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Exploring the effectiveness of smart school program as a policy innovation in South Sulawesi, Indonesia

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Abstract: The Smart School program, a policy innovation implemented by the South Sulawesi Provincial Government in Indonesia, has been successfully adopted by schools in the region. This study aims to examine the factors contributing to the successful adoption of the Smart School program focusing on five key attributes: relative advantage, compatibility, complexity, trialability, and observability. A qualitative approach was employed, involving interviews with key informants from the Education Office and schools participating in the program. The findings reveal that the Smart School program has demonstrated a significant relative advantage compared to previous educational practices, improving the accessibility and quality of education, enhancing school administration efficiency, and fostering the development of students' digital skills. The program's compatibility with existing values, past experiences, and the needs of potential adopters has facilitated its adoption. Despite some challenges related to technological infrastructure and teacher training, the overall complexity of the program is not considered a significant barrier to its adoption. The trialability of the program has played a crucial role in its success, allowing schools to experiment with technology integration before fully committing to the program. The observability of the program's positive outcomes has also encouraged schools to embrace and implement the Smart School program. The study concludes that the successful adoption of the Smart School program can be attributed to its alignment with the five attributes of innovation diffusion. The program's success highlights its potential as a model for policy innovation in the education sector. Recommendations for sustaining and enhancing the program's success include ongoing investment in technological infrastructure, targeted teacher training, continuous stakeholder engagement, and the establishment of a platform for sharing best practices among schools.

Keywords: *Policy innovation, Public education, Smart school program, Technology integration.*

1. Introduction

Education is the primary key to developing a nation's human resources. Therefore, the education sector has become a top priority for both central and local governments (Yuan, 2018; Xu, 2021; Chao, 2024; Tsvetkova, 2024). However, educational challenges persist across various countries (Ozawa et al, 2022; Tarján et al, 2024; Appels et al, 2024). In Indonesia specifically, there are issues concerning insufficient resources, facilities, and well-trained educators (Mufanti et al, 2024; Andrina et al, 2024; Rahiem, 2024; Semma et al, 2024). Innovation in educational policy becomes crucial in addressing these challenges.

The South Sulawesi Provincial Government initiated an educational innovation program called "Smart School." This program, launched directly by Governor Andi Sudirman Sulaiman, aims to promote human resource development in South Sulawesi. The Smart School program represents a policy innovation aligned with South Sulawesi's Regional Medium-Term Development Plan 2018-2023 and Laws No. 23/2014 on regional government and No. 11/2019 on the National System of Science and Technology.

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South Sulawesi is Indonesia's first province to implement the Smart School learning system at the high school level. According to the South Sulawesi Provincial Education Office data, 317 high schools across districts/cities have implemented this program. The learning innovation integrates digital and conventional learning with various features required by students and teachers in both online and independent learning processes (Zhu, 2019; Zheng et al, 2024; Hinostroza et al, 2024; Villalobos et al, 2024). The Smart School program is expected to gradually achieve equitable learning quality throughout South Sulawesi.

The primary characteristic of Smart School is the utilization of information technology in teacher-student interactions as users. The design of innovative educational programs aims to enhance efficiency, effectiveness, collaboration, and transparency, which are considered less achievable through conventional learning methods (Lytras et al, 2022; Banjar et al, 2023; Chuaphun, & Samanchuen, 2024). The Smart School concept also encompasses technology-based school management to better adapt to the information era.

The implementation of the Smart School policy innovation by the South Sulawesi Government since 2021 has received appreciation from Bappenas. This program has demonstrated positive results in improving educational quality in South Sulawesi. Through Smart School, South Sulawesi successfully ranked among the top 5 provinces with the highest number of students admitted to state universities through the UTBK-SBNT 2023 pathway, with 10,994 students (33.10%) out of 33,212 applicants. This figure shows significant improvement compared to 2022, which only saw 8,902 students (25.36%).

Despite its positive impact, preliminary research has identified several implementation challenges in the Smart School program. First, internet availability remains a primary constraint as the program is fully integrated with internet connectivity. Second, Smart School requires numerous devices, sometimes leading to usage difficulties. Third, human resources still face challenges in operating Smart School devices, necessitating training.

Based on the above explanation, this research aims to examine the extent of Smart School policy innovation success as perceived by the community and analyze whether the program provides benefits or creates difficulties for society. It is essential to ensure that government policy innovations positively impact their intended beneficiaries. The study focus will be directed toward explaining the three main Smart School issues from the perspective of policy innovation theory using five innovation attributes from diffusion of innovation theory. Analysis using the frameworks of relative advantage, compatibility, complexity, trialability, and observability will help explain the extent of success and challenges in implementing the Smart School program as a policy innovation in the education sector.

