Sosiohumaniora: Jurnal Ilmu-ilmu Sosial dan Humaniora Vol. 26, No. 2, July 2024: 234 - 245
ISSN 1411 - 0903 : eISSN: 2443-2660

BUILDING A KNOWLEDGE-BASED ECONOMY IN INDONESIA: TRIPARTITE COORDINATION BETWEEN HUMAN RESOURCE DEVELOPMENT, RESEARCH, AND INDUSTRY

Anggia Utami Dewi
Department of International Relations, ASEAN Research Center, Universitas Padjadjaran
E-mail: anggia.utami@unpad.ac.id

ABSTRACT
Indonesia aims to be a developed economy based on knowledge in 2045, hence the coordination between the training of human resources as knowledge transfer, knowledge production, and industrial development becomes crucial. This research analyzes the tripartite coordination between human resource development, research, and industry under the context of knowledge-based economic development in Indonesia. Through a qualitative desk study, this research attempts to inquire about the national-level reform policies and strategies to enhance coordination and see the main actor behind and within the initiative processes. The key findings highlight that the national-level reform initiatives to enhance the trilateral sectors coordination can be seen in four dimensions, which are legal frameworks; policy schemes; consolidating structures; and funding schemes, with the focus on the improvement of quality, relevance, and competitiveness of higher education in supporting the quest to build knowledge economy. Further, the results have also shown that the government is still the dominant actor behind the principal changes, and there has been a changing pattern of reform policies in favor of industrial linkage, particularly since the second term of Joko Widodo's administration. From the evidence found in this study, it can be concluded that Indonesia as a developing economic and higher education system follows the global convergence in building a knowledge-driven economy through government-led coordination among the training of human resources, research, and industry. However, the distinctive context from the Indonesian experience also provides the divergence of the global trend. Hence, this research has contributed to the discourse of higher education in the knowledge economy particularly from developing systems in Southeast Asia.

Keywords: tripartite coordination, knowledge economy, higher education, Indonesia, developing system

MEMBANGUN PEREKONOMIAN BERBASIS PENGETAHUAN DI INDONESIA: KOORDINASI TRIPARTIT ANTARA PENGEMBANGAN SUMBER DAYA MANUSIA, PENELITIAN, DAN INDUSTRI

ABSTRAK
Indonesia bertujuan untuk menjadi negara ekonomi maju berbasis pengetahuan di tahun 2045, karenanya koordinasi antara pelatihan sumber daya manusia sebagai transfer pengetahuan, produksi pengetahuan, dan pembangunan industrial menjadi sangat penting. Penelitian ini menganalisis koordinasi tripartit antara pengembangan sumber daya manusia, penelitian, dan industri dalam konteks pembangunan ekonomi berbasis pengetahuan di Indonesia. Melalui *desk study* kualitatif, penelitian ini berupaya untuk mengetahui kebijakan dan strategi reformasi di tingkat nasional untuk meningkatkan koordinasi dan melihat aktor utama di balik dan di dalam proses inisiatif tersebut. Temuan-temuan utama menyoroti bahwa inisiatif reformasi tingkat nasional untuk meningkatkan koordinasi sektor trilateral dapat dilihat dalam empat dimensi, yaitu kerangka hukum; skema kebijakan; struktur konsolidasi; dan skema pendanaan, dengan fokus pada peningkatan kualitas, relevansi, dan daya saing pendidikan tinggi dalam mendukung upaya membangun ekonomi pengetahuan. Lebih lanjut, hasil penelitian juga menunjukkan bahwa pemerintah masih menjadi aktor dominan di balik perubahan-perubahan mendasar tersebut, dan terdapat perubahan pola kebijakan reformasi yang mendukung hubungan industrial, terutama sejak masa jabatan kedua pemerintahan Joko Widodo. Dari bukti-bukti yang ditemukan dalam penelitian ini, dapat disimpulkan bahwa Indonesia sebagai negara berkembang dengan sistem ekonomi dan pendidikan tinggi mengikuti konvergensi global dalam membangun ekonomi berbasis pengetahuan melalui koordinasi yang dipimpin pemerintah antara pelatihan sumber daya manusia, penelitian, dan industri. Namun, konteks berbeda dari pengalaman Indonesia juga memberikan perbedaan dalam tren global. Oleh karena itu, penelitian ini telah berkontribusi pada wacana pendidikan tinggi dalam ekonomi pengetahuan khususnya dari sistem yang sedang berkembang di Asia Tenggara.

Kata kunci: koordinasi tripartit, ekonomi pengetahuan, pendidikan tinggi, Indonesia, sistem berkembang

INTRODUCTION

The strategic arrangement of universities in the pursuit of national economic competitiveness is closely related to a strong emphasis on technology-driven economic development under the ‘knowledge economy’ discourse (King, 2009; Shin, Li, Nam, Byun, & Nam, 2020). Under the knowledge economy, the use and creation of knowledge become the core engine of growth.

DOI: https://doi.org/10.24198/sosiohumaniora.v26i2. 55474
Submitted: 18 June 2024, Accepted: 31 Juli 2024, Publish: 01 Agustus 2024

Therefore, there are four core pillars suggested by the World Bank to support the transition towards knowledge-driven economies, which are long-term investments to produce educated and skilled workforces, supportive economic and institutional environment, effective innovation systems, and modern infrastructure in the information system (Chen & Dahlman, 2006, p. 4). Among the core pillars, effective innovation systems and highly skilled human resources are two out of four that higher education and universities could play their roles, particularly through their knowledge transmission and knowledge production functions (Chen & Dahlman, 2006; Suh & Chen, 2007). What makes the two functions 'special' in the knowledge economy is the fact that they have to be strengthened and extended so they can meet societal and industrial demands.

