



Analysis of Education SWOT in Indonesia in Preparing the Golden Generation of Indonesia 2045

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Abstract

Background. Indonesia is experiencing a strategic momentum towards Indonesia Emas 2045, a long-term vision centered on the quality of its human resources.

Aims. This study aims to analyze strategies to improve the quality of education and the mastery of science and technology (IPTEK) to prepare an adaptive, competitive, and innovative generation.

Methods. The method used is an exploratory qualitative approach through Focus Group Discussion (FGD) involving education stakeholders, complemented by a SWOT analysis to identify strengths, weaknesses, opportunities, and threats in the education system.

Result. The results of the study indicate that the main challenges faced are disparities in educational quality across regions, low literacy in IPTEK, and a lack of integration between the curriculum and the needs of the world of work.

Conclusion. Through the SWOT Analysis, the main technical priorities to be addressed include procurement of ICT devices, ongoing teacher training, equalizing infrastructure, and strengthening the vocational curriculum.

Implementation. This study provides strategic recommendations for transforming the Indonesian education system to be more adaptive and aligned with the needs of the 21st century.

Keywords: Indonesia Emas 2045, education, science and technology, SWOT, FGD, human resource transformation



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INTRODUCTION

The Golden Indonesia Vision 2045 is a national ideal that wants to make Indonesia a developed country exactly 100 years after its independence. One of the main pillars of achieving this vision is the development of superior and competitive human resources (HR). This literature review analyzes various academic and policy perspectives in order to prepare the next generation of the nation that will support Indonesia in 2045.

Golden Indonesia 2045 is a long-term strategic vision that rests on four pillars: human development and mastery of science and technology (IPTEK), sustainable economic development, equitable development, and national resilience and governance. According to Bappenas (2020), to realize this vision, investment in human resources from an early age is very important. "Human development will determine the direction and quality of Indonesia 2045" (Bappenas, 2020). Some of the main challenges in preparing superior human resources include the low quality of education, inequality of access to education, and the lack of optimal vocational education and job training systems. A study by Arifin and Muslim (2021) emphasizes that Indonesia is experiencing a "learning crisis" where student learning outcomes are still inadequate even though the school participation rate is quite high. "The main problem is not in access, but in the quality of learning itself" (Arifin & Muslim, 2021).

Recent studies in the field of education transformation towards *a Golden Indonesia 2045* show that the main focus of previous research includes several key aspects, namely:

1. The Quality of Learning Crisis. Studies confirm that although educational participation is increasing, student learning outcomes are still low and do not reflect 21st century competencies.
2. Curriculum reform and 21st century learning. The Merdeka curriculum and *student-centered learning* approach have been identified as strategies to improve critical thinking, collaboration, and creativity skills.
3. Digitalization and technology literacy (IPTEK). Previous research emphasizes the importance of digital literacy as a key competency in the Industrial Revolution 4.0 era, although its implementation still faces access gaps.
4. Educational inequality. Global reports (World Bank, OECD) show that there is a significant disparity between urban areas and 3T areas.
5. The role of the educational ecosystem (family–school–community). Previous studies have highlighted the importance of character education based on multi-actor collaboration, but it is still partial.

Synthesis of the State of the Art: In general, the current literature is still fragmented, focuses on specific aspects (curriculum, technology, or quality of teachers), and has not integrated all dimensions of education in one comprehensive strategic framework.

LITERATURE REVIEW

Education is the main foundation in shaping the golden generation. The Independent Learning Curriculum approach launched by the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) is a strategic step in providing space for creativity and innovation. According to Suryadi (2022), student-centered and project-based learning can improve 21st-century skills such as critical thinking, collaboration, and digital literacy. "The Independent Curriculum supports the formation of character and competencies needed in the future" (Suryadi, 2022).

The literature also highlights the importance of the role of family and society in supporting education and character formation of the younger generation. According to Hidayat (2020), character education is not enough to be imposed on schools alone, but requires collaboration from the child's closest environment, namely the family. "The internalization of values will not succeed without example and strengthening in the family environment" (Hidayat, 2020).

