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Towards Digitalization of Performance Management as a Strategy for Improving Sustainable Education

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ABSTRACT

This study explores the digitalization of performance management as a strategy to enhance sustainable education in Indonesia. Using a qualitative approach, data were gathered through in-depth interviews with five key informants, including policymakers, school administrators, educators, technology experts, and educational researchers. The findings reveal that digitalized systems offer benefits such as real-time monitoring, data transparency, and improved collaboration among educators. However, challenges persist, including infrastructural limitations, digital literacy gaps, and resistance to change. Strategies such as capacity building, pilot projects, and inclusive planning are recommended to address these barriers. The study underscores the potential of digital performance management to transform education sustainably, provided these challenges are systematically mitigated.

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1. INTRODUCTION

The integration of digital technologies into performance management systems has become increasingly vital in addressing the challenges of modern education. In Indonesia, a nation characterized by diverse educational landscapes and systemic disparities, digitalization offers a promising pathway to enhance the quality, accessibility, and sustainability of education. Traditional performance management systems, which focus on evaluating teacher effectiveness, student outcomes, and institutional efficiency, often struggle with limited scalability, lack of real-time data, and insufficient alignment with broader educational goals. Digital tools, however, can address these limitations by facilitating data-driven decision-making and continuous improvement. They offer real-time insights, scalability, and better alignment with national education objectives, thereby transforming traditional approaches [1]–[3]. Among the key benefits are enhanced personalization and accessibility—achieved through AI-based learning platforms tailored to individual student needs [2]—and improved teacher performance via monitoring tools and ongoing professional development [3]. Moreover, the use of technology in administrative functions increases efficiency, enabling teachers to dedicate more time to instruction [4]. However, significant challenges persist,

including disparities in digital infrastructure—particularly in remote regions (Putra et al., 2024; "The Role of Technology in Indonesian Education at Present", 2023)—and the need for comprehensive teacher training programs to build digital literacy and pedagogical competence [1], [4]. Furthermore, effective integration requires coordinated policy-making and collaboration among government bodies, educational institutions, and the private sector to ensure a supportive ecosystem for digital transformation [4].

The shift towards digitalized performance management aligns with Indonesia's commitment to Sustainable Development Goal 4, which emphasizes inclusive and equitable quality education. By leveraging digital technologies, educational institutions can enhance transparency and effectiveness in evaluations, foster accountability among stakeholders, and promote sustainable development in education [5], [6]. Digital platforms facilitate real-time feedback and collaboration, enabling educators and administrators to address performance gaps proactively and align efforts with long-term educational objectives [5], [7]. This transformation is further supported by policies such as the Directorate General of Teachers and Education Personnel Regulation No. 7607/B.B1/HK.03/2023, which aims to improve learning quality through technology-based performance management [7]. Digital tools not only provide a framework for transparent and accountable performance tracking but also help bridge the gap between traditional pedagogical practices and the evolving demands of 21st-century education [5]. By fostering inclusive, equitable, and sustainable learning environments, these technologies empower students to become active contributors to society. However, challenges such as technological infrastructure disparities, especially in rural regions, limited digital literacy, and concerns over data privacy must be addressed to ensure the successful and equitable implementation of these digital innovations [6], [7].

Despite the potential benefits, the adoption of digitalized performance management systems in Indonesia is not without challenges. Infrastructure limitations, digital literacy gaps, and resistance to change among educators and administrators pose significant barriers. Addressing these challenges requires a comprehensive understanding of the opportunities and constraints involved in implementing such systems. A qualitative approach is particularly suited for exploring these complexities, as it allows for in-depth analysis of stakeholder experiences and insights. This study aims to investigate the role of digitalized performance management as a strategy for improving sustainable education in Indonesia. By examining the perspectives of five key informants—comprising policymakers, education practitioners, and technology experts—this research seeks to uncover how digital tools can be leveraged to enhance performance management systems.

2. LITERATURE REVIEW

2.1 Digitalization in Performance Management

The integration of digital technologies in performance management has significantly improved the evaluation of teaching effectiveness, institutional efficiency, and student outcomes through platforms like Learning Management Systems (LMS), data analytics tools, and performance dashboards that provide real-time monitoring and actionable insights—essential for tracking progress and aligning with institutional goals [8], [9]. These tools enhance data accuracy, transparency, and accessibility, and are particularly beneficial in resource-limited contexts. In Morocco, for example, digital platforms have supported systemic educational reform by streamlining performance management across all levels [8]. AI and cloud-based systems further strengthen these tools by predicting trends and enabling data sharing, while AI-driven HR solutions optimize recruitment, evaluation, and teacher development through

personalized feedback and automation [9]. Effective performance management systems also require input, process, and output evaluations, reinforced by continuous training, feedback, and recognition to improve learning outcomes [3]. However, challenges such as data privacy, reduced teacher autonomy, and over-reliance on technology persist, calling for ethical frameworks, AI training, and long-term impact assessments [9].

