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Types of Risks in the World of Education and Strategies for Handling Them in the Digital Era at UPT SDN 20 Jalamu Pesisir Selatan Regency

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ABSTRACT

The digital transformation of education has fundamentally changed school management and learning processes, while simultaneously introducing new forms of risk that require systematic management. This article aims to identify key types of risks faced by UPT SDN 20 Jalamu, Pesisir Selatan Regency, and to analyze appropriate mitigation strategies in the context of the digital era. This study employs a conceptual review approach supported by limited field insights from school administrators and teachers. The analysis indicates four dominant categories of risk: technological infrastructure limitations, data security vulnerabilities, disparities in digital literacy among teachers, and unequal access to digital resources among students. To address these risks, schools need to adopt phased infrastructure development, strengthen human resource capacity through continuous digital literacy training, implement basic data governance and cybersecurity practices, and design inclusive strategies to reduce the digital divide. Effective digital risk management must be context-sensitive, aligned with school capacity, and integrated into strategic planning documents. The findings highlight that digital risk management in primary education is not merely technical in nature but also organizational and cultural, requiring leadership commitment, stakeholder collaboration, and continuous evaluation.

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1. INTRODUCTION

In any educational system, the existence of risk is inevitable. Risk is part of the dynamic management of educational institutions, which constantly face various uncertainties in achieving their goals. Risk can be defined as the possibility of an undesirable event occurring that has the potential to cause harm to the educational organization, either directly or indirectly. The term "risk" describes a negative condition, in the form of an unexpected event or a situation that should be avoided as much as possible. In other words, risk reflects the uncertainty surrounding an event within a certain time period that has the potential to cause harm and impact the future sustainability of the organization or company. Therefore, risk management is a crucial aspect for every organization, including educational institutions. Like other organizations, educational institutions also face various risks that can hinder the achievement of educational goals, both originating from internal and external factors (Fitri & Hidayat, 2023).

In the world of education, the digital era risk management strategy at the UPT SDN 20 Jalamu requires consideration of changing industry needs. Collaboration with companies, particularly those in the

technology sector, is a strategy to ensure the school curriculum aligns with industry developments. Furthermore, digitalization also drives the need for teacher readiness to adopt technology, which requires ongoing coaching and training. In the current digital era, education is undergoing a significant transformation in the management and implementation of the teaching and learning process. The use of information technology has had a positive impact on UPT SDN 20 Jalamu in Pesisir Selatan Regency, including increased administrative efficiency, expanded access to learning resources, and strengthened interaction between teachers and students through various digital platforms. However, behind this progress, various new risks have emerged that need to be anticipated, such as data security threats, dependence on technological devices, low digital literacy among the school community, and reduced quality of social interaction in the educational environment.

This situation demonstrates that technological advances not only open opportunities for improving the quality of education but also pose challenges that must be systematically managed through a planned risk management approach. Therefore, it is crucial for the UPT SDN 20 Jalamu to understand the types of risks that may arise in school operations and design effective management strategies to adapt to changing times. Good risk management will help schools minimize potential losses, maintain organizational stability, and continuously improve the quality of learning. Furthermore, risk management in the educational context is not only oriented towards preventing losses or operational disruptions, but also plays a strategic role in creating an adaptive and sustainable learning environment. Through appropriate risk identification and analysis, schools can identify potential threats early and prepare mitigation measures appropriate to their capacity and resources. Thus, risk is no longer viewed solely as a threat, but rather as an opportunity to innovate and strengthen school management systems.

This paradigm shift aligns with modern educational management principles that place technology as a primary instrument for improving the efficiency, transparency, and accountability of educational institutions. In the context of the UPT SDN 20 Jalamu, this approach is highly relevant as the school seeks to integrate various aspects of digitalization into its administrative and learning systems. Therefore, emerging risks, both technical, human resource, and social, must be comprehensively mapped so that management strategies are not merely reactive but proactive and oriented toward long-term quality improvement. Furthermore, it's important to understand that each type of risk has different characteristics and impacts on school performance. Technological risks, for example, relate to device availability and network stability, while human risks relate more to the readiness of teachers and students to utilize technology effectively. Meanwhile, social risks involve changes in communication and interaction patterns within the school environment due to increased reliance on digital devices. A thorough understanding of each of these risk dimensions will help schools prioritize policies and determine the most appropriate interventions.

