

Readiness of Human Resources Facing Demographic Bonus and Professional Revolution in Indonesia

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Abstract

Digitalization today has a significant impact on improving workforce competency standards. One aspect is the mastery and utilization of technology, which is now a benchmark for job providers in the recruitment process. Indonesia also faces the challenge of the demographic bonus phenomenon, where the number of productive workers increases but quality remains inadequate. Unlike previous studies that focused more on evaluating education as a factor shaping human resources, this study examines the relationship between the demographic bonus phenomenon and professional revolution as well as reasons behind low-quality human resources in Indonesia. The purpose of this research is to provide solutions for human resource readiness in facing challenges posed by both demographic bonuses and professional revolutions in Indonesia. The researcher used a Systematic Literature Review Method by analyzing 36 Scopus and Sinta accredited journal articles sourced from Scopus and Google Scholar metadata through Publish or Perish (PoP). The results show two main problems: first, low quality of Indonesian human resources indicated by poor thinking skills; second, ineffectiveness of vocational high school education in producing competent workers due to their inability to optimize relationships with industries or employers. To overcome these problems, it is suggested to optimize STEAM learning and revitalize vocational schools while changing study duration to five years for Diploma II equivalent graduates like Thailand's vocational education system.

Keywords: Demographic Bonus, Formal and Vocational Education, Professional Revolution, Steam

INTRODUCTION

Technological developments in the Revolutions 4.0 and 5.0 eras have fundamentally transformed the global job market by changing the required skill sets and increasing reliance on digital capabilities. Industrial Revolution 5.0, in particular, emphasizes the synergy between human expertise and intelligent systems. This demands that human resources (HR) be ready not only in technical aspects, but also in adaptive, cognitive, and moral resilience. Meanwhile, Indonesia is entering a crucial demographic transition phase known as the demographic dividend, which is expected to peak in 2030. This period is characterized by a high proportion of the population of working age. This can be an opportunity for economic growth, but it could also become a social burden if the quality of the workforce is inadequate. Despite this growing urgency, Indonesia still faces structural challenges in its education and employment systems. The high unemployment rate of 6.73% among Vocational High School (SMK) graduates shows the gap between the output of formal education and the changing needs of the labor market.

Evaluation of Indonesian education has been carried out previously in several studies, such as a research study conducted by Samil (2022) which focused on evaluating the quality of vocational high schools using the Baldrige Excellent Framework, the research was conducted using accreditation indicators, Education Quality Assurance (PMP), and Principal Performance Assessment (PKKS) which were integrated into the Malcolm Baldrige for Performance Excellent (MbfPE) and became a benchmark in assessing the quality of vocational schools in Indonesia so far. Research studies conducted by Jaedun (2020) using document collection and survey methods that focus on evaluating the application of demand-based approaches in vocational high schools found a misalignment between the skills of graduates and the demand for labor by industry, the results of this study indicate the misalignment of academic programs and the average majors registered by students at vocational high schools with employment potential in each region in Indonesia, thus showing the potential for an increase in the number of unemployed, especially vocational school graduates. Then, a research study conducted by Ibarra-Olivo (2024) which seeks to explore the effect of FDI by multinational enterprises (MNEs) in global value chains (GVCs) on the number of TVET graduates in Vietnam and Indonesia, the findings reveal that greenfield FDI plays a role

in shaping TVET supply, with heterogeneous effects across different segments of the GVC and subnational regions. This research confirms that middle-income countries should prioritize human capital development to ensure long-term growth and economic improvement. Foreign investment can be a key capital and opportunity that the government can leverage in optimizing human capital development.

Previous studies have mostly focused on evaluating the quality of vocational education or curriculum effectiveness, but not many have comprehensively examined the relationship between demographic dynamics, digital transformation, and human resource readiness. In addition, moral dimensions such as declining values, weak critical thinking skills, and strong character have also not received much attention in policy discourse. Therefore, this research aims to fill the gap by presenting a multidimensional analysis of Indonesia's HR readiness through the approach of human capital theory, capability approach, and HR resilience theory.

This research uses a Systematic Literature Review (SLR) approach to synthesize findings from 36 accredited national and international journal articles, to identify strategic solutions in improving Indonesia's HR readiness. Integrating the perspectives of demography, education and professional revolution, this research highlights key gaps in vocational education, digital competency and social-emotional development. Ultimately, this research offers strategic reforms in the form of curriculum restructuring, strengthening, collaboration with industry, and integration of character education as an integral part in shaping a competitive, adaptive and moral Indonesian workforce.

LITERATUR REVIEW

In discussing the readiness of Indonesia's human resources to face the demographic bonus and professional revolution, a theoretical foundation is needed that is able to explain the relationship between demographic dynamics of human capacity development and the transformation of the world of work.

First, the Human Capital Theory developed by Gary S. Becker (1993) states that investment in education, training, and health is key in increasing individual and collective productivity. In the context of the demographic dividend, this theory explains that the

demographic dividend can only be optimized if the productive-age population has relevant skills and work capacity.

Second, the Capability Approach pioneered by Amartya Sen (1999) and Martha C. Nussbaum (2011) offers a framework for assessing HR readiness not only based on educational inputs, but also on an individual's ability to choose and live a life of value. This approach emphasizes that work readiness includes a person's right and freedom to access opportunities, social skills and active participation in development.

Third, the Human Resource Resilience Theory as developed by Lengnick-Hall (2011), focuses on the adaptive ability, flexibility and resilience of individuals in the face of changes in the world of work, economic uncertainty, and psychological stress in the context of the professional revolution, resilience is an important quality in dealing with technological disruption and changes in the type of work.

Fourth, the Demographic Transition Theory helps explain the structural context of Indonesia's demographic dividend. This theory describes the phase of population change from high birth and death rates to lower rates, which creates a surge in the working-age population. Understanding this transition is important for formulating long-term human capital development strategies.

Fifth, the Transitional Labor Market Theory, developed by Günter Schmid (1998), explains the importance of institutional bridges that allow individuals to make flexible transitions between education, training and the world of work. The theory emphasizes that a modern labor market system should allow for mobility throughout the work life cycle, including reskilling. In the context of the demographic bonus, this theory is relevant to explain that the success of utilizing the productive age is highly dependent on the ability of the national education and training system to adjust to changes in the structure and needs of the profession due to technological disruption.

By combining these four approaches, the theoretical framework used in this research forms the foundation of a multidimensional analysis of the readiness of Indonesian human resources in terms of formal and vocational education, adaptive ability to digitalization, and moral and character aspects that underlie long-term competitiveness (Trisakti & Irnawati, 2019).

RESEARCH METHOD

This research uses a qualitative thematic method with a Systematic Literature Review (SLR) approach to identify, evaluate and synthesize academic findings relevant to the readiness of Indonesia's human resources in facing the demographic bonus and professional revolution. This method was chosen because it is able to provide a comprehensive understanding of various previous studies and strengthen theoretical and policy bases in a systematic manner (figure 1).

