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The Effect of Digital Transformation on Employee Work Effectiveness at Bone Sugar Factory

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Abstract

Purpose of Study: This study aims to analyze the effect of digital transformation on employee work effectiveness at Bone Sugar Factory.
Methodology: This quantitative survey involved 103 respondents from a population of 420 employees. Data were collected through Google Forms from June 4 to June 28, 2026, and analyzed using IBM SPSS Statistics version 26 through descriptive statistics, validity and reliability tests, simple linear regression, t-test, and coefficient of determination.
Main Findings: Digital transformation had a positive and statistically significant effect on work effectiveness, with a regression coefficient of 0.723, t-value of 11.855, significance of 0.000, and R^2 of 0.582. The mean scores for digital transformation and work effectiveness were 4.48 and 4.37, respectively, both categorized as very high.
Novelty/Originality of This Study: This study empirically examines the relationship in the context of a sugar industry-based agroindustrial organization, a context that remains relatively limited in previous studies.

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INTRODUCTION

Background of the study:

Digital transformation has become an important strategy for improving organizational productivity in response to developments in information and communication technology. Digital technology has driven changes across sectors, including manufacturing, through information systems, work-process automation, data analysis, and technology-based communication. The Indonesian government, through the Making Indonesia 4.0 program, has established digital transformation as a national strategy to strengthen industrial competitiveness through digital technology adoption, productivity improvement, and development of human resources who are adaptive to technological change (Ministry of Industry of the Republic of Indonesia, 2023). Statistics Indonesia (2024) also reports increasing information technology use across business sectors.

Literature review:

Vial (2021) defines digital transformation as the process of reshaping organizations through digital technology to create new value, improve business-process efficiency, and increase organizational responsiveness to environmental changes. Verhoef et al. (2021) emphasize that digital transformation involves changes in business strategy, organizational culture, and operating models. Westerman, Bonnet, and McAfee (2022) state that its success depends on integrating technology with business strategy and human resources. Laudon and Laudon (2022) show that integrated information systems can support decision-making, information flows, and coordination across organizational units.

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Gap analysis:

Previous studies indicate a positive relationship between digital transformation and organizational effectiveness. Rahmani et al. (2025) found a significant effect on employee performance management effectiveness, while Astari et al. (2026) reported positive effects on human resource management. Ariyanti and Gumilar (2024) linked digital transformation to work effectiveness through employee communication. However, most previous studies have been conducted in service, education, government, or general organizational settings. Research in agroindustry-based manufacturing, particularly the sugar industry, remains relatively limited.

Rationale of the study:

Bone Sugar Factory began developing digital technology applications in 2024 to support its operational activities. The use of information systems, digital communication, and technology-based data management is expected to accelerate work and improve work effectiveness. However, empirical evidence regarding the extent to which digital transformation affects employee work effectiveness at Bone Sugar Factory remains limited.

Purpose or Hypotheses of the study:

This study aims to analyze the effect of digital transformation on employee work effectiveness at Bone Sugar Factory. The hypothesis is that digital transformation has a positive and significant effect on employee work effectiveness at Bone Sugar Factory.

METHOD

Research Design:

This study used a quantitative approach with a survey method to examine the relationship between digital transformation (X) and employee work effectiveness (Y) using numerical data.

Participant:

The respondents were 103 employees of Bone Sugar Factory who met the research criteria and provided usable questionnaire responses.

Population and the methods of sampling:

The population consisted of 420 employees. The minimum sample was calculated using the Slovin formula with a 10% margin of error: $n = 420 / (1 + 420(0.10)^2) = 80.77$, rounded to 81 respondents. Probability sampling with simple random sampling was used. A total of 103 eligible questionnaires were obtained and analyzed.

Instrumentation:

The instrument was a five-point Likert questionnaire: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1). It consisted of 20 statements, with 10 items for digital transformation and 10 items for work effectiveness. Validity was tested using Pearson Product Moment correlation and reliability using Cronbach's Alpha. All items were valid with item-total correlations above 0.80, and the instrument was highly reliable with Cronbach's Alpha of 0.983.

Procedures and if relevant, the time frame:

The study was conducted at Bone Sugar Factory, Bone Regency, South Sulawesi. Data were collected online through Google Forms from June 4 to June 28, 2026. Primary data were obtained from questionnaires, while secondary data were obtained through literature from books, scientific journals, official government documents, and other relevant sources.