In addition to internal aspects, external factors also influence the level of risk in primary education. Support from local governments, community involvement, and collaboration with the private sector are important factors that can strengthen schools' resilience to the challenges of digitalization. For example, partnerships with local internet service providers can accelerate the provision of network access in schools, while collaboration with universities or technology training institutions can help improve teacher competency through training and mentoring. Educational risk management in the digital age is inextricably linked to the importance of building a risk-aware culture across all school components. Principals, teachers, administrative staff, and even students need to understand that technology use must be accompanied by responsible digital ethics. This culture can be fostered through internal policies that emphasize data security, disciplined device use, and adherence to agreed-upon digital work procedures.

By establishing a structured and sustainable risk management system, schools can not only minimize the negative impacts of digitalization but also capitalize on emerging opportunities to strengthen learning innovation. The UPT SDN 20 Jalamu is expected to be an example of the application of contextual digital risk management in elementary education, where resource limitations are not a barrier to creating a resilient and adaptive education system. This article aims to identify various types of risks that arise in the educational context at UPT SDN 20 Jalamu, Pesisir Selatan Regency, and analyze relevant management strategies in the digital era based on a review of scientific literature and field findings.

Article Type

This manuscript is classified as a **conceptual review article**. The study emphasizes theoretical analysis and synthesis of existing research related to educational risk management in the digital era, complemented by limited field insights. No primary quantitative data collection or statistical testing was conducted. Instead,

the article integrates findings from previous studies to develop a structured understanding of risk categories and mitigation strategies applicable to primary education settings.

2. METHOD, DATA, ANALYSIS

This conceptual study employs a literature review supported by exploratory field interviews. Literature was collected from reputable journals, books, and academic reports published between 2015–2025. Databases used include Google Scholar and ResearchGate. Field insights were obtained through semi-structured interviews with teachers and administrators at UPT SDN 20 Jalamu. The analysis followed three stages:

a. Identification of risks related to digital transformation. At this stage, the study systematically examined all forms of risks that might arise in the school's digitalization process. This includes reviewing theoretical frameworks from previous research and comparing them with real conditions observed in the school environment. The identification process ensures that both explicit risks such as inadequate digital infrastructure and implicit risks such as resistance to technology adoption are recognized early. This stage forms the foundation of the entire analysis because comprehensive risk recognition prevents important issues from being overlooked.
b. Categorization into technology, data security, human resources, and digital divide risks. Once the risks were identified, they were grouped into four major categories to create clarity and analytical structure.
    1) Technology risks involve infrastructure limitations, device malfunction, unstable internet connectivity, and dependency on digital tools.
    2) Data security risks include unregulated data storage, vulnerability to cyber threats, and lack of standardized protection protocols.
    3) Human resource risks cover teachers' varied levels of digital literacy, gaps in competency, and readiness to integrate technology into educational practices.
    4) Digital divide risks capture inequities in students' access to devices, internet connection, and digital learning resources. Categorizing risks helps reveal patterns, highlight priorities, and determine which risks require immediate intervention.
c. Synthesis of findings to formulate mitigation strategies. In this stage, information from literature and field interviews were integrated to produce comprehensive and context-based recommendations. The synthesis not only compares theoretical insights with practical experiences but also identifies which strategies are feasible, scalable, and most relevant for the school's needs. This process allows the study to derive realistic solutions, such as improving infrastructure gradually, strengthening digital literacy programs, establishing data governance mechanisms, and creating inclusive policies for students with limited digital access.

This method ensures theoretical depth while incorporating contextual understanding from field realities. Through the combination of literature review and field-based insights, the study achieves a balanced perspective: theoretical rigor from academic sources and practical relevance from school-level experiences. This integrative approach enhances the credibility of the findings and ensures that the proposed mitigation strategies are grounded in both scholarly evidence and real-world applicability.