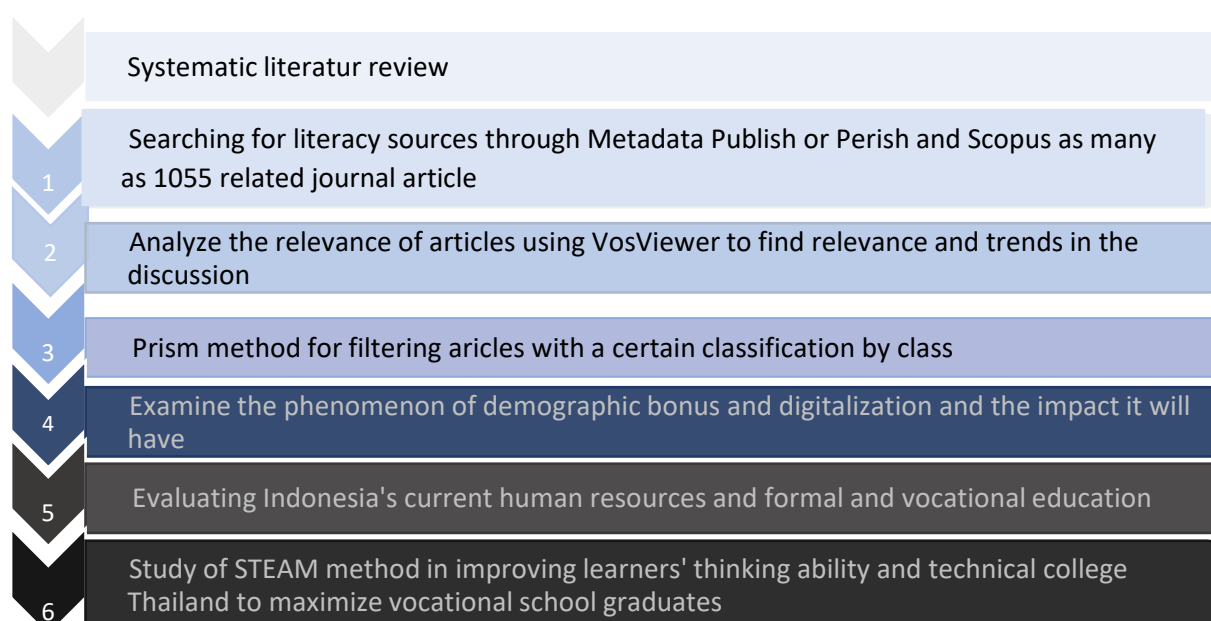


Figure 1. Research Methods

The SLR steps were carried out following the PRISMA (Preferred Reporting Items for Systematic Literature Reviews and Meta-Analyses) guidelines. The article search process was conducted through national and international academic databases, such as Google Scholar, Scopus, and Publish Or Perish (PoP), using the keywords; "demographic bonus", "industrial revolution 4.0", "vocational education", "human resource quality", "capability", and "workforce resilience".

The initial stage of research was carried out by searching for reference sources in the form of journal articles, proceedings, books and websites using scopus metadata and publish or perish, from the search results obtained as many as 1055 articles with details of 766 articles from scopus metadata and 289 articles from publish or perish. By using

multiple reference sources, the author can see the problem in a variety of more complex perspectives. The first analysis was conducted on 1055 articles using the Vos Viewer application to see the trend of discussion and relevance between articles in the scope of formal and vocational education in Indonesia.

The analysis process is then carried out in more depth by selecting 1055 journal articles using the prism method with several inclusion and exclusion criteria (table 1).

Table 1. Inkusion and Exclusion criteria

No	Category	Inclusion Criteria	Exclusion Criteria
1.	Publication Type	Journal Articles, Proceedings, Books, Websites	Opinion/editorial articles without scientific methodology, duplicate articles, articles without full access
2.	Journal Specifications	National journals are at least indexed by sinta and international journals are indexed by Scopus	journals not indexed by Sinta/Scopus
3.	Year of Publication	January 2015 - December 2024	Before 2015
4.	Research locus	Indonesia (National)	Overseas/other countries
5.	Researcher Nationality	Indonesia and Foreign Nationals	Identity unknown
6.	Keywords	Formal and Vocational Education, Demographic Bonus, Professional Revolution, Steam	In addition to formal and vocational education, demographic bonuses, professional revolutions, steam
7.	Field	Education and demographics	Beyond the discussion of the field of Education and Demography
8.	Research Subject	Productive population (15-64 years old), high school/vocational school students, workforce	Unproductive population (0-14 years and 65 years and above).

Journal articles will be selected through 4 stages which are assessed based on the following grouping criteria (tale 2):

Tabel 2. Journal Classification

Classification Stage	Category
IDENTIFICATION	Accredited by Sinta and Scopus
SCREENING	Heading
ELIGIBILITY	Abstract
INCLUDED	Relevance of the content of the article

The results of the journal identification process based on accreditation using the keywords "demographic bonus", "industrial revolution 4.0", "vocational education", "human resource quality", "capability", and "workforce resilience", were analyzed using Vos Viewer to visualize the bibliometric network.

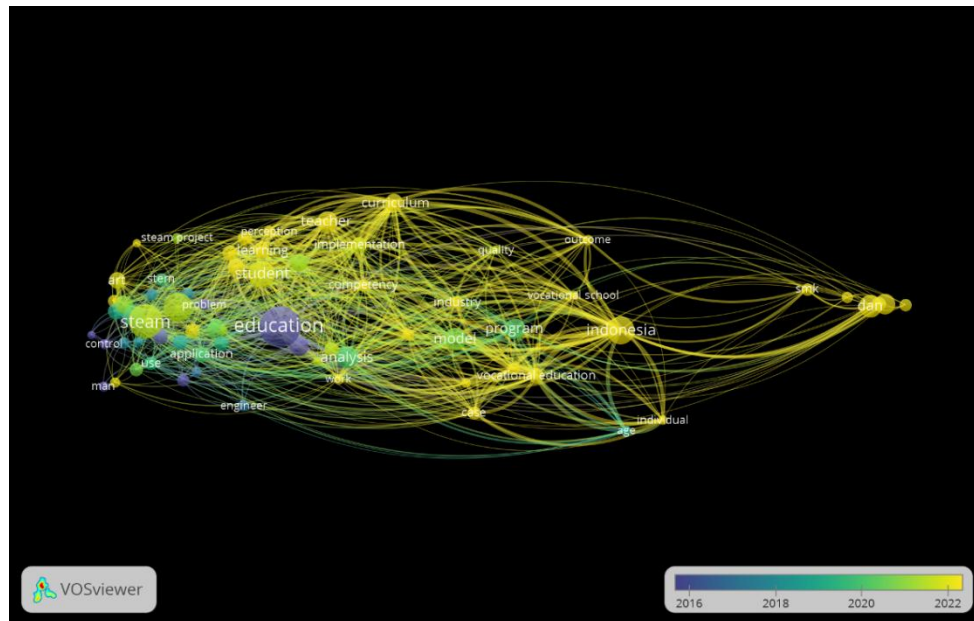


Figure 2. Vos Viewer Analysis

Figure 2 show the results of mapping using the Vos Viewer application found that from a total of 1055 articles, most articles discussed education, and the most frequently discussed issues were learning models, analytical power, competence, industry, vocational, steam methods, implementation, quality, training, ausbildung methods and outcomes final results. So it can be concluded that there are many articles that discuss the evaluation of Indonesian education by linking education with steam and vocational with link and match programs, but until now there has been no journal article that discusses the relevance between the meeting of two phenomena that can have a major impact on changing times, especially Indonesia, the phenomenon is demographic bonus and digitalization. Therefore, the author will conduct article efficiency to obtain relevant and accurate information and data.

The selection of journal articles aims to get the best and most relevant journal articles to the topic discussed so that the process of analyzing the problem will be maximized and efficient in the use of research time. The following are the results of the selection of 1055 journal articles using the prism method (figure 3):

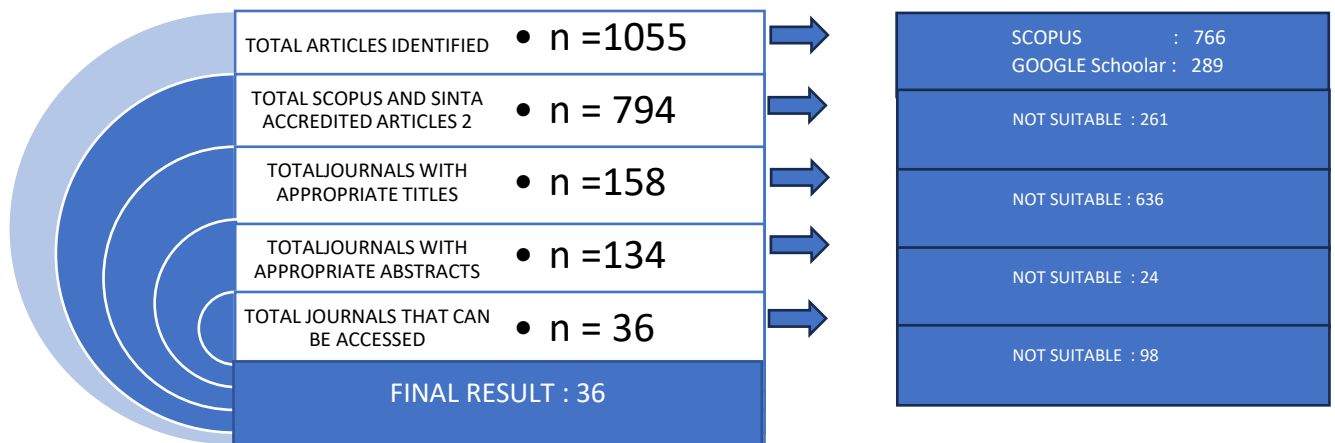


Figure 3. Systematic Literatur Review

From a total of 1055 journal articles obtained from search results through Publish Or Perish metadata, Google Scholar and Scopus, the author found 36 articles that were relevant to the keywords and accessible. The 36 articles consist of 17 sinta indexed articles, and 18 scopus accredited articles (Table 3).