2. Method

This qualitative research employs a case study approach to provide an objective description and explanation of the Smart School policy innovation implementation in the South Sulawesi Provincial Government, Indonesia. The study focuses on analyzing the implementation of the Smart School program as a manifestation of the South Sulawesi Provincial Government's policy innovation in the education sector and describing the factors influencing the implementation process. The research is based on Everett Rogers' theory of innovation diffusion, examining the program through five innovation attributes: relative advantage, compatibility, complexity, trialability, and observability.

Data collection was conducted through observation, interviews, and literature study. Observations were carried out at the South Sulawesi Provincial Education Office and selected high schools in Makassar city implementing the Smart School program. Semi-structured interviews were conducted with key informants, including the Head of the High School Development Division at the South Sulawesi Provincial Education Office, principals, teachers, and students from schools participating in the Smart School program. Secondary data were obtained from policy documents, journal articles, and written reports related to the implementation of the Smart School program.

The collected data were analyzed using an interactive model consisting of three stages: data reduction, data display, and conclusion drawing. Data reduction involves selecting, simplifying, and transforming raw data from field notes. The data is then organized and presented in a narrative text, supported by documents, photos, and other relevant materials, to facilitate conclusion drawing. The

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researcher continuously verifies the data throughout the data collection process, analyzing patterns, themes, similarities, hypotheses, and drawing tentative conclusions. The final conclusions are drawn by extracting the essence of the research results based on observations and interviews.

To ensure the trustworthiness of the study, several strategies were employed, including prolonged engagement, persistent observation, triangulation, peer debriefing, and member checking. Prolonged engagement involves spending sufficient time in the field to build trust with participants and gain an in-depth understanding of the phenomenon. Persistent observation helps identify the most relevant characteristics and elements related to the research problem. Triangulation is achieved by using multiple data sources, methods, and theories to corroborate the findings. Peer debriefing involves discussing the research process and findings with impartial colleagues to obtain feedback and enhance the credibility of the study. Member checking is conducted by sharing the research findings with the participants to confirm the accuracy of the interpretations.

The research adheres to ethical principles, ensuring the confidentiality and anonymity of the participants. Informed consent was obtained from all informants before their participation in the study. The researcher maintains objectivity and avoids personal biases throughout the data collection and analysis process.

3. Result

3.1. Relative Advantage

The Smart School program in South Sulawesi Province has demonstrated significant advantages and benefits compared to previous educational practices. The program has improved the accessibility and quality of education through the integration of technology, enabling students to engage in interactive and in-depth learning experiences. The efficiency of school administration has also increased, thanks to the integrated digital system, which has streamlined communication among teachers, students, and parents. Moreover, the Smart School program supports the development of students' digital skills, preparing them for the challenges of the technological era.

The implementation of the Smart School program has greatly facilitated the delivery of learning materials by teachers. The digital platform allows for easy uploading and access to teaching materials and assignments, while interactive features such as educational videos and online quizzes enhance student engagement and understanding. The communication system within the program enables teachers to provide timely feedback and assistance to students, improving the effectiveness and efficiency of the teaching and learning process.

Schools implementing the Smart School program have experienced improved management efficiency, more effective learning processes, and enhanced collaboration among stakeholders. The program has also contributed to the development of digital skills for both students and teachers, which is crucial for future success. Overall, the Smart School program has brought significant improvements to the quality of education in South Sulawesi Province. However, the effectiveness of the Smart School program is dependent on the quality of internet access in schools. Additionally, the lack of direct interaction between teachers and students in the Smart School setting may be a limitation compared to face-to-face classroom interactions, where teachers can directly monitor students' progress.

3.2. Compatibility

The Smart School program in South Sulawesi Province demonstrates a high level of compatibility with existing values, past experiences, and the needs of potential adopters. The program aligns with the current global trend of integrating technology into various aspects of life, including education.

In today's digital era, technology has become an integral part of daily life, and the Smart School program is a relevant innovation that aligns with this development. The program utilizes technology to create a more interactive and dynamic learning environment, incorporating digital devices, the internet, and various educational applications to make the teaching and learning process more efficient and engaging. Furthermore, the Smart School program facilitates access to information and educational materials, allowing students to learn at their own pace and with greater flexibility. This innovation also

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supports the development of 21st-century skills, such as digital literacy, critical thinking, and collaboration, preparing students for an increasingly digital future.

The Smart School program is also compatible with previous ideas and initiatives related to technology-based education. Prior to the implementation of the Smart School program, some schools in South Sulawesi Province were already encouraging the use of technology to support the teaching and learning process, such as establishing computer labs, internet connectivity, and computerized school databases. The introduction of the Smart School program by the Education Office was well-received by school administrators, who quickly adapted to the new policy, demonstrating the program's compatibility with existing values and practices.

