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Development of Islamic Smart Schools and Artificial Intelligence-Based Learning to Build a Golden Generation with Asta Cita Values for the SDGs

Muhammad Arif Wicagsono¹, Waston², Andri Nirwana AN³, Muthoifin⁴

^{1,2,3,4}Faculty of Islamic Studies, Universitas Muhammadiyah Surakarta, Indonesia

¹muhammad.arif.qhoir@gmail.com, ²was277@ums.ac.id, ³an140@ums.ac.id,

⁴mut122@ums.ac.id

Abstract

Objective: This study aims to analyze the development of Islamic Smart Schools based on Artificial Intelligence to build a Golden Generation with Asta Cita Insight in Indonesia. **Theoretical framework:** The theoretical framework of this study integrates the philosophy of Islamic education and the Sustainable Development Goals (SDGs), in particular the Sustainable Development Goals (SDGs), namely SDG 4 on Quality Education, SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 16 (Peace, Justice, and Resilient Institutions). **Literature review:** A literature review reveals that previous research has identified Smart Schools and Artificial Intelligence in administration, management, and teaching and learning activities to have a positive impact on improving the quality of education. **Methods:** The research method is the Mixed Methods Model Sequential Exploratory Design, which combines qualitative and quantitative methods. This research was conducted at Muhammadiyah PK Kottabarat Junior High School in Surakarta and Muhammadiyah AI Kautsar PK Junior High School in April - August 2025. The subjects of the study include principals, vice principals, teachers, parents, students, and stakeholders. Data were obtained from in-depth interviews, participant observations, field documentation analyzed by qualitative methods, and questionnaire data results analyzed using quantitative methods using SPSS software. **Results:** The development of Islamic Smart Schools and AI-based learning has a significant effect on the formation of the Golden Generation with Asta Cita insights, with a contribution of 63.8%. The school integrates digital technology and AI into management, learning, the competence of teachers, staff, and students through various excellent programs such as smart classrooms, digital literacy, international classes, AI training, and strengthening Islamic character through tahfidz, mentoring, and Hizbul Wathon scouting activities. **Implications:** This study confirms that the development of Islamic Smart Schools makes a significant contribution to the achievement of Asta Cita, especially on the goal of building superior and characterful human resources and the Sustainable Development Goals (SDGs), namely SDG 4 on Quality Education, SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 16 (Peace, Justice, and Resilient Institutions). **Novelty:** The novelty of this research lies in the educational model that combines school digitalization with Islamic values. This Education Model can be a reference in preparing the golden generation of 2045 through a technological approach based on spirituality and character.

Keywords: islamic smart school, artificial intelligence, golden generation, asta cita, sustainable development goals (sdgs).

INTRODUCTION

Digital transformation has become a global phenomenon in the era of the industrial revolution that changed the world of education [1]. Digital transformation funds in the education sector have increased based on global *Educational Technology* (EdTech) Industry data worth USD 123.40 billion in 2022, increasing to USD 142.37 billion in 2023 (grandviewresearch.com, 2024). Digital transformation in the field of education, according to EdTech in schools, has increased by 99% since 2020, showing the acceleration of the use of educational technology around the world. The global education sector alone spends US\$ 7.6 trillion, with the government's contribution of 60–70% of total funding (holoniq.com, 2024). In Indonesia, despite the increasing trend of digitalization, computer access in schools is still low at only 5.31% in elementary schools, 27.10% in junior high schools, 39.38% in high schools, and 41.45% in vocational schools in 2022 (BPS, 2023). This condition shows that there is a gap between the potential of digital technology and its implementation in the field, especially in the context of equitable distribution of education quality. The reality in Indonesia is that the use of digital technology has not been maximized. Limited internet connection [2], High use of technology for gaming and entertainment [3], Infrastructure Gap, Low Use of *E-Learning* [4]. The impact is that Indonesia has not competed with developed countries [5]. Hasil penelitian *IMD World Digital Competitiveness*. In the 2021 ranking, Indonesia is in the 53rd position out of 64 countries. The results of the *ASEAN Countries Education Ranking* research show that Indonesia ranks fifth in ASEAN. Indonesia is ranked 108th out of the countries that participated in the survey. In the 2018 and 2022 *Programme for International Student Assessment (PISA)* survey, Indonesia occupies the bottom position with a ranking of 74th in 2018 and ranked 69th in 2022 out of 80 countries [6].

This research will discuss Islamic *Smart School*, *Artificial Intelligence*, and the Golden Indonesia Generation. Recent studies show that the integration of AI-based digital programs can improve the digital competence and *academic self-efficacy* of students in rural areas of China [7]. Another study revealed that the use of AI-based automated feedback tools encourages teachers to adopt a *design thinking* approach in learning, thereby increasing student effectiveness and engagement [8]. In addition, a critical-reflective approach to AI education has been proven to increase students' confidence and sense of digital responsibility in digitized high schools [9]. Another study suggests that there is a positive perception of digital classrooms based on *Artificial Intelligence* (Technology-Rich Classrooms), providing ease of learning [10]. Recent research suggests that the integration of *blockchain* and *metaverse* is beneficial in educational curriculum design to increase activeness in learning [11]. Another study revealed that Artificial Intelligence-based digital literacy can make it easier for students to maximize scientific knowledge, technical skills, and socio-ethical understanding [12]. Teachers' digital competencies play an important role in integrating effective technology in teaching. Another study stated that the Smart School concept also makes it easier for teachers to provide digital counseling services [13]. Learning that integrates Thai culture (Philosophy of Sufficiency Economy) in Roblox games can increase learning effectiveness [14]. Schools that utilize digital platforms in learning will facilitate the implementation of effective and efficient learning [15].

Previous research has identified the potential of technology in the world of education to improve the quality of education. Although the impact of *Smart Schools* and *Artificial Intelligence* on administration, management, and teaching and learning activities has a positive impact on education, not much is discussed about the development of *Islamic Smart Schools*, namely the development of schools based on religious values and learning based on *Artificial Intelligence*, to build a golden generation with an Asta Cita vision of the Industrial Revolution era.

Realizing that there is a gap, this study delves deeper into how the Development of *Islamic Smart Schools* and Artificial Intelligence-based learning can build a Golden Generation with an Asta Cita vision of the Industrial Revolution Era. Although the literature

on the contribution of technology to education is constantly evolving, it turns out that there are still significant shortcomings. *First*, most of the literature discusses the development of *Digital Schools/Smart Schools*, but there has been no discussion of integration with religious values, namely Islam. *Second*, most studies assess that the use of *Artificial Intelligence* is used for the development of learning in the classroom, but no one has discussed character development, especially to build a Golden Generation with Asta Cita's insight. *Third*, there are still limitations in studies that systematically map the integration of AI in *Islamic Smart Schools* that are in line with the national development agenda, such as Asta Cita. The majority of studies focus on technical or pedagogical aspects separately, while studies that combine national policy frameworks, golden generation visions, and international research mapping are rare.