The Industrial Revolution 4.0 and the digital era are crucial factors in preparing the golden generation. According to Putri & Nugroho (2021), digital literacy and technology mastery will be the key to the competitiveness of the workforce in the future. However, there is still a digital divide, especially in remote areas. "Digital literacy must be included in the core curriculum from primary education" (Putri & Nugroho, 2021).

The literature reviewed shows that preparing for the Golden Indonesia Generation 2045 requires a systemic and collaborative approach between the state, educational institutions, families, and communities. Investments in education, digital transformation, and character building must be carried out simultaneously and sustainably.

The main problem faced by Indonesia in preparing for the golden generation of 2045 is the uneven quality of education and the low relevance of the education system to the needs of science, technology, and the future world of work. The elaboration of the problem is such as: The quality of teachers and learning is not optimal; many teachers are not equipped with modern pedagogical skills and digital technology; learning still focuses on memorization, not on *critical thinking* or *problem solving*. Limited Facilities & Access to Quality Education; disadvantaged, outermost, and frontier (3T) regions experience inequality in access to quality education and digital facilities (OECD, 2020). Curriculum that is Less Adaptive to Changes in Science and Technology ; The education system has not been fully integrated with the needs of industry 4.0, such as artificial intelligence, data science, and digital entrepreneurship (World Bank, 2020). The lack of research and innovation culture in the educational environment; The

weak collaboration between the world of education, industry, and research institutions causes stagnant mastery of science and technology (Bappenas, 2020). Educational evaluation is still dominated by cognitive assessment; assessments that focus on test scores have not encouraged 21st-century character, creativity, or skills (Ministry of Education and Culture, 2022).

The main question of this research is: How can the strategy of improving the quality of education and mastery of science and technology prepare the 2045 Golden Indonesia generation effectively and equitably? and derivative questions; What are the main needs of the young generation in the field of education and science and technology to achieve the vision of a Golden Indonesia 2045?, What are the strengths, weaknesses, opportunities, and threats (SWOT) in the current Indonesian education system in supporting the mastery of science and technology?, What is the perception of stakeholders (teachers, students, industry, government) regarding the relevance of education today to future challenges?,

The objectives of this research are: identify the needs and challenges of education in preparing the superior generation of 2045, explore the opinions of stakeholders through Focus Group Discussions (FGDs), analyze strengths, weaknesses, opportunities, and threats (SWOT) in the education system.

The limitations of this study are: limited area focus. This research was only conducted in a few representative areas (for example: big cities, suburban areas, and 3T areas) and only in Majalengka Regency. The research subjects are limited. The research involved education stakeholders such as teachers, students, principals, education practitioners, and government representatives, but did not include an in-depth national policy analysis. The topic of education is limited to the quality aspects and mastery of science and technology. Other aspects such as education financing, budget politics, or socio-cultural issues are not discussed in depth in this study. The approach used is qualitative, the research uses the FGD method, and SWOT analysis, so that the results obtained are exploratory descriptive and not generalistic quantitative. The time span of the study is limited, Data collection is carried out over a specific period of time (e.g. 2–3 months), so the dynamics of long-term policy change cannot be thoroughly traced.

This research has a high urgency because it touches on the main foundation of Indonesia's long-term development, namely superior human resources (HR). In the face of the era of globalization, technological disruption, and demographic bonuses, quality education and mastery of science and technology are the keys for Indonesia to realize the vision of a Golden Indonesia 2045.