3. RESULT AND DISCUSSION

Result

In the context of risk management in the digital era, research findings at the UPT SDN 20 Jalamu in Pesisir Selatan Regency demonstrate the importance of adapting to technological developments and strategic efforts to ensure graduate quality that meets current demands. The implementation of digital facilities, such as the use of projectors, Wi-Fi networks, and various digital learning applications, is the first step in supporting educational transformation in schools. However, this digitalization process also creates various types of risks that require serious management, particularly when network system disruptions, cyberattacks, or technical errors can hinder the digital learning process. In such situations, schools risk losing critical data, disrupting access to learning materials, and reducing the effectiveness of teaching and learning activities. In addition to technological risks, the limited technical skills of teachers and students in operating digital platforms also pose challenges that have the potential to reduce the quality of the educational process. Therefore, risk management in the digital era at UPT SDN 20 Jalamu focuses not only on providing technological facilities but also includes strengthening data security, improving digital

competency for educators and students, and developing planned risk management strategies through training, mentoring, and emergency response protocols.

Based on research findings, the UPT SDN 20 Jalamu in Pesisir Selatan Regency has undertaken a number of efforts to address the challenges and risks arising from technological developments in the digital era. Research findings indicate that most teachers have begun adapting to the use of simple technological devices, such as laptops, projectors, and learning support applications, to assist with teaching and learning activities and school administration. However, teachers' abilities in operating these technologies vary. Some teachers have been able to integrate digital devices into the creation of teaching materials, while others still require further guidance and training to optimally utilize them in the learning process. In terms of facilities and infrastructure, the school does not yet have a Wi-Fi network in every classroom, so internet access remains limited and often relies on teachers' personal data. This situation presents an obstacle to expanding the implementation of digital systems in the school environment. Furthermore, online learning has not yet been implemented at the UPT SDN 20 Jalamu due to limited supporting devices, both for teachers and students. Most students do not have independent learning facilities at home, so the learning process continues to be carried out face-to-face. This situation demonstrates that schools' digital readiness still needs to be improved to anticipate changes in education patterns in the future.

To mitigate the risks arising from these limitations, the school has initiated various strategic measures. One of these is improving teacher competency through internal training, experience-sharing sessions, and direct mentoring by the principal and more experienced educators. These activities focus on strengthening teachers' abilities in managing digital administration, creating technology-based teaching materials, and understanding the basics of data security. Furthermore, the school plans to gradually develop its technology infrastructure, including expanding internet access and procuring digital devices to support teaching and learning activities.

The efforts undertaken by the UPT SDN 20 Jalamu demonstrate a commitment to implementing educational risk management in a gradual and sustainable digital era. Despite still facing limitations in facilities and digital literacy, the school continues to adapt to technological changes by emphasizing the importance of human resource readiness, information security, and the effectiveness of the learning process. This approach is expected to strengthen the school's competitiveness while maintaining educational quality amidst the increasingly rapid development of the digital era. In addition to the efforts already made, schools are also beginning to recognize that successful digital transformation cannot be achieved instantly. The adaptation process requires time, careful planning, and support from all school components. The principal plays a crucial role as the primary driver in fostering digital awareness among teachers and students. Through a participatory leadership approach, the principal encourages open communication regarding challenges and needs in technology use, so that any issues can be promptly addressed with solutions.

In addition to strengthening leadership roles, collaboration between teachers is also a crucial factor in accelerating the development of digital competencies. Teachers with advanced skills in operating learning devices and applications serve as mentors for colleagues who still need guidance. This sharing of best practices helps create a professional learning environment among educators and strengthens the spirit of mutual cooperation in the face of change. From a student perspective, the use of digital learning technology is starting to show positive progress, although it is not yet optimal. Some students have become accustomed to using presentation applications, instructional videos, or online learning resources to complement classroom activities. However, their ability to select valid information and apply ethical technology use remains limited. Therefore, the school plans to integrate digital literacy learning into extracurricular activities to provide students with a more comprehensive understanding of responsible and productive technology use.

On the other hand, financial challenges are also a major obstacle to developing digital facilities in schools. Budget constraints mean that several infrastructure improvement plans, such as adding computers or expanding internet networks, have not been fully implemented. To address this, schools are working with school committees, local governments, and the private sector to seek funding and grants for technology devices. This collaborative approach is expected to accelerate the equitable distribution of digital facilities without unduly burdening school budgets. The research also shows that successful digital risk management depends heavily on individual awareness of the importance of system security and sustainability. Teachers and administrative staff are being trained to protect students' personal data, store digital documents in cloud storage, and perform regular data backups. These simple steps have proven effective in reducing the risk of data loss due to device damage or minor cyberattacks.