Following these ideas, some theoretical approaches suggest models of close collaboration between participating sectors and actors to promote innovation, which is crucial in the knowledge economy creation (Etzkowitz & Leydesdorff, 2000; Leydesdorff, 2006). In the triple helix model, these sectoral actors mainly include government, industry, and academia, although the advancement of the models also considers other participating actors (Etzkowitz & Leydesdorff, 1995; Leydesdorff, 2012). On the other hand, other frameworks such as national innovation system (Godin, 2009; Green, 1996), knowledge triangle (Unger & Polt, 2017), knowledge systems (Hertz, Brinkerhoff, Bush, & Karetji, 2020) and the tripartite coordination among human resource development (hereafter: HRD), research and industry (Shin et al., 2020) also address the importance of functional linkages among human resource training function, research and development function, and finally the innovation function. From these function-based approaches, the roles of HRD and research can be taken by diverging actors, in which universities play a prominent standing.

These conversions of knowledge, intensified by globalization, have presented two sides of the coin for countries globally: opportunities to promote advanced socio-economic development likewise risks to fall behind the race (Suh & Chen, 2007). The advanced successful models imposed the standards of ideal transformations, sending signals for countries to adjust their pace amidst the abrupt shifts. Despite differences in timing, many developing countries globally, including in the Southeast Asian region, have eagerly bought the ideas and started to implement the plans to build a knowledge economy, and Indonesia is not the exception (Evers, 2003). Indonesia is among the catching-up economies that have been following the mega-trend of development agenda towards knowledge-based economies in Asia (Menkhoff, Evers, & Chay, 2010).

Currently, Indonesia has set the goal to be one of the world-leading economies in 2045 (Abdini & Effendi, 2017). The country aims to be a developed economy, with an economic transformation from a natural resource-dependent economy to a highly competitive value-added manufacturing and service economy. However, despite being the largest economy in Southeast Asia, Indonesia falls behind in terms of the global knowledge index, where it ranked number 75th, much lower in comparison with Singapore (12th), Malaysia (43rd) and even Viet Nam (69th) as other major economies in the region (Global Knowledge Index, 2021).

The country has been struggling with the issue that most catching-up economies encounter, which is the labor market adjustment (Matsumoto & Bhula-or, 2018). The structural mismatch between industry and human resources has been hindering the advanced industry technology development, where the issues of low quality of education and training were stated to be one of the explaining factors (Mans, 1996). As seen in Figure 1, the sectoral value added has changed over the past thirty years, indicating the transition of economic activity in Indonesia.

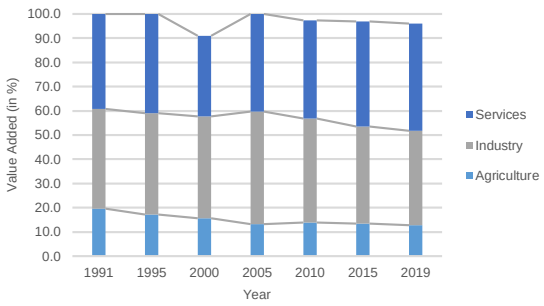

Figure 1. Sectoral Value Added, Indonesia

Source: World Bank (2021)

This transition is followed by the change in employment patterns (see Figure 2), which unfortunately shows gaps in comparison with the economic structural change (Allen, 2016). For example, although the share of agriculture has decreased to only 12,7 percent in 2019, the data shows that around 28,5 percent of employment is still in this sector (see Figures 1 and 2).

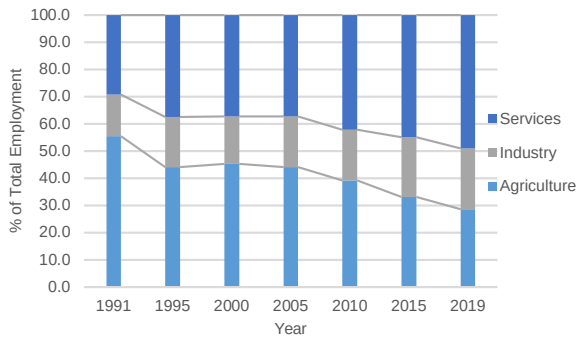

Figure 2. Employment by Sectors, Indonesia
Source: World Bank (2021)

The lag between economic and employment growth indicates a structural mismatch that can be analyzed from diverse angles, but labor's or worker's skills are a crucial part of the comparison (Di Gropello, 2013). In Indonesia, just as it is in other developing countries, skill mismatch has been the main source of the issues in labor market outcome, including low labor productivity (Allen, 2016; Matsumoto & Bhula-or, 2018).

Among a range of factors, the low and uneven quality of higher education has been argued as the underlying issue of the skill gaps. Universities and other higher education institutions that function to train human resources are challenged with the fitness of the curriculums and skills they deliver. This has also shown the issue of limited connection and/or cooperation between universities and industries (World Bank, 2014a).

Other crucial problems hindering the transformation to be a developed economy are the weak higher education systems and poor performance of Indonesia's science and technology, particularly in terms of research capacity and knowledge production attributes. This is, for instance, indicated by the number and impact of international publications and patents (Abdini & Effendi, 2017). The voice and presence of Indonesia in global scientific dialog were very low. Regardless of its huge population, Indonesia has a small number of researchers per million, only 216 in 2018, far beyond Malaysia with 2184 in the same year (UNESCO, 2022).

Further, despite of the rapid growth of higher education in terms of enrolment rate and higher education providers, the quality and governance issues have been persistent deterring challenges. Indonesian top universities do not rank sufficiently in global university leagues, where in 2014, there was no single Indonesian university ranked in the top 500 of Times Higher Education World University Ranking (Rosser, 2019). In terms of investment, despite an increasing trend of Gross Expenditure in Research and Development (GERD), Indonesia currently spends only 0.23 percent of its GDP on R&D (Huda, Pawennei, Ratri, & Taylor, 2020; UNESCO, 2022).

Based on the given context above, this research aims to analyze the efforts to enhance the tripartite coordination between human resource development (HRD), research, and industry under the national agenda to build a knowledge-based economy in Indonesia. The main research questions are as follows. *What are the key reform policies and strategies that have been set to enhance coordination between HRD, research, and industry in Indonesia? Who are the main actors involved?*

Among diverse approaches to see the interaction among actors and sectors in the knowledge economy discourse, this research chooses to use the lens of tripartite coordination between HRD, research, and industry which focuses on the functional-level inclusive coordination model (Shin et al., 2020). The adoption of this lens would be a rational choice to be taken in the developing systems where priority should begin on the efforts to enhance the capacity of each element of function, with state government leading the capacity building and coordinating function (Shin et al., 2020).