To fill this gap, this study proposes a holistic model that integrates *Smart School*, *Artificial Intelligence*, *Islamic Religious*, and the Development of the Golden Generation with Asta Cita Era Insights. "*Islamic Smart School*" is a digital-based education concept that integrates Islamic values. This concept is expected to support Indonesia's ideals, namely Building the 2045 Golden Generation with Asta Cita Insights. The Golden Generation of 2045 is a young generation that has high quality, competitiveness, and readiness to face future challenges, especially to welcome life in 2045, which coincides with the celebration of 100 years of Indonesian independence [16]. The golden generation is expected to be part of the backbone of the nation's progress, with superior quality in various fields [17]. The Golden Generation was achieved, one of which was the development of *Islamic Smart Schools* based on *Artificial Intelligence*. "*Islamic Smart School*" is a digital-based education concept. The Golden Generation is included in the discussion of goal number 4, which is to strengthen the development of human resources (HR), science, technology, education, health, sports achievements, gender equality, and to strengthen the role of women, youth, and people with disabilities.

Thus, this study has the following objectives:

1. Analyzing the development of *Islamic Smart Schools* based on *Artificial Intelligence* to Build a Golden Generation with Asta Cita Insight in the Industrial Revolution Era in Indonesia.
2. Analyzing Islamic Smart School-based Education Programs to Build a Golden Generation with Asta Cita Insight in the Industrial Revolution Era in Indonesia.
3. Analyzing the effectiveness of *Islamic Smart School* development and *Artificial Intelligence-based learning* to build a Golden Generation with Asta Cita Insight in the Industrial Revolution Era in Indonesia.

LITERATURE REVIEW

The Development of Smart Schools and the Impact of Digital Technology in Education

"*Smart School*" is an educational concept that uses Information and Communication Technology (ICT) to improve the quality of learning and school administration. This concept aims to create a more interactive, efficient, and integrated learning environment. *First*, the initial concept and basic idea of the "*Smart School*" first emerged along with the development of computer technology and the internet in the late 20th century [18]. Education is starting to utilize technology to access information faster and more easily. *Second*, the initial implementation was carried out in the early 1990s, which began with developed countries such as the United States, Canada, and European countries beginning to introduce programs to integrate technology in education, one of which is the "*Classroom of the Future*" project in the United States. *Third*, the pilot project of the "*Smart School*" concept is in Malaysia.

Malaysia was the first country to implement the concept of "*Smart School*" nationally in 1997. The Malaysian government launched an initiative to implement the *concept of "Smart School Flagship"* as part of a grand plan to create a *Multimedia Super Corridor (MSC)*. *Multimedia Super Corridor (MSC)* aims to digitize education and provide students with skills in the 21st century. According to the Ministry of Education Malaysia's website, in 2013, Malaysia had 7,745 primary schools and 2,340 secondary schools. Installation of ICT facilities in all schools in Malaysia. Development of school infrastructure. Planning for 10,085 schools is carried out in stages. *Smart School* has been made one of the flagship applications in the *Multimedia Super Corridor (MSC)*. In 1999, there were around 635 schools undergoing the ICT *Smart School* program. The *Smart School* concept presents innovative and creative learning. The output of the *Smart School concept* is to produce students who have technological skills and can think critically. The *Smart School Pilot Project* is being implemented in 87 schools across the country. Starting in 1998, the Teacher Education Division of the Ministry of Education, Malaysia, was tasked with training teachers for the *Smart School Program*. An important factor in the success of the *Smart School Program* is teacher competency training [19].

The Prime Minister of Malaysia has created the Malaysian Education Blueprint 2013-2025. Eleven shifts have been proposed to achieve the national vision of the *Smart School Program*. Shift Number 7 is to leverage ICT to improve quality learning across Malaysia. UNESCO 2012 reviewed and found that the use of ICT has tremendous potential to accelerate effective and efficient learning. Fourth, the *Smart School Program* is growing globally. The Industrial Revolution caused the *concept of "Smart School"* to develop. The country began investing in ICT infrastructure, educational software, and teacher competency enhancement training to make the "*Smart School*" education concept a success. Countries that have the *concept of "Smart School"* include the Australian Country with the "*Digital Education Revolution*" and the European Continent with the *concept of the "Future Classroom Lab"*. Fifth, in the modern era, the *concept of "Smart School"* is synonymous with the use of computers, the internet, mobile devices, educational applications, *e-learning*, *big data*, and *artificial intelligence* [20]. The *Smart School program* is a solution to improve the effectiveness and efficiency of school management and teaching and learning activities [21]. The *concept of Smart School* is synonymous with Information and Communication Technology (ICT), which supports independent and interactive learning.

Teacher competence plays an important role in the success of *Smart Schools*. The Indonesian government has developed teacher competency standards. This standard can be used as a good indicator of teachers' pedagogic competence. The standards of pedagogic competence of teachers have been clearly regulated in the Minister of National Education Regulation Number 16 of 2007 concerning Standards of Academic Qualifications and Teacher Competence. The regulation contains an explanation of pedagogic competence as a teacher's competence in managing learning, starting from a deep understanding of the characteristics of students to the ability to apply various learning theories and learning principles. Teachers are expected to be able to design a curriculum, compile a syllabus, and develop lesson plans that suit the needs and potential of students. Pedagogic competencies include the ability to utilize learning technology, create effective educational communication, and carry out objective assessments and evaluations. Teachers are expected to conduct continuous reflection so that the learning process continues to improve and they are able to provide optimal student development facilities. Teacher Competencies in the Era of Industrial Revolution 4.0. According to the *National Educational Technology Standards (NETS) Framework*. The core standards that must be met by teachers in the 21st century or the era of the industrial revolution 5.0 are: (a) teachers can provide facilities and can provide inspiration and creativity in teaching by integrating digital technology, (b) teachers as educators must be able to design and develop learning based on technology and information, (c) teachers must be able to set an example as responsible digital citizens, (d) teachers must continuously develop their professional abilities [22].

H1: There is a positive and significant influence of Artificial *Intelligence-based learning* to build a Golden Generation with Asta Cita Insight in the Industrial Revolution Era in Indonesia.

Islamic Smart School to Build a Golden Generation with Asta Mind's Vision in the Industrial Revolution Era in Indonesia

In the era of the Industrial Revolution 4.0, students need to master a set of 21st century competencies as listed in various global frameworks, and this is in line with Asta Cita's vision that places the development of superior human resources as a national priority. Education is the main foundation for building superior human resources. Schools have a strategic role through the implementation of educational programs to prepare the 2045 Golden Generation with the Asta Cita number 4 insight, namely, strengthening the development of human resources (HR), science, technology, education, health, sports achievements, gender equality, and strengthening the role of women, youth, and persons with disabilities. The enGauge 21st Century Skills framework emphasizes the importance of mastering digital literacy, the ability to communicate effectively, high productivity, and an inventive mindset that drives innovation. In line with that, the National Educational Technology Standards (NETS) emphasize the need for active use of technology to support the learning process and the development of digital competencies. Meanwhile, the Assessment and Teaching of 21st Century Skills (ATC21S) framework directs students to master four main domains, namely *ways of thinking* (thinking creatively, critically, and being able to solve problems), *ways of working* (able to communicate and collaborate), *tools of working* (mastering information and technology literacy), and *living in the world* (have life skills and social responsibility). The Partnership for 21st Century Skills framework further strengthens the need for these competencies by emphasizing critical thinking, problem-solving, communication, collaboration, creativity, innovation, ICT literacy, contextual learning, and the ability to understand and use information and media intelligently. With the integration of these various frameworks, students in the digital era are expected to be able to become adaptive, competent, and ready individuals to face global challenges.