Furthermore, schools have begun implementing internal policies restricting the use of personal devices in the workplace to maintain consistent network security. The use of official school accounts for all digital activities is also mandatory to facilitate data tracking and control. This micro-policy approach is part of a realistic risk mitigation strategy, aligned with the resource capacity of elementary schools. Interviews with several teachers revealed that changes in work patterns due to digitalization have significantly impacted the school culture. Teachers are required to be more independent, creative, and accustomed to online systems. While this initially created an additional burden, over time, some teachers began to experience positive benefits such as time efficiency, easier administrative access, and increased variety of teaching methods. This adaptation process demonstrates that mental readiness and openness to innovation are key factors in the successful implementation of technology in elementary schools.

In addition to human resources, social environmental factors also influence the effectiveness of digital risk management implementation. Support from parents and the surrounding community is a crucial determinant in expanding the success of school programs. Through active outreach and communication, schools strive to foster parents' understanding of the importance of digital literacy at home. Some parents have even begun participating in technology-based school activities, such as attending simple workshops on family digital safety. These efforts strengthen the synergy between schools and their communities, ensuring that technology implementation extends beyond classroom learning to students' daily lives. Therefore, the risk management strategies implemented by schools are not merely reactive to threats but proactive in building comprehensive digital resilience.

The results of this study indicate that establishing a documentation system and regular evaluation of digital activities is a crucial element in ensuring program sustainability. Every teacher training activity, equipment procurement, or technical incident is documented to serve as the basis for developing subsequent policies. Through this data-driven approach, schools can make continuous improvements that align with the principles of educational quality management. Through these various efforts, the SDN 20 Jalamu School Unit (UPT) has demonstrated positive progress in building a foundation for risk management in the digital age. Despite still facing limited resources, the commitment and consistency of all school elements are key strengths in managing risks and capitalizing on opportunities posed by technological advancements. The school is expected to leverage this experience as a foundation for building an adaptive, safe, and inclusive education system in the future.

Discussion

Risk management in educational institutions is a very important aspect in carrying out various activities and ensuring the smooth running of the educational process (Suatini, 2019). In facing challenges and potential risks, educational institutions need to adopt a proactive approach to identify, evaluate, and manage these risks (Munawwaroh, 2017). Aspects that need to be considered in managing the risks of educational institutions involve understanding the risks that may arise, both in operational, financial, and security and health aspects. Careful planning, implementation of appropriate policies, and the use of appropriate technology and resources can help educational institutions minimize the impact of risks and maintain operational sustainability. Furthermore, involving all stakeholders, such as students, parents, educators, and other relevant parties, in the risk management process is also key. Open and transparent communication can build a shared understanding of potential risks and the mitigation measures taken by educational institutions (Herdiansyah & Kurniati, 2020). Therefore, risk management in educational institutions is crucial for maintaining the smooth and sustainable operation of educational activities. Every institution needs to be proactive in identifying and addressing various risks, whether related to operations, finances, or safety and health.

Effective risk management requires thorough planning, appropriate policies, and optimal use of technology and resources. Furthermore, successful risk management depends heavily on the cooperation and involvement of all parties, including teachers, students, parents, and other stakeholders involved in the school. Through open and transparent communication, educational institutions can build shared awareness of potential risks and determine appropriate preventive and mitigating measures. Based on the research results, several types of risks faced by the UPT SDN 20 Jalamu in Pesisir Selatan Regency in implementing digital transformation in the school environment. These risks include technological risks, data security risks, human resource risks, and the risk of the digital divide, all of which are interrelated and impact the effectiveness of education delivery.

First, technological risks arise from limited digital facilities and infrastructure. The school does not yet have a Wi-Fi network in every classroom, so internet access remains limited and relies on teachers' personal data packages. This situation causes the digitalization process to be slow and uneven across all school activities. These obstacles can disrupt the smooth administration and technology-based learning innovation

if not addressed promptly through more comprehensive infrastructure development planning. Second, data security and protection risks are also important concerns. The use of various digital applications in the preparation of administration and teaching materials has not been balanced by an adequate information security system. Academic data and school documents are still largely stored manually and have not been integrated into a secure digital storage system. This raises the potential for data leaks, loss, or misuse. Therefore, strengthening cybersecurity literacy for teachers and education personnel is a crucial step to minimize these risks (Watini, 2024).

