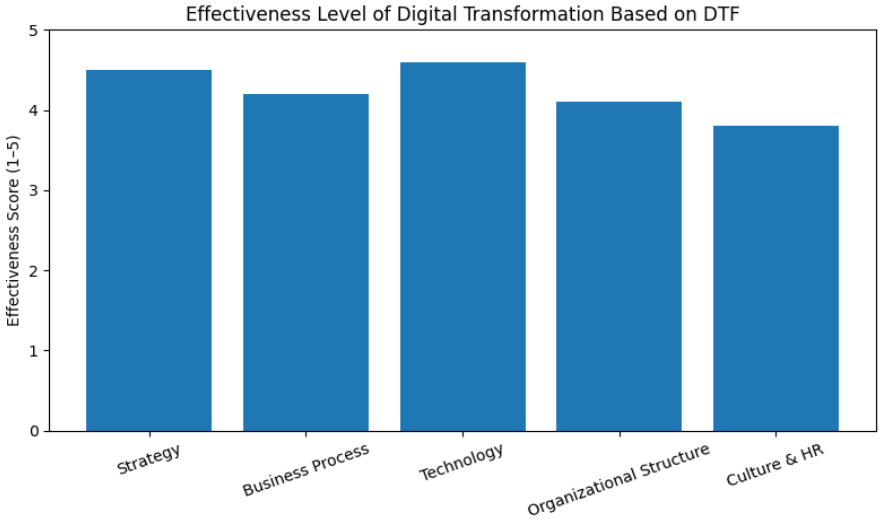

Figure 3. Graph of the Effectiveness Level of Digital Transformation Based on DTF

Based on Figure 3, the technology dimension obtained the highest score of 4.6 which indicates that the LPD system has been able to support digital transformation optimally through an integrated and stable system. The strategy dimension also received a high score of 4.5, which indicates that the implementation of LPD has been aligned with the company's vision and digitalization direction.

Meanwhile, the work culture and human resources dimension received the lowest score of 3.8 although it was still in the good category. This shows that the human aspect is an important factor that needs to be strengthened through capacity building and continuous training so that digital transformation can run sustainably and have a maximum impact on the company's operational performance.

3.4 Discussion

The results of this study show that the implementation of the LintraMax Plantation Director (LPD) application at PT. Tolan Tiga Indonesia – Perlabian Estate has a positive impact on the effectiveness of operational administration, especially in improving process time efficiency, reducing data input errors, and improving information accuracy and consistency. These findings are in line with the view of Verhoef et al. [1] who stated that digital transformation is a multidimensional process that is able to improve operational performance if applied in an integrated and strategic manner. This is also reinforced by Kraus et al. [2] who affirm that the digitization of internal business processes contributes directly to organizational efficiency and productivity.

The observed improvement in work time efficiency across all clerical roles indicates that administrative digitization significantly reduces time-consuming manual activities. This result is consistent with prior studies emphasizing that integrated digital systems streamline workflows and enhance the reliability of organizational information [3],[4]. From an operational perspective, the LPD system functions as an enabler that facilitates faster data processing and reporting, thereby supporting more timely managerial decision-making.

The decrease in the rate of data input errors after the implementation of LPD is also in line with research on the plantation and agribusiness sectors. Siregar stated that the digital information system in the plantation sector is able to significantly improve the accuracy of operational data recording [5]. This is reinforced by the findings of Harahap et al. [6] who show that the digitization of plantation production administration is able to reduce recording errors and improve the reliability of operational reports. Thus, the results of this study confirm that administrative digitalization is an effective solution to the problem of manual recording in the plantation sector.

From the perspective of digital transformation strategy, the results of this study show that the implementation of LPD has been aligned with the company's administrative modernization strategy. These findings are consistent with Bresciani et al.'s research which states that a targeted digital transformation strategy is able to improve organizational performance in a sustainable manner [7]. However, this study is also in line with the findings of Bughin et al. [8] and Kane et al. [9] who affirm that digital transformation can fail if it focuses only on technology without the support of adequate strategies and organizational changes.

