Journal of Mathematics Teaching, Social Research and Opinion
Vol. 5, No. 1, March 2026, pp. 535 – 544, https://doi.org/10.58421/misro.v5i1.1107
ISSN 2962-7842

Analysis of Human Resources Readiness in Facing Organisational Digital Transformation Towards Industry 4.0: A Case Study at Instant Cement Manufacturing Company

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Article Info

Article history:

Received 2026-01-22
Revised 2026-02-26
Accepted 2026-02-26

Keywords:

Change Management
Digital Transformation
Human Resources Readiness
Industry 4.0
Manufacturing Company

ABSTRACT

Digital transformation poses significant challenges for the Indonesian manufacturing sector in the Industry 4.0 era, demanding human resource (HR) readiness in line with technology adoption. This study analyses HR readiness at PT XYZ, an instant cement manufacturing subsidiary of Major Corporate Group, as it navigates organisational digital transformation. Using a qualitative single-case study design, the population included all PT XYZ employees involved in digital transformation, with a purposive sampling of six key informants: the HR Manager, Production Manager, IT Manager, one Supervisor, and two Production Employees. The instruments consisted of semi-structured interview guidelines, limited observation protocols, and a documentation checklist, analysed through the Miles and Huberman interactive model with thematic techniques for pattern identification. The results indicate an overall positive HR readiness, characterised by a collective understanding of transformation as a change in mindset and culture, supported by inter-divisional collaboration that overcomes psychological resistance and technical obstacles through ongoing training and mentoring. However, generational gaps persist. In conclusion, despite successful adaptation through upskilling, companies need an inclusive strategy for sustainable competitiveness.

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1. INTRODUCTION

The development of digital technology and the emergence of the Industry 4.0 concept have fundamentally changed the operational landscape of manufacturing companies [1], [2]. Digital transformation is not simply the adoption of information technology, but rather a strategic shift that impacts business processes, organisational models, leadership capacity, and human resources (HR) competencies [1], [3], [4].

In Indonesia, the pressure to digitalise is increasing due to market developments, efficiency demands, and the need for more transparent supply chain integration [5]. For example, in the cement and building materials sector, Major Corporate Group, a major industry player, has begun accelerating digital transformation, including strategic partnerships to leverage cloud technology to enhance the data capabilities, security, and flexibility of its IT infrastructure. This initiative not only impacts technology governance but also encourages subsidiaries to adapt their HR management practices and operational processes [3], [6].

At the organisational level, the success of digital transformation depends heavily on the readiness and capabilities of human resources [7], [8]. The concept of change readiness positions individual cognitive, affective, and behavioural readiness as the primary determinant of an organisation's ability to adopt and internalise technological change. Effective change messaging must build perceptions of engagement, benefits, and leadership support to foster transformational readiness at both the individual and group levels [9].

In the context of digitalisation in the manufacturing industry, this means that training programs, internal communications, and the role of change champions determine the level of employee adaptation to new digital systems. On the technology acceptance side, the Technology Acceptance Model (TAM) states that perceived usefulness and ease of use influence individuals' attitudes and intentions to adopt new technologies. Empirical studies in the context of HR management and information systems confirm the relevance of TAM in the adoption of training, ERP, HRIS, and IoT-based manufacturing applications, which are now commonly implemented in the production and management processes of modern manufacturing companies [10].

Empirical studies in the Indonesian context show that digital transformation in HR management presents structural and cultural challenges. Recent systematic reviews identify key issues such as limited HR digital capabilities, IT infrastructure issues at production sites, and the need for a contextualised digital readiness assessment framework. These studies emphasise that digitalisation programs must be complemented by competency development strategies and change communication designs tailored to the characteristics of the Indonesian workforce.

Practically speaking, manufacturing companies that are part of a large corporate group, such as PT XYZ, a subsidiary of Major Corporate Group, have unique dynamics. Parent-driven transformation policies, such as cloud infrastructure migration and ERP standardisation, often lead subsidiaries to adopt similar technologies, but implementation needs to be tailored to local operational scale, technical capacity, and talent profile. Major Corporate Group reports and announcements regarding collaborations with cloud technology providers and other digital initiatives provide context that subsidiaries like PT XYZ have access to robust corporate transformation resources and guidance. However, success at the plant and operator level depends on how these policies translate into training programs, IT support, and cultural changes [11].