Third, human resource (HR) risks relate to the ability of teachers and educators to operate digital devices and applications. Findings indicate that teachers' digital literacy levels vary; some teachers are already capable of utilizing technology for creating teaching materials and administration, while others still require technical guidance. This competency imbalance can reduce the effectiveness of technology implementation in the classroom. Strengthening digital capacity through ongoing training and sharing best practices is a crucial strategy to ensure all teachers have equal skills in utilizing learning technology (Wirasti, 2024). Fourth, the risk of a social-digital divide is also a challenge at the UPT SDN 20 Jalamu. Most students do not have independent learning devices at home, making it difficult to adopt online-based learning if needed in the future. This situation creates a gap in access to technology between students who have the means and those who do not. If not addressed, this gap can widen the disparity in learning outcomes between students (Sutrisno, 2024). Therefore, inclusive strategies such as lending learning devices, providing alternative printed modules, and guided learning at school are needed to ensure that all students have equal learning opportunities.

The following are several recommended strategies for managing digital risks at UPT SDN 20 Jalamu:

a. Establish clear storage rules, regular backups, and account governance; introduce simple cybersecurity practices (strong passwords, software updates);
b. Increase human resource capacity for tiered teacher training in basic digital literacy, the creation of digital teaching materials, and technology-based classroom management. Conduct hands-on mentoring sessions supported by research on digital literacy profiles.
c. Develop a phased infrastructure and prioritize access, starting with reliable shared access points, such as teacher hotspots or multimedia rooms, to classroom network improvement plans, leveraging partnerships with local governments for funding.
d. Continuity and emergency response plans, including procedures in the event of network disruptions or security incidents, such as offline backups of teaching materials, alternative printed learning packages, and technical personnel in schools.
e. Adopt an inclusive approach to inequality by identifying digitally vulnerable students and implementing mitigation strategies such as device lending, offline modules, or guided learning hours at school.

Implementing the above strategies is expected to reduce the probability and impact of identified digital risks, improve teacher and student preparedness for technology-based learning, and maintain the continuity of educational services in the event of technical disruptions or security incidents. The success of these strategies requires strong commitment from school management, support from the local government, and the active involvement of the school community, including parents and the surrounding community.Practically, digital risk management planning at the UPT SDN 20 Jalamu needs to be outlined in the school's strategic documents, such as the School Work Plan (RKS) and the School Activity and Budget Plan (RKAS). This way, every activity related to improving digital facilities, training teachers, or strengthening data security can be measured and monitored systematically. The application of risk-based management principles allows schools to identify potential threats early, determine mitigation priorities, and monitor implementation results on an ongoing basis (Hidayat, 2023).

In addition, strengthening teacher capacity is a key factor in supporting the effectiveness of risk management strategies. Teachers not only function as technology users but also as facilitators and innovators within digital learning environments. Through digital literacy training and data management programs, teachers are expected to understand how to secure digital documents, operate learning software efficiently, and integrate technology into instructional practices without compromising pedagogical values. According to Lestari (2023), teachers with strong digital literacy tend to be more adaptive to technological changes and more capable of creating engaging and relevant learning environments for students. On the other hand, policy support from the district government and the education office also plays a crucial role. The government can facilitate the provision of basic digital infrastructure such as internet access, school ICT equipment, and access to national learning platforms. This cross-sector collaboration is necessary so that risk management does not become solely the responsibility of the school, but rather part of a broader and more sustainable educational system. Community and parental involvement also serve as supporting

elements in mitigating digital risks. Through effective communication between the school and parents, awareness regarding the safe and responsible use of technology can be instilled from an early age. This helps cultivate a positive culture of digital literacy within both families and the school environment (Susanti, 2022). Furthermore, the school needs to implement regular evaluations of its digital risk management strategies. This evaluation includes assessing the effectiveness of digital facilities, data security measures, and the ability of teachers and students to utilize technology. The evaluation results will serve as a basis for refining policies and determining improvement priorities for the future. The adoption of continuous improvement principles aligns with quality management approaches in education, which emphasize sustainable performance enhancement (Rahmadani, 2024).

