Digital Transformation in Pesantren: The Kyai's Role in Improving Educational Services

Samsul Bahri*, Abd Hamid Wahid, Najiburrahman
Universitas Nurul Jadid, Probolinggo, East Java, Indonesia

*Corresponding Author: samsul_bahri@gmail.com
http://doi.org/10.33650/ijess.v3i2. 3417

Abstract:

This research focuses on the role of Kyai in improving the quality of services at the Islamic Boarding School through the adoption of digital technology. Using a qualitative approach, the data collection method is carried out through in-depth interviews, participatory observations, and documentation involving Kyai, students, and pesantren administrators. The study results show that Kyai plays an important role in facilitating the transformation of educational services, including implementing an online registration system that facilitates access to information for parents and students. In addition, using digital platforms increases transparency and efficiency in communication, creating a better relationship between pesantren administrators and the community. The implications of this study show that the support and advocacy of Kyai in utilizing technology can solve modern education's challenges. These findings emphasize the importance of technology integration in pesantren management as a strategic step to improve the quality of education services. This research also provides new insights for developing educational policies in the pesantren environment to become more adaptive and responsive to the needs of the times.

Key Words: *Digital Technology, Service Quality, Community Engagement*

INTRODUCTION

Islamic boarding schools (pesantren) have long played a central role in shaping many young Indonesians' educational and spiritual lives (Aggarwal et al., 2023; Gamage et al., 2021; Ma & Wang, 2022). However, in an era characterized by rapid technological advancements, these traditional institutions face increasing pressure to modernize their administrative and educational processes (Firoozi et al., 2024; Li et al., 2021; Narayanan et al., 2020). One particular area of concern is the efficiency and transparency of student registration, financial transactions, and the communication of academic progress to parents and guardians (Agwu et al., 2022; Hakimi et al., 2021; Sianturi et al., 2022). The reliance on manual systems often leads to delays, inaccuracies, and confusion (Aminizadeh et al., 2024; Ng et al., 2021; Ruskin et al., 2020).

This gap becomes even more pronounced as parents and students increasingly expect seamless, instant access to information. As society moves toward a more digitally integrated environment (Kurniawan et al., 2022; Plekhanov et al., 2023; Webber et al., 2022), pesantren must find ways to bridge traditional educational values with the digital tools that define modern life. Addressing this challenge is not merely a matter of convenience; it is essential to maintaining public trust and ensuring Islamic education remains relevant in the contemporary world (Achruh et al., 2024; Hasan et al., 2022; Omolara et al., 2022).

Existing research highlights the transformative impact of digital technology on education management and service quality. Previous research explored how transparent communication through digital platforms enhances parental involvement and institutional credibility (Aghdam et al., 2020; Wang et al., 2023; Zapata-Cantu et al., 2023). Then, research about technology adoption demonstrated that technology adoption not only simplifies administrative tasks but also strengthens student engagement and academic performance (Almusaed et al., 2023; Mhlongo et al., 2023; Ouyang et al., 2022). Previous studies have also indicated that digital tools foster inclusivity, as online systems provide easier access for rural and underserved communities (Han & Kumwenda, 2024; Matsieli & Mutula, 2024; Pérez-Escolar & Canet, 2023). However, while numerous studies have examined the benefits of digital integration in public schools and universities, there is limited research on how these strategies apply within the unique context of pesantren. This gap in the literature underscores the importance of exploring how spiritual leaders in pesantren, particularly Kyai, can leverage digital technology to maintain educational standards while adapting to societal demands for efficiency and transparency.

This research analyzes how Kyai can play a transformative role in bridging traditional pesantren values with digital innovation. The central problem is that many pesantren still rely on outdated, manual systems that hinder the timely delivery of services. This study seeks to explore the potential of digital platforms to improve administrative efficiency, enhance parent-student communication, and strengthen overall service transparency. Specifically, it examines the strategies that Kyai can adopt to guide their institutions through a digital transition without compromising the religious and cultural principles central to pesantren education. This research contributes to the broader discourse on integrating technology into traditional educational environments by identifying successful approaches and challenges. Ultimately, this study seeks to offer practical solutions for pesantren administrators and educators, helping them navigate the complexities of modernization while preserving their foundational values.