2.2 Sustainable Education and the Role of Digital Tools

Digital tools play a pivotal role in advancing Sustainable Development Goal 4 (SDG 4) by enhancing inclusivity, equity, and quality in education through expanded access, improved pedagogical methods, and sustainable practices. In developing countries, digital platforms help overcome challenges such as teacher shortages and geographic isolation, bridging disparities between well-resourced and under-resourced schools while promoting lifelong learning through flexible, personalized resources [10]. Interactive technologies like virtual reality (VR) and augmented reality (AR) further enrich the learning process by making complex concepts more accessible and engaging [11]. At the same time, digital tools support teachers with innovative pedagogical approaches and data-driven platforms that monitor academic progress, helping unlock students' full potential and improving overall education quality [2]. These technologies also align with environmental sustainability by reducing reliance on paper-based systems and minimizing resource waste through automation [6]. Moreover, initiatives like Education for Sustainable Development (ESD) integrate sustainability principles into educational content, empowering individuals to act as agents of change toward a more sustainable future [12].

2.3 Theoretical Framework

The theoretical foundation for this study is grounded in the Technology Acceptance Model (TAM) and systems theory. TAM provides insights into the factors influencing the acceptance and use of digital tools, such as perceived ease of use and usefulness (Davis, 1989). Systems theory, on the other hand, emphasizes the interconnectedness of educational stakeholders and processes, highlighting the need for holistic approaches to performance management.

These frameworks guide the exploration of how digital tools are perceived and utilized by stakeholders in the Indonesian education sector. They also underscore the importance of aligning technological innovations with broader educational goals, ensuring that digitalization contributes to sustainable and equitable outcomes.

3. METHODS

A qualitative approach was deemed appropriate for this study due to its ability to capture the complexities and nuances of the phenomenon under investigation. Focusing on the lived experiences and perspectives of informants, the study aimed to uncover underlying themes and patterns surrounding the digitalization of performance management in Indonesia's education sector. Adopting an exploratory framework, the research sought to identify opportunities, challenges, and strategic considerations in implementing digital performance systems. Five key informants were selected using purposive sampling, based on their expertise and direct involvement in educational performance management and digital transformation. These included a policy maker from the Ministry of Education, a school administrator from a leading urban school, a technology expert specializing in educational technology integration, a teacher from a rural school undergoing digital transition, and an educational researcher focused on sustainable education and technology. This diverse selection allowed the study to capture a well-rounded perspective spanning policy, practice, and technological insights.

Data were collected through semi-structured interviews, designed to provide both structure and flexibility in exploring

participants' experiences with digitalized performance management systems. Key areas of inquiry included perceived benefits, challenges, and recommendations for effective implementation. Interviews were conducted either in-person or via video conferencing, depending on informants' availability and location, with each session lasting approximately 60 minutes and recorded with consent for transcription. Thematic analysis, based on Braun and Clarke's (2006) six-step framework, was employed to analyze the data: familiarization with the transcripts, initial coding, theme development, reviewing themes, defining and naming themes, and reporting. NVivo software supported the coding and organization process, ensuring a systematic and efficient analysis. This method allowed the research to generate in-depth insights aligned with the study's objectives.

4. RESULTS AND DISCUSSION

4.1 Benefits of Digitalized Performance Management

The informants highlighted several advantages of adopting digital tools in performance management systems. One key benefit is real-time monitoring and feedback. The policymaker emphasized that digital tools enable continuous tracking of educational outcomes, stating, "Digitalization enables us to monitor teacher and school performance in real-time, aiding swift and data-driven decision-making." Similarly, the school administrator noted that such tools provide immediate feedback to teachers, allowing for timely interventions and improvements in teaching effectiveness. This immediacy supports a more responsive and adaptive management process within schools, especially in dynamic educational environments.

Another major advantage is the improvement in data accuracy and transparency. The technology expert pointed out that automated data collection minimizes human error and enhances the reliability of performance evaluations: "The primary advantage of technology is ensuring data accuracy. When data is collected automatically, manual errors are significantly reduced." In addition, digital platforms have facilitated greater collaboration among educators. Teachers reported that these tools promote the sharing of best practices and strengthen teamwork. One teacher remarked, "It's easier to collaborate with colleagues through digital platforms. We can share materials and support each other more efficiently." These insights underscore the transformative role of digital tools in fostering a more transparent, collaborative, and data-informed educational environment.