In facing the dynamics of the Industrial Revolution 4.0 era, students need to be equipped with 21st century skills as listed in the enGauge 21st Century Skills, NETS, ATC21S, and P21 frameworks, which emphasize digital literacy, creativity, critical thinking, collaboration, information literacy, and life skills. All of these competencies are very relevant to Asta Cita's vision, especially in the agenda of developing superior human resources, global competitiveness, and Pancasila character. The implementation of *Islamic Smart School* is a strategic educational model to realize the integration between digital competencies and Islamic spiritual values, so that students not only master technology, but also have noble morals and integrity. Through the integration of learning technology, sharia-based digital literacy, worship habituation, and collaborative learning, *Islamic Smart School* prepares students to master *ways of thinking*, *ways of working*, and *tools for working*, as well as *living in the world* with a religious and socially responsible character. Thus, Islamic Smart Schools play an important role in forming Indonesia's Golden Generation that is intelligent, competitive, with an Islamic personality, and Asta Cita insight, so that it is able to become a locomotive of the nation's progress in the midst of increasingly complex global challenges.

H2: There is a positive and significant influence of the development of *Islamic Smart Schools* to build a Golden Generation with Asta Cita Insight in the Industrial Revolution Era in Indonesia.

METHODOLOGY

Research Design

The design of this research is (*Mixed Method*) using the *Sequential Exploratory Design* model, which is a *Mixed Method* research model that begins with data collection and data analysis using qualitative methods for exploration and in-depth exploration of a phenomenon, and then develops with quantitative methods to obtain measurable, comparative, and associative data. *Mixed Method* Research is a perfect and comprehensive method because there are complementary methods. The uniqueness of *Mixed Method* Research is that it provides more complete, credible, objective, and valid research data and combines various viewpoints that provide benefits to produce breadth and depth of data understanding.

The mixed-methods *Sequential Exploratory Design* was employed because the research topic, Islamic Smart School development and AI-based learning within the framework of *Asta Cita*, requires an in-depth exploration of complex educational, technological, and religious constructs that have not been extensively studied in an integrated manner. The qualitative phase was necessary to explore how Islamic Smart School and AI integration were implemented in Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Alkautsar PK Junior High School through interviews, observations, and document analysis. The findings from this phase were then used to develop quantitative instruments, ensuring that all questionnaire items reflected real conditions in the field and were contextually grounded.

In this study, the *Sequential Exploratory* procedure was operationalized as follows: (1) the qualitative phase was conducted first to identify themes, indicators, and patterns of implementation related to Islamic Smart School, AI-based learning, and the formation of *Asta Cita*-oriented Golden Generation; (2) these themes were transformed into measurable variables and used to construct a Likert-scale questionnaire; (3) the instrument underwent expert validation and statistical testing; (4) the quantitative phase was then conducted to measure the magnitude of influence using validity tests, reliability tests, and multiple regression analysis; and (5) the qualitative and quantitative findings were integrated to produce a comprehensive interpretation.

This design strengthened the research by combining the depth of qualitative insights with the precision of quantitative measurement, yielding a comprehensive, credible, and evidence-based understanding of how Islamic Smart School and AI-based learning contribute to building the Golden Generation with *Asta Cita* vision.

Content Validity

The process of instrument validity in the study is carried out through a systematic and multi-stage procedure that aims to ensure that the instrument used truly reflects the theoretical construct to be measured. The question items were initially developed based on scales from previous research that have been validated in the fields of educational technology, AI adoption, and information systems success models. The researcher carried out literature identification by searching and collecting references relevant to the research topic, including Smart School, Artificial Intelligence, Golden Generation, *Asta Cita*, and the Industrial Revolution Era through Scopus articles and journals with VOSviewer and Bibliometrics [23]. This step will help us understand the theoretical framework and the results of relevant previous research. The items were then examined by experts consisting of (1) academics from the University of Muhammadiyah Surakarta, (2) the Surakarta Regional Leadership Primary and Secondary Education Council (Surakarta PDM Dikdasmen Council), (3) the Chairman of the Surakarta Muhammadiyah Teachers Forum (FGM), and (4) the Surakarta PDM Surakarta Regional Leadership Library and Information Council (MPI) to get an expert perspective in Smart School, Artificial Intelligence, Golden

Generation, Asta Cita, and the Industrial Revolution Era to assess clarity, relevance, and suitability for research objectives. This approach provides robust mediation testing with good statistical reliability.

The validity test of the questionnaire was obtained using the Pearson Product-Moment SPSS validity test. The basis for taking the Pearson Product-Moment validity test is in two ways, namely, first, the comparison of the calculated r value with the r table. If the value r calculated $>$ of r table, then the result is valid; if the value r calculated is less than the r table, then the result is invalid. Second, by looking at the significance value (Sig.), that is, if the significance value $<$ 0.05, then the result is valid; if the significance value $>$ 0.05, then the result is invalid. The r -value of the table with $N=40$ at a significance of 5% in the distribution of the r -value of the statistical table, then the r -value of the table is obtained as follows: 0.312.

Populasi

The research population consisted of students in Surakarta. The students are students from Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Alkautsar PK Junior High School. First, Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Alkautsar PK Junior High School have educational innovations. Second, Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Alkautsar PK Junior High School have a 21st century learning approach based on a digital Learning Management System (LMS), such as blended learning, digitization of administration, and integration of technology in learning. This research aims to collect information from students so that the results can be generalized widely. The focus of the research is the Development of Islamic Smart School (x1) and Artificial Intelligence -based learning (x2) towards the Development of the Golden Generation with Asta Mind's Vision in the Industrial Revolution Era (y).

Sample Size and Sampling Techniques

A total of 156 of the students went through the non-probability convenience sampling technique. This method was chosen because of the ease of accessing participants who actively use Smartphones. Although convenience sampling allows for rapid data collection, this method has the potential to limit the generalization of results due to the possibility of sample bias and underrepresentation of learners. In order to meet the ethical aspect, participants are given information about the purpose of the research, anonymity is guaranteed, and we provide information that participation is voluntary. Participant consent is obtained electronically.

Instrument Development and Validation

First, the researcher collected data through in-depth interviews, participant observations, and field documentation, and analyzed qualitative data. Second, it is developed with quantitative methods to obtain measurable, comparative, and associative data. The research questionnaire was assessed on a Likert scale of 1-5, with a score of 1 strongly disagree (STS), a score of 2 disagree (TS), a neutral score of 3 (N), a score of 4 agree (S), and a score of 5 strongly agree (SS). Questionnaires are distributed to research subjects online through Google Forms to be more effective and efficient. The completed questionnaire is then collected for processing. The data processing process begins by first taking the results of the questionnaire answers from the respondents, the second is grouping the data based on the respondents, the third is tabulating the data in quantitative form through the SPSS software application for quantitative data analysis, and the fourth is the answers of each respondent in a distribution table.