This research is at the cutting of the study between the transformation of education, mastery of science and technology, and the vision of a Golden Indonesia 2045. Based on the literature analyzed in the article, previous studies emphasized the importance of: education-based development of superior human resources; curriculum reforms such as the Independent Curriculum to improve 21st century skills; strengthening digital literacy and technology in facing the industrial era 4.0. Studies from the World Bank and OECD highlight the following: *Learning Crisis* and low quality of learning; inequality of access to education between regions. Previous research is generally: partial (focusing on curriculum, technology, or teacher quality only); using quantitative or macro policy approaches. The position of this research: Integrating various aspects (human resources, science and technology, policies, stakeholders) in one framework; Using an exploratory qualitative approach based on FGD + SWOT; Focusing on a comprehensive strategic analysis of education towards 2045

Based on the analysis of the literature and the content of the article, there are several significant research gaps:

Conceptual Gap. Previous research was partial and sectoral; There is no holistic model that integrates education, science and technology, industrial needs, national policy

Empirical Gap. Lack of field-data-based research from stakeholders; Lack of *a bottom-up* approach (voice of customer in education)

Contextual gap. Global studies (OECD, World Bank) have not fully adapted to Indonesia's local context; Lack of region-specific studies (e.g. regions such as Majalengka)

Methodological Gap. Dominance of approach: quantitative macro; normative policy analysis; Minimal use of exploratory participatory methods

Practical Gap. The lack of a strategic model that: connects education with the world of work; integrating science and technology operationally; Policy implementation is not yet based on the real needs of stakeholders

RESEARCH METHODS

This research is qualitative, descriptive, exploratory with a participatory approach through FGD and SWOT analysis to systematically examine educational needs and strategies to improve the quality of science and technology-based education towards a Golden Indonesia 2045.

Below are the methods and techniques of data collection such as: Focus Group Discussion (FGD). Involving stakeholders such as: teachers, principals, lecturers and academics, student

representatives, industry practitioners, government representatives (Education Office/Ministry of Education and Culture). The FGD is used to identify the "Voice of Customer" related to the educational needs and competencies of science and technology in the 21st century. Observation and Document Study. Documents such as the RPJMN, the Independent Curriculum, OECD reports, and the World Bank are used to triangulate the data. The data analysis technique carried out is a SWOT analysis. It is used to identify Strengths, Weaknesses, Opportunities, Threats related to the education system and mastery of science and technology based on the results of the FGD.

The main novelty of this research lies in the following aspects:

1. Integration of FGD+SWOT Methods. Incorporating: Empirical perspectives from stakeholders (FGDs); Systemic strategic analysis (SWOT); Rarely used simultaneously in national education studies
2. Multi-Stakeholder approach, involving: Teachers, students, academics, industry, and government; Provide an overview of "voice of customer" education, not just policy analysis
3. Focus on synchronizing Education–Science and Technology–World of Work. Not only discussing education, but also: Relevance to industry 4.0; Future competency needs
4. Specific Context of Golden Indonesia 2045. The research is explicitly directed to: Support a long-term national vision; Provide strategic recommendations based on actual conditions

DISCUSSION

This research is in the position of developing a study of science and technology-based education transformation in the context of Golden Indonesia 2045 by integrating various perspectives that were previously still fragmented. The novelty of the research lies in the use of an exploratory qualitative approach through a combination of Focus Group Discussion (FGD) and SWOT analysis involving multi-stakeholders to produce more contextual strategic recommendations. The research gaps filled include a lack of integration between the education system and industrial needs, inequality in the quality of education between regions, a low research and innovation culture, and the limitations of a participatory approach in national education analysis.

Based on the analysis of the articles and literature cited, there are several research gaps that are filled: Education System Integration Gap. Previous research: Fragmented (curriculum, technology, or HR only); Gap: There is no holistic and systemic approach yet
Research contribution: Integrating all elements of education in one SWOT analysis

The gap in the relevance of education to science and technology and industry. Problem: The curriculum is not fully up to the needs of the world of work. Gap: Lack of direct stakeholder needs-based research. Contribution: Using FGDs to capture real needs

1. Spatial Inequality. Problem: Education disparity in 3T vs city areas. Gap: Lack of strategic studies based on local conditions. Contribution: A case study of the region (Majalengka) as a representation
2. Research and Innovation Culture Gap. Problem: Low culture of research and collaboration. Gap: Lack of research linking education to innovation ecosystems. Contribution: Emphasizing the importance of triple helix collaboration (government–industry–academia)
3. Methodological gap. Previous research: quantitative policy or descriptive policy. Gap: Lack of a stakeholder-based participatory approach. Contribution: FGD approach + document triangulation + SWOT.