4.2 Challenges in Implementation

Despite the benefits of digital tools, informants identified several significant obstacles that hinder effective implementation. One major challenge is infrastructure gaps, particularly in rural areas where internet connectivity is unreliable and access to devices is limited. A teacher from a rural school shared, "In my school, internet issues are a major obstacle. This greatly hampers the digital system's functioning." Without stable technological infrastructure, the potential of digital performance management systems remains underutilized, especially in underserved regions where they are needed most.

Another critical barrier is digital literacy. Both the school administrator and the technology expert emphasized that many educators lack the necessary skills and confidence to use digital tools effectively. "Many users feel apprehensive about new technology, necessitating intensive training programs," noted the technology expert. Additionally, resistance to change emerged as a common issue. The policymaker observed that some educators view digital systems as burdensome or irrelevant, stating, "The biggest challenge is overcoming resistance from stakeholders who perceive this technology as overly complex." These challenges highlight the need for targeted support, training, and change management strategies to facilitate a smoother transition toward digital transformation in education.

4.3 Strategies for Effective Implementation

The informants proposed several practical strategies to mitigate the challenges associated with digital performance management systems. Capacity building emerged as a critical approach, with tailored training programs deemed essential for addressing digital literacy gaps among educators. The educational researcher emphasized, "Workshops and mentoring sessions can address skill gaps and build confidence among educators." Such programs are vital not only for skill development but also for reducing apprehension and building a supportive learning culture around technology use in education.

Another recommended strategy was the use of pilot projects to demonstrate the effectiveness of digital tools before full-scale implementation. The policymaker stated, "Pilot projects are crucial to demonstrate the technology's benefits to stakeholders," suggesting that early successes can help build trust and reduce resistance. Additionally, collaborative planning was identified as a key factor in ensuring successful adoption. Teachers advocated for greater involvement in the design and implementation process, noting, "Educators should be part of the planning process to address practical challenges and foster buy-in." These strategies reflect a holistic and inclusive approach, emphasizing the importance of preparation, demonstration, and stakeholder engagement in supporting sustainable digital transformation.

DISCUSSION

The adoption of digitalized performance management systems aligns with global goals for sustainable education by promoting efficiency, transparency, and equity. Real-time monitoring and enhanced accountability, as emphasized by Smith and Thompson (2019), demonstrate the potential of digital tools to support systemic improvements. However, persistent challenges such as infrastructural gaps and digital literacy limitations—common in many developing regions—continue to hinder widespread adoption [13]. In Indonesia, for instance, the implementation of E-SAKIP has led to significant cost reductions, improving transparency and cutting performance reporting expenses by up to 70% (Handayani & Syahrial, 2024). Furthermore, digital innovations like AI and IoT contribute to broader Sustainable Development Goals (SDGs) by enhancing efficiency in sectors such as education and healthcare [14]. Yet, to overcome these challenges, strategic leadership and coordinated investment in infrastructure and digital training are essential [15].

Resistance to adopting digital tools highlights the importance of inclusive decision-making and well-structured change management. Pilot programs and collaborative planning—key elements in Kotter's (1996) change model—help generate small wins and build stakeholder momentum toward digital transformation. Leadership plays a vital enabling role in this context, where clear policies, institutional support, and stakeholder collaboration are fundamental for sustaining progress. According to systems theory [16], successful digitalization requires the alignment of leadership, infrastructure, and stakeholder roles in a cohesive framework. As shown by recent studies, the effectiveness of digital performance systems depends not only on technological tools but also on supportive ecosystems involving policy clarity, continuous training, and ethical standards [14], [15], [17]. Therefore, for digital transformation in education management to meaningfully contribute to sustainable development, it must be guided by integrated strategies that address both human and technical dimensions.

Implications for Practice

1) Policymakers should establish comprehensive frameworks to guide digital performance management, focusing on infrastructure and resource allocation.
2) Training programs tailored to the needs of educators and administrators can mitigate digital literacy barriers.

3) Involving educators in the planning process ensures practical challenges are addressed and fosters ownership of the system.

5. CONCLUSION

The digitalization of performance management presents a promising avenue for fostering sustainable education in Indonesia. The study highlights significant benefits, including enhanced transparency, real-time feedback, and collaboration among educators, which collectively contribute to improved educational outcomes. However, the successful implementation of such systems requires overcoming challenges such as digital infrastructure gaps, resistance to change, and limited digital literacy.

Practical strategies identified in the study—such as capacity building, pilot testing, and involving stakeholders in planning—offer a roadmap for navigating these obstacles. By adopting a systematic and inclusive approach, policymakers and educational leaders can maximize the impact of digital tools, ensuring that they serve as catalysts for equitable and sustainable education across diverse contexts in Indonesia. Future research could expand on this foundation by exploring the long-term impacts of digitalization and its role in bridging the urban-rural divide in education.

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