This study argues that Kyai, who actively advocates for and guides the integration of digital tools, will see improved service quality and increased stakeholder satisfaction. When thoughtfully implemented, the underlying assumption is that technology can coexist harmoniously with pesantren's

traditional values, allowing for enhanced transparency, efficiency, and accessibility. Furthermore, it is anticipated that the availability of online registration, digital payment systems, and streamlined communication platforms will reduce administrative burdens, enabling Kyai and educators to focus more on their primary mission: fostering students' moral and academic development. Preliminary evidence from case studies in similar educational contexts suggests that this integration strengthens trust between pesantren administrators and the wider community, as parents and students gain more precise insights into the institution's operations. As such, the research expects to reveal that the successful digital transformation of pesantren hinges on the proactive, visionary leadership of Kyai.

RESEARCH METHOD

The type of research used in this study is qualitative research with a descriptive approach. This approach was chosen because it allows researchers to explore various aspects of the role of Kyai as personal branding in holistically improving the quality of services at the Nurul Qadim Islamic Boarding School, Probolinggo, East Java, Indonesia. Qualitative research is more appropriate because it can provide a deeper understanding of social phenomena and their meanings and a richer context regarding the perceptions and experiences of resource persons (Farquhar et al., 2020; Loose et al., 2023; Maxwell, 2021). Using this method, researchers can capture the complexity of interactions between individuals and identities as kai in managing educational services responsive to changing times.

Data collection techniques are carried out through three main methods, namely in-depth interviews, participatory observation, and documentation. This research was conducted at the Nurul Qadim Islamic Boarding School to obtain relevant data regarding the application of technology and the role of Kyai. The respondents in this study consisted of three Kyai, five students, one guardian of students, and one boarding school administrator. The respondents were selected using the purposive sampling method, where each resource person was considered to have rich and relevant information related to the research theme, so it was expected to provide a more in-depth perspective. Table 1 below shows the coding for the interviewees involved in this study.

Table 1. Coding for Informants

Code	Sources	Description
I_K	Eat. Shafidzul Hakim Nor	Leaders of Islamic Boarding Schools
I_KY	KH. Abdul Hadi Noer	Chairman of the Foundation
I_AS	Abdus Salam	Chief Service Operator
I_WS	Wisnu Saputra	Active Students
I_KAH	Abdullah Hassan	Additional Resource Persons
I_AY	Ainul Close	Technologist
I_S	Santri	Additional resource persons

Table 1 provides a clear overview of the coding for the sources involved in the study, which will facilitate information mapping and further data analysis. For data analysis, this study uses analysis techniques from Milles & Huberman (2014), which includes three stages: data reduction, data presentation, and conclusion. In the data reduction stage, the researcher selects relevant information from interviews and observations and organizes the data into categories per the research objectives. Furthermore, the presentation of data is carried out by presenting information in a systematic narrative form that allows researchers and readers to understand the context. Finally, conclusions are drawn by considering relevant patterns, themes, and relationships between the data to develop a comprehensive understanding. Thus, this analysis focuses on numerical data and the more profound meaning and context of the information obtained.

RESULT AND DISCUSSION
Result
the Role of Kyai in Improving Service Quality

The findings of this study highlight the central role of the Kyai in enhancing service quality. The Kyai emphasized adapting to technological advancements in educational and service practices. Implementing an online student registration system, which allows parents to register remotely, marks a significant departure from traditional methods. In the interview, K revealed, "We must adapt to the times, including technology. Consciously or not, this will determine how we serve students and parents (I_K)." This statement indicates that Kyai feels it is essential to maintain tradition and pay attention to innovation in service.

The field revealed that the teaching and service system underwent significant changes after adopting new technology. This can be seen from the online student registration system, which allows parents to register without physically coming to the pesantren. Instead of relying on traditional methods, the foundation chairman, KY, explained: "The presence of technology in our services is a strategic step. Students can access information at any time. We must move quickly, or we will be behind (I_KY)." The deeper meaning of this statement shows the awareness of the importance of advocacy for technology as part of an effective learning and service strategy.

He also referred to the responsibility of Kyai to encourage the spirit of learning and innovation in the entire structure of the pesantren. He said, "Using technology improves efficiency and expands our (I_KY) educational reach." This shows that the role of kai in improving service quality must align with their efforts to remain relevant and responsive to the community's needs. This is shown in Table 2 regarding distributing digital service hours.