Focus Group Discussion (FGD) is used as the main technique for primary data collection to explore in-depth perspectives from various stakeholders in the field of education and science and technology development.

Objectives of the FGD:

1. Identify the needs, challenges, and expectations of stakeholders for quality education and mastery of science and technology towards a Golden Indonesia 2045.
2. Absorb *the voice of customers* which will be the basis for SWOT and QFD analysis.

FGD Participants:

1. Teachers and principals
2. High school students and students
3. Lecturers and academics
4. Industry/technology practitioners
5. Representatives of the Education Office and relevant ministries

Implementation Techniques:

1. The FGD was held in 2–3 focus groups, 6–10 participants each.
2. The moderator guides the discussion based on the guidelines that have been prepared.
3. All sessions were recorded and analyzed using *thematic coding*.

Examples of FGD Topics:

1. Current educational challenges and needs.
2. Expectations for the science and technology curriculum and digitalization.

3. Technical priority recommendations for education reform.

Observation and Document Study

This method is used to support and complement the results of the FGD, as well as to ensure the validity of the data through triangulation techniques.

Types of Documents Reviewed:

1. National policy document: *RPJMN 2020–2024, Golden Indonesia Vision 2045*
2. Independent Curriculum Guide
3. World Bank and OECD report on Indonesian education
4. National Education Quality Indicator Achievement Data

Purpose of Document Observation:

1. Provide policy context and up-to-date statistical data.
2. Identify the gap between educational policy and field practice.

Triangulation Technique

The combination of FGD and document observation allows researchers to triangulate data, so that the final results become more valid, comprehensive, and scientifically accountable.

SWOT Analysis of Education in Indonesia

Education is the foundation of national development and an important instrument to produce superior human resources towards the Golden Indonesia 2045 vision. However, the education system in Indonesia faces various dynamics, both in terms of access, quality, and relevance. One way to map this condition is through analysis SWOT (Strengths, Weaknesses, Opportunities, Threats).

A. Strengths

1. The Government's Commitment to Education
 - a. Education is a priority sector in the State Budget with a budget allocation of at least 20% (1945 Constitution Article 31 Paragraph 4).
 - b. Development of national programs such as *the Independent Curriculum*, *Smart Indonesia Program*, and *Driving Teachers*.
2. Wide Number of Educational Institutions

Thousands of formal and non-formal educational institutions are spread to the village level.

3. Utilization of Technology in Education

The development of digital platforms such as Rumah Belajar, Merdeka Mengajar, and local LMS encourages the integration of digitalization of learning.

"Indonesia's education investment continues to be increased to encourage the strengthening of superior human resources" (Ministry of Education and Culture, 2022).

B. Weaknesses

1. Uneven Quality of Education

Inequality between regions, especially between cities and disadvantaged areas, is particularly striking in terms of teacher quality, facilities, and learning outcomes.

2. Learning Crisis

A World Bank study (2020) shows that Indonesian students experience high *learning poverty*: around 53% of 10-year-old students are unable to understand simple texts.

3. Low Teacher Competence

Many teachers have not taken modern pedagogical training or are still applying old, non-contextual methods. "Indonesia faces serious challenges in terms of the quality of learning and strengthening the teaching profession" (World Bank, 2020).

C. Opportunities

1. **Demographic Bonus.** The large productive age population is an opportunity to produce superior human resources if accompanied by quality education.

2. **Industry 4.0 Integration and Digital Transformation.** Technology-based education, coding, and entrepreneurship can be a solution to increase global competitiveness.

3. **Collaboration with the private and international sectors.** Support from global industry and institutions opens up opportunities to improve the quality and relevance of education through strategic cooperation. *"Digital transformation and curriculum reform are strategic opportunities for the education of the future" (OECD, 2020).*

D. Threats

1. **Technology Access Gap.** The 3T region (frontier, outermost, disadvantaged) still experiences obstacles in internet access and learning devices.