This study aims to analyse the level of human resource readiness of PT XYZ in facing the organisation's digital transformation towards Industry 4.0, identifying influencing factors such as digital competence, management support, training mechanisms, organisational

culture, and technical barriers, and formulating practical recommendations based on field findings. The urgency of this study lies in the urgent need for the Indonesian manufacturing sector to build human resource readiness to support Making Indonesia 4.0, where delays in adaptation can reduce global competitiveness. The novelty of the study lies in the single qualitative case study approach that explores the perceptions, experiences, and practices of human resource adaptation across levels in an instant cement manufacturing subsidiary, filling a gap in previous studies that are more general without a specific focus on the dynamics of large corporate groups.

2. METHOD

This research uses a qualitative approach with a single case study design to deeply understand the readiness of human resources (HR) in facing the digital transformation of the organisation towards Industry 4.0 at PT XYZ, an instant cement manufacturing company [12], [13]. The qualitative approach was chosen because it can describe organisational phenomena contextually and holistically, in accordance with the characteristics of social research that emphasises subjective understanding and field dynamics, which highlights the flexibility of the single case design in in-depth exploration of specific cases [14], [15], [16]. In addition, Creswell and Creswell [17] confirm that case study design is effective for exploring organisational change processes such as digital transformation, where data is collected from multiple sources to build a coherent narrative.

The primary research instrument was a semi-structured interview guide developed based on change readiness theory, the Technology Acceptance Model (TAM), and the Resource-Based View of the World (RBV), supplemented by a limited observation guide and a documentation study checklist. Data collection techniques included in-depth interviews, participant observation, and document studies such as company policies, training reports, and digitalisation procedures, with triangulation of sources and methods to enhance validity [18], [19], [20]. Data analysis was conducted through an interactive model, including data reduction, data display, and conclusion drawing/verification, with thematic analysis techniques to identify patterns and meanings from field data that emphasise data verification through comparison of findings to ensure the reliability of qualitative interpretations [21].

The research population was all employees of PT XYZ involved in the digital transformation process, spanning various organisational levels from management to operations at the instant cement factory. The sample was selected purposively using a purposive sampling technique to ensure cross-level representation, consisting of six key informants: HR Manager, Production Manager, IT Manager, one Supervisor, and two Production Employees, selected based on their in-depth knowledge of the transformation context. This technique is in accordance with Sugiyono [22] and Suryana [23], who stated that purposive sampling is ideal for qualitative research to obtain informative informants, in the context of case studies that emphasise purposeful selection for data depth.

The research procedure began with preparation, including instrument development and ethical clearance, followed by data collection through semi-structured interviews lasting 60-90 minutes per session, field observations at production sites, and document review over

two months. Subsequently, the data were transcribed, coded, and analysed iteratively with member checking to validate interpretations, as well as the application of ethical principles such as informed consent and confidentiality of informants. Emphasising this systematic sequence to maintain credibility, the findings were closed through a logically integrated thematic arrangement of the findings, from description to practical recommendations.

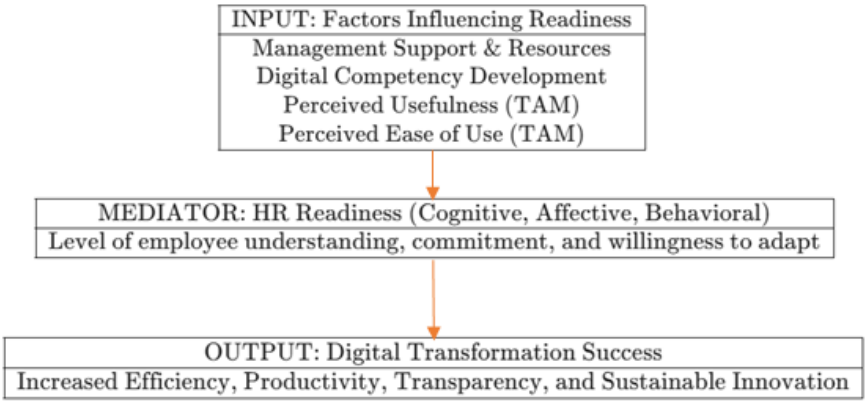

Figure 1: Conceptual Model Diagram

3. RESULTS AND DISCUSSION

This research aims to describe the Human Resources (HR) readiness of PT XYZ in facing organisational digital transformation towards the Industry 4.0 era. Based on the results of in-depth interviews with six informants from various job levels, several main findings were obtained, grouped into several major themes as follows:

A. Understanding and Meaning of Digital Transformation

The interview results indicate that all informants have a relatively uniform understanding of the meaning of digital transformation, which is the company's efforts to increase efficiency, productivity, and competitiveness through the application of digital technology. The HR Manager explained that digital transformation at PT XYZ is not just about replacing tools or systems, but a fundamental change to the way of working, mindset, and organisational culture. According to him, "digital transformation means how people within the organisation adapt to new systems, it is not just about software or tools, but about new mental and behavioural readiness for work [24].

In line with this, the IT Manager described digital transformation as the integration of digital systems across divisions, aiming to create a faster, more transparent, and efficient workflow. According to him, systems like ERP and SCADA have now been implemented in operational processes to ensure that production, distribution, and HR data are interconnected in real-time. For production employees, digitalisation is understood more simply, as "an easier and faster way of working because the tools are already automated," as stated by one operator.

This cross-level understanding shows that digital transformation at PT XYZ has become part of the collective organisational awareness, although the depth of understanding still differs across positions. At the management level, transformation is seen as a corporate

strategy, while at the executive level, it is focused more on work efficiency and operational comfort.

B. Motivation and Organisational Support for Digitalisation

The company's primary motivation for digital transformation is to increase competitiveness and efficiency of work processes, in line with the strategic policy of the parent company. The HR Manager mentioned that digitalisation is part of the group's strategic direction, emphasising process excellence and data integration across business units. Top management support for this initiative is also quite strong, especially in providing infrastructure and allocating budget for digital training for employees.

The interview results also show that organisational support comes in the form of training, technical assistance, and open communication. Supervisors and employees mentioned that before the new system was implemented, they always attended socialisation sessions and simulations on the use of digital tools or systems. Furthermore, HR and IT are also actively involved in mentoring during the initial phase of system implementation. Internal communication groups such as WhatsApp are used to expedite coordination when technical issues arise in the field.

This support strengthens the organisation's commitment to change. However, some informants mentioned that there is still a disparity in the distribution of training, where senior employees feel they need to adapt longer than the younger generation. Nevertheless, the spirit of togetherness and collaboration among employees is an important capital in maintaining the smooth progress of digitalisation.

C. HR Readiness and Digital Competency

HR readiness at PT XYZ shows positive development, although variations still exist across generations and job levels. Based on interviews with the HR Manager and IT Manager, most employees are already able to operate digital systems such as ERP, e-learning, and application-based attendance systems. HR assesses that "HR readiness is above average, but still needs improvement in digital literacy and data analysis."

Younger employees adapt faster because they are already accustomed to digital technology in daily life, while senior employees show a cautious attitude and tend to avoid technical errors. The Supervisor added that this difference is addressed with a collaborative approach, where younger employees help seniors in using the system, while senior employees provide guidance related to conventional work processes. The IT Manager emphasised the importance of digital competency, which includes technical skills, analytical skills, and an understanding of data security. For this purpose, the company has facilitated internal training based on digital modules and technical assistance by technology vendors. This program is part of an upskilling strategy that is expected to increase HR capabilities in facing the challenges of Industry 4.0.

D. Barriers in the Digital Adaptation Process

Although organisational support is relatively strong, some obstacles still emerge in the digital adaptation process. The first barrier is psychological resistance, especially from

senior employees who feel anxious about the new system and worry about making mistakes. The Supervisor explained that the fear of making mistakes makes some operators reluctant to experiment with digital features. The second barrier is technical, namely, network disruption and delays in data integration between production sensors and the central server, which occurred during the initial phase of system implementation. Additionally, the Production Manager highlighted the digital skill gap between employees, which can slow down the overall adaptation process.