The use of this tripartite coordination lens will also enrich the current body of literature on framing of science and technology and its relation to the development (e.g. Amir & Nugroho, 2013 and Nugroho, 2017), also the policy and practical analysis on research and development, the knowledge sector, and innovation systems in Indonesia (e.g. Datta et al., 2016; Hertz, Brinkerhoff, Bush, & Karetji, 2020; Huda, Pawennei, Ratri, & Taylor, 2020; Lawrence et al., 2020; Pawennei et al., 2020).

METHOD

This research is designed through the lens of the qualitative method to emphasize in-depth knowledge and comprehensive images to explain a complex phenomenon, which is appropriate for several goals of social research (Johnson & Larry, 2003; Ragin, 2011). The data collection was

conducted through desk study and data triangulation was exercised to ensure research validity (Creswell, J.W., & Miller, 2000). A desk study was administered to review and evaluate necessary and relevant documents including but not limited to government official documents, international organizations' publications and reports, news, survey data, public records, presentation materials, and press releases (Bowen, 2009).

To provide an analytical framework, this research uses the knowledge economy thesis in Indonesia after the formal commencement of the 2019 National Medium-Term Development Plan, which announced the aim for the country to be a developed economy by 2045. The agenda framework has become the main umbrella of government in designing courses of initiatives to achieve the goal. This research focuses on seeing these developments, not just from the time frame, but also the emerging social and policy discourse on the knowledge economy direction in Indonesia.

RESULTS AND DISCUSSION

Since 1998, Indonesia has entered the Reformation Era, and major reforms in diverse social, political, and economic sectors have been taken to make the country more democratized, decentralized, less bureaucratic, and developed. The country's objective to become a developed economy needs to be supported by agile governance of higher education and also a good innovation ecosystem, which requires a working collaboration between the training of human resources, research and development, and industry.

However, the current coordination is still hampered by the challenges of limited capacities for HRD or education, as well as research and innovation capacities of the higher education sector and its institutions. This condition is almost similar to what other developing higher education systems are facing, particularly in Southeast Asia. Although the overall capacities have increased from 1995 to 2020 (see Table 1 and Table 2)[1], the development has been focusing on the quantitative aspect.

Table 1. Capacities for Human Resource Development, 1995-2020

	1995	2000	2010	2015	2020
Tertiary Enrolment (%, Gross)	n/a	15%	24%	28%	36%
% of Doctorates among Faculty	n/a	n/a	9.50%	12.5%	18.0%
Number of Enrolled Students based on Program					
Bachelor	n/a	59.7%	71.4%	80.4%	83.9%
Master	n/a	n/a	5.2%	4.2%	3.8%
Doctoral	n/a	n/a	0.5%	0.4%	0.5%
Others	n/a	40.3%	22.9%	15.0%	12.0%
Expenditure on Tertiary Education (% of total government expenditure on education)	33.90%	n/a	34.33%	44.62%	41.59%
Share of GDP by Field	A: 17.1% I: 41.8% S: 41.1%	A: 15.7% I: 41.2% S: 33.4%	A: 13.9% I: 42.8% S: 40.1%	A: 13.49% I: 41.04% S: 43.3%	A: 13.7% I: 38.2% S: 44.4%
Employment by field	A: 44% I: 38% S: 18%	A: 45.3% I: 37.3% S: 17.4%	A: 39.1% I: 42.2% S: 18.7%	A: 33% I: 45% S: 22%	A: 28.5% I: 49.1% S: 22.4%
Percentage of college graduates work within one year after graduation	n/a	n/a	n/a	n/a	57.35%
Unemployment Rate of Tertiary Graduates	8.00%	10.38%	9.88%	4.96%	4.38%

Source: UNESCO (2022), World Bank (2022), MoECRT (2022)

In terms of tertiary enrolment, Indonesia has achieved the mass higher education stage with a 36 percent rate of gross enrolment. However, the enrolment is still dominated by more than 80 percent at the undergraduate level, with only 5 percent enrolment at the graduate level. This condition is not supportive enough to build a high-tech industrial development and a knowledge-based economic development where more graduate-level enrolment, particularly doctorate level, is crucial (Shin, 2012; Shin, Kehm, & Jones, 2018).

The provision of quality higher education also demands sufficient funding and high capacities of academics, which Indonesian higher education is still lacking (Logli, 2016; World Bank, 2014b). For funding, even though the share of government expenditure for the higher education sector is relatively higher in comparison with other educational sectors (around 41.6 percent), the amount is still not enough if we consider the size of higher education institutions in the country. Among the total teaching force or faculty members, in 2020, only 18 percent held doctoral qualifications. This is considerably low in comparison with developed systems such as the United Kingdom (around 50 percent), or even with other developing systems such as Bangladesh (33 percent) (HESA, 2021; Shin et al., 2020).

[1] The overall capacities of higher education (teaching-related and research-related aspects), innovation capacities, and competitiveness capacities by using representative comparable indicators as suggested by Shin et al., (2020). The data are gathered from multiple sources, such as national statistics data, World Bank development indicators data, also the UNESCO Institute of Statistics data.

Table 2. Capacities for Research and Innovation, 1995-2020

	1995	2000	2010	2015	2020
Number of researchers per million population	n/a	212.67	n/a	178.9	215.99[a]
R&D expenditure (% of GDP)	n/a	0.07	0.085[b]	0.24[c]	0.23[a]
Publication number in Web of Science	422	607	1740	6569	23359
Publication number in Scopus	397	771	2944	8585	51262
R&D expenditure by performers (HE sector, government, enterprise), in %	n/a	E: 26.3 G: 69.8 HE: 3.9	E: 18.9 G: 43.2 HE: 37.9[d]	E: 25.7 G: 39.4 HE: 34.9[b]	Ent: 7.3 Gov: 70.5 HE: 21.2[a]
Medium and high-tech manufacturing value added (% manufacturing value added)	27.6	35.7	39.7	35.3	37.3[e]

Source: UNESCO (2022), World Bank (2022)

Notes: Some data are not available at all, or not available by the exact year. Therefore some data used the closest year where data are available. [a] Data is from 2018, [b] Data is from 2013, [c] Data is from 2016, [d] Data is from 2009, [e] Data is from 2019.