Through these steps, UPT SDN 20 Jalamu can build a more resilient educational system in response to the challenges of the digital era. Although the current facilities and infrastructure may not yet be ideal, collaborative strategies, capacity building, and strengthened policy support can become important foundations for addressing emerging risks in the future. In addition to the strategies previously discussed, it is essential to highlight that the effectiveness of digital risk management in educational institutions greatly depends on the establishment of a systematic monitoring culture. Schools must not only design mitigation strategies but also ensure continuous supervision, documentation, and evaluation of all digital-related activities. Periodic assessments allow management to detect weaknesses early, measure progress, and determine whether existing policies are still relevant to current technological dynamics. Moreover, digital risk management should be viewed as an ongoing cycle rather than a one-time intervention. Once a mitigation plan has been implemented, the school should follow it up with impact evaluations, stakeholder feedback, and data-driven revisions. Such a dynamic framework ensures that the institution remains responsive to technological changes and new forms of digital threats that may emerge over time. For instance, the growing use of artificial intelligence in education introduces new ethical and data governance concerns that must be integrated into future risk management policies. An equally important dimension of sustainable risk management lies in institutional governance. A strong governance structure provides clarity in terms of roles, responsibilities, and accountability among staff members. UPT SDN 20 Jalamu, for example, can establish a small digital management team or task force responsible for coordinating technology use, monitoring compliance with security procedures, and reporting periodically to the school leadership. Such a decentralized but coordinated approach can enhance responsiveness and ensure that digital policies are implemented consistently across classrooms.

Furthermore, capacity building must extend beyond technical training. Teachers and administrative staff should also be equipped with soft skills such as digital ethics, critical thinking, and problem-solving abilities to handle unexpected challenges. This holistic approach prepares school personnel not only to use technology effectively but also to make informed decisions in complex digital environments. In this regard, fostering a growth mindset among educators is crucial. When teachers perceive technology as an opportunity for professional growth rather than an additional burden, their engagement and innovation in digital practices tend to increase significantly. Another crucial factor that influences digital risk management outcomes is organizational culture. Schools that encourage collaboration, experimentation, and openness to feedback tend to adapt more successfully to digital transformation. By creating an atmosphere where mistakes are treated as learning opportunities, schools can reduce resistance to technological adoption and accelerate digital maturity. Leaders must therefore act not only as administrators but also as cultural architects who nurture trust and motivation within their teams.

In addition, student involvement should not be overlooked in managing risks related to technology use. Encouraging students to participate in digital safety campaigns, peer learning groups, or ICT clubs helps them develop ownership over their learning environment. Empowering students in this way can reduce misuse of digital tools and enhance awareness about cybersecurity and responsible online behavior. This participatory model also aligns with 21st-century education principles, which emphasize learner agency and collaboration in achieving digital citizenship. At a broader level, it is imperative to acknowledge that schools do not operate in isolation. The digital readiness of a single institution is influenced by the surrounding ecosystem government regulations, internet service availability, community awareness, and even socioeconomic disparities. Therefore, multi-stakeholder collaboration becomes a prerequisite for effective digital risk management. Local governments, private companies, and civil society organizations can provide financial, technical, and training support to strengthen school resilience. For example, internet providers can offer subsidized connectivity, while local universities can assist with research and digital literacy workshops for teachers.

Furthermore, integrating risk management principles into policy frameworks is critical to institutionalize good practices. Including risk assessment components in the School Work Plan (RKS) and

School Budget Plan (RKAS) ensures that every digital initiative is planned, budgeted, and monitored within an accountability framework. This institutional alignment prevents risk management from being treated as an ad hoc activity and instead embeds it into the school's long-term development agenda. Another element that requires attention is ethical risk management. As digital tools become more embedded in teaching, issues such as data privacy, algorithmic bias, and digital surveillance may arise. Schools must develop clear ethical guidelines to govern the use of technology, ensuring that innovation does not compromise students' rights and well-being. Teachers should also be educated on the importance of consent, confidentiality, and fairness in the use of educational data.