However, these obstacles were well responded to by the company through open communication and a field mentoring system. The company also improved the network system and strengthened cross-divisional coordination to ensure the smooth operation of digital processes. From the management side, HR recognised that the main challenge is not just technical, but also the change in work culture. The shift to digital systems requires a new mindset that emphasises transparency, collaboration, and speed in decision-making. Therefore, mindset change is an important part of the HR readiness strategy.

E. Strategies for Strengthening HR Readiness in Facing Digital Transformation

The interview results show that PT XYZ has implemented several strategies to increase HR readiness in facing digital transformation, first, through continuous training and development of digital competencies. The HR Manager explained that the company has collaborated with training institutions and technology vendors to organise training on digital literacy and on-site coaching. Second, the company builds a collaborative work culture and a continuous learning culture that encourages employees to share knowledge. Third, internal communication strategies are strengthened through routine coordination forums, cross-divisional meetings, and internal digital channels such as corporate email and online discussion groups. The Supervisor mentioned that this open communication is effective in accelerating the resolution of technical problems and enhancing the sense of togetherness among employees. Fourth, the company encourages periodic evaluation of the effectiveness of digital systems, including involving employees in providing input on new policies. The two production employees interviewed expressed their hope that the company would improve digital facilities in the work area and expand practical training for production line operators. They also hope that future digital systems will be "easier to use and not too complicated," so that all employees can adapt without fear.

The research findings show that PT XYZ views digital transformation not merely as technology adoption, but as a comprehensive change in mindset, work processes, and organisational culture. This view aligns with the digital transformation framework proposed by Westerman, Bonnet, and McAfee, where digital transformation demands alignment between business strategy, organisational structure, and human resources (HR) capabilities. In the PT XYZ context, this alignment is evident through the integrated policy of the parent company, which encourages all subsidiaries to adapt towards the digitalisation of business processes.

From a local perspective, it is asserted that digitalisation in Indonesian organisations must be understood as a cultural change oriented towards increasing competency, collaboration, and sustainable innovation. This is clearly seen in PT XYZ's steps, which not

only update the digital infrastructure but also build collective awareness of the importance of digital literacy and the employees' mental readiness to face change. Digital transformation in manufacturing companies like PT XYZ is also in line with the national vision Making Indonesia 4.0, which emphasises increasing industrial competitiveness through the utilisation of smart technology and data-based efficiency.

HR readiness is the most dominant component in the success of digital transformation at PT XYZ. The research results show that although most employees have a positive attitude towards change, there are variations in the level of readiness across generations and positions. This phenomenon is consistent with the Change Readiness theory proposed [25], which states that organisational readiness for change is determined by the extent to which individuals understand, accept, and commit to the direction of the change.

Basnet [26] and Parimalam and Dhanabagiyam [27] also found that HR readiness in the Indonesian public sector is strongly influenced by management support and continuous training programs. These findings reinforce the interview results at PT XYZ, which show that digital training and direct mentoring by the IT team are the main keys to adaptation success. Similarly, the study confirms that upskilling and reskilling are crucial strategies for minimising resistance to digital change in the Indonesian manufacturing environment.

Although organisational support for digitalisation is quite strong, this research found psychological and technical barriers. Psychological barriers emerge in the form of fear of making mistakes and doubts about the effectiveness of the new system. This is consistent with the organisational change theory proposed by Kotter (1996), which states that uncertainty and worries about losing control often cause individual resistance to change. Technical barriers such as connection disruption, delays in data integration, and infrastructure limitations were also initial challenges at PT XYZ. In the Indonesian context, it is emphasised that technical barriers are still a major constraint in the digitalisation process in medium-scale manufacturing companies, especially because IT infrastructure is not yet fully evenly distributed and system maintenance still depends on external parties.

To overcome these barriers, PT XYZ adopted an open communication strategy and a field mentoring system. This approach aligns with the concept of a learning organisation (Senge, 1990), where collective learning and continuous reflection help the organisation adapt to environmental changes. In practice, refreshment training activities and knowledge-sharing sessions among employees are important means to build confidence and collaboration in the workplace.