Data Collection

This research was conducted at Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Alkautsar PK Junior High School in April 2025 - August 2025. The subjects of this study are school principals, deputy principals, teachers, parents, students, and stakeholders. Data was obtained from the results of surveys, observations, documentation, and in-depth interviews with school principals, vice principals, teachers, parents, students, and stakeholders. Questionnaire data is collected through an online Google form, which is distributed to students. The survey aims to measure the variables X-1 and X-2, namely the development of *Islamic Smart School* (x1) and *Artificial Intelligence-based learning* (x2) towards the Development of the Golden Generation with an Astonishing Mind in the Industrial Revolution Era (y). The research questionnaire was assessed on a Likert scale of 1-5. Questionnaires are distributed to research subjects online through Google Forms to be more effective and efficient. The completed questionnaire is then collected for processing. The data processing process begins by taking the results of questionnaire answers from respondents. The second step is grouping respondent data, the third step is tabulating data in quantitative form through the SPSS software application for quantitative data analysis, and the fourth answer of each respondent's question in a distribution table. Before the final data collection, tests are carried out to ensure the clarity and consistency of the items, and minor improvements are made before the final distribution.

Data Analysis

First, the researcher collected data through in-depth interviews, participant observations, and field documentation, and analyzed qualitative data. Second, it is developed with quantitative methods to obtain measurable, comparative, and associative data. The research questionnaire was assessed on a Likert scale of 1-5, with a score of 1 strongly disagree (STS), a score of 2 disagree (TS), a neutral score of 3 (N), a score of 4 agree (S), and a score of 5 strongly agree (SS). The completed questionnaire is then collected for processing. The data processing process begins by first taking the results of the questionnaire answers from the respondents, the second is grouping the data based on the respondents, the third is tabulating the data in quantitative form through the SPSS software application for quantitative data analysis, and the fourth is the answers of each respondent in a distribution table. A statistical method to analyze the relationship between a single dependent variable and two or more independent variables by using multiple linear regression tests. Multiple linear regression test is a statistical method used to analyze the relationship between one dependent variable, namely the Golden Generation with Asta Cita Insight, and two or more independent variables, namely the development of Islamic Smart Schools and Artificial Intelligence-based learning Simultaneously. The goal is to understand how changes in the free variable affect the bound variable, as well as to predict the value of the bound variable based on the value of the free variable.

RESULTS AND DISCUSSION

Development of Islamic Smart Schools based on Artificial Intelligence to Build a Golden Generation with Asta Cita Insight

Muhammadiyah Junior High School PK Kottabarat Surakarta and Muhammadiyah Al Kautsar PK Junior High School, as Muhammadiyah's flagship school, strive to develop schools to answer educational challenges in the era of the Industrial Revolution 4.0. In order to realize the vision of forming a golden generation with Asta Cita insights, Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Al Kautsar PK Junior High School are committed to integrating digital technology and Artificial Intelligence in all aspects of learning and school management. The development of Islamic Smart Schools based on Artificial Intelligence to Build a Golden Generation with Asta Cita Insight in the

Industrial Revolution Era at Muhammadiyah PK Kottabarat Junior High School, Surakarta, and Muhammadiyah Al Kautsar PK Junior High School, as follows:

a. ICT-Based School Management Development

Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Al Kautsar PK Junior High School developed an Islamic *Smart School-based school management* with 6 managements. Among them are the following:

1. Curriculum and Learning Management

First, carry out curriculum planning, implementation, and evaluation. *Second*, the management of the learning process, namely, preparing the learning component. *Third*, the development of teaching materials, methods, and learning strategies through *PK Learning*, learning videos, and *digital-based education* platforms

2. Human Resource Management (HR)

First, digital-based recruitment, starting from administrative selection, Ismuba test, interviews, and coaching. *Second*, training and improvement of teacher professionalism. *Third*, evaluate the performance of teachers and staff through supervision in one week.

3. Student Management

First, admission of new students is online-based. *Second*, digital-based character development, including religion and habituation of Islamic values, Qur'an memorization programs, AKM successes, *edutrip programs*, *fun trips*, *hizbul wathon camps*, and *home stays*. *Third*, extracurricular activities and talent development.

4. Financial Management and Infrastructure

First, planning and managing the school budget. *Second*, procurement, maintenance, and development of school facilities. *Third*, optimizing the use of school resources.

5. School-to-Community Relations Management (Public Relations)

First, building relationships with students' guardians through POMG meetings once a month for school program deliberations, and building good relationships with the community through providing zakat, infak, and alms to the community. *Second*, cooperation with the government, industry, and other external parties, for example, cooperation with PDM Surakarta, newspapers, journalists, travel agencies, and schools in Indonesia and abroad. *Third*, improving the school's image and reputation through school social media.

6. First Administrative and Administration Management

Document management based on *hardcopy* and *soft files* through the school's central server. *Second*, the school information system through *the school website*. *Third*, archives and documentation of school activities through *Google Drive*, *flash disk*, *hard disk*, and the *school center server*.

Table 1. Table of ICT-Based School Management Development

Information	Muhammadiyah Junior High School PK Kottabarat Surakarta	Muhammadiyah Al Kautsar PK Junior High School
Curriculum and Learning Management	Learning process management, PK Learning, videos, and education platforms.	Learning process management, E-Module, video, educational platform. Presence, digital-based journals.

Human Resource Management (HR)	Digital-based recruitment, Training and professional improvement of teachers, Performance evaluation	Digital-based recruitment, Training and professional improvement of teachers, Performance evaluation
Student Management	Online PPDB, CBT Test, Character Development through Digital-Based Programs	Online PPDB, CBT Test, Character Development through Digital-Based Programs
Financial Management and Infrastructure	School budget planning. Procurement, maintenance, and development of school facilities. Optimization of the use of school resources.	School budget planning. Procurement, maintenance, and development of school facilities. Optimize the use of school resources.
School-to-Community Relations Management (Public Relations)	Maintain a harmonious relationship with stakeholders. Cooperation with external parties	Maintain a harmonious relationship with stakeholders. Cooperation with external parties
Administrative and Administrative Management	Digital-based data management, websites, documentation through Google Drive, flash drive, hard disk, and server	Digital-based data management, websites, documentation through Google Drive, flash drive, hard disk, and server

b. Development of Technology, Information, and Communication Competencies of Students

Students have the following Technology, Information, and Communication competencies. *First*, the ability to use technological devices. Students are able to utilize learning technology, such as smartphones, tablets, laptops, Smart TVs, technology-based exams (CBT test), and digital platform-based learning. *Second*, the ability to use the internet, namely, students using digital libraries and computer laboratories. *Third*, basic programming and coding skills through extracurriculars. *Fourth*, Graphic Design and Multimedia Skills, namely the use of Canva in learning to make PPTs, Posters, Flyers, etc. The school provides multimedia spaces for learning through podcasts, radio, and learning videos. Fifth, utilizing educational platforms, students are able to take advantage of PK E-Learning, Zoom, Quizizz, Google Form, Google Meet, Canva, Padlet, etc. The advantage of Muhammadiyah PK Kottabarat Surakarta Junior High School is the use of Smart TV and PK Learning, while Muhammadiyah Alkautsar PK Junior High School is an E-Module.

c. External support for Smart School development

Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Alkautsar PK Junior High School develop software and network management with external parties, procurement of *e-learning school* applications, school payments, and digital-based canteen management with Bank Syariah Indonesia.

d. ICT Competent School Staff Development Program

Administrative staff in schools must have good digital competence. This program aims to improve the competence, performance, and professionalism of school staff in supporting

educational goals. This program is carried out with training, guidance, and individual and team capability development.

e. Teacher Digital Literacy Competency Development

Workshops, Seminars, and Webinars on Improving Digital Learning Based on *Artificial Intelligence*. The activities that have been carried out are (a) Artificial Intelligence coding training, (b) *In-House Training* (IHT) Deep Learning, (c) HOTS and STEM-based learning, (d) Improvement of digital-based learning skills in the form of YouTube, Office 165 Application, Google Classroom, Zoom, CBT, and Canva.