Finally, achieving digital resilience is not merely a technical challenge but also a moral and social commitment. Educational institutions have a responsibility to prepare their communities for a rapidly evolving digital society. This includes cultivating values of adaptability, accountability, and inclusivity. Through continuous learning, collaborative partnerships, and evidence-based decision-making, schools like UPT SDN 20 Jalamu can transform digital risks into opportunities for institutional growth and innovation. In summary, risk management in the digital era must be seen as an integrated process involving governance, culture, and community participation. When schools consistently align technology adoption with human development, ethical awareness, and systemic evaluation, they can not only minimize risks but also leverage digitalization to enhance educational quality and equity. The experience of UPT SDN 20 Jalamu provides a valuable model for other basic education institutions in Indonesia seeking to navigate the complexities of digital transformation while safeguarding educational integrity and inclusiveness. Beyond the internal strategies and policies, the long-term success of digital risk management also depends on how schools embed resilience thinking into their institutional planning. Resilience in education refers to the ability of schools to anticipate, absorb, and adapt to disruptions while maintaining their core functions (Henderson et al., 2021). In digital contexts, this means preparing the institution not only for current technological challenges but also for future uncertainties such as cyberattacks, software obsolescence, and digital inequality.

To achieve this, UPT SDN 20 Jalamu must cultivate a risk-aware learning ecosystem that integrates prevention, response, and recovery strategies. Prevention involves proactive steps such as digital literacy campaigns and consistent hardware maintenance. Response mechanisms focus on quick, coordinated action during incidents such as system breakdowns or data breaches while recovery plans ensure the restoration of critical educational services with minimal disruption. This triadic approach aligns with the risk management cycle promoted by the International Organization for Standardization (ISO 31000:2018), which emphasizes continuous improvement and feedback. In addition, leadership development emerges as a vital factor in fostering a sustainable digital risk culture. Principals and administrative leaders need specialized training to manage technology-based operations, evaluate cyber risks, and lead digital transformation with ethical consideration (Fullan & Quinn, 2020). Transformational leadership, characterized by vision, communication, and empowerment, has been proven to enhance teachers' commitment to change and strengthen collective efficacy in dealing with new technologies. Another essential dimension is teacher professional identity in digital settings. Teachers are not merely users of technology but co-creators of pedagogical innovation. When teachers perceive themselves as competent and confident in digital spaces, they are more likely to experiment with new learning models and contribute to institutional innovation (Tondeur et al., 2021). Thus, digital risk management should not be limited to technical safeguards it must also empower educators to take ownership of digital transformation.

From a social perspective, the digital divide remains one of the most persistent barriers to equitable education. Risk management efforts must therefore integrate principles of digital justice and inclusion, ensuring that all students regardless of their socioeconomic background can benefit from technology-enhanced learning (UNESCO, 2022). Schools can implement targeted interventions such as lending programs, community ICT centers, and parent workshops to mitigate these disparities. Such initiatives align with the Sustainable Development Goal (SDG 4) on quality education and inclusive lifelong learning.

Furthermore, the ethical dimension of digital governance requires growing attention in school environments. With the increasing use of digital data and learning analytics, concerns about privacy, consent, and surveillance are becoming more urgent (Livingstone & Third, 2017). Schools need to establish clear ethical standards for handling student information, define data ownership, and educate both teachers and learners about responsible data behavior. This ethical vigilance ensures that technological advancement does not compromise students' rights or educational equity. Cross-sector partnerships also play a decisive role in sustaining digital safety. Collaborations between schools, local governments, technology providers, and universities can generate innovative and low-cost solutions. For example, schools may partner with local higher education institutions for teacher mentoring programs or work with

telecommunication companies to provide subsidized internet access for students. These partnerships can transform isolated risk management efforts into a community-based digital resilience framework, enhancing both efficiency and inclusiveness (OECD, 2023).

Finally, embedding monitoring and evaluation systems within school governance ensures accountability and continuous refinement. Regular risk audits, digital safety reviews, and feedback surveys can provide actionable insights into emerging issues. The use of performance indicators such as incident frequency, system uptime, or user satisfaction can serve as measurable outcomes for assessing the success of digital management policies (Braun & Clarke, 2019). In conclusion, the experience of UPT SDN 20 Jalamu underscores that digital risk management must be multidimensional, encompassing infrastructure, human capital, ethical governance, and community participation. The school's incremental progress illustrates how small-scale initiatives, when aligned with strategic leadership and continuous learning, can lead to sustainable digital transformation. Building such an ecosystem requires not only technical investment but also a cultural shift toward collaboration, transparency, and shared accountability. Another essential aspect in ensuring the sustainability of digital risk management within schools is the institutionalization of knowledge management systems. Schools that systematically collect, store, and share digital risk-related knowledge are better prepared to respond to emergencies and policy changes. For instance, maintaining a digital logbook that records incidents such as cyber threats, system outages, or hardware failures enables the institution to identify recurring patterns and formulate preventive strategies. Knowledge management also supports succession planning, ensuring that valuable lessons are preserved even when personnel changes occur (Nonaka & Takeuchi, 2019).