Aside from capacity contexts, the other important element in tripartite coordination is the coordination function itself, both for human resource development, as well as for research coordination (Shin et al., 2020). The coordination for HRD, can be assessed by the link and match between labor market or industrial demand with the higher education student population. Based on 2020 data, more than 70 percent of Indonesian university students are enrolled in social science, education, art, and humanities majors, and only around 20 percent are enrolled in Science, Technology, Engineering, and Mathematics (STEM) majors (DGHE, 2020). Among them, only 4.3 percent are graduate-level students. The current coordination status is not favorable and ideal if we consider the priority of economic sector development designed under the current agenda to become a developed economy in 2045.

In terms of coordination for research, coordinating bodies at the national level to coordinate the tripartite functions were either weak or not functioning (Burhani, Mulyani, & Pamungkas, 2021). As reported in previous research, in Indonesia, research and innovation management was scattered and had minimum capacity (Mans, 1996), public research institutes and universities were also working independently, as they were managed by different authorities. Arguably, the only guiding framework to coordinate research with human resource and industrial development might be the national development plan, managed by the Ministry of National Development Planning/ National Development Agencies. However, the official guide might be not sufficient to implement an effective coordination mechanism.

To address the multifaceted issues, the Indonesian government has tried to reform diverse related aspects, including the intensive capacity-building agenda for the past twenty-five years (Huda et al., 2020; Indrawati & Kuncoro, 2021; Pannen, 2018). This research, however, applies the lens of tripartite coordination as the guiding perspective to analyze the government-led initiatives in enhancing coordination among the HRD, research, and industrial development. Thus, to answer the first question on the reforms and strategic initiatives taken by the Indonesian government under the leadership of Joko Widodo, the data has shown that there are at least four major dimensions in the building of a tripartite coordination system which are: legal framework, consolidating or governing structure, policy, and programs, and finally finance or funding aspect (see Figure 3). These major dimensions are coherent with the framework discussed by Hertz et al., (2020); Shin et al., (2020); Unger & Polt, (2017) on the logic of knowledge system, knowledge triangle, and tripartite coordination.

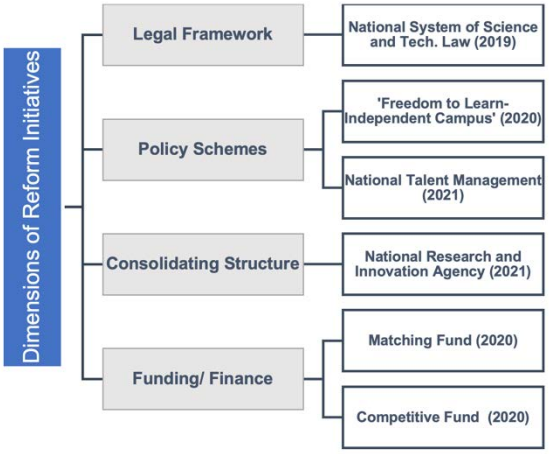

Figure 3 Key Reform Policies and Strategies to Enhance Tripartite Coordination
Source: Author

Legal Framework

The efforts in establishing the ecosystem for science, technology, and innovation (STI) have been started since the independence era (Putera, Widianingsih, Ningrum, Suryanto, & Rianto, 2022a). However, during Joko Widodo's administration period, the STI system was developed into an integrated system, where several major policies were introduced. The key initiatives from the legal framework can be seen mainly from the enactment of the Higher Education Law (2012) and the National System of Science and Technology Law (2019). However, while the Higher Education Law (2012) focuses on the higher education sector, the National System of Science and Technology Law (2019) provides a more comprehensive approach to the tripartite coordination lens.

Assessing that the previous reform efforts were still not enough to push the competitiveness of Indonesia's R&D and that the previous law on the national system of research, development, and implementation of science and technology was also outdated, in 2019 the National System of Science and Technology Law was enacted to regulate the system as the basis to formulate development policies needed to enhance the capacity of science and technology to achieve the country's objectives and to increase the independence and competitiveness of the nation (National System on Science and Technology Law (11/2019), 2019). The law enactment is also closely related to the goal of building the knowledge economy.

In addition to the role and positioning of science and technology for national development, the Law also regulates the organization of science and technology, where HEIs, including universities as one of the actors in the system of science and technology, function to prepare the human resource needed for the conduct of science and technology and to do so, the HEIs are expected to strengthen their capacity in teaching, research, and community services (Article 45 of the (National System on Science and Technology Law (11/2019), 2019; Putera et al., 2022a; Putera, Widianingsih, Ningrum, Suryanto, & Rianto, 2022b). The law also stated that HEIs that can create invention and innovation will receive incentives. The law also acts as the legal basis for the establishment of the National Research and Innovation Agency (BRIN).

Policy Schemes

To implement the objectives of enhancing tripartite coordination, diverse policies and programs have been delivered to ensure that the quality of higher education, also research and innovation are enhanced. For example, under the Higher Education Long Term Strategy (HELTS) 2003-2010, three main goals to increase the nation's competitiveness, autonomy and decentralization, and organizational quality were set to be achieved (DGHE, 2003; Nizam & Nurdin, 2010). The special funding schemes to build World Class University has started during the period too (Dewi, 2018). The indicators of gross enrollment rate in STEMs and also number of intellectual property rights were also included as a performance assessment of the Directorate General of Higher Education between 2009 and 2014 (MoRTHE, 2015).

At the beginning of Joko Widodo's presidency in 2014, one of the major reforms was the decision to merge the Directorate General of Higher Education, which previously was managed under the Ministry of Education and Culture, with the Ministry of Research and Technology. In 2015, the Ministry of Research, Technology, and Higher Education (MoRTHE) was formally established. From 2014 to 2019, the policy and programs include the goal of increasing the reputation of Indonesian leading universities in the World Class University League.