Table 3. Prism Method Screening Results

No	Index	Journal Name	Journal Title	Research Results
1	Sinta 2	Equity: Journal of Economics and Finance	Capital Disclosure Intellectual College High Vocational Rates in Indonesia By Instrument Accreditation of Study Programs (IAPS) 4.0	The results of the study show that vocational universities in Indonesia generally disclose Intellectual Capital (IC) in the form of images or graphs and narratives. However, there is a high proportion of IC items that are not disclosed (47.40%). The most frequently disclosed information focused on structural capital (66%), followed by relational capital, while human capital was only disclosed as much as 36% of the 30 items.

(1)	(2)	(3)	(4)	(5)
2	Sinta 2	JPPI (Indonesian Journal of Educational Research)	Collaboration analysis Schools with the business world and The industrial world in Improve quality School Graduates vocational secondary	The results of the study show that the collaboration between SMK Negeri 3 Jayapura and the business and industry world (DU/DI) has had a positive impact on improving the quality of graduates, but has not reached its maximum potential <u>2.4</u> . Some areas that need improvement include aligning the climate with the needs of industries involving DU/DI from the early stages, the role of industry teachers that emphasizes more on substantial practice, and increasing the absorption of graduates that are not limited to MoU agreements or outstanding graduates
3	Sinta 2	Journal of Educational Research and Evaluation	A Precedence Evaluation Of Demand And Supply Between Vocational High School Graduates And Workforce Requirement In Indonesia	The results of the study show that there is a mismatch between academic programs and student registration in higher vocational schools (VHS) with the needs of the job market in various provinces in Indonesia. The research also revealed that the competence of VHS graduates in terms of theoretical knowledge, job characteristics, and workforce skills is at a moderate level. These findings have an important impact on reducing the gap between labor supply and demand, by ensuring that the graduates produced are in line with the needs of the industry.
4	Sinta 2	Proceedings of the National Postgraduate Seminar	Educational Innovation and School Education Indonesian Vocational	The results show that the achievement of learning outcomes is influenced by innovations in learning, including creative learning methods, adequate teacher skills, and good pedagogic competence. In addition, a competency-based curriculum can prepare students to compete globally in the maritime/shipping industry in the industrial era 4.0 and towards the upcoming society 5.0 era
5	Sinta 2	ITS Journal of Science and Art	Literature Study on Quality Evaluation Secondary Vocational with <i>Baldrige</i> school <i>Excellence Framework</i>	The results of the study show that the provision of quality educational services requires various quality improvements. In an effort to improve the quality of schools for students, there are a number of indicators that affect the quality of Vocational High Schools (SMK). Malcolm Baldrige for Performance Excellence (MBfPE), which is part of the Malcolm Baldrige National Quality Award (MBNQA) assessment, as well as school assessment documents such as accreditation, Education Quality Assurance (PMP), and Principal Performance Assessment (PKKS) have been used by schools as preliminary data related to MBfPE assessments.

(1)	(2)	(3)	(4)	(5)
6	SJR Q3	Research in Comparative & International Education	Reconstructing policy transfer in adult and vocational education and training	Research reveals an understanding of education policy transfer with particular attention to training relating to VET and the labour market. A literature review on the transfer of VET policies was followed by an explanation of VET reform in adult and vocational education and training around the world. The historical aspect of VET's transfer policy is explained by an emphasis on the borrowing and borrowing process between countries in the Northern and Southern hemispheres.
7	SJR Q2	Pegem Journal of Education and Instruction	A Systematic Literature Review of STEM Education in Indonesia (2016-2021): Contribution to Improving Skills in 21st Century Learning	The results show that the most dominant learning models that interact with STEM or STEAM are project-based learning, problem-based learning, and inquiry. In the context of STEM or STEAM education, critical thinking skills, scientific literacy, and learning outcomes are the main themes. Empirical research is needed to explore the potential of STEAM education in improving skills relevant to 21st century learning.
8	SJR Q2	Sustainability Journal	Industry 5.0—A Human-Centric Solution	The results show that the fields of technology, mass customization, and advanced manufacturing are undergoing rapid changes. Robots are becoming increasingly important as they can now connect with the human mind through brain-machine interfaces and advances in artificial intelligence. There is an urgent need to increase productivity without removing human workers from the manufacturing sector, which presents significant challenges to the global economy
9	SJR Q2	Education Sciences	Learning Patterns in STEAM Education : A Comparison of Three Learner Profiles	The research identified three categories of STEAM students: Thinkers, Speakers, and Followers. There was a significant difference in positive emotions between the Thinkers and Followers groups. In addition, Speakers and Followers show a striking difference in terms of contributions as well as active participation.
10	SJR Q2	Frontiers in Education	Exploring teachers' understanding and implementation of STEAM: one size does not fit all	The results of the study show that teachers can improve their understanding of STEAM and implement relevant learning if supported by sustainable and collaborative pedagogy and materials. These findings emphasize the Importance of support, autonomy, and mortality for teachers in adopting a STEAM integration approach that is appropriate to their classroom and school context.

(1)	(2)	(3)	(4)	(5)
				The implications of these findings are relevant for researchers and practitioners developing STEAM professional teacher development programs
11	SJR Q2	Education Sciences	Outdoor STEAM Education: Opportunities and Challenges	Outdoor settings in schools provide a favorable context for STEAM education, allowing for a wide range of learning experiences. The results of the study show that teachers' perception of the characteristics of outdoor spaces can facilitate or inhibit the implementation of pedagogical activities outdoors.
12	SJR Q3	International Journal of Information and Education Technology	Effect of STEAM Education Program Using Flexible Display	The development of STEAM programs using flexible displays is expected to be an effective tool for math, science, and software subjects. Through the development of the Scratch 2.0-based Flexible Display Programming Tool, the satisfaction measurement program shows an increase in positive attitudes towards science and mathematics. In addition, qualitative measurements state the potential of suggested educational methods in the fields of Science, Technology, Engineering, Arts, and Mathematics
13	SJR Q1	Journal of Policy Studies	Employment and Skill Development Initiatives in the Labor Markets: The Cases of Indonesia and Thailand	The Government of Indonesia, with a commitment to addressing poverty and skills gaps, has strategized initiatives to increase productivity and power savings. The "School in the Factory" program in Thailand is an exemplary model, offering a comprehensive approach to workforce competencies by effectively integrating education and industry needs. The analysis also includes the broader context of population policy, drawing valuable lessons from the Republic of South Korea. The success of population policies in South Korea highlights the importance of principles such as New Public Management (NPM), New Public Governance (NPG), and New Public Service (NPS). These principles are then linked to cases in Indonesia and Thailand, providing a deeper understanding of governance dynamics in the context of population and employment strategies
14	SJR Q2	Cogent Education	The role of vocational	The results of the estimates showed that individuals with vocational education had a statistically lower likelihood of decline compared to those with non-vocational education. However, a more in-depth analysis of the poverty rate of vocational high school graduates by age suggests that this may not be the case for recent graduates of vocational high schools. Meanwhile, control variables such as age, age