Table 2. Table of Teacher Digital Literacy Competency Development

Program	Muhammadiyah Junior High School PK Kottabarat Surakarta	Muhammadiyah Alkautsar PK Junior High School
Workshops and Seminars	Strengthening pedagogical competence, strengthening 21st century learning design, and the AKM question writing workshop	Strengthening pedagogic competence and strengthening teachers' character, ice-breaking training, AKM question writing workshops, and activity-based learning.
Digital Learning Training	Zoom training, Google Classroom, Quipper, Zenius, Edelink, learning design with STEM-based, Educational administration training, Office 165 Application Training, school YouTube-based learning, Graphic design application training, such as Canva.	Zoom training, Google Classroom, Edmodo, YouTube-based learning, educational administration training, and In House Tryning

f. Development of Digital-Based Classrooms (Smart Classroom)

First, learning using adequate hardware, such as LCD, Projector, Smart TV, Audio Visual, Laptop, Computer, etc. *Second*, the school provides internet connectivity. *Third*, the School has a PK-Elearning Digital Platform.

g. Development of Subjects Integrated with Information and Communication Technology

Muhammadiyah Junior High School PK Kottabarat Surakarta and Muhammadiyah Al Kautsar PK Junior High School develop subjects that are integrated with Information and Communication Technology. This is a strategic step in order to prepare students to face the challenges of the digital era. Teachers provide identification of students' competencies in the field of technology and information. Teachers in carrying out learning activities use digital-based education platforms, and teachers use digital-based learning evaluations.

h. Smart School Development Through ICT Coordinator

Muhammadiyah Junior High School PK Kottabarat Surakarta and Muhammadiyah Al Kautsar PK Junior High School have a teacher who serves as an ICT Coordinator who has a high level of understanding and skills. The IT coordinator is in charge of planning the development and responsibility of internet and intranet systems, examples are responsible for PK E-Learning applications, podcasts, seminars, and online studies, CBT exams, wifi, school servers, and ICT laboratories.

Islamic Smart School-based Education Program to Build a Golden Generation with Asta Cita Insight in the Industrial Revolution Era in Indonesia

Education is the main foundation for building superior human resources. Schools have a strategic role through the implementation of educational programs to prepare the 2045 Golden Generation with the Asta Cita number 4 insight, namely, strengthening the development of human resources (HR), science, technology, education, health, sports achievements, gender equality, and strengthening the role of women, youth, and persons with disabilities. The following are the school activity programs to build a golden

generation with an astacita perspective in Muhammadiyah Junior High School PK Kottabarat Surakarta: (1) Morning mentoring and Halaqoh Tahfidz. Morning mentoring activities for students are dhuha prayer, dhikr, prayer, and reading the Qur'an. (2) Tasmi' Al-Qur'an, which is an activity of reciting the memorization of the Qur'an one juz by students witnessed by stakeholders through the PK TV Youtube Channel, (3) Muhammadiyah Youth Studies (KARIIM), which is a religious study activity through the PK TV Youtube channel, (4) Tahajud Prayer Program and Virtual Studies, tahajud prayer activities at home and studies via zoom which are attended by teachers and students once a month, (5) The Nasaran Hati (Nasi) Program is a program for making Islamic flyer designs, (6) Homestay Program, which is community service activities, religious activities, art learning, creativity and entrepreneurship, (7) PK Sharing Program, is a student philanthropic program in the form of raising Natural Disaster Assistance distributed to the community, (8) Hizbul Wathon Program and Summer Camp, which is a Muhammadiyah scouting activity that aims to improve character. The AKM Success Program, is a school activity carried out to prepare for the Minimum Competency Assessment Test (AKM), (9) the School Literacy Movement, which is a movement to read books simultaneously, (10) OSN Coaching, which is an additional program for students related to OSN competition materials, (11) Extracurricular Activities, activities to channel students' interests and talents and academic and non-academic potential, (12) Artificial Intelligence Training, namely international collaboration to strengthen education together with the Education Delegation of the University Of Hong Kong, namely Dr. Ju Seong Lee, Dr. Timothy Tailor and Lai Wan Yee Winsy related to foreign language-based learning and Artificial Intelligence, (12) Overseas Edutrip (Malaysia and Singapore), which is an edutrip program that aims to provide international experience, independence, confidence in cross-cultural interaction, strengthen learning motivation, nationalism. The output of this activity is an Edutrip travel memoir book with an ISBN. (13) Implementation of the Flag Ceremony, (14) Development of the International Class Program (ICP) class, namely the International Class Program. ICP classes use international languages, namely English and Arabic in subjects such as English, mathematic and science, (15) English Language Day, which is an English language refraction program, (16) Hunting Tourist, namely students carrying out Hunting Tourist activities at Prambanan Temple with English communication with foreign tourists, (17) Health Checkup, which is a school working with the government and Puskesmas to increase students' awareness of maintaining health, (18) Literacy Tourism, namely students participating in literacy activities at Solopos Media Group, (19) PK Got's Talent & Market Day, is an activity to show students' talents and entrepreneurial abilities to make commercial products.

The following are the school activity programs to build a golden generation with an astacita perspective in Muhammadiyah Al Kautsar PK Junior High School: (1) PK Kelas Tahfidz is a special class with a target of memorization of 6 juz in 3 years, equipped with the Dauroh Tahfidz program and Applied ICT learning, (2) PK Class ICT focuses on Applied Information and Communication Technology and the manufacture of ICT products, with a target of memorization of 2 juz and strengthening BTA, (3) Class Meeting and Market Day is a post-exam activity that trains sportsmanship, creativity, cooperation, and entrepreneurial spirit through competitions and selling practices, (4) Funventure Day is an outdoor learning with an adventure nuances to foster creativity and cooperation, held at Ibarbo Park, (5) Dauroh Tahfidz is an intensive coaching of tahsin, tahfidz, muraja'ah, and morals, (6) Baitul Arqom aims to strengthen Al-Islam Kemuhammadiyah, leadership, da'wah, and student character, (7) The Hizbul Wathon Program fosters independence, mutual cooperation, and nationalism and wins the overall champion of the 2025 HW Kartasura Grand Camp, (8) The AKM Preparation Program is carried out for one month with the guidance of internal teachers to improve literacy and numeracy skills, (9) English Camp improve English language skills through interactive activities such as games, storytelling, and role play, (10) Outing Class integrates learning inside and outside the classroom, with visits to Melikan Pottery Village (grade 7), Sangiran Museum (grade 8),

and Taman Pintar Yogyakarta (grade 9), (11) Extracurricular providing a choice of interests and talents such as cooking, graphic design, robotics, coding, music, archery, silat, futsal, swimming, equestrian, and badminton, (12) Community Service involves students in landfill activities, cleaning mosques, spreading dai, recitation, and sharing basic necessities to foster social awareness based on Islamic values.