Table 2. Distribution of Digital Service Hours at Nurul Qadim Islamic Boarding School

Type of Service	Service Hours	Platform
Santri Registration	08:00 - 17:00 WIB	Website Pesantren
Payment	24 Hours (Online)	Mobile App
Santri Information	24 Hours (Online)	Website & App
Consultation	10:00 AM - 12:00 PM	Zoom/WhatsApp

Table 2. presents the distribution of digital service hours and shows that student registration services, student information, and payment have been integrated into an efficient digital system. With flexible service hours, such as registration, open from 08:00 to 17:00 WIB, and payment and information services available 24 hours online, the pesantren shows its commitment to ensuring accessibility for students and parents. This strategy not only improves operational efficiency but also reduces barriers to communication and interaction, allowing parents to get the necessary information at any time. The existence of a digital platform that supports this service reflects the readiness to adapt to technological developments and improve service quality, which ultimately aims to provide a better experience for all Islamic boarding school residents.

Service Innovation through Technology

Through technology, pesantren strives to answer modern educational challenges and increase transparency and efficiency in every service aspect. Prioritizing innovation further strengthens its position as an educational institution that is adaptive and responsive to the needs of the times. Implementing the digital platform is one of the most significant innovations found during the research. The head of the service operator stated, "With this application, we can monitor every student activity in real time. This helps us respond faster to (I_AS) issues." This statement shows how important technology is in improving service responsiveness.

One of the active students added, "In the past, we had to wait a long time to get information, but now everything is at our fingertips. It is very easy (I_WS)." Simplifying information is essential in accelerating decision-making by students and parents, creating better service transparency. As conveyed by one of the speakers, the support of experts in the technology field said, "We strive continuously to improve the application to suit the needs of users, (I_AY)" reflects the commitment of the Islamic boarding school to continue to evaluate and improve continuously. This shows the importance of collaboration between administrators and technology experts in creating adaptive and responsive services.

The web-based and mobile application systems have reduced obstacles that previously made communication difficult between students, parents, and pesantren administrators. Figure 1. Below is the display of user interaction on the student registration system. This website is designed to make it easier for parents and prospective students to register online, as well as illustrate the commitment of Islamic boarding schools to adopting digital technology as part of service innovation.

Figure 1. Website of the PP Santri Registration System. Nurul Qodim
(Source: https://ponpesnurulqadim.com/psb/)

The student registration system website of the Islamic Boarding School demonstrates simplicity and ease of navigation, which are crucial for enhancing user experience. The intuitive interface allows parents to quickly access information on registration, requirements, and procedures. Simple yet informative visual elements help reduce confusion and increase the efficiency of the registration process. Additionally, the online registration feature showcases the pesantren's effective adaptation to modern needs, where speed and accessibility are essential in providing optimal services. Through this system, the Islamic Boarding School addresses the challenges of the digital era and offers significant convenience for users to engage in Islamic boarding school education.

Evaluation and Feedback on Service Quality

Service quality evaluation is an important theme in the findings of this study. KH. Abdullah Hasan stated, "We need to listen to the feedback from the residents of the Islamic boarding school. Only then can we move forward (I_KAH)." This implies that participation and feedback from the community are urgently needed to improve the quality of services in the future. The case shows that pesantren administrators actively collect feedback through surveys and regular meetings with students and parents. As in the interview, "With this survey, we can understand which areas need improvement in the ministry (I_AS)." Using survey methods to obtain insights indicates a data-driven approach to service evaluation.

Through discussions with several students, the relevance of the feedback was seen in the sentence, "We need to be included in the regulations related to the services we receive (I_S)." It is a fact that the active role of students in the evaluation of service quality is important to create tolerance and two-way understanding between administrators and students.

The evaluation of service quality emerged as a key theme in the findings of this study. KH. Abdullah Hasan emphasized the importance of listening to feedback from the Islamic boarding school residents, noting that only through this can improvements be made. This highlights the necessity of community participation in enhancing service quality. The pesantren administrators actively gather feedback through surveys and regular meetings with students and parents, as reflected in one interview statement: "With this survey, we can understand which areas need improvement in the ministry." This approach underscores a data-driven method for evaluating services. Furthermore, student feedback also emphasized the significance of their involvement in service-related regulations, as one student noted, "It is very important for us to be included in the regulations related to the services we receive." This suggests active student participation fosters tolerance and mutual understanding between students and administrators.

Discussion

The findings of this study emphasize the importance of evaluating the quality of service, where feedback from Islamic boarding school residents is the key to service improvement. KH. Abdullah Hasan underlined the need to listen to the voices of the community to achieve progress. The management actively collects feedback through surveys and regular meetings, supporting a data-driven approach to service evaluation. This aligns with Yu et al. (2024), which emphasizes increasing effectiveness through user participation. Discussions with students emphasized the importance of their involvement in the evaluation process, which creates two-way communication and strengthens a sense of ownership in service management. Thus, integrating feedback is an important strategy to improve service quality and empower Islamic boarding schools' educational community.