Analysis plan:

Data were analyzed using IBM SPSS Statistics version 26 through descriptive statistics, validity testing, reliability testing, simple linear regression, t-test, and coefficient of determination (R^2). Hypothesis testing used a 5% significance level ($\alpha = 0.05$).

Scope and/or limitations of the methodology you used:

The study examined only one independent variable, digital transformation, in relation to work effectiveness and was conducted at a single research site. The R^2 value of 0.582 indicates that 41.8% of the variation in work effectiveness is associated with factors outside the model.

RESULTS AND DISCUSSION

Results:

The study involved 103 employees as respondents. Respondent characteristics, descriptive statistics, validity and reliability results, and regression results are presented below.

Table 1. Operationalization of Research Variables

Variable	Indicator	Item No.
Digital Transformation (X)	Use of digital technology	1, 2
Digital Transformation (X)	Ease of information access	3, 4
Digital Transformation (X)	Digital-based work communication	5, 6
Digital Transformation (X)	Technology-based work system	7, 8
Digital Transformation (X)	Work process efficiency	9, 10
Work Effectiveness (Y)	Timeliness of work	11, 12
Work Effectiveness (Y)	Work quality	13, 14
Work Effectiveness (Y)	Work productivity	15, 16
Work Effectiveness (Y)	Work efficiency	17, 18
Work Effectiveness (Y)	Achievement of work targets	19, 20

Source: Primary data processed (2026)

Table 2. Respondent Characteristics

Characteristic	Frequency (n)	Percentage (%)
Gender – Male	93	90.3
Gender – Female	10	9.7
Age – ≤30 years	3	2.9
Age – 31–40 years	24	23.3
Age – 41–50 years	53	51.5
Age – >50 years	23	22.3
Length of work – <10 years	10	9.7
Length of work – 10–20 years	50	48.5
Length of work – 21–30 years	39	37.9

Characteristic	Frequency (n)	Percentage (%)
Length of work – >30 years	4	3.9
Division – Technical Services	28	27.2
Division – Plantation	26	25.2
Division – HR and General Affairs	21	20.4
Division – Processing/Refining	13	12.6
Division – Installation	13	12.6
Division – Warehouse	2	1.9
Total	103	100.0

Source: Primary data processed (2026)

Most respondents were male (90.3%), with the dominant age group being 41–50 years (51.5%). Most respondents had worked for 10–20 years (48.5%) and came from the Technical Services Division (27.2%).

Table 3. Descriptive Statistics of Research Variables

Variable	Mean	Category
Digital Transformation	4.48	Very High
Work Effectiveness	4.37	Very High

Source: Primary data processed (2026)

The descriptive results show mean scores of 4.48 for Digital Transformation and 4.37 for Work Effectiveness, both categorized as very high. For digital transformation, the highest indicator was that digital technology makes work easier (4.61), while the lowest was that technology helps reduce work errors (4.34). For work effectiveness, the highest values were increased productivity and digital systems making work easier (4.42 each), while the lowest was the ability to achieve work targets (4.32).

Table 4. Validity and Reliability Test Results

Test	Result	Conclusion
Validity	r calculated > 0.80	All items valid
Reliability	Cronbach's Alpha = 0.983	Highly reliable

Source: Primary data processed (2026)

All questionnaire items had item-total correlations above 0.80 and were therefore considered valid. Cronbach's Alpha of 0.983 indicates very high internal consistency.

Table 5. Model Summary and ANOVA Test

R	R Square	Adjusted R Square	F	Sig.
0.763	0.582	0.578	140.50	0.000

Source: Primary data processed (2026)

The R^2 value of 0.582 indicates that digital transformation explains 58.2% of the variation in employee work effectiveness, while 41.8% is associated with other factors outside the study. The F value of 140.50 with a significance level of 0.000 indicates that the regression model adequately explains the relationship between the two variables.

Table 6. Simple Linear Regression Test Results

Variable	Coefficient (B)	t	Sig.
Digital Transformation	0.723	11.855	0.000

Source: Primary data processed (2026)

The regression equation is Y = a + 0.723X. The regression coefficient of 0.723 indicates that a one-unit increase in digital transformation is associated with a 0.723-unit increase in work effectiveness. The t-value of 11.855 with a significance level of 0.000 (<0.05) indicates a positive and statistically significant effect.