Table 3. Table of Education Program to Build a Golden Generation

Golden Generation	Muhammadiyah Junior High School PK Kottabarat Surakarta	Muhammadiyah Al Kautsar PK Junior High School
Development of pious human resources.	Morning mentoring, Halaqoh Tahfidz, Worship assistance, Tasmi' Al-Qur'an Muhammadiyah Youth Study (KARIIM), Virtual Tahajud, Heart Advice (Nasi)	Tahfidz Class, Dauroh Tahfidz, Baitul Arqom
Human resource development in science and technology.	AI and Coding Training, Overseas Edutrip (Malaysia and Singapore), International Class Program (ICP) class development.	Funventure Day, Outing Class.
Human resource development in education (academic and non-academic)	Homestay, Hizbul Wathon and Summer Camp, PK Sharing, AKM Success, school literacy movement, OSN coaching, Extracurricular activities, English Language Day, Hunting Tourist.	Hizbul Wathon Program and Summer Camp, PK Sharing, AKM Success, English Camp, and Community Service.
Human resource development in health and sports achievement.	Health Check-up, Great Indonesian Children's Gymnastics and Journalism Extracurriculars, Broadcasting, Cooking, Graphic Design, Coding, English Club, Robotics, Drawing, Contemporary Music, Archery and Pencak Silat, Futsal, Basketball, Badminton, and KIR.	Cooking, graphic design, robotics, coding, music, archery, silat, futsal, swimming, equestrian, and badminton
Human resource development in gender equality, strengthening the role of women, youth, and persons with disabilities	Anti-Bullying Seminar Program, Extracurricular, Flag Ceremony Implementation, and PK Got's Talent & Market Day.	Class Meeting and Market Day

The Effectiveness of Islamic Smart School Development and Artificial Intelligence-Based Learning to Build a Golden Generation with Asta Cita Insight in the Industrial Revolution Era

The validity test of the questionnaire was obtained using the Pearson Product-Moment SPSS validity test. The basis for taking the Pearson Product-Moment validity test is in two ways, namely, first, the comparison of the calculated r value with the r table. If the value r calculated $>$ of r table, then the result is valid; if the value r calculated $<$ of r table, then the result is invalid. Second, by looking at the significance value (Sig.), that is, if the significance value $<$ 0.05, then the result is valid; if the significance value is $>$ 0.05, then the result is invalid. The r -value of the table with $N=40$ at a significance of 5% in the distribution of the r -value of the statistical table, then the r -value of the table is obtained as follows: 0.312. The test results can be seen in the following table:

Table 4. Table of the validity test

VARIABEL	R CALCULATE	R TABLE	INFORMATION
	X_1 (Development of Islamic Smart Schools)		
$X_{1.1}$	0.526	0.312	Valid
$X_{1.2}$	0.677	0.312	Valid

X _{1.3}	0.814	0.312	Valid
X _{1.4}	0.787	0.312	Valid
X _{1.5}	0.821	0.312	Valid
X _{1.6}	0.714	0.312	Valid
X _{1.7}	0.786	0.312	Valid
X _{1.8}	0.830	0.312	Valid
X _{1.9}	0.443	0.312	Valid
X _{1.10}	0.703	0.312	Valid
	X ₂ (Artificial Intelligence-Based Learning)		
X _{2.1}	0.548	0.312	Valid
X _{2.2}	0.594	0.312	Valid
X _{2.3}	0.801	0.312	Valid
X _{2.4}	0.622	0.312	Valid
X _{2.5}	0.758	0.312	Valid
X _{2.6}	0.756	0.312	Valid
X _{2.7}	0.777	0.312	Valid
X _{2.8}	0.726	0.312	Valid
X _{2.9}	0.780	0.312	Valid
X _{2.10}	0.612	0.312	Valid
	Y (The Golden Generation)		
Y.1	0.647	0.312	Valid
Y.2	0.652	0.312	Valid
Y.3	0.821	0.312	Valid
Y.4	0.877	0.312	Valid
Y.5	0.727	0.312	Valid
Y.6	0.750	0.312	Valid
Y.7	0.662	0.312	Valid
Y.8	0.665	0.312	Valid
Y.9	0.773	0.312	Valid
Y.10	0.708	0.312	Valid

The results of the validity test showed that the r-value of each item of the questionnaire question was greater than the r-value of the table. The validity of each question item used as a metric shows that the instrument is effective in measuring concepts or variables. The validity results reinforce the belief that data from the instrument can be used to show an accurate picture of the variables being measured. Based on the above data, it can be concluded that each question item of all variables can be considered valid as a metric.

Reliability measurements are carried out through the use of Cronbach's alpha test. If Cronbach's alpha value exceeds 0.60, the questionnaire is declared reliable. The following data from the reliability test results can be seen in Table 2 below.

Table 5. Table of Reliability

Variable	Cronbach's Alpha	Reliability	Information
X ₁ (Development of Islamic Smart Schools)	0,884	0,60	Reliabel
X ₂ (Artificial Intelligence-Based Learning)	0,742	0,60	Reliabel
Y (The Golden Generation)	0.901	0,60	Reliabel

The results of Cronbach's alpha score for the variables of Islamic Smart School Development, Artificial Intelligence-based Learning, and Golden Generation with Asta Cita Insight show that the data is above 0.60. The results obtained can be concluded that the question items from the three variables are considered reliable, so they can be reliable and used as a valid measuring tool used to measure these variables.

A statistical method to analyze the relationship between a single dependent variable and two or more independent variables by using multiple linear regression tests. Multiple linear regression test is a statistical method used to analyze the relationship between one dependent variable, namely the Golden Generation with Asta Cita Insight, and two or more independent variables, namely the development of Islamic Smart Schools and Artificial Intelligence-based learning Simultaneously. The goal is to understand how changes in the free variable affect the bound variable, as well as to predict the value of the bound variable based on the value of the free variable.

Table 6. Table of Coefficients

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	5.661	2.112		2.680	.008
VAR 1 (Development of Islamic Smart Schools)	.521	.074	.503	7.083	.000
VAR 2 (Artificial Intelligence-Based Learning)	.333	.067	.354	4.977	.000

a. Dependent Variable: VAR 3 (The Golden Generation)

The basis for decision-making in the multiple linear regression test can be through the t-test and the F-test. The basis for deciding the t-test is (1) If the value of Sig < 0.05, or t is calculated > t of the table, then there is an influence of variable X on variable Y and (2) if the value of Sig > 0.05, or t is calculated < t table, then there is no influence of variable X on variable Y. The basis for decision-making of Test F is (1) If the value of Sig < 0.05, or F calculates > F table, then there is a simultaneous influence of variable X on variable Y, (2) If the value of Sig > 0.05, or F calculates < t table, then there is no simultaneous influence of variable X on variable Y.