Further, the implementation of New Public Management reform is strongly adapted with the use of performance indicators for assessing teaching and research activities in university (Gaus & Hall, 2016). During this period too, the key indicators of the Directorate General of Higher Education have started to include the graduates' competence certification, graduates entrepreneurship, quantity of research productivity from international publications, and R&D prototype, which further indicates the focus on enhancing the relations with industry (MoRTHE, 2015).

During the second term of Joko Widodo's administration, the Directorate General of Higher Education was given back to its' original 'parents', which is the Ministry of Education and Culture. This remarks the birth of the key policy to enhance tripartite coordination, which is the 'Freedom to Learn-Independent Campus'. It was a program introduced by the newly appointed Minister of Education, Culture, Research, and Technology (hereafter: MoECRT), Nadiem Makarim, in 2020.

Under this umbrella policy, there are several programs and also other supporting programs or policies to enhance the coordination among diverse stakeholders. For instance, one aspect of the policy regulates the requirement of opening a new study program to be developed with a collaboration partner in curriculum development, internship provision, and also employment for graduates. The partners can be from business and industry sectors, state-owned enterprises, non-profit sectors, highly reputable global top universities, or other relevant organizations or institutions (MoEC, 2020).

The second policy discussed here is the 'National Talents Management' which was introduced in 2021. The policy is initiated to prepare talented and globally competitive human resources to support the goal of Indonesia's vision for 2045. The grand design of the policy is projected for 23 years, from 2022 to 2045. There are three programs under the policy, which are the National Talents Management in Research and Innovation, National Talents Management in Art and Culture, and National Talents Management in Sports. The main coordinating agency for this policy is the Ministry of National Development Planning, and each program is coordinated by different ministries, and supported through collaboration among different ministries.

Consolidating Structure

To coordinate industry with human resource development and research, it is argued that operating, functioning bodies, are needed (Shin et al., 2020). In Indonesia, the main body at the national level to ensure that the national development planning is well designed to meet the national objectives, synchronized between budgeting and implementation processes, and coordinated among actors, sectors, and stakeholders, is the Ministry of National Development Planning/National Development Planning Agency. The ministry acts as the coordinator as well as think tanks and decision-makers in their diverse roles. The strategic function of the ministry was started as early as the nation-building process of the country, and the efforts were paid with the rapid economic development in Indonesia during the New Order era.

Despite the coordinating role of the Ministry of National Development Planning/ National Development Planning Agency, the issues of limited coordination for research and innovation have been a concern for quite some time in Indonesia. Entering the current industrial revolution, Indonesia's position in its innovation index is still very disappointing. Indonesia ranked only 87 among 132 countries in terms of global innovation index (WIPO, 2021). This has pushed Joko Widodo to make research and innovation one of the priorities in his leadership.

Through the Government Regulation (78/ 2021), the National Research and Innovation Agency (NRIA/ BRIN) was finally established, with the hope that it would be the grand house for national research and innovation in Indonesia. The agency has two main structures which are the research infrastructures (for planning, managing, and coordinating) and the research organizations (for conducting research). By merging four main non-ministry public research institutes (which are the Indonesian Institute of Science, National Nuclear Energy Agency, National Institute of Aeronautics and Space, and Agency for the Assessment and Application of Technology), also research and development bodies under ministries, NRIA aims to consolidate the R&D process and fundings, and strengthening collaboration among diverse actors and sectors.

To ensure that the research and innovation ecosystem is developed in every layer, the regulations also mentioned the establishment of a Regional Research and Innovation Agency (hereafter RRIA). This regional-based agency is expected to be the backbone of research or evidence-based policy development at provincial or municipal levels. Per April 2022, only three provinces have established their own RRIA, whilst there is no single municipal government has established the agency (Kamil, 2022).

The idea of building a national research agency was one of the campaign agendas of Joko Widodo in the 2019 presidential election. This bold decision of the current BRIN/ NRIA standing in terms of function and position has provoked a lot of criticism, triggering a stronger debate between the interest groups. Before the agency's establishment, the issue of this 'super', 'mega-agency' that would take over almost all decision-making to funding for science in the country had already become a huge debate (Rochmyaningsih, 2019). Those who reject or criticize the idea, are afraid that the agency would be an institution without checks and balances. Those who support the idea, state that having a coordination body would help address the latent issues on the management and conduct of research and innovation in the country.

Funding Instruments

The last dimension of reform policies to enhance tripartite coordination is the funding instruments through diverse types of schemes. There are two main funding schemes programs initiated and managed by MoECRT, and one open platform funding initiative from NRIA.

The 'Matching Fund' program is the funding scheme initiated by the MoECRT to support the research downstream by strengthening collaboration between HEIs with businesses and industries. This is argued as one of the transformative funding schemes that is designed to support the higher education transformation in Indonesia, that currently has eight main objectives, and is delivered through the umbrella program of Freedom to Learn-Independent Campus (MoECRT, 2021). The utilization of an open platform called 'Kedaireka' (https://kedaireka.id), opens the chance for HEIs and businesses and industries to build the partnership, and apply for funding. The increasing commitment of the Indonesian government to this funding can be seen in Figure 4, where the total amount of matching funds has been multiplied around 4 times in the 2022 fiscal year.

In 2021, there are a total of 429 projects funded through the Matching Fund program, where around 37.3 percent of the projects funded are proposed by the autonomous legal universities (DGHE, 2021b). Another funding scheme initiated by the MoECRT is the 'Competitive Fund' Program, which is aimed at supporting breakthrough innovation of HEIs to build their competitiveness. This competitive funding scheme is designed under the Freedom to Learn-Independent Campus, which is distributed into several types of sub-schemes. The government's commitment to this scheme has also increased

significantly from around 36,2 million USD in 2021 to 90,6 million USD in 2020 (DGHE, 2021).