Discussion:

The findings are consistent with Vial (2021), who explains that digital transformation can improve operational efficiency and create added value. Verhoef et al. (2021) emphasize that digital transformation involves not only technology adoption but also changes in business processes and organizational strategy. At Bone Sugar Factory, digital technology is reflected in easier access to information, faster work communication, and support for task completion. The results are also consistent with Rahmani et al. (2025), Astari et al. (2026), and Ariyanti and Gumilar (2024).

Implications:

The findings highlight the importance of optimizing information systems, digital communication, and technology use in work activities. Developing employees' digital competencies is also necessary to maximize the benefits of digital transformation.

Research contribution:

This study provides empirical evidence on the effect of digital transformation on work effectiveness in a sugar-industry agroindustrial context. This context expands digital transformation research, which has previously focused largely on services, education, government, and general organizations.

Limitations:

The study used only one independent variable and one research site. The survey design and use of respondents' perceptions limit the scope of interpretation. A total of 41.8% of the variation in work effectiveness remains associated with factors outside the model.

Suggestions: Future research may add variables such as leadership, organizational culture, work motivation, work environment, or digital competence, and may involve more diverse locations and work units.

CONCLUSION

This study shows that digital transformation has a positive and statistically significant effect on employee work effectiveness at Bone Sugar Factory. The regression analysis produced a coefficient of 0.723, a t-value of 11.855, and a significance level of 0.000 (<0.05). The R^2 value of 0.582 indicates that digital transformation explains 58.2% of the variation in work effectiveness, while

41.8% is associated with factors outside the model. Descriptively, digital transformation had a mean of 4.48 and work effectiveness had a mean of 4.37, both categorized as very high.

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AUTHOR CONTRIBUTION STATEMENT

JS and ASA contributed to the preparation, review, and editing of the manuscript. Both authors approved the final version of the manuscript and take responsibility for its content.

AI DISCLOSURE STATEMENT

The authors used ChatGPT during the preparation of this work for language structuring, formatting assistance, and manuscript organization. After using the tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

CONFLICTS OF INTEREST

The authors declare that there are no financial, institutional, or personal conflicts of interest that could influence the conduct of this study, the analysis of data, the preparation of the manuscript, or its publication.

REFERENCES

Ariyanti, N. K., & Gumilar, M. (2024). Pengaruh transformasi digital terhadap efektivitas kerja yang dimediasi oleh komunikasi karyawan pada Dinas Kearsipan Provinsi Sulawesi Selatan. Jurnal Manajemen dan Digital (JMD). http://repository.binadarma.ac.id/id/eprint/7844

Astari, S. I., Gumilar, F., Saputra, P., Supenna, A., Sukmara, A. R., & Budianto, A. (2026). Pengaruh transformasi digital terhadap manajemen sumber daya manusia di Indonesia. Journal of Management Review, 10(1), 639–644. https://jurnal.unigal.ac.id/managementreview/article/view/23754

Badan Pusat Statistik. (2024). Statistik Indonesia 2024. Badan Pusat Statistik. https://www.bps.go.id

Kementerian Perindustrian Republik Indonesia. (2023). Making Indonesia 4.0: Strategi Transformasi Industri Nasional. https://kemenperin.go.id

Laudon, K. C., & Laudon, J. P. (2022). Management information systems: Managing the digital firm (17th ed.). Pearson.

Rahmani, F., Hermaji, M., Toyyibah, N. R., Subahri, S., & Mastiyarni, A. (2025). Pengaruh transformasi digital terhadap efektivitas manajemen kinerja karyawan. Jurnal Riset Multidisiplin Edukasi, 2(12), 222–230. https://doi.org/10.71282/jurmie.v2i12.1307

Vial, G. (2021). Understanding digital transformation: A review and a research agenda. The Journal of Strategic Information Systems, 30(2), 101626. https://doi.org/10.1016/j.jsis.2021.101626

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. Journal of Business Research, 122, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

Warner, K. S. R., & Wäger, M. (2021). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. Long Range Planning, 54(2), 102445. https://doi.org/10.1016/j.lrp.2020.01.001

Westerman, G., Bonnet, D., & McAfee, A. (2022). Leading digital: Turning technology into business transformation. Harvard Business Review Press.

Yoo, Y., Boland, R. J., Lyytinen, K., & Majchrzak, A. (2021). Organizing for innovation in the digitized world. Organization Science, 32(1), 139–156.