2. **Socioeconomic disparities.** Children from poor families are more at risk of dropping out of school or experiencing limited learning resources.

3. Reliance on Exams. Evaluation systems that are still dominated by cognitive assessments often hinder the development of holistic learning and character.

Table 1. State of the Art, Research Gap, and Novelty

No.	Previous Studies / Authors	Research Focus	Key Findings	Research Gap	Novelty of This Study
1	Arifin & Muslim (2021)	Learning crisis in Indonesian education	Identifies low student learning outcomes despite high enrollment rates	Limited to outcome-based analysis without strategic systemic solutions	Proposes a comprehensive strategic framework using SWOT analysis
2	World Bank (2020)	Education quality and policy reform	Highlights learning poverty and teacher competency issues	Macro-level perspective lacking stakeholder engagement	Incorporates multi-stakeholder insights through Focus Group Discussions (FGD)
3	OECD (2020)	Education and innovation systems	Emphasizes the importance of digital transformation and innovation	Generalized global recommendations without contextual specificity	Provides a context-specific analysis aligned with Indonesia Emas 2045
4	Suryadi (2022)	Merdeka Curriculum transformation	Promotes student-centered and project-based learning approaches	Focuses primarily on curriculum without systemic integration	Connects curriculum transformation with industry and science-technology (IPTEK) demands
5	Putri & Nugroho (2021)	Digital literacy in education	Identifies digital literacy as a key future competency	Lacks strategic implementation framework	Integrates digital literacy into a broader strategic education model
6	Scarlet Witch (2020)	Role of family in character education	Emphasizes family as a central factor in character development	Does not integrate family role within a broader education system	Incorporates family, education, and stakeholder ecosystem into a unified framework
7	Bappenas (2020)	Indonesia Gold 2045 vision	Highlights the importance of human resource development	Conceptual and policy-oriented, lacking empirical analysis	Provides empirical and strategic insights at the local level
8	Fullan et al. (2018)	Deep learning in education	Stresses global competencies and student engagement	Global perspective with limited local adaptation	Adapts deep learning approach to Indonesian educational context
9	Shao (2012)	Entrepreneurial and creative education	Promotes innovation and entrepreneurial skills in education	Not aligned with national development frameworks	Aligns entrepreneurial education with Indonesia's long-term national vision
10	This Study	Education system transformation and IPTEK readiness	Identifies strengths, weaknesses, opportunities, and threats through FGD and SWOT analysis	—	Introduces an integrative, participatory, and strategic model combining FGD and SWOT to support Indonesia Emas 20

CONCLUSION

The SWOT analysis shows that although Indonesia has structural strengths and strategic opportunities to advance education, there are still many weaknesses and threats that

need to be addressed through a systemic approach. Quality-based education reform, equity, and digital innovation must be a priority in long-term planning towards a Golden Indonesia 2045. The literature shows that human development and mastery of science and technology are the main prerequisites for Indonesia in realizing its vision of becoming a developed country by 2045. Development based on the quality of human resources, innovation, and technology must be designed collaboratively and measurably.

Deep learning-based curriculum offers a relevant approach to prepare learners for a dynamic and uncertain world. Systemic commitment, policy support, teacher training, and flexible curriculum design are needed for this learning transformation to be sustainable in a sustainable manner.

Challenges and Implementation

1. Some of the main challenges: inequality in the quality of education between regions, low participation in research and innovation, lack of research budget (below 1% of GDP), lack of human resources for scientists and technocrats.
2. Challenges of Deep Learning Implementation. Although this concept is very potential, challenges in the implementation of deep learning curriculum include: high administrative burden of teachers. Lack of in-depth pedagogical training. Reliance on exam-based assessments. Inequality of access to technology. (Stiggins & Chappuis, 2012)

Recommendations:

1. Increase education and research budgets.
2. Building leading research centers in the region.
3. Encourage triple helix (government–industry–university) partnerships.
4. The integration of digital literacy and technology since primary education.

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