The compatibility of the Smart School program with the needs of the school environment in South Sulawesi Province is evident. The program aligns with the current global development and is compatible with pre-existing ideas about schools that implement science and technology. The implementation of the Smart School program involves all school stakeholders, indicating their desire to adopt the program.

3.3. Complexity

The implementation of the Smart School program in South Sulawesi Province has faced some challenges, despite its potential benefits. Based on interviews with key informants from the Education Office and schools, several difficulties have been identified in the process of disseminating and implementing the program.

One of the main issues is the uneven distribution of technological infrastructure across schools. Not all schools have adequate access to the internet and the necessary digital devices, which can hinder the successful implementation of the Smart School program. Additionally, many teachers still require further training to optimize the use of technology in their teaching practices. Some schools have also struggled to adapt to the new system, which can be attributed to the complexity of the program.

Moreover, the cost of implementing and maintaining the technology is relatively high, which can be a burden for schools with limited budgets. Overcoming these difficulties requires support and collaboration from various stakeholders, including the government, schools, and the community. Another challenge identified during the interviews is the rotation of school principals and the personnel responsible for the Smart School program within schools. In some cases, the participants attending the program's socialization sessions are different from those responsible for its implementation in the schools. This discrepancy, combined with the limited human resources from the Education Office in overseeing the program's implementation, can lead to inconsistencies and difficulties in the program's execution.

However, despite these challenges, the Smart School program is not considered to be overly complex or difficult to adopt in the school environment. As stated by one of the informants, the technology used in the Smart School program is similar to what is used in everyday life, such as smartphones, making it easier for students to adapt to the program.

The Education Office of South Sulawesi Province has been able to address the complexities of the Smart School program, as evidenced by its successful implementation in high schools across the province. The program's effectiveness is reflected in the increased number of students from South Sulawesi who have been accepted into public universities through the Computer-Based Written Examination (UTBK) SBNT 2023. The total number of students accepted reached 10,994 out of 33,212 applicants (33.10%), a significant improvement compared to the previous year's 8,902 students (25.36%).

3.4. Trialability

The trialability aspect of the Smart School program has played a crucial role in its adoption by schools in South Sulawesi Province. According to the Diffusion of Innovation theory by Rogers, trialability refers to the extent to which an innovation can be experimented with on a limited basis. This allows potential adopters to test the innovation and assess its benefits before fully committing to its implementation.

Based on the interview with an informant, it is evident that the school had already been experimenting with the use of technology in the learning process before the introduction of the Smart

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School program. The school had been utilizing various tools such as projectors, computers, and tablets to support teaching and learning activities. This initial implementation of technology in education had yielded positive responses from students, who became more enthusiastic, motivated, and actively engaged in classroom discussions and group assignments. The use of technology also facilitated students' understanding of the subject matter.

When the Education Office of South Sulawesi Province introduced the Smart School program and provided socialization to the schools, SMA Negeri 17 Makassar was able to quickly adapt and align its existing infrastructure to support the program. The school's prior experience with technology integration in education made the transition to the Smart School program smoother and less challenging.

The trialability of the Smart School program, as demonstrated by the school's initial experimentation with technology in education, allowed the school to evaluate the benefits and feasibility of the program before fully adopting it. The positive outcomes experienced during the trial period, such as increased student engagement and improved learning outcomes, further encouraged the school to continue implementing the Smart School program. The Education Office of South Sulawesi Province provided guidance and support to the schools during the initial stages of the Smart School program's implementation. This assistance helped schools navigate the challenges and ensure a successful transition to the new educational approach.

3.5. Observability

The observability aspect of the Smart School program has been a significant factor in its adoption by schools in South Sulawesi Province. According to Rogers' Diffusion of Innovation theory, observability refers to the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it.

Prior to implementing the program, the school had received training from the Education Office of South Sulawesi Province on the use of technology in the learning process. SMA Negeri 5 Makassar had already been utilizing technology in education, which made them enthusiastic about receiving further guidance and support from the Education Office.

The training provided by the Education Office allowed the school to observe the benefits and potential outcomes of the Smart School program. By witnessing the positive impact of technology integration in education, the school was more inclined to adopt the program. The observability of the program's results, as demonstrated through the training and the school's prior experience with technology, played a crucial role in their decision to implement the Smart School program. The observability of the Smart School program's success in other schools that had already adopted it may have also influenced SMA Negeri 5 Makassar's decision to adopt the program. When the results and benefits of an innovation are visible to others, it becomes easier for potential adopters to accept and implement the innovation themselves.