The role of the Human Resources (HR) department at PT XYZ occupies a central position in managing the digital transition. Based on the interview results, HR functions as a change facilitator, ensuring that every transformation policy has a positive impact on employee competence and well-being. PT XYZ's HR approach, which is oriented towards continuous training and cross-generational learning, illustrates the implementation of the human-centred transformation principle. The success of digital transformation is not solely determined by the level of technology adoption, but also by the organisation's ability to position people as the centre of innovation. PT XYZ has demonstrated this practice through open internal communication policies, the formation of digital training forums, and the use of internal platforms for knowledge sharing.

Furthermore, PT XYZ's strategy in creating a continuous learning culture reflects the principle of dynamic capability as explained [28], which is the organisation's ability to adapt, integrate, and build new competencies according to changes in the business environment. PT XYZ's HR consistently encourages active employee participation in training and system evaluation activities, which ultimately increases the sense of ownership towards the ongoing transformation.

Inter-departmental synergy is one of the main strengths of PT XYZ in facing digital transformation. The research results show that collaboration between the HR, IT, and Production divisions has created effective communication and mentoring mechanisms. IT plays a role in providing systems and technical training. At the same time, HR ensures that the psychological aspects and HR competencies are well managed, which emphasises that the success of digital system implementation in Indonesian public organisations strongly depends on cross-unit coordination and leadership support.

In the PT XYZ context, managerial leadership plays an important role in building trust and creating a work climate that supports digital learning. Furthermore, this collaboration demonstrates the application of the socio-technical system theory, where the success of digital innovation is influenced not only by technology but also by social involvement and inter-individual relationships within the organisation. This approach proved effective at PT XYZ, as it strengthened the integration between the technical and human aspects in the digitalisation process.

The findings of this research provide an important picture for the Indonesian manufacturing sector that is moving towards the Industry 4.0 era. First, HR readiness is the main determining factor for the success of digital transformation. Therefore, companies need to invest not only in technology but also in building digital competencies and mindsets. Second, the importance of building an organisational culture that supports innovation, collaboration, and continuous learning, as implemented at PT XYZ. Third, digital transformation policies must be inclusive, taking into account differences in competency levels between generations and providing space for all employees to learn together. Fourth, top management support needs to be accompanied by an open communication system and employee empowerment. Thus, the digitalisation process not only generates efficiency but also strengthens organisational resilience against long-term change.

4. CONCLUSION

This study demonstrates that human resource readiness at PT XYZ in facing organisational digital transformation towards Industry 4.0 is generally characterised by a positive collective orientation, grounded in a shared understanding of transformation as a strategic shift encompassing mindset, work culture, and competency development. The most significant finding is that inter-divisional collaboration between HR, IT, and Production units serves as the primary mechanism through which both psychological and technical barriers to adaptation are managed, with continuous training, field mentoring, and open communication channels functioning as institutional enablers of this process. A persistent generational gap in digital readiness was also identified, wherein younger employees

demonstrate faster adaptation while senior employees require more intensive and personalised support structures to achieve comparable levels of digital proficiency.

The theoretical implications of this study reinforce the relevance of Change Readiness theory, the Technology Acceptance Model, and the dynamic capabilities framework in understanding HR adaptation within Indonesian manufacturing contexts, affirming that transformation success is contingent upon the alignment of people, culture, and technology rather than technology adoption alone. Practically, the findings provide a contextual reference for manufacturing companies within large corporate groups seeking to design inclusive, HR-centred digitalisation strategies that account for generational diversity, support sustained upskilling programs, and embed continuous learning as an organisational norm rather than a reactive measure.

This study acknowledges that its single-case design at PT XYZ limits the transferability of findings to other manufacturing or industrial settings, and that the purposive selection of six informants may not fully represent the breadth of employee experiences across the entire workforce. These boundaries restrict the generalizability of conclusions to contexts with similar organisational structures, corporate governance arrangements, and transformation stages.

Future research is encouraged to employ multi-case comparative designs or mixed-methods approaches to validate and extend these findings across diverse manufacturing environments in Indonesia. Longitudinal studies examining HR readiness after full Industry 4.0 implementation would further contribute to the field by capturing transformation outcomes over time. For the broader public, this research contributes to the national discourse on Making Indonesia 4.0 by providing empirical evidence that sustainable industrial digitalisation depends fundamentally on human capital investment, inclusive training policies, and culturally adaptive change management, insights that are relevant not only to corporate strategists but also to policymakers, educators, and workforce development institutions.

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