(1)	(2)	(3)	(4)	(5)
				squared, gender, location of residence, and marital status showed results that were in line with expectations.
15	SJR Q2	Cogent Education	The role of industry to unlock the potential of the <i>Merdeka</i> curriculum for vocational school	The findings of the study highlight the complex relationship between vocational schools and industry, with diverse industry roles. The industry's contribution is manifested in curriculum alignment, including competency design, cooperation agreement drafting, and competency adjustment to industry needs. The industry also supports the implementation of the curriculum by fostering a 5S work culture through training, mentoring in the workplace, and strengthening work character. The industry's assessment of the <i>Merdeka</i> policy is considered important, covering aspects of collaboration, education, and the quality of the work produced
16	SJR Q2	Journal of Research in Innovative	The impact of STEAM integration on preservice teachers' disposition and knowledge	The results of this study show that the integration of STEAM in mathematics methods courses involves pre-service teachers through four steps in the investigation process, namely connection, collaboration, communication, and evaluation, using the Project-Based Learning (PBL) approach. Pre-service teachers not only experienced an improvement in their attitude disposition and confidence, but also gained a better knowledge of STEAM integration
17	SJR Q2	Journal of Ecohumanism	Navigating the Curriculum Landscape: The Impact of Curriculum 2013 and <i>Merdeka</i> Curriculum on Teachers' and Students' Learning Outcomes in Indonesia	The results of the study show that the Independent Curriculum significantly increases student motivation and engagement, especially through a project-based learning approach. More than 50% of teachers agree that this integration in the curriculum is more effective in helping them design learning. However, the main challenge in implementing this curriculum is limiting resources, especially in remote areas. Many teachers also have difficulty adjusting to more innovative teaching methods, although they accept the goodness offered by this curriculum.
18	SJR Q1	Journal of International Business Policy	FDI and human capital development: a tale of two Southeast Asian economies Outcomes and Creativity	The findings show that greenfield foreign direct investment (FDI) contributes to shaping the supply of vocational education and training (TVET), with varying impacts across different segments of the global value chain (GVC) and subnational regions. In particular, FDI in the logistics, sales and marketing sectors, as well as support and services are related to an increase in the number of TVET graduates in the

(1)	(2)	(3)	(4)	(5)
			under the UN Sustainable Development Goal: Project-Based Learning Oriented STEAM Curriculum	area, while FDI in the head office and production may lead to a decline in technical skills. To address this dynamic, public policy needs to prioritize education systems that are flexible and able to adapt to the changing skills demands of multinational corporations (MNEs). Thus, this economy can improve the quality of local human.
19	SJR Q2	Empirical Research in Vocational Education and Training	Comparing labor market performance of vocational and general school graduate in Indonesia: insights from stable and crisis conditions	The results of the study show that vocational school graduates have an advantage in getting an early job compared to high school graduates, with vocational school graduates tending to enter the world of work faster. In addition, in terms of resilience during the pandemic, as measured by changes in income, vocational school graduates showed a better ability to maintain or even increase their income compared to high school graduates. These findings provide important insights for both theoretical development and practical considerations in vocational education.
20	SJR Q3	International Journal of Evaluation and Research in Education (IJERE)	Empirical studies for Evaluate Competence student Vocational Education	The low job readiness of vocational education graduates is caused by a mismatch between their competencies and existing job demands. As a result, the poverty rate among vocational school graduates is increasing, mainly due to the low mastery of competencies and low absorption of labor
21	SJR Q3	International Journal of Evaluation and Research in Education (IJERE)	Entrepreneurship education vocational schools: an Indonesian model	The findings show that entrepreneurship education can be applied in Indonesian vocational schools. The proposed model focuses on the development of a distinctive Indonesian mindset, practical entrepreneurial skills, and active collaboration with industry, aiming to prepare graduates to be ready for work and entrepreneurship. This research has important implications for the transformation of vocational education in Indonesia by providing a framework that supports graduates' transition to the workforce and encourages entrepreneurial efforts, thereby contributing to broader economic development and innovation.
22	SJR Q2	Sustainability Journal	Evaluation of Disabled STEAM Students' Education Learning	This study aims to examine the impact of the STEAM curriculum on students with learning disabilities, including their learning outcomes and creativity. The results show that teaching that focuses on developing creative thinking is an effective strategy to present a structured STEAM curriculum and achieve SDG4 targets. The STEAM

(1)	(2)	(3)	(4)	(5)
			Outcomes and Creativity under the UN Sustainable Development Goal: Project-Based Learning Oriented STEAM Curriculum with Micro:bit	curriculum that focuses on Project-Based Learning (PBL) under the SDG4 target has a positive impact on students' creativity competencies and learning outcomes.
23	SJR Q3	Internatioanl Journal Of Financial Research	The fourth industrial revolution: Opportunities and challenges	The results show that the Fourth Industrial Revolution, a term coined by Klaus Schwab, describes a world in which individuals move between digital domains and offline reality by leveraging connected technologies to manage their lives.
24	Sinta 2	Journal Of Biometrics And Population	Family Subjective Well-Being At The Early Of Covid-19 Pandemic In Indonesia	The results of the study show that there is a decline in economic conditions that have an impact on working conditions, finances, and providing food needs. Environmental factors such as the socioeconomic and financial status of the family (including education, income, and employment) remain key factors that significantly affect the level of subjective well-being of the family.
25	Sinta 2	Journal Of Biometrics And Population	The Effect Of Educational Background On The Quality Of Life Of The Pre-Elderly Population	The results of the study showed that there was a significant influence between the educational background and the quality of life of the pre-elderly population in Timbangan District, Ogan Ilir Regency, with a score of 7.16%. Thus, the educational background can contribute to improving the quality of life of the pre-elderly community in the area.
26	Sinta 2	Symmetry Journal	Learning Difficulties Student Math In Indonesia Reviewed From <i>Self-Efficacy</i> : <i>Systematic Literature Review (Slr</i>	Using the Systematic Literature Review (SLR) method, researchers found that the difficulty of learning mathematics received significant attention, as seen from the number of studies published each year. This shows that there are still many students, especially at the junior high school level, who have difficulty learning mathematics.
27	Sinta 2	Axiom: Journal of Mathematics Education Study Program	Investigating Research Related to Cognitive Diagnostics Mathematics	The results of the study show that research on the topic of cognitive diagnostics in mathematics materials in Indonesia mostly aims to analyze the mistakes made by students when working on mathematics problems and analyze the difficulties

(1)	(2)	(3)	(4)	(5)
			Materials in Indonesia through <i>Systematic Literature Review</i>	they face, both in learning mathematics and in solving problems. This is in line with the purpose of cognitive diagnostic tests, which is to identify the difficulties experienced by students in the learning process
28	Sinta 2	Elemental Journal	Realistic Mathematics Education (RME) To Improve Solveability Mathematical Problems Students in Indonesia	The results of the study show that the ability to solve problems in daily life is the main competency that must be possessed by students in the 21st century. The RME learning model can bridge the abstract concepts of mathematics taught in the classroom with everyday reality. This study recorded an average effect size of 0.42, which is included in the medium effect category, and the results of the Funnel Plot and Egger's Test tests showed that there was no publication bias. In conclusion, the RME learning model has an effect on students' mathematical problem-solving ability with moderate influence.
29	Sinta 2	Journal of Educational and Learning Technology	Technology Journal Education and Learning	The results of the study show that the key to the successful implementation of the Independent Curriculum is to increase <i>the mindset</i> of teachers and students to make changes, so that this curriculum can be applied optimally. With the empowerment of human resources and the increase in productivity carried out by teachers, they can develop a new perspective in learning activities to achieve the goal of improving effective student learning achievement.
30	Sinta 4	Educational: Journal of Educational Sciences	Technology Journal Education and Learning	The findings of the study show that the Independent Curriculum has great potential to increase the effectiveness of learning and achieve educational goals in Indonesia. Despite the challenges ahead, there are positive signs that this curriculum can bring beneficial changes to education in the country. To maximize this potential, collaborative efforts from various parties are needed, including the government, schools, teachers, parents, and the community.
31	Sinta 4	Journal of Business Management	Evaluation Analysis Curriculum Programs 2013 and Curriculum Independent	The Independent Learning Policy has the characteristics of stressful creativity, organization on problem solving, learning based on the needs of the Study Program