In the dimension of human resources and work culture, the results of the study show that LPD users have good adaptability to the digital system. These findings support the research of Samsudin and Nurhalimah who stated that the role of human resources is a key factor in the success of organizational digital transformation [10]. In addition, Lumbanraja [11] also emphasized that the transparency and consistency of data in the digital administration system is greatly influenced by the competence and discipline of system users.

The results of this study are also in line with the concept of dynamic capabilities put forward by Warner and Wäger [12], where organizations that are able to develop dynamic capabilities through digital technology will be more adaptive to changes in the business environment. The improvement in administrative efficiency and accuracy through LPD shows that the company has started to build these digital capabilities.

When compared to previous research, the findings of this study are consistent with the results of Lestari and Yuningsih [13] who stated that digital transformation contributes to improving organizational administrative performance. In addition, these results also support the digital business strategy framework put forward by Bharadwaj et al. [14] which emphasize the importance of integrating digital technology with organizational business strategies.

In the traditional industrial sector, Correani et al. stated that digital transformation requires adjustments to organizational structures and business processes so that the benefits of technology can be optimally felt [15]. These findings are relevant to the results of the study which shows that a clear division of clerical roles and the support of organizational structures also support the effectiveness of LPD implementation. This is also in line with the research of Almeida et al. [16] which affirm that organizational culture has a significant influence on the success of digital transformation.

Furthermore, research by Fitriani et al. and Rahman et al. shows that an organization's digital capabilities have a positive effect on operational performance [17], [18]. These findings support the results of research that show an increase in the efficiency and quality of operational reports after the implementation of LPD. In addition, Zhang et al. [19]also found that digital transformation has a positive correlation with improved operational performance and organizational sustainability.

In the context of innovation and organizational transformation, the results of this study are also relevant to the findings of Nambisan et al. who stated that digital transformation encourages changes in the way of working and the creation of new values in organizations [20]. The evaluation of integrated information systems carried out in this study is in line with the approach put forward by Susanti and Prabowo [21], which emphasize the importance of comprehensive digital system evaluation in the agribusiness sector.

Furthermore, the results of this study support Wahyudi's view that digital transformation in modern organizations must be carried out gradually and sustainably [22]. This condition is also in line with the concept of digital maturity put forward by Ferreira et al. [23], where organizations are at a certain level of digital maturity and still need to strengthen the strategic and HR aspects. These findings are reinforced by Müller et al. [24] who stated that organizational readiness is a determining factor for the success of long-term digital transformation.

Thus, the overall results of this study are not only consistent with previous research, but also strengthen the relevance of the Digital Transformation Framework as a tool for evaluating digital transformation in the operational sector. This is in line with Rahayu and Putra's research which emphasizes that the use of digital transformation frameworks is able to provide a more comprehensive and objective evaluation of the implementation of digital systems in operations-based industries.

4. CONCLUSION

This study analyzes the effectiveness of digital transformation of plantation operational administration through the implementation of the LintraMax Plantation Director (LPD) system at PT. Tolan Tiga Indonesia – Perlabian Estate uses the Digital Transformation Framework. The results of the study show that the implementation of LPD is able to improve work time efficiency, reduce data input errors, and improve the accuracy and consistency of operational information.

The evaluation based on the Digital Transformation Framework shows that the technology and strategy dimensions are at a good level of effectiveness, while the business process and organizational structure dimensions are enough to support the implementation of digital systems. However, the dimensions of work culture and human resources still need to be strengthened so that digital transformation can be sustainable.

The main contribution of this research lies in the empirical evaluation of the application of the Digital Transformation Framework in the real system-based administration of plantation operations. Practically, the results of this study confirm that digital transformation in the plantation sector needs to be carried out in an integrated manner by strengthening organizational and human resource aspects.

This research has several limitations. First, the research was conducted on one unit of plantation companies so that the results of the research could not be generalized widely to all plantation sectors. Second, the qualitative approach used is highly dependent on the perception and experience of the research subject, so the potential for subjectivity is unavoidable. Third, the evaluation of the effectiveness of digital transformation has not considered quantitative performance indicators in detail, such as the measurement of process time or statistical error rates. Therefore, further research is recommended to expand the research object to more than one plantation company and combine qualitative and quantitative approaches so that the evaluation of digital transformation can be carried out more comprehensively and objectively.

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