The analysis of the results of the above theme shows that the role of Kyai as personal branding is vast in building the quality of service, which aligns with the theory of transformational leadership. Kyai functions not only as a spiritual leader but also as an innovator who can utilize technology to provide services that meet the needs of the times. The findings that technology can speed up the communication process show the need for adaptation in education in the digital era.

Innovations implemented through digital platforms also underscore the importance of flexibility and speed of response in services. With continuous feedback, the importance of integrated evaluation becomes a handle for service

improvement that is not only assumption but based on concrete data. In a broader context, this finding strengthens the urgency of Islamic boarding schools to continue to adapt and improve the quality of services to attract public interest in the world of higher-quality Islamic education.

The above research shows that innovation through technology has improved communication efficiency and service transparency. As revealed by Abdus Salam, implementing digital platforms allows for real-time monitoring of student activities, speeding up responses to problems and reducing information barriers between students, parents, and administrators. This finding aligns with previous research by Sianturi et al. (2022), which emphasizes the importance of technology in improving the quality of education and services in Islamic boarding schools. In addition, the collaboration between the management and experts, as revealed by Ainul Yaqin, reflects the seriousness of conducting continuous evaluation. This shows that the application of technology is not just the introduction of a new system but a strategic step towards a more adaptive and responsive education management to the needs of the times.

This research highlights the crucial role of Kyai in improving service quality through technology adoption. KH. Chafidzul Hakim Noer emphasized that innovation is needed to meet the needs of students and parents, reflecting the importance of adapting to the times. This aligns with previous research by Agwu et al. (2022), which showed that integrating technology in education management can improve efficiency and accessibility. This step strives to provide a better and more responsive experience for its entire community.

This approach improves the quality of services and creates a relevant educational model that faces the challenges of the times and the community's needs. The practical contribution of the findings of this study lies in implementing technology that improves the quality of services, including communication efficiency and service transparency, which can be a model for other educational institutions in adopting digital systems to meet modern needs. The successful implementation of the online registration platform and the active collection of feedback show that collaboration between pesantren administrators and technology experts is critical in creating responsive services. Theoretically, this research strengthens transformational leadership, where Kyai is a spiritual leader and an agent of change who utilizes technology to improve educational services. Thus, this research contributes to the literature on the management of education in Islamic boarding schools, showing that combining technology and visionary leadership can create significant positive changes in the quality of educational services.

CONCLUSION

This research highlights the importance of the role of Kyai as personal branding in improving the quality of services through the adoption of digital technology. Key findings show that service innovations, such as online

registration systems and active feedback collection, speed up communication and increase transparency and accessibility for students and parents. The takeaway from this study is the importance of adapting to the times, which reinforces the understanding that the effectiveness of educational services depends not only on tradition but also on the ability to innovate and meet the needs of society. Thus, readers can take key lessons regarding the relevance of technology in education that can be applied in other educational settings.

This research significantly updates the existing perspectives on education management in pesantren by integrating technology as a central element in enhancing service quality. It also introduces a novel approach to collecting feedback through a data-driven method, which has not been widely explored in the context of Islamic educational institutions. However, the study has limitations, mainly its narrow focus on the Islamic Boarding School, which limits the generalizability of the findings to other institutions. These constraints highlight the need for more extensive follow-up research, particularly studies comparing Islamic boarding schools while considering gender and age variables. Such research is expected to yield broader and more detailed data, serving as a foundation for more tailored and effective policies in the future.

ACKNOWLEDGMENT

REFERENCES

Achruh, R., Rusdi, M., & Idris, R. (2024). Challenges and Opportunities of Artificial Intelligence Adoption in Islamic Education in Indonesian Higher Education Institutions. *International Journal of Learning, Teaching and Educational Research*, *23*(11), 423–443. https://doi.org/10.26803/ijlter.23.11.22

Aggarwal, S., Wright, J., Morgan, A., Patton, G., & Reavley, N. (2023). Religiosity and Spirituality in the Prevention and Management of Depression and Anxiety in Young People: A Systematic Review and Meta-Analysis. *BMC Psychiatry*, *23*(1), 729. https://doi.org/10.1186/s12888-023-05091-2