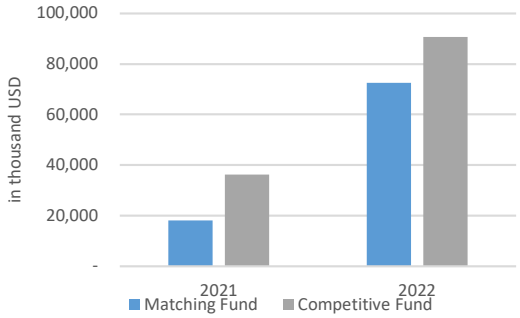

Figure 4 Current Funding Schemes for HEIs
Source: DGHE, 2021b

The competition is also designed by the cluster of HEIs, which can be divided into three main leagues. The league-based competition is expected to drive more fair competition among HEIs with similar features, such as from its student body composition (League A is for HEIs with a minimum of 18,000 students; League B is for HEIs with 5,000-18,000 students; and League C is for HEIs with 1,000-5,000 students). This approach of league-based competition for public universities is also divided into three leagues based on their management status: working unit public HEIs (League III), general service unit public HEIs (semi-autonomous, League II), and autonomous legal HEIs (League I).

Unlike the Matching Fund which focuses on research and innovation activities in collaboration with businesses and industries, the competitive fund focuses on supporting the goal of the Freedom to Learn-Independent Campus policy, particularly assists HEIs in achieving eight key performance indicators of higher education transformation which covers three main aspects: the quality of graduates, the quality of lecturers/ academics, and the quality of curriculums (DGHE, 2020).

The third is the 'Research and Innovation' funding scheme, which is initiated and managed by the BRIN/ NRIA. Under this main funding scheme, there are at least seven funding programs that have their specific targets and characteristics. The programs are 1) National Research Priorities (NRP); 2) Research and Innovation for COVID-19 Countermeasures; 3) Research Collaboration Center; 4) Sail Day; 5) Expedition and Exploration; 6) Research-based Start-Up; and 7) Health Innovation Products.

Among those programs, the 'Research Collaboration Center' is specifically designed to support and develop research collaboration on specific topics between BRIN/ NRIA, HEIs, and industries. Under the funding scheme, there are two types of sub-programs, which are: the collaboration between HEIs and BRIN/ NRIA, and the collaboration between HEIs, BRIN/ NRIA, and industries.

CONCLUSION

The notion of building a knowledge economy has become an emerging discourse in Indonesia. Under this discourse, the importance of science and technology, the knowledge triangle, and the coordination between human resource training, research and development, and industry are highlighted as crucial. However, as elaborated in this research, the problem of skill mismatch, low quality and rigid governance of higher education, and limited linkage and engagement among sectors are hindering the knowledge economy quest in the country.

Therefore, this study has attempted to contribute to the policy discussion under the knowledge economy discourse in Indonesia by inquiring about the national-level reform policies and strategies to enhance the coordination between the training of human resources, research, and the industry. Regardless of the absence of science and technology 'mainstreaming', following the global discourse of the importance of innovation and its relation with reforming the sectors related to it (i.e. higher education, research, and development), there seem to be efforts taken to better coordinate the three aspects to boost the national competitiveness of Indonesia.

By ensuring that there are legal frameworks, policy schemes, consolidating structure or governing system, and also funding, the government as the leading actor behind the coordination has been focusing on the enhancement of access, quality, and competitiveness of higher education in supporting the national development in Indonesia. Further, from the four aspects of reform policies and strategies taken during Joko Widodo's administration, the data has shown that there have been changing patterns of reform policies with the favor of industrial linkage as one of the most apparent patterns of change.

Here, universities, together with other HEIs, are expected to function effectively, answering the needs of national and global demands by adjusting to the external pressures from the surrounding environment (Amaral, Jones, & Karseth, 2002). The use of performance indicators to evaluate universities, with the focus on strategic linkage with industries, and overall relevance with market demand, has been consistent with the global discourse on the conjunction between government, industry, and university (Beerkens, 2010). It highlights the substantiality of

efficiency, accountability, and responsiveness of higher education.

From the evidence found in this study, it can be concluded that Indonesia as a developing economic and higher education system follows the global convergence in building a knowledge-driven economy through government-led coordination among the training of human resources, research, and industry. The distinctive context from the Indonesian experience also provides the divergence of the global trend.

To conclude, this paper has contributed to the discourse of higher education in the knowledge economy particularly from developing systems in Southeast Asia. However, with the focus on national reform policies, this research poses limitations in examining the implementation by diverse stakeholders as well as the evaluative analysis of the policies. This provides the gap for further research on the policy studies, specifically on the tripartite coordination agenda.

ACKNOWLEDGMENTS

This paper is written based on parts of an unpublished dissertation from the author. The author would like to express sincere appreciation for all the comments and inputs given during the writing process of this paper.

REFERENCES

Abdini, C., & Effendi, S. (2017). *Science, Technology and Higher Education towards Indonesia 2045*. Jakarta: Indonesian Academy of Sciences.

Allen, E. R. (2016). *Analysis of Trends and Challenges in the Indonesian Labor Market. Asian Development Bank* (Vol. 2016). Manila. https://doi.org/10.1016/j.rcp.2015.08.004

Amaral, A., Jones, G. A., & Karseth, B. (Eds.). (2002). *Governing Higher Education: National Perspectives on Institutional Governance*. Dordrecht: Springer Science+Business Media. Retrieved from http://link.springer.com/10.1007/978-94-015-9946-7%0Ahttps://www.google.com/books/edition/Governing_Higher_Education_National_Pers/NdIGCAAAQBAJ?hl=en&gbpv=1&dq=Higher+education+governance&printsec=frontcover#spf=1586689819980

Amir, S., & Nugroho, Y. (2013). Beyond the Triple Helix: Framing STS in the Developmental Context. *Bulletin of Science, Technology & Society*, *33*(3–4), 115–126. Retrieved from http://bst.sagepub.com/cgi/doi/10.1177/0270467613509603

Beerkens, E. (2010). Global models for the national research university: Adoption and adaptation in Indonesia and Malaysia. *Globalisation, Societies and Education*, *8*(3), 369–391. https://doi.org/10.1080/14767724.2010.505099