(1)	(2)	(3)	(4)	(5)
32	Sinta 4	Journal of Policy Analysts	Optimizing Bonuses Demographics For Reducing Rate Poverty in Indonesia	Various policies need to be formulated to take advantage of the opportunities that are expected to arise in 2030-2040 in Indonesia. Research shows that to optimize the benefits of the demographic bonus, several steps that can be taken include developing human quality through education and training, expanding the labor market, managing population growth, and improving population health.
33	Sinta 2	Journal of Biometrics and Population	Influence Analysis Parenting Patterns Against Traffic Accidents On High School Students Using Regression Logistics	The results of the logistic regression test showed that there was no significant influence between parental parenting and traffic accidents experienced by the respondents (authoritarian parenting style with a value of $p = 0.966$; OR = 0.967, and permissive parenting with a value of $p = 0.616$; OR = 1,556). In conclusion, traffic accidents are not directly affected by parental parenting. However, this parenting pattern also plays a role in shaping individual characteristics, including in decision-making and driving attitudes.
34	Sinta 2	Journal of Science Dynamics	Evaluation of STEM Education by Turkish Science Teachers	Based on the results of the study, it was concluded that young teachers had a higher average score in improving the relationship between schools, the community, and the business world. In addition, it was found that teachers who applied STEM approaches in education over a period of time also showed higher averages in creating a STEM culture and climate and building relationships between schools, communities, and the business world
35	Sinta 2	Journal of Social Treasures	Navigating the Digital Society: Financial Literacy as a Tool for Empowerment	Temuan dari penelitian ini mengungkapkan berbagai tantangan, seperti minimnya motivasi dan kompleksitas produk keuangan, serta kesulitan dalam menilai tingkat literasi dan ketidakmerataan akses. Di tengah masyarakat yang semakin terdigitalisasi, pemahaman tentang literasi keuangan digital menjadi sangat penting untuk memberikan pengetahuan dan keterampilan individu yang dibutuhkan dalam mengelola keuangan pribadi mereka.
36	Sinta 4	Journal of Instructional and Development Researches	Numeracy Literacy At School Basic Based PISA 2023 indicators; Systematic Literatur Reviews	The results showed that of the 22 articles described, only a few were in the high category. For the mathematical reasoning indicator, only six articles out of 22 were identified, while for the mathematical solution indicator there were nine articles. In addition, of the three high-category articles on the mathematical reasoning indicator and five high-category articles on the mathematical completion indicator, all of them focused on testing numeracy literacy skills, so that they did not have a significant

(1)	(2)	(3)	(4)	(5)
				impact on improving numeracy literacy skills. This shows that there is still a lack of research aimed at improving numeracy literacy skills in accordance with the 2023 PISA indicator standards.

From the results of the selection process using the PRISMA method, the data obtained from each article was analyzed using thematic synthesis, by grouping the findings based on key issues such as: education mismatch with the labor market, digital skills challenges, character building, and evidence-based policy strategies.

RESULT AND DISCUSSION

The results of the literature synthesis show that the readiness of Indonesia's human resources in facing the demographic bonus and professional revolution still faces a number of fundamental challenges, which can be categorized into four main thematic issues: (1) mismatch between education and labor market needs, (2) low digital competence, (3) weak strengthening of character and morality and (4) limited synergy between education and industry.

In understanding the readiness of Indonesia's human resources, it is important not only to identify general symptoms such as low quality of graduates or weak collaboration between educational institutions and industry, but also to explore the root causes of systemic problems. The main root causes include the lack of planning integration across sectors (education, labor, and industry), overlapping vocational regulations, and low incentives for the private sector to engage in workforce competency development. In addition, suboptimal institutional governance between ministries is a major obstacle in the implementation of education-to-work transition policies.

There are three main pillars that have a dominant role in the policy-making process. Namely, the central government (Ministry of Education, Research and Technology, Ministry of Manpower, and Bappenas). Local government (Education Office and Manpower Office). And the industry and business sector (DUDI). The absence of an integrated coordination forum between the three leads to a disconnection in the chain of competency formation, which has an impact on mismatches and structural unemployment.

One conceptual framework that can explain this relationship comes from the theory of transitional labor markets (Schmid, 1998), which emphasizes the need for institutional bridges between education, training and the labor market in the face of new economic dynamics. This theory argues that public policies should facilitate labor mobility from one phase of life to the next (e.g. from school to work, from work to training to retraining) in a flexible manner.

In the context of Human Capital theory, this transition must be supported by investments in education and training that result in increased individual productivity. Meanwhile, from the perspective of the Capability Approach, this transitional system must allow individuals the freedom to choose a competency development path that is in line with the life values that they find meaningful. In the Indonesian context, the demographic bonus will only be beneficial if it is supported by an education system that is innovative and responsive to the needs of professional transformation. Therefore, the integration of workforce planning, vocational education reform, and technology utilization is key to converting demographic opportunities into sustainable economic competitiveness.

The Phenomenon of Demographic Bonus and the Professional Revolution

The Family Planning (KB) program, which was first initiated in 1957, has had a major impact on the current demographic condition of the Indonesian population. Over a Period of 68 years, the family planning program has helped the Indonesian government to restructure demography and control population. This is evidenced by the decrease in the dependency ratio (dependency rate) from 2010 (50.15%) experiencing a significant change in 2015 (48.6%) (BKKBN, 2024). According to data from the central statistics agency, since 2015 Indonesia's dependency ratio has continued to develop until 2025, indicated by a decrease to 47.3 percent, a decrease of 1.3 percent compared to 2015 (BKKBN, 2024). The demographic bonus is associated with the emergence of an opportunity called the window of opportunity, which can be utilized to improve community welfare (Yulianti & Fitriansyah, 2024). This means that the number of dependents of the population who are at productive age against the population of unproductive age will be reduced so that it will have an impact on the level of welfare of

the community economically will become more stable and will experience a more significant increase in economic levels towards a positive direction (Andriani et al., 2024).

According to the National Statistics Agency, the demographic bonus in Indonesia began in 2015 and the peak of the demographic bonus is predicted to occur in 2030-2035 and then will end in 2045 (Figure 4).

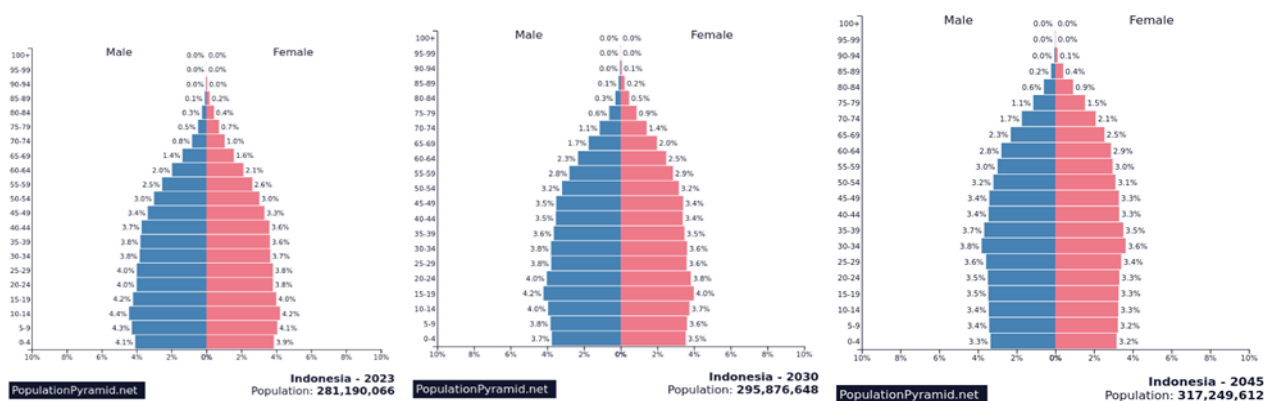


Figure 4 . Development of the Population Structure 2023, 2030, 2045

Source: (The 2010-2035 Indonesian Population Projection Understanding the Causes, Consequences and Policy Options for Population and Development, 2014)

Based on the 2045 population diagram table, it shows that the largest age group is at the age of 24-30 years, so if the government is able to reduce the unemployment rate consistently, the national productivity rate will be better. However, if the opposite happens, the burden on the national economy will increase and the government's task will become increasingly difficult. Evaluation and optimization of education is a key factor in breaking the cycle of poverty. However, underdevelopment in the education sector is still a major obstacle that hinders the empowerment of productive human resources, which acts as the main motor in optimizing the demographic bonus.

Mismatch of Education and Job Market Needs

The development of the times that brings technological advances is a challenge for the government in maximizing the demographic bonus. Success in utilizing the demographic bonus opportunity will be measured by the quality of existing human resources. Meanwhile, the unpreparedness of the community in facing the progress of the times will cause a significant decline in all aspects, especially economic and social, and has the potential to cause the country to experience bankruptcy in the future.