4. Discussion

The findings of this study demonstrate that the Smart School program, as a policy innovation implemented by the South Sulawesi Provincial Government, has been successfully adopted by schools in the region. The program's success can be attributed to its alignment with the five attributes of innovation diffusion, as proposed by Everett Rogers: relative advantage, compatibility, complexity, trialability, and observability.

The Smart School program has exhibited a significant relative advantage compared to previous educational practices in South Sulawesi Province. The integration of technology has improved the accessibility and quality of education, enabling students to engage in interactive and in-depth learning experiences. This finding is consistent with previous research by Keengwe and Onchwari (2011), who found that technology integration in education enhances student engagement and learning outcomes. The improved efficiency of school administration and communication among stakeholders, as well as the development of students' digital skills, further highlight the relative advantage of the Smart School program. To sustain and enhance these advantages, it is recommended that the South Sulawesi

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Provincial Government continue to invest in technological infrastructure and provide ongoing professional development for teachers, as suggested by the research of Ertmer and Ottenbreit-Leftwich (2010).

The Smart School program has also demonstrated a high level of compatibility with existing values, past experiences, and the needs of potential adopters in South Sulawesi Province. The program aligns with the current global trend of integrating technology into various aspects of life, including education. This finding is supported by the work of Ertmer and Ottenbreit-Leftwich (2010), who emphasize the importance of aligning technology integration with the values and beliefs of educators and the educational system. The compatibility of the Smart School program with previous technology-based education initiatives in the province has facilitated its adoption by schools. To further enhance compatibility, it is recommended that the South Sulawesi Provincial Government engage in continuous dialogue with educators and stakeholders to ensure that the program remains aligned with their needs and values, as suggested by Rogers' (2014) Diffusion of Innovation theory.

Despite the potential benefits of the Smart School program, its implementation has faced some challenges related to complexity. The uneven distribution of technological infrastructure and the need for further teacher training have been identified as barriers to the program's successful implementation. This finding aligns with the research of Bingimlas (2009), who identified lack of access to technology and lack of teacher competence as major barriers to technology integration in education. However, the overall complexity of the Smart School program is not considered to be a significant obstacle to its adoption, as the technology used is similar to what is used in everyday life. To address the complexity challenges, it is recommended that the South Sulawesi Provincial Government prioritize the equitable distribution of technological resources and provide targeted teacher training programs, as suggested by the research of Tang et al (2024).

The trialability of the Smart School program has played a crucial role in its adoption by schools in South Sulawesi Province. Schools had the opportunity to experiment with technology integration in education before fully committing to the program. This finding is consistent with Marra et al (2003), which suggests that the ability to experiment with an innovation on a limited basis reduces uncertainty and promotes adoption. The positive outcomes experienced during the trial period, such as increased student engagement and improved learning outcomes, further encouraged schools to adopt the Smart School program. To capitalize on the trialability attribute, it is recommended that the South Sulawesi Provincial Government continue to provide opportunities for schools to pilot and experiment with new technologies and teaching strategies, as suggested by the research of Hughes et al (2016).

The observability of the Smart School program's results has been a significant factor in its adoption by schools in South Sulawesi Province. The training provided by the Education Office and the success of other schools that had already adopted the program made the benefits of the innovation visible to potential adopters. This finding aligns with Talukder & Quazi (2011) research, which posits that the easier it is for individuals to see the results of an innovation, the more likely they are to adopt it. The observability of the program's positive outcomes has encouraged schools to embrace and implement the Smart School program. To further enhance observability, it is recommended that the South Sulawesi Provincial Government establish a platform for sharing best practices and success stories among schools, as suggested by the research of Waheed et al (2018).

5. Conclusion

The successful adoption of the Smart School program in South Sulawesi Province can be attributed to its alignment with the five attributes of innovation diffusion: relative advantage, compatibility, complexity, trialability, and observability. The program's relative advantage, compatibility with existing values and needs, manageable complexity, opportunity for experimentation, and observable results have contributed to its successful implementation. These findings are consistent with previous research on technology integration in education and Rogers' Diffusion of Innovation theory. The Smart School program's success in improving the quality of education, facilitating the teaching and learning process, and enhancing the digital skills of students and teachers highlights its potential as a model for policy innovation in the education sector. However, addressing the challenges related to technological

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infrastructure and teacher training is crucial for the program's continued success and scalability. Future research could explore the long-term impact of the Smart School program on student learning outcomes and the development of 21st-century skills. Additionally, investigating the factors that contribute to the successful scaling and sustainability of the program could provide valuable insights for policymakers and educators seeking to implement similar innovations in other contexts.

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