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27–40. https://doi.org/10.3316/QRJ0902027

Burhani, A. N., Mulyani, L., & Pamungkas, C. (2021). *The National Research and Innovation Agency (BRIN): A New Arrangement for Research in Indonesia*. *ISEAS - Yusof Ishak Institute - Trends in Southeast Asia*. Singapore: ISEAS Publishing. https://doi.org/10.2307/j.ctt1zgwjjb.7

Chen, D., & Dahlman, C. (2006). *The Knowledge Economy, the KAM Methodology and World Bank Operations* (World Bank Institute Working Paper No. 37256). *World Bank Institute Working Paper*. Retrieved from https://ssrn.com/abstract=841625

Creswell, J.W., & Miller, D. L. (2000). In Qualitative Inquiry. *Theory Into Practice*, *39*(3), 124–130._____ https://doi.org/10.1207/s15430421tip3903

Datta, A., Marpaung, L., Meirio, A., Sabri, R., Mackenzie, J., & Young, J. (2016). The Indonesian Knowledge Sector: A Contextual Analysis, 1–30. Retrieved from https://www.ksi-indonesia.org/file_upload/The-Indonesian-Knowledge-Sector-A-Contextual-Anal-04Apr2017142208.pdf

Dewi, A. U. (2018). Towards Knowledge Economy: A Comparative Study of Indonesian and South Korean Internationalization of Higher Education. *KnE Social Sciences*. https://doi.org/10.18502/kss.v3i10.2905

DGHE. (2020). *Higher Education Statistics 2020*. Jakarta. Retrieved from https://pddikti.kemdikbud.go.id/publikasi

DGHE. (2021a). Guidelines for Public HEIs' Key Performance Indicators. Jakarta: Indonesian Ministry of Education, Culture, Research and Technology.

DGHE, D. G. of H. E. (2003). *Higher Education Long Term Strategy (2003-2010)*. Jakarta.

DGHE, D. G. of H. E. (2021b). Matching Fund Recepients. Retrieved April 7, 2022, from https://kedaireka.id/matchingfund

Di Gropello, E. (2013). Role of the education and training sector in addressing skill mismatch in Indonesia. In D. Suryadarma & G. W. Jones (Eds.), *Education in Indonesia* (pp. 236–

266). Singapore: ISEAS Publishing. https://doi.org/10.1355/9789814459877-017

Etzkowitz, H., & Leydesdorff, L. (1995). The Triple Helix - -University-Industry-Government Relations: A Laboratory for Knowledge Based Economic Development. *EASST Review*, *14*(1), 14–19.

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From National Systems and "mode 2" to a Triple Helix of university-industry-government relations. *Research Policy*, *29*(2), 109–123. https://doi.org/10.1016/S0048-7333(99)00055-4

Evers, H.-D. (2003). Transition towards a knowledge society: Malaysia and Indonesia in comparative perspective. *Comparative Sociology*, *2*(2), 355–374. https://doi.org/10.1163/15691330310041881 6

Gaus, N., & Hall, D. (2016). Performance Indicators in Indonesian Universities: The Perception of Academics. *Higher Education Quarterly*, *70*(2), 127–144. https://doi.org/10.1111/hequ.12085

Global Knowledge Index. (2021). Global Knowledge Indox. https://knoema.com/infographics/aomssce/global-knowledge-index

Godin, B. (2009). National Innovation System: The System Approach in Historical Perspective. *Science, Technology, & Human Values*, *34*(4), 476–501. https://doi.org/10.1177/0162243908329187

Green, K. (1996). *National innovation systems: a comparative analysis*. (R. R. Nelson, Ed.), *R&D Management* (Vol. 26). Oxford University Press, Inc. https://doi.org/10.1111/j.1467-9310.1996.tb00951.x

Hertz, J. C., Brinkerhoff, D. W., Bush, R., & Karetji, P. (2020). Knowledge Systems: Evidence to Policy Concepts in Practice. *Policy Brief*, (June), 1–8. Retrieved from https://www.rti.org/rti-press-publication/knowledge-systems

HESA. (2021). HE academic staff by HE provider and highest qualification held.

Huda, N., Pawennei, I., Ratri, A., & Taylor, V. L. (2020). *Making Indonesia's Research and Development Better: Stakeholder Ideas and International Best Practices*.

Indrawati, S. M., & Kuncoro, A. (2021). Improving Competitiveness Through Vocational and Higher Education: Indonesia's Vision For Human Capital Development In 2019–2024. *Bulletin of Indonesian Economic Studies*, *57*(1), 29–59. https://doi.org/10.1080/00074918.2021.1909692

Johnson, B., & Larry, C. (2003). *Quantitative, Qualitative, and Mixed Approaches*. *Educational Research*. SAGE Publications.

Kamil, I. (2022, April 20). Head of NRIA stated RRIA is formed to strengthen the research and innovation in Indonesia (in Indonesian: Kepala BRIN Sebut BRIDA Dibentuk untuk Perkuat Riset dan Inovasi di Tanah Air). *Kompas*. Retrieved from https://nasional.kompas.com/read/2022/04/20/15102871/kepala-brin-sebut-brida-dibentuk-untuk-perkuat-riset-dan-inovasi-di-tanah

King, R. (2009). *Governing universities globally: Organizations, regulation and rankings*. *Governing Universities Globally: Organizations, Regulation and Rankings*. Cheltenham: Edward Elgar Publishing Limited. https://doi.org/10.1080/13603101003780350

Lawrence, S., Hogan, M., Brower, A., & Zayed, S. (2020). *Global Practices for Building Innovation Ecosystems*.

Leydesdorff, L. (2006). *The knowledge-based economy and the triple helix model*. *Understanding The Dynamics Of A Knowledge Economy* (Vol. 44). https://doi.org/10.4337/9781845429898.00009

Leydesdorff, L. (2012). The Triple Helix, Quadruple Helix, ..., and an N-Tuple of Helices: Explanatory Models for Analyzing the Knowledge-Based Economy? *Journal of the Knowledge Economy*, *3*(1), 25–35. https://doi.org/10.1007/s13132-011-0049-4

Logli, C. (2016). Higher Education in Indonesia: Contemporary Challenges in Governance, Access, and Quality. In *The Palgrave Handbook of Asia Pacific Higher Education* (pp. 561–581). New York: Palgrave Macmillan US. https://doi.org/10.1057/978-1-137-48739-1_37

Mans, D. (1996). *Indonesia: Industrial Technology Development for a Competitive Edge*. Washington DC.