The occurrence of the digitalization transition is behind the emergence of considerations of expertise, training, competence, technological development, attitude, and personal characteristics so that it becomes a new standard for industry in choosing a workforce (Semarang et al., 2023). Currently, the challenges of digitalization have implications for restructuring the expertise possessed by the workforce so that the ability to utilize technology is a top priority in the workforce recruitment process (Xu et al., 2018). The Covid-19 pandemic that emerged at the end of 2019 became the momentum for the acceleration of the transition process (Ariansyah et al., 2024). The restriction of space forces the entire world population to be able to adapt and innovate so that activities continue as they should (Oktriyanto et al., 2023). The digital transformation that has occurred has changed the standard of society's needs so that the industry has also experienced significant changes (Adiandari, 2023). This is certainly a challenge for Indonesia where the phenomenon of digital transformation and professional revolution occurs along with the emergence of the rare phenomenon of demographic bonus.

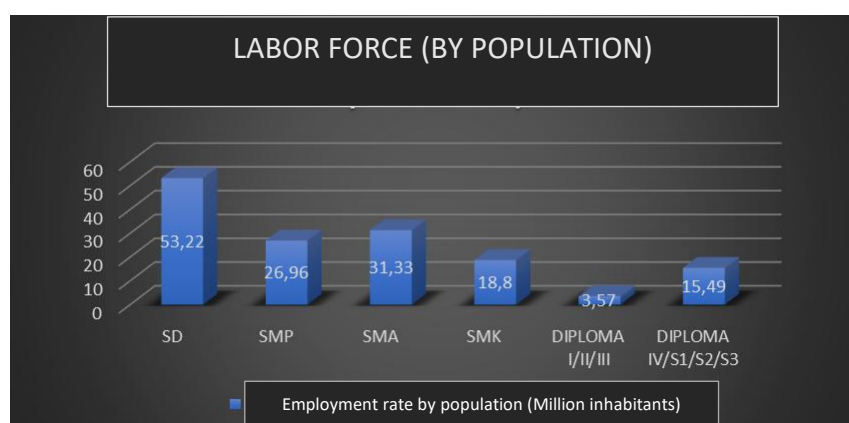


Figure 5. Labor Force by Education February 2024

Source: (Employment Data Management Field, 2024)

The Ministry of Manpower released the February 2024 edition of Indonesia's general employment profile, the profile shows that currently Indonesia has a working-age population of 214 million with a workforce of 69.80 percent compared to the non-workforce. Of the total 214 million working-age population, there are 7.20 million open unemployed.

Figure 5 show Most of the labor force in Indonesia today is still dominated by primary school graduates, which has implications for the low competency standards of

the workforce. Consequently, most workers are only able to access low-skill jobs with limited income levels. This condition can hinder the optimization of the workforce, both in terms of quantity and productivity. Thus, the potential of the demographic bonus cannot be maximally utilized to improve community welfare (figure 6).

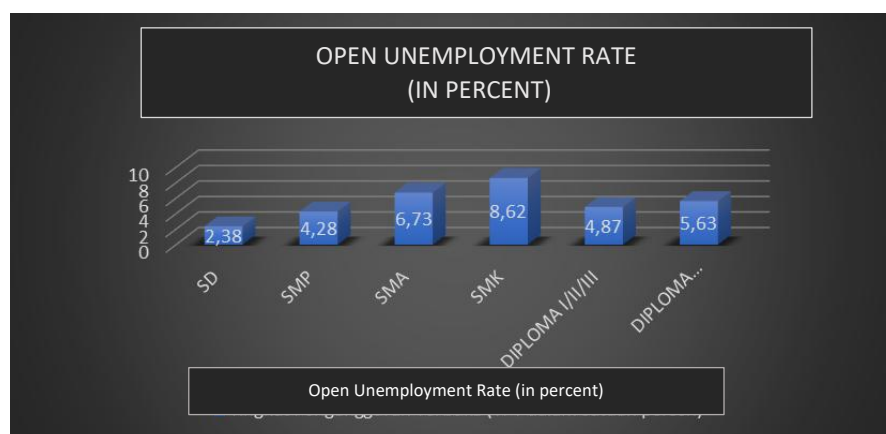


Figure 6. Open Unemployment Rate by education

Soure: (BPSDM Kominfo, 2023)

The Open Unemployment Rate in the same period shows that graduates of Vocational High Schools (SMK) are the largest contributor to unemployment in Indonesia as many as 8.62 percent of SMK graduates become unemployed. This shows that there is a lack of accuracy in the curriculum or operations that run in education in Indonesia so that the results of vocational education in SMK cannot meet the standards of market demand for the required workforce.

Many studies highlight that the formal and vocational education curriculum in Indonesia has not fully adapted to the dynamic needs of modern industry(Jaedun et al., 2020;Andriani et al., 2024). Competencies of SMK graduates are often generic, not specific to the needs of certain industrial sectors. This is exacerbated by the lack of curriculum updates based on local industry needs, as well as weak practical training in the business and industrial world (DUDI). The result is a high level of open unemployment among young graduates.

Fading morality, character and soft skills

The high unemployment rate is certainly inseparable from the quality of human resources. The quality of human resources can be assessed from the intellectual level of

students (Herawati et al., 2020), the low ability to think and analyze a project has a correlation with the decline in character values, elements of manners such as ethics, attitudes, beliefs, habits and will arise from the ability to think rationally, and this is not included in emotional intelligence but intellectual intelligence which leads to a person's thinking ability (Yoana et al., 2024). Healthy and rational thinking will definitely create a logical way of acting in the form of manners or behavior (Pikri et al., 2019). The irony is that the development of the times at this time has created a generation that lacks morals, it is enough to show how the quality of the ability to analyze and think owned by the current generation is considered poor. The statement of the head of BKKBN Hasto Wardoyo in the IDIK webinar, Hasto said that in the data belonging to the World Population Review, the achievement of the average IQ of Indonesian children in 2022 reached 78.9 percent, this achievement made Indonesia have to rank 130 out of 199 countries in the world (Triono Subagyo, 2022).

The moral decline that occurred was reinforced by data from Pusiknas Polri (2024) which showed that in the period from January to June 15, 2024 the National Police cracked down on 255,489 cases of crime throughout Indonesia. As much as 9.92 percent of this number is the crime of theft with aggravation (curat). This number also places theft as the most common crime. As of June 15, 2024 a total of 25,350 cases of theft without violence occurred in Indonesia with a percentage of 40.15 percent within 5 months compared to 2023 reaching 60.2 percent in a 12-month period so that the number is predicted to continue to grow until the end of the 2024 period in December. The National Police Criminal Investigation Unit (Bareskrim) recorded at least 5 crimes out of a total of 10 cases with the highest number of reports motivated by economic problems, including theft without violence, ordinary theft, fraud / fraudulent acts, embezzlement, curanmor 2 wheels with a total of 87,925 cases. This phenomenon shows that the increasing crime rate provides a fact that the decline of the nation's manners and morality is real. This is a benchmark that the human resources we have today have poor thinking skills and are not competitive.

Indonesia's 2023 PISA results in the field of numeracy literacy were 366 points, 106 points different from the average country in the world and placed Indonesia in a low ranking (Yuda & Rosmilawati, 2024). The decline in Indonesia's PISA score is another fact

of the low ability to think of Indonesia's current generation. The method of instilling character by parents or educators who are hard and firm is often linked to human rights, causing a stigma that the method of instilling hard and firm character by parents or educators is no longer relevant to the times (Bayumi & Hendrati, 2019). As a result, children's thinking skills become weak and children tend to act without thinking first. The current digitalization makes it easier to access information so that intercultural transactions occur which slowly begin to influence and change local culture. The cultural incompatibility that began to be implemented caused the collapse of noble values and lowered moral standards as a nation of Malay descent. This is increasingly destroying the morals of the nation's children, which in turn, forms an attitude of normalization towards immoral culture in people's lives. Head of BKKBN Hasto Wardoyo in the IDIK webinar said that, in the data belonging to the World Population Review, the dynamics that occur in the world of education in Indonesia ranging from curriculum problems which are still considered inappropriate, infrastructure facilities to competence and lack of teaching staff to date have made it difficult to solve human resource problems in Indonesia (Triono Subagyo, 2022). Various updates and innovations have been made by the government, but the implementation has not been maximized and has found new challenges that require follow-up and fundamental solutions. This is a threat to Indonesia in the future because the high quantity of productive forces cannot be balanced with good quality human resources.