Known: n (number of samples) = 156

k (number of variables) = 2

Answer :

X₁

T table = t (α/2; n-k-1)

$= t(0.05/ 2; 156-2-1)$
 $= t(0.025 ; 153)$ (t-value distributions of tables)
 $= t$ table is 1.975
 The result is $= 7,083 > 1,975$ (Influential)

X_2

T table $= t(a/2; n-k-1)$
 $= t(0.05/ 2; 156-2-1)$
 $= t(0.025; 153)$ (t-value distributions of tables)
 $= t$ table is 1.975
 The result is $= 4.977 > 1.975$ (Influential)

H1 and H2 Hypothesis Testing with the t-test obtained interesting data. First, the first hypothesis test (H1). It is known that the Sig. value for the influence of X_1 on Y is $0.000 < 0.05$ and t calculated as $7.083 > 1.975$, so that it can be concluded that H1 is accepted, which means that there is an influence of X_1 (Development of Islamic Smart Schools) on Y (Golden Generation). Second, the First Hypothesis Testing (H2), it is known that the Sig. value for the influence of X_2 on Y is $0.000 < 0.05$, and t is calculated as $4,977 > 1,975$, so it can be concluded that H2 is accepted, which means that there is an influence of X_2 (Artificial Intelligence-based Learning) on Y (Golden Generation).

Table 7. Table of Annova

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	2507.506	2	1253.753	134.664	.000 ^b
Residual	1424.468	153	9.310		
Total	3931.974	155			

a. Dependent Variable: VAR 3 (The Golden Generation Asta Cita Vision)

b. Predictors: (Constant), VAR 2 (Artificial Intelligence-Based Learning), VAR 1(Development of Islamic Smart Schools)

F tabel $= F(k ; n-k)$
 $= F(2 ; 156-2)$
 $= F(2; 154)$ (Find the table F-value distribution list)
 $= 3, 05$
 The result is $= 3, 05$

Testing the H3 Hypothesis with the F test related to Variable X_1 (Development of Islamic Smart School) and Variable X_2 (Artificial Intelligence-based Learning) it was known that the significance value for the simultaneous influence of X_1 and X_2 on Y was $0.000 < 0.50$ and the value of F was $134.6 > 3.05$ from F was 3.05, so it can be concluded that Hypothesis 3 was accepted, which means that there was an influence of Variable X_1 (Development Islamic Smart School) and Variable X_2 (Artificial Intelligence-based Learning) simultaneously against Y (Golden Generation).

Table 8. Table of Model Summary

Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate
1	.799 ^a	.638	.633	3.05127

a. Predictors: (Constant), VAR 2 (Artificial Intelligence-Based Learning), VAR 1 (Development of Islamic Smart Schools)

The Terminated Coefficient aims to find out what percentage of the influence of variables X_1 and X_2 on variable Y . Based on the output above, it is known that the value of R Square is 0.638, which means that the influence of variables X_1 and X_2 simultaneously on variable Y is 63.8%.

Development of Islamic Smart Schools and Artificial Intelligence-Based Learning to Build a Golden Generation with Asta Cita Vision

Research on the development of *Islamic Smart Schools* and Artificial Intelligence-based Learning to Build a Golden Generation with Asta Cita Vision in the Industrial Revolution Era 4.0 has a significant contribution to the achievement of the *Sustainable Development Goals* (SDGs). The implementation of *Smart Schools* is not only oriented towards the use of technology, but also towards strengthening the quality of learning, character development, and creating an inclusive and sustainable educational ecosystem.

First, the use of e-learning in learning. Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Al Kautsar PK Junior High School have developed a comprehensive digital learning system through the use of *Learning Management System* (PK-Learning and e-module), *Computer-Based Test* (CBT), as well as the support of digital facilities such as *Smart TVs*, LCDs, projectors, audiovisual devices, laptops, computers, and internet networks. This innovation supports the improvement of learning quality that is adaptive to the needs of the 21st century and in line with SDG 4 (Quality Education) and SDG 9 (Industry, Innovation, and Infrastructure).

Second, digital literacy training for teachers. Muhammadiyah Junior High School PK Kottabarat Surakarta and Muhammadiyah Al Kautsar PK Junior High School consistently carry out various programs to strengthen the competence of educators. The program includes workshops on pedagogic competencies, 21st century education, HOTS, and AKM-based question preparation, training on the use of digital learning platforms (Zoom, Google Classroom, Edmodo, Quipper, Zenius, and Edelink), STEM-based learning development and activities, as well as educational administration and graphic design training. This effort directly contributes to improving teacher professionalism and strengthening the quality of learning relevant to SDG 4 (Quality Education).

Third, on the aspect of religious character development. Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Al Kautsar PK Junior High School integrate Islamic values in educational activities through morning mentoring programs, halaqah, and dauroh tahfidz, worship mentoring, tasmi' Al-Qur'an, Baitul Arqam, Muhammadiyah Youth Studies (KARIIM), as well as worship habituation through *the Golden Habbit* and *Virtual Tahajud* programs. The integration of religious character education plays a role in forming students with morals, integrity, and inclusive personalities, which is in line with SDG 16 (Peace, Justice, and Resilient Institutions).

Fourth, the School supports the concept of Green School and Paperless School Management. Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Al Kautsar PK Junior High School implemented a digital attendance system and learning journal as part of efforts to improve school management efficiency as well as reduce the use of paper. This practice demonstrates the school's commitment to the principles of environmental sustainability and is relevant to SDG 12 (Responsible Consumption and Production).

Fifth, in the aspect of empowering superior and inclusive human resources, the two schools develop various programs to strengthen students' competencies through artificial intelligence training, coding, international programs, *outing classes*, *edutrips*, strengthening literacy, coaching AKM and OSN, as well as various extracurricular activities, such as

academic, sports, arts, and skills. These programs are designed to accommodate the potential and interests of students without discrimination, thereby supporting the creation of equal and equitable education, in line with SDG 5 (Gender Equality) and SDG 10 (Reducing Inequality).

Thus, the development of digital-based school management and *Smart School* learning in Surakarta not only contributes to improving students' *critical thinking* skills, but also significantly supports the achievement of various SDGs targets through quality, inclusive, characterful, and sustainable education.

Discussions

Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Al Kautsar PK Junior High School are committed to integrating digital technology and *Artificial Intelligence* to realize the vision of forming a golden generation with Asta Cita insight. First, the Development of Digital-Based School Management through curriculum management, Human Resources (HR), student affairs, finance and infrastructure, school-to-community relations (PR), and Administration. Second, the development of students' digital competencies through the use of technology, digital libraries and computer laboratories, extracurricular programming and basic coding, and the use of e-learning. Third, the development of *smartschools* through the support of various parties, such as the Muhammadiyah Regional Executive, Muhammadiyah Regional Executive, etc. Fourth, the digital competency development program for school staff. Fifth, Development of Teachers' Digital Literacy Competencies through Workshops, Seminars, and Webinars focusing on digital learning based on *Artificial Intelligence*, MGMP, Academic Supervision, Awarding, and Study. Sixth, Development of Digital-Based Classrooms (Smart Classrooms) through LCD, Projectors, Smart TVs, Audio Visual, Laptops, Internet Connections, PK-Elearning E-Modul. Seventh, the development of subjects that are integrated with technology through the PK-elearning platform. Eighth, *Smartshool Development* through the ICT Coordinator, who is tasked with planning the development and responsibility of the internet and intranet systems.