Aghdam, A. R., Watson, J., Cliff, C., & Miah, S. J. (2020). Improving the Theoretical Understanding Toward Patient-Driven Health Care Innovation Through Online Value Cocreation: Systematic Review. *Journal of Medical Internet Research*, *22*(4), e16324. https://doi.org/10.2196/16324

Agwu, P., Orjiakor, C. T., Odii, A., Onalu, C., Nzeadibe, C., Roy, P., Onwujekwe, O., & Okoye, U. (2022). "Miracle Examination Centres" as Hubs for Malpractices in Senior Secondary School Certificate Examination in Nigeria: A Systematic Review. *International Journal of Educational Development*, *88*, 102538. https://doi.org/10.1016/j.ijedudev.2021.102538

Almusaed, A., Almssad, A., Yitmen, I., & Homod, R. Z. (2023). Enhancing Student Engagement: Harnessing "AIED"'s Power in Hybrid Education—A Review Analysis. *Education Sciences*, *13*(7), 632. https://doi.org/10.3390/educsci13070632

Aminizadeh, S., Heidari, A., Dehghan, M., Toumaj, S., Rezaei, M., Jafari Navimipour, N., Stroppa, F., & Unal, M. (2024). Opportunities and Challenges of Artificial Intelligence and Distributed Systems to Improve the Quality of Healthcare Service. *Artificial Intelligence in Medicine*, *149*, 102779. https://doi.org/10.1016/j.artmed.2024.102779

Farquhar, J., Michels, N., & Robson, J. (2020). Triangulation in Industrial Qualitative Case Study Research: Widening the Scope. *Industrial Marketing Management*, *87*, 160–170.

Firoozi, A. A., Tshambane, M., Firoozi, A. A., & Sheikh, S. M. (2024). Strategic Load Management: Enhancing Eco-Efficiency in Mining Operations Through Automated Technologies. *Results in Engineering*, *24*, 102890. https://doi.org/10.1016/j.rineng.2024.102890

Gamage, K. A. A., Dehideniya, D. M. S. C. P. K., & Ekanayake, S. Y. (2021). The Role of Personal Values in Learning Approaches and Student Achievements. *Behavioral Sciences*, *11*(7), 102. https://doi.org/10.3390/bs11070102

Hakimi, L., Eynon, R., & Murphy, V. A. (2021). The Ethics of Using Digital Trace Data in Education: A Thematic Review of the Research Landscape. *Review of Educational Research*, *91*(5), 671–717. https://doi.org/10.3102/00346543211020116

Han, S. P., & Kumwenda, B. (2024). Bridging the Digital Divide: Promoting Equal Access to Online Learning for Health Professions in an Unequal World. *Medical Education*, *59*(1), 56–64. https://doi.org/10.1111/medu.15455

Hasan, M. K., Alkhalifah, A., Islam, S., Babiker, N. B. M., Habib, A. K. M. A., Aman, A. H. M., & Hossain, M. A. (2022). Blockchain Technology on Smart Grid, Energy Trading, and Big Data: Security Issues, Challenges, and Recommendations. *Wireless Communications and Mobile Computing*, *2022*(1), 9065768. https://doi.org/10.1155/2022/9065768

Kurniawan, T. A., Liang, X., O'callaghan, E., Goh, H., Othman, M. H. D., Avtar, R., & Kusworo, T. D. (2022). Transformation of Solid Waste Management in China: Moving Toward Sustainability Through Digitalization-Based Circular Economy. *Sustainability (Switzerland)*, *14*(4), 2374. https://doi.org/10.3390/su14042374

Li, L., Rong, S., Wang, R., & Yu, S. (2021). Recent Advances in Artificial Intelligence and Machine Learning for Nonlinear Relationship Analysis and Process Control in Drinking Water Treatment: A Review. *Chemical Engineering Journal*, *405*, 126673. https://doi.org/10.1016/j.cej.2020.126673

Loose, F., Hudders, L., De Jans, S., & Vanwesenbeeck, I. (2023). A Qualitative Approach to Unravel Young Children's Advertising Literacy for YouTube Advertising: In-Depth Interviews with Children and Their Parents. *Young Consumers*, *24*(1), 74–94.

Ma, Q., & Wang, F. (2022). The Role of Students' Spiritual Intelligence in Enhancing Their Academic Engagement: A Theoretical Review. *Frontiers in Psychology*, *13*, 857842. https://doi.org/10.3389/fpsyg.2022.857842

Matsieli, M., & Mutula, S. (2024). COVID-19 and Digital Transformation in Higher Education Institutions: Towards Inclusive and Equitable Access to Quality Education. *Education Sciences*, *14*(8), 819. https://doi.org/10.3390/educsci14080819

Maxwell, J. A. (2021). Why Qualitative Methods Are Necessary for Generalization. *Qualitative Psychology*, *8*(1), 111.