Education in Indonesia today has not been able to form the ability to think and foster individual learning needs (Ilma et al., 2023), the decline in intellectual levels is partly due to the dynamics that occur in the world of education, this can be seen from the curriculum that is always changing, starting in the last 25 years the education curriculum in Indonesia has undergone 4 changes but the quality of education still has not shown a better change. This is in line with what was conveyed Anindito Aditomo (2022) that Indonesian education is still stagnant at the lowest level.

Referring to a research conducted by the International Institute for Management Development (IMO) World Talent Ranking (WTR) states that the level of competitiveness of Indonesia's HR expertise is ranked 46 out of a total of 67 countries surveyed by WTR, the data is taken through 31 statistical data and survey responses grouped into 3

indicators (Mochamad Rafli, 2024). The three are the level of investment and talent development, HR readiness and the ability of a country to attract foreign talent. Arturo Bris as director of the IMD World Competitiveness Center (WCC) explained in (KELIK DEWANTO, 2024), that some countries have excellent education systems, but fail to prepare human resources and attract the right (foreign) talent to meet labor market needs. This shows that Indonesia is in a difficult position in the mission of improving the quality of human resources, starting from the government's unpreparedness in managing existing human resources both from health, education to the availability of jobs that are lacking for high school or vocational graduates.

Optimization of learning prioritized on a mathematical basis can be a solution in efforts to improve the quality of human resources by focusing on the main indicator, namely honing students' thinking skills (An, 2020). Logicality is a human ability to think using reality-oriented reasoning and plausibility (Rahmah et al., 2024). One of the best methods to hone logical thinking skills is math and science. The reasoning that we use to draw conclusions is not only based on natural logic (guessing), but also scientific logic. The thinking process will become more objective so that it can reduce errors when making decisions (Song et al., 2019). Mathematics is the science of logic about form, structure, magnitude and concepts related to one another. Mathematics is a pattern of thinking, a pattern of organizing logical proof, as if it were a language that uses terms that are defined carefully, clearly and accurately (Widana, 2021).

In mathematics, order or systematicity in thinking is required so that mathematics learning is considered effective in the implementation of solving problems in life (Klorina & Juandi, 2022), this is in line with what was conveyed (Hasibuan et al., 2023) that mathematics is a subject that is important for students, 2023) that mathematics is a very strategic lesson in shaping student character through the development of reason and understanding of values because in mathematics there is a process of seeking truth through proof by generalizing properties, theorems, postulates and axioms, the substance of mathematics including a) science is an illustration of examples / actions and relationships, b) Mathematics is a perspective, c) Arithmetic is a language, d) Mathematics is equipment, e) Mathematics is a lesson. Therefore, optimizing learning based on mathematics and science must be a priority in order to hone the ability to think

logically and improve students' ability to solve problems systematically. Optimizing mathematics in the curriculum can be integrated with the Science, Technology, Engineering, Arts and Mathematics (STEAM) method (Liao et al., 2022).

The STEAM method is a learning method that focuses on students' ability to integrate various disciplines, such as computational thinking that involves problem solving, designing systems, understanding human behavior by utilizing basic concepts of computer science and self-efficacy which is defined as an assessment of one's ability to perform a given task well (Ilma et al., 2023). NMC report (2015):Higher Education Edition 2015 indicates that STEAM is the key to effecting future change over the next 2-3 years. STEAM is essential to be implemented to meet the growing demand for human resources and economic development (Lu et al., 2022), several studies have revealed that STEAM training stimulates learning performance, perceptions of learning and student leadership (Correia et al., 2024).

Learning methods in Indonesia have basically implemented STEAM-based learning methods through the independent curriculum initiated by former Minister of Education, Research and Technology Nadiem Makarim. The independent curriculum provides a project-based approach (Project-Based Learning) that encourages active, creative, and in-depth learning and enhances critical and collaborative thinking skills (Rahma et al., 2023). However, in its implementation, there are still quite a lot of problems that cause the implementation to not go well, such as teacher unpreparedness in understanding and actively implementing the independent curriculum, inadequate facilities and infrastructure, teaching materials that are not optimal and less relevant to the needs of the learning context and up-to-date to support effective learning. Therefore, optimization is needed regarding the independent curriculum, because basically the independent curriculum is in line with the direction of 21st century learning development which requires the ability to solve problems and think critically. The independent curriculum encourages adjustments to digitalization (Murtadlo et al., 2024), so that investment in the ability of teaching staff is considered to have a very important role because teachers are the bridge between knowledge and students who encourage the creation of superior human resources (Aslan Efe & Hanas, 2022).

Lack of Synergy between Education and Business/Industry

In addition to the emphasis on steam-based learning methods, attention also needs to be shown to vocational schools by emphasizing priority on optimizing links and matches. The distribution of labor for SMK graduates must be clear so that there is no accumulation of labor each year. Indonesia's employment profile released by the Ministry of Manpower in the first period of February written by bidang pengelolaan data ketenagakerjaan (2024) shows that SMK is the largest contributor to unemployment, namely out of a total of 18.80 million workforce or 12.59% of the total workforce, SMK graduates contributed 8.62 percent of unemployment, meaning that only 2.97 percent were absorbed by the industry. The high number of SMK graduates who are not absorbed by industry indicates a fundamental problem in SMK educational institutions, because the reality that occurs in the labor market is not in accordance with the vision of the establishment of SMK.

there is an oversupply as stated by (Munthe & Mataputun, 2021), that most Indonesians do not analyze data and job opportunities first before determining the major they want to pursue, people tend to choose certain majors based on the number of enthusiasts for a major or known as "fomo". This causes students to accumulate in one department so that the number of SMK graduates who are concentrated in one department causes the opportunity to get a job to be small.

Low competence of vocational school graduates due to 3 main factors

Based on Law Number 20 of 2003 concerning the Indonesian National Education System, SMK is a vocational school established by the government with the aim of preparing students to become a professional and competent workforce in their fields. SMK graduates are prepared to fill middle-level job vacancies in accordance with the chosen expertise program with teaching materials that focus on practical and technical knowledge. SMK training programs are designed according to the needs of labor qualifications in the labor market, so that SMK graduates are projected to be able to directly enter the world of work because they have been provided with education, training and internships during their education at SMK. The high number of SMK graduates who become unemployed is an irony because SMK, which should be a

government tool to reduce unemployment and increase national economic power, actually adds to the burden on the state with high unemployment rates (Arifa., 2024).

There are 2 main factors behind the need for revitalization of SMK, the first is digitalization, technological developments, changes in the structure of society and changes in industry needs for workforce qualification standards (kemendikbud., 2019). The dynamic development of the industry requires educational institutions, especially SMKs, to be active in making adjustments to the standard needs of the industry. This is also emphasized by the president through Presidential Regulation Number 68 of 2022 regarding the importance of the role of the head of service in strengthening the link and match. In supporting the optimization of employment, the first concern is how to improve the competency standards of SMK students so that they can meet the qualification standards in accordance with industry needs. Through Presidential Regulation No. 68 of 2022, the president emphasized the need for cooperation between various parties, in this case the head of service, business associations and professional / industry associations in compiling a curriculum that suits the needs so that later students who graduate from SMK can be directly absorbed by the industry. The link and match program is a very efficient program in maximizing employment, but in its implementation there are still very many heads of offices or SMKs that are still unable to establish good and sustainable cooperation with industry or employers (Yoto et al., 2024).

Second, there is a skill gap between learning materials and industry needs. Currently, vocational schools are dominated by technology and engineering majors between 15% and 39% (kemendikbud., 2019). The regulation of the Director General of Higher Education (No.66/D.05/KK/2018) states that technology and engineering vocational schools have the most study programs, namely 13 study programs and 58 special competencies and have the largest number of students, but unfortunately the potential for employment in the field of technology and engineering expertise still cannot absorb all or most of its graduates. Based on the results of a survey conducted by Kominfo at IMDI, 87.18% of respondents (9,677 companies) stated that Office Suite and Project Management Software, including Microsoft Word, Sheets, Power Point and Google Drive, are the most needed digital skills today (figure 7).