Development of *Islamic Smart Schools* based on Artificial Intelligence to Build a Golden Generation with Asta Cita Insight in accordance with the theory of Smart Principals and Smart Schools, Among them are *Developing ICT-capable management*, *Developing ICT-capable pupils* (Developing students who have ICT competence) [24], *External support and services*, *Staff development programmes for ICT capability*, *Developing ICT-capable teachers*) [25], *Developing ICT-capable classrooms*) [26]. Improving competencies through seminars and workshops [27]. This theory is strengthened by the latest research that educational institutions will succeed in the digital era by encouraging teachers to participate in e-learning training and digital platforms [28]. Improving teacher competence through supervision and MGMP [29]. Teachers must have good competencies (pedagogical, professional, personality, and social) [30]. The characteristics of millennial teachers who are technologically capable, have a good work culture, and person-job fit have a positive effect on the effectiveness of learning [31]. Teachers who have open and effective communication are important in developing students' character [32]. The success of education to create a golden generation can be achieved through good relationships between schools, parents, and families to build and improve the personalities of school-age children in the 5.0 era [33]. The Development of *Islamic Smart Schools* based on Artificial Intelligence to Build a Golden Generation with Asta Cita Insight, in accordance with previous research, namely, superior Islamic education can be achieved with institutional strengthening strategies, human resource improvement, holistic curriculum, variety of educational programs, comprehensive evaluation, and networking/partnerships [34].

Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Al Kautsar PK Junior High School are committed to integrating digital technology and *Artificial Intelligence* to realize the vision of forming a golden generation with Asta Cita

insight with educational program innovation. First, the development of pious human resources through morning mentoring and Halaqoh Tahfidz, worship assistance, Tasmi' Al-Qur'an, Muhammadiyah Youth Studies (KARIIM), Virtual Tahajud Program, and Heart Advice Program (Nasi) [35]. Second, human resource development in science and technology through Artificial Intelligence Training and Coding Training, Overseas Edutrip (Malaysia and Singapore), and International *Class Program* (ICP) class development. Third, human resource development in education (academic and non-academic) through Homestay, Hizbul Wathon Program, Summer Camp, PK Sharing, AKM Success, School literacy movement, OSN coaching, and extracurricular activities, English Language Day, Hunting Tourist [36]. Fourth, Human resource development in health and sports achievements through the Health Examination Program, Great Indonesian Children's Gymnastics and Journalism Extracurriculars, Broadcasting, Cooking, Graphic Design, Coding, English Club, Robotics, Drawing, Contemporary Music, Archery, Pencak Silat, Futsal, Basketball, Badminton, and KIR. Fifth, Human resource development in gender equality, strengthening the role of women, youth, and people with disabilities through Anti-Bullying Seminar Programs, Extracurriculars, Flag Ceremony, and PK Got's Talent & Market Day.

The development of *Islamic Smart Schools* based on *Artificial Intelligence* to Build a Golden Generation with Asta Cita Insight in accordance with the educational framework in the era of the industrial revolution or the 21st century has been proposed by experts. *First, the enGauge 21st Century Skills* Framework, namely mastery of digital literacy, effective communication, high productivity, and inventive thinking [37]. *Second, the National Educational Technology Standards (NETS) framework*. *Third, Assessment and Teaching 21st Century Skills*, namely (1) *Ways of thinking*, Creative education, critical thinking, problem solving, (2) *Ways of working*, namely communication and collaboration, (3) *Tools of working*, information literacy, and (4) *Living in the world*, life skills [38]. *Fourth, The Partnership for 21 Century Skills* Framework, the competencies that must be possessed are (1) *critical thinking and problem solving skills*, (2) *communication and collaboration skills*, (3) being able to create something and being able to innovate (*creativity and innovation skills*), (4) *Information and communications technology literacy*, (5) *contextual learning skills* and (6) *information and media literacy skills*. Educational institutions develop strategies to increase digital literacy [39]. Muhammadiyah PK Kottabarat Surakarta Junior High School also develops moderate Islamic education with various digital-based Islamic activities that have the main moderate character values, tawasuth (middle), tawazun (balanced), and ta'addul/i'tidal (fair) [40]. The positive impact of the curriculum is that students have good religious character, tolerance, empathy, and sympathy [41].

The effectiveness of *Islamic Smart School* development and *Artificial Intelligence-based learning* to build a Golden Generation with Asta Cita Insight in the Industrial Revolution Era was measured by quantitative analysis using the SPSS application. First, the first hypothesis test (H1). It is known that the Sig. value for the influence of X1 on Y is $0.000 < 0.05$, and t is calculated as $7.083 > 1.975$, so that it can be concluded that H1 is accepted, which means that there is an influence of X1 (Development of *Islamic Smart School*) on Y (Golden Generation with Asta Mind's Vision). Second, the Second Hypothesis Test (H2), it is known that the Sig. value for the influence of X2 on Y is $0.000 < 0.05$, and t is calculated as $4.977 > 1.975$, so it can be concluded that H2 is accepted, which means that there is an influence of X2 (Artificial Intelligence-based Learning) on Y (Golden Generation with Asta Mind's Insight). Third, H3 Hypothesis Testing with the F test related to Variable X1 (Development of *Islamic Smart School*) and Variable X2 Artificial Intelligence-based Learning at the same time. it is known that the significance value for the simultaneous influence of X1 and X2 on Y is $0.000 < 0.50$ and the value of F is $134.6 > 3.05$ from F was 3.05, so it can be concluded that Hypothesis 3 is accepted, which means that there is an influence of Variable X1 (Development *Islamic Smart School*) and Variable X2 Learning based on *Artificial Intelligence*) Simultaneously against Y (Golden Generation with Asta Mind Insight) with Terminated Coefficient Data shows that the value

of R Square is 0.638, which means that the influence of variables X1 and X2 simultaneously on variable Y is 63.8%.

CONCLUSION

The development of Islamic Smart Schools and Artificial Intelligence (AI)-based Learning to Build a Golden Generation with Asta Cita Insight in the Industrial Revolution Era shows that the digital transformation of education in Indonesia is still facing challenges in the form of technology access gaps. The results of the study found that Muhammadiyah PK Kottabarat Surakarta Junior High School and Muhammadiyah Al Kautsar PK Junior High School have succeeded in integrating digital technology and AI into school management, learning, competence of teachers, staff, and students through various excellent programs such as smart classrooms, digital literacy, international classes, AI training, to strengthening Islamic character through tahfidz, mentoring, and Hizbul Wathon scouting activities. Quantitative analysis with multiple regression showed that the development of Islamic Smart Schools and AI-based learning had a significant effect on the formation of the Golden Generation with Asta Cita insights, with a contribution of 63.8%. Thus, this study emphasizes that the concept of AI-based Islamic Smart School improves digital literacy, 21st century competence, and strengthens religious character and nationalism, so that it can become an innovative educational model to realize the 2045 Golden Generation that is globally competitive and noble in character.

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Author Contribution

W provides research concepts, drafts manuscripts, and develops methodologies. MAW conducts research, curates and analyzes data, conducts validation, and prepares visualizations. AN and W have contributed to the development of methodologies, providing critical reviews, editing manuscripts, and providing oversight of the entire research process. All authors have agreed to the final version of the manuscript.

Conflicts of Interest

All authors declare no conflict of interest.

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