Matsumoto, M., & Bhula-or, R. (2018). Problem of skills mismatch in Asia and the Pacific: How useful are the existing measurement for future skills strategies? In *Skills and the future of work: Strategies for inclusive growth in Asia and the Pacific*. (pp. 338–363). Thailand. Retrieved from http://nlrc.mol.go.th/research/blzTZwD/202022914_Ruttiya-Problem__of__skills__mismatch__in_Asia_

and_t.pdf

Menkhoff, T., Evers, H.-D., & Chay, Y. W. (2010). *Introduction: Governing and Managing Knowledge in Asia*. (T. Menkhoff, H.-D. Evers, & Y. W. Chay, Eds.). Singapore: World Scientific Publishing Co. Pte. Ltd. https://doi.org/10.1142/9789814289900_0001

MoEC. (2020). *Merdeka Belajar: Kampus Merdeka*. *Kemendikbud*. Retrieved from https://osf.io/sv8wq/

MoECRT. (2021). *Guidelines for Matching Fund Program 2022*. Jakarta. Retrieved from https://trentino4equity.trentinosviluppo.it/wp-content/uploads/2021/06/2021-06-21-Avviso-Pubblico-Matching-Fund.pdf

MoECRT. (2022). Indonesian Higher Education Database. Retrieved June 30, 2022, from https://pddikti.kemdikbud.go.id

MoRTHE. (2015). *Ministry Strategic Planning (2015-2019)*. *Kemenristekdikti*. Jakarta.

National System on Science and Technology Law (11/2019) (2019). Jakarta. Retrieved from https://peraturan.bpk.go.id/Home/Details/117023/uu-no-11-tahun-2019

Nizam, & Nurdin, M. (2010). Governance reforms in higher education : A study of institutional autonomy in Indonesia.

Nugroho, Y. (2017). Developing Knowledge Community: What is beyond N-Helix? *Proceedings of AICS - Social Sciences*, *7*(0), 8. Retrieved from http://e-repository.unsyiah.ac.id/AICS-Social/article/view/10141

Pannen, P. (2018). Higher Education Systems and Institutions, Indonesia. In *Encyclopedia of International Higher Education Systems and Institutions* (pp. 1–10). Springer Nature B.V. https://doi.org/10.1007/978-94-017-9553-1_581-1

Pawennei, I., Esti, K., Camil, M. R., Huda, N., Novianda, A., Nugraha, L. K., & Amalia, M. (2020). *Mengobarkan Inovasi, Mengorbankan Standar Mutu: Telaah Isu Iptek, Riset, dan Inovasi dalam UU Cipta Kerja*. Jakarta.

Putera, P. B., Widianingsih, I., Ningrum, S., Suryanto, S., & Rianto, Y. (2022a). Science, Technology and Innovation (STI) ecosystems in Indonesia (1945–2021): A historical policy analysis. *History of Science and Technology*, *12*(2), 302–319. https://doi.org/10.32703/2415-7422-2022-12-2-302-319

Putera, P. B., Widianingsih, I., Ningrum, S., Suryanto, S., & Rianto, Y. (2022b). The policy dynamics of Indonesia's science, technology, and innovation system (STI system): Current state of research and literature construction. *Journal of Science, Technology and Innovation Policy*, *8*(1), 31–43. https://doi.org/10.11113/jostip.v8n1.107

Ragin, C. (2011). *Constructing Social Research*. Thousand Oaks: Pine Forge Press.

Rochmyaningsih, D. (2019). Indonesian mega-science agency in the balance as election begins. *Nature*, *568*(7752), 286–287. https://doi.org/10.1038/d41586-019-01160-3

Rosser, A. (2019). Big Ambitions, Mediocre Results: Politics, Power and the Quest for World-Class Universities in Indonesia. In *Higher Education in Asia* (pp. 81–99). Springer Science and Business Media B.V. https://doi.org/10.1007/978-981-13-9294-8_4

Shin, J. C. (2012). Higher education development in Korea: Western university ideas, Confucian tradition, and economic development. *Higher Education*, *64*(1), 59–72. https://doi.org/10.1007/s10734-011-9480-5

Shin, J. C., Kehm, B. M., & Jones, G. A. (2018). *Doctoral education for the knowledge society : convergence or divergence in national approaches?* Springer.

Shin, J. C., Li, X., Nam, I., Byun, B. K., & Nam, I. (2020). Building a coordination system of HRD, research and industry for knowledge and technology-driven economic development in South Asia. *Higher Education Policy*, *74*(February), 1–25. https://doi.org/10.1057/s41307-020-00220-y

Suh, J., & Chen, D. H. C. (2007). *Korea as a Knowledge Economy: Evolutionary Process and Lessons Learned*. Washington DC: World Bank.

UNESCO. (2022). UNESCO Education Statistics. Retrieved April 28, 2022, from http://data.uis.unesco.org

Unger, M., & Polt, W. (2017). The knowledge triangle between research, education and innovation -A conceptual discussion. *Foresight and STI Governance*, *11*(2), 10–26. https://doi.org/10.17323/2500-2597.2017.2.10.26

WIPO. (2021). *Global Innovation Index 2021*. Switzerland.

World Bank. (2014a). *Indonesia's Higher Education System: How Responsive is it to the Labor Market ? World Bank Policy Research Working Paper*. Jakarta.

World Bank. (2014b). *Tertiary education in Indonesia: directions for policy*. Jakarta.

Retrieved from_____ http://documents.worldbank.org/curated/en/105061468044074141/Tertiary-education-in-Indonesia-directions-for-policy

World Bank. (2021). World Development Indicators. Retrieved from_____ https://databank.worldbank.org/source/world-development-indicators#