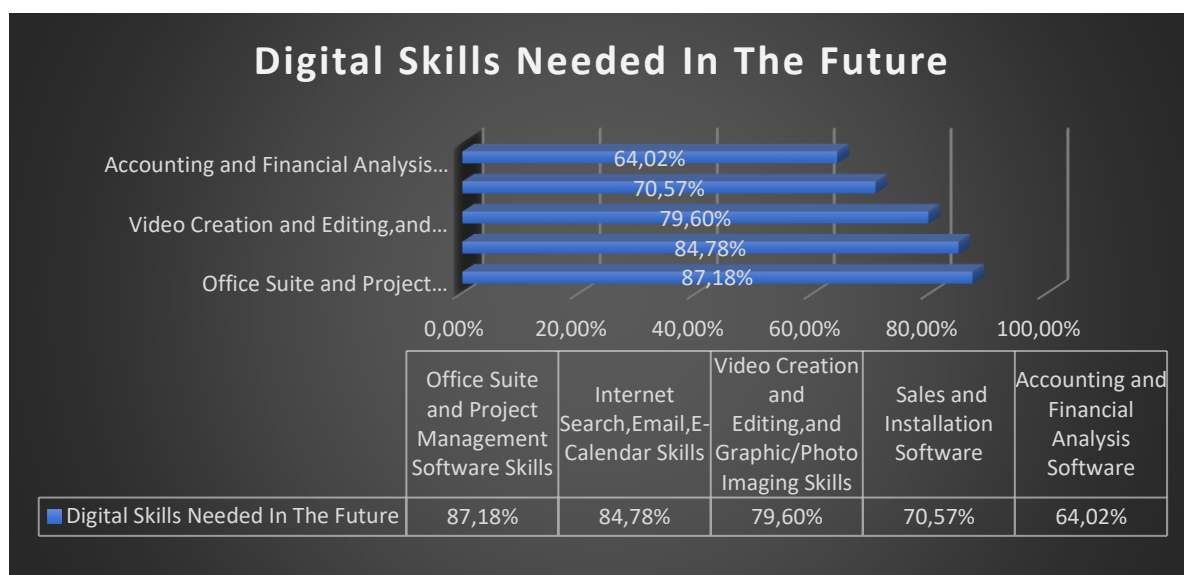


Figure 7. 21st Century Skills

Source:(Bidang Pengelolaan Data Ketenagakerjaan, 2024)

Management Software, including Microsoft Word, Sheets, Power Point and Google Drive are the most needed digital skills at this time. In 2030 it is predicted that new professions will emerge that make technology a standard of competence, these professions include data scientists and analysts, AI experts, software and game development, data analytics, blockchain development, market research, digital marketing, biotechnology, content creators and others. The large number of study programs and special competencies in vocational learning in SMK as well as the large number of graduates who are not absorbed by the industry are of course very contradictory to the survey data released by IMDI Kominfo which actually reveals other facts that digital skills are a benchmark in hiring workers. Based on these two facts, the important point that can be concluded is that the quality of the output of vocational education in SMK in Indonesia is still low and has not been able to meet the standard needs of the labor market. So strategic is the role of technology in the professional revolution that it is important for the government to prepare the community to face future challenges that are full of renewal in skills and knowledge (kominfo et al., 2020).

Problems related to the quality of vocational education outcomes in SMK have led industries to raise standards for the qualifications of the workforce they accept. SMK graduates who are considered less competent are the reason for limiting the number of

workers absorbed, the industry prefers to hire workers who already have experience or at least have education up to polytechnic (Kemenko ekonomi RI, 2024). This is why SMK graduates dominate the open unemployment rate, and to solve this problem, the Indonesian Government needs to improve the quality of education so that SMK graduates can be Recognized for quality in the world of work.

From an international perspective, countries such as Germany and Thailand have successfully developed strong vocational education models through a dual-system approach and close collaboration with industry. In Germany, vocational training is carried out directly in companies in collaboration with educational institutions, while Thailand implements a 5-year Applied Diploma (High Vocational Certificate) program that is integrated between vocational secondary and higher education. This model can be an adaptive reference for the Indonesian context, with adjustments to infrastructure conditions, teaching human resource capacity, and fiscal incentives. To clarify the relationship between the demographic bonus and the professional revolution in the context of HR readiness, it is important to see them as dynamically interacting phenomena. The demographic bonus creates opportunities for economic growth through an increase in the number of productive age population, but this potential can only be maximized if the workforce has competencies that match the demands of the new era of work. This is where the revolution triggered by technological transformation and globalization becomes a determining factor in absorbing productive labor. Without a match between the skills profile of the workforce and the new job structure that demands digital literacy, critical thinking, and flexibility, the demographic bonus can actually turn into a social burden due to the increase in productive age unemployment.

The compulsory education system in the field of vocational education (technical college) that runs in Thailand can be an example of the application of vocational education that allows maintaining the quality and existence of technical college graduates in Thailand. In Indonesia, vocational education at the SMK level is not equated with polytechnic or vocational college education. SMK students will receive vocational education at SMK for 3 years as part of compulsory education and graduate with certain competencies in accordance with the chosen major but students do not have certain

certifications as proof of competence or expertise but only get a diploma to indicate that they have undergone education at SMK.

In contrast, vocational education in Thailand is divided into 3 levels; the first upper secondary level (equivalent to vocational school) with a 3-year study period, the second diploma level with a 2-year study period and the bachelor level with a 2-year study period. However, currently most technical colleges in Thailand only offer a 5-year program consisting of 3 years of upper secondary level and 2 years of diploma level (Kbri et al., 2014). Unlike Indonesia, polytechnics in Thailand are institutions for obtaining open certificates of expertise rather than being vocational education institutions as in Indonesia. Thailand's vocational education system, which provides a 5-year learning opportunity with diploma 2 equivalent graduates, is an excellent form of system in maximizing the workforce, so that SMK graduates can graduate with a good enough educational background to get a decent job and 5 years is enough time to provide debriefing and training to students and make them a ready-to-use workforce (Yulianti & Fitriansyah, 2024). If the vocational education system in Indonesia adopts the system that runs in Thailand, the quality of SMK graduates will become a competent workforce because 5 years is a very sufficient time to provide education and training to students if the methods or teaching materials provided can be right on target. Therefore, the government needs to transfer VET-related policies so that Indonesia's vocational education can have a significant impact on productive workforce utilization and unemployment reduction (Barabasch et al., 2021).

CONCLUSION

Based on the results of the literature synthesis analysis, it can be concluded that the readiness of Indonesia's human resources in facing the demographic bonus and professional revolution is still at an unoptimal stage. Four strategic issues that become the main challenges are the mismatch between the curriculum and the needs of the labor market, low digital competence, weak character building and soft skills, and the lack of collaboration between educational institutions and the industrial world. These gaps show that Indonesia has not been able to fully utilize the potential of the demographic bonus to encourage economic growth based on the quality of human resources.

In the context of national policy, strengthening human resources needs to be aligned with the development priorities listed in the 2020-2024 National Medium-Term Development Plan (RPJMN), especially in the agenda of improving the quality of vocational education and mastery of technology. In addition, policies must also consider the capacity of implementers at the regional level and the private sector to encourage multi-stakeholder involvement.

Therefore, revitalization of the vocational curriculum by the Government is needed, the Government through the Ministry of Education and Culture and BNSP needs to accelerate the preparation of an adaptive curriculum based on industrial occupational standards, by involving professional associations and the business sector. The Thai vocational model (High Vocational Certificate) can be adapted through trials in priority industrial areas such as special economic zones (KEK); then, Strengthening Digital Competencies is also an important point that must be considered. Relevant ministries such as Kominfo and Kemdikbudristek need to develop micro-credential-based digital training and online platforms that can be accessed by students, teachers, and the informal workforce. Programs such as the Digital Talent Scholarship and MBKM need to be expanded to include AI, big data, and technology management.

Integration of Character Education and Soft Skills will increase the competence and value of the workforce. Therefore, educational institutions are encouraged to implement a project-based learning character curriculum that contains the values of the Pancasila Student Profile. Intracurricular and extracurricular activities should support the strengthening of work ethics, leadership, and social empathy; finally, optimization in Education and Industry Partnerships is needed. The government needs to provide fiscal incentives to industries that actively collaborate with schools or vocational colleges, such as tax deductions for joint apprenticeship and training programs. Local governments can facilitate local partnership forums between vocational schools and businesses (local skill councils) that encourage market demand-based training.

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