Mhlongo, S., Mbatha, K., Ramatsetse, B., & Dlamini, R. (2023). Challenges, Opportunities, and Prospects of Adopting and Using Smart Digital Technologies in Learning Environments: An Iterative Review. *Heliyon*, *9*(6). https://doi.org/10.1016/j.heliyon.2023.e16348

Milles, M. B., & Huberman. (2014). *Qualitative Data Analysis: A Methods Sourcebook*. Sage Publications.

Narayanan, H., Luna, M. F., von Stosch, M., Cruz Bournazou, M. N., Polotti, G., Morbidelli, M., Butté, A., & Sokolov, M. (2020). Bioprocessing in the Digital Age: The Role of Process Models. *Biotechnology Journal*, *15*(1), 1900172. https://doi.org/10.1002/biot.201900172

Ng, K. K. H., Chen, C. H., Lee, C. K. M., Jiao, J. (Roger), & Yang, Z. X. (2021). A Systematic Literature Review on Intelligent Automation: Aligning Concepts from Theory, Practice, and Future Perspectives. *Advanced Engineering Informatics*, *47*, 101246. https://doi.org/10.1016/j.aei.2021.101246

Omolara, A. E., Alabdulatif, A., Abiodun, O. I., Alawida, M., Alabdulatif, A., Alshoura, W. H., & Arshad, H. (2022). The Internet of Things Security: A Survey Encompassing Unexplored Areas and New Insights. *Computers and Security*, *112*, 102494. https://doi.org/10.1016/j.cose.2021.102494

Ouyang, F., Zheng, L., & Jiao, P. (2022). Artificial Intelligence in Online Higher Education: A Systematic Review of Empirical Research from 2011 to 2020. *Education and Information Technologies*, *27*(6), 7893–7925. https://doi.org/10.1007/s10639-022-10925-9

Pérez-Escolar, M., & Canet, F. (2023). Research on Vulnerable People and Digital Inclusion: Toward a Consolidated Taxonomical Framework. *Universal Access in the Information Society*, *22*(3), 1059–1072. https://doi.org/10.1007/s10209-022-00867-x

Plekhanov, D., Franke, H., & Netland, T. H. (2023). Digital Transformation: A Review and Research Agenda. *European Management Journal*, *41*(6), 821–844. https://doi.org/10.1016/j.emj.2022.09.007

Ruskin, K. J., Corvin, C., Rice, S. C., & Winter, S. R. (2020). Autopilots in the Operating Room: Safe Use of Automated Medical Technology. *Anesthesiology*, *133*(3), 653–665. https://doi.org/10.1097/ALN.0000000000003385

Sianturi, M., Lee, J. S., & Cumming, T. M. (2022). A Systematic Review of Indigenous Parents' Educational Engagement. *Review of Education*, *10*(2), e3362. https://doi.org/10.1002/rev3.3362

Wang, R., Bush-Evans, R., Arden-Close, E., Bolat, E., McAlaney, J., Hodge, S., Thomas, S., & Phalp, K. (2023). Transparency in Persuasive Technology, Immersive Technology, and Online Marketing: Facilitating Users' Informed Decision Making and Practical Implications. *Computers in Human Behavior*, *139*, 107545. https://doi.org/10.1016/j.chb.2022.107545

Webber, J. L., Fletcher, T., Farmani, R., Butler, D., & Melville-Shreeve, P. (2022). Moving to a Future of Smart Stormwater Management: A Review and Framework for Terminology, Research, and Future Perspectives. *Water Research*, *218*, 118409. https://doi.org/10.1016/j.watres.2022.118409

Yu, Y., Appiah, D., Zulu, B., & Adu-Poku, K. A. (2024). Integrating Rural Development, Education, and Management: Challenges and Strategies. *Sustainability (Switzerland)*, *16*(15), 6474. https://doi.org/10.3390/su16156474

Zapata-Cantu, L., Sanguino, R., Barroso, A., & Nicola-Gavrilă, L. (2023). Family Business Adapting a New Digital-Based Economy: Opportunities and Challenges for Future Research. *Journal of the Knowledge Economy*, *14*(1), 408–425. https://doi.org/10.1007/s13132-021-00871-1