Moreover, digital risk management should not be seen merely as a defensive mechanism but as a means to drive innovation and quality improvement. Schools that approach digital risks strategically can transform challenges into opportunities to modernize their systems, enhance teacher creativity, and improve communication efficiency. For example, by adopting secure cloud-based solutions, schools not only safeguard data but also enable collaborative teaching and real-time resource sharing among teachers. Thus, the management of digital risk evolves from being reactive to becoming a proactive driver of school improvement. Another point of emphasis is the integration of digital risk management into teacher professional development frameworks. Professional learning communities (PLCs) can be leveraged to create a continuous culture of improvement, where teachers collaboratively evaluate digital practices, identify emerging risks, and share innovative solutions. Such peer-supported structures not only enhance technical competence but also foster a sense of shared responsibility among educators for maintaining digital safety (Stoll & Louis, 2017). Additionally, the psychological readiness of teachers and students should not be overlooked. Resistance to change often arises not because of a lack of skill but because of anxiety, uncertainty, or fear of failure. Thus, digital transformation must be accompanied by psychosocial support mechanisms, including counseling, coaching, and motivational workshops that build confidence and reduce technostress (Tarafdar et al., 2019). Emotional well-being directly influences the effectiveness of technology adoption, and consequently, the overall resilience of the educational system.

Furthermore, the integration of risk communication strategies is critical in managing crisis situations. Transparent communication channels between the school, parents, and the community can reduce panic and misinformation during technical disruptions or data security incidents. Establishing a communication protocol defining who should report, how, and to whom helps streamline decision-making and maintains public trust in the institution (Coombs & Holladay, 2020). Environmental sustainability is another emerging dimension of digital risk management. As technology usage increases, so does electronic waste (e-waste) from outdated or damaged devices. Schools can mitigate environmental risks by implementing responsible e-waste management practices, such as recycling, refurbishing old equipment, and promoting green computing behaviors. Aligning digital risk management with environmental ethics demonstrates institutional responsibility and aligns education with the global Sustainable Development Goals (SDG 12: Responsible Consumption and Production).

Finally, continuous policy advocacy and capacity-building at the regional level are vital for long-term transformation. District and provincial education authorities must not only provide infrastructure but also facilitate policy alignment across schools, ensuring standardized digital safety frameworks. When local policies support shared digital infrastructure, smaller schools can benefit from economies of scale, reducing costs while maintaining robust data protection and operational security (World Bank, 2023). In summary, the implementation of digital risk management at UPT SDN 20 Jalamu demonstrates that successful digital transformation in schools requires a multi-layered approach combining governance, leadership, communication, professional growth, psychological support, and sustainability. The experience of this

institution illustrates how resource-limited schools can gradually build resilience through strategic planning, collaboration, and a commitment to continuous learning.

4. CONCLUSION

Based on the study results, it can be concluded that the UPT SDN 20 Jalamu faces various challenges and risks in the digitalization process of education. These risks include limited technological infrastructure, suboptimal data security, varying levels of teacher digital literacy, and disparities in technology access among students. Nevertheless, the school has demonstrated positive efforts by conducting teacher training, gradually improving its infrastructure, and establishing collaborations with external parties. Effective risk management requires systematic and continuous implementation. Schools should develop risk maps, response plans, and regular evaluations to anticipate potential problems early. Strengthening human resource capacity is key to ensuring the success of digital transformation. Teachers with strong digital literacy skills will be more adaptable to change and able to utilize technology to improve the quality of learning. Ultimately, successful digital risk management depends not only on the availability of technology, but also on a school organizational culture that is collaborative, open to change, and focused on quality improvement. With a shared commitment from all stakeholders, the UPT SDN 20 Jalamu can become an example of a resilient, innovative, and adaptive elementary school in facing the challenges of education in the digital era.

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