

Bridging Talent Barrier Through the Lenses of Circularity Principles

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ABSTRACT

Circularity, or the circular economy, uses systems and business models to redirect waste into profitable uses. It also extends the lifespan of materials and products. Significant economic impact requires multidisciplinary talent to identify new challenges and implement innovation. The stagnating performance of youth worldwide highlights the need to redesign education for circular talent management. While emerging economies have topped various global metrics, countries such as Malaysia, Indonesia, and Thailand still face declines in key performance indicators (KPI). This study analyses international indices related to industrial performance (innovation and responsible operations) and capacity-building investments, correlating them with the teaching and learning culture versus the global youth performance indicator, using a mixed-methods approach. A qualitative analysis of expert capacity-building materials and a comparative analysis of the Global Innovation Index (GII) and Environmental Protection Index (EPI) as predictors for responsible operations reveal that high-achieving nations in the Programme for International Students Assessment (PISA) 2022 also champion the GII and EPI. The indices both shape and are shaped by talent development. As circularity accounts for a significant portion of capacity-building materials, the findings underscore the importance of leveraging foundational skills to mitigate talent barriers and implementing resource-efficient processes towards achieving GII and EPI. In essence, the outcome marks circularity principles as the promising route for sustainable human capital, technology, and planetary growth.

Keywords: Circular Bioeconomy, Circularity, PISA, Talent.

INTRODUCTION

Circularity and Talent Challenge

Resource deficits can be addressed by using materials efficiently. Resource-efficient systems that redirect waste into production and close the material flow loop (Morales et al., 2022) are crucial to the circular economy and the circularity principle. First described by William McDonough, the circular economy promotes responsible production and consumption. This extends product lifespans and moves from a linear system to a regenerative resource loop (Pena et al., 2020), keeping products, precursors, components, and energy values in circulation (Jabbour et al., 2025). It applies to industries not limited to construction (AlQudsy, 2024), agro-commodity management (Ghazali & Zbiec, 2022; Ghazali, 2023; Ghazali & Shafie, 2024), furniture-making (Kulakovskaya et al., 2024), nanotechnology (Ghazali et al., 2024), and farming. In architecture, the principle of 'form and function' emphasises the importance of minimising resource extraction and mitigating environmental harm (Delaqua, 2023). In recent years, the circular economy has extended to the jewellery industry (Chen & Roadkasamri, 2025), accounting (Aranda-Usan et al., 2024; Vysoshan et al., 2024), household (da Silva and Ramos, 2025), and human

resource management (da Silva, 2025). On that ground, cultivating and developing talent is crucial for driving progress toward the adoption of circularity. When talent goes undeveloped, human capital is wasted, significantly slowing transitions and risking sustainability for a growing global population (Neme et al., 2024; World Bank, 2024) that depends on depleting natural resources. Building a strong talent pool and involving stakeholders in talent development remains crucial for achieving success in the circular economy.

Talent, defined as outstanding potential in a particular field, whether in a range of activities and situations or within a specialisation and narrow area of expertise, is driven by innate enthusiasm, and talent development is continuous and phased (Zhao et al., 2024). Dereliction of the systematic process can critically damage an organisation, indicative of underperformance (Chamorro-Premuzic, 2014), disengagement, and low productivity. Improper talent tapping at higher education institutions (HEIs) arises from talent undervaluation or task-talent mismatch, indicating talent mismanagement. Internationally derived metrics for teaching, such as those by Times Higher Education score and OECD's PISA 2022 and PISA 2025, can serve as an immediate calibration for universities to enhance their commitment to providing quality education, which is closely associated with dedicated educators (Hile et al., 2022).

Education focused on nation-building and encouraging student dedication is key to effective talent development. When teachers and students are dedicated, they help create a learning culture that supports ongoing talent growth, even in regular classrooms (Newby et al., 2022).

A lack of commitment often stems from undervaluing or lacking clear Key Performance Indicators (KPIs) for teaching compared to other duties. In research universities, this can cause educators to have different goals. The national goal of quality education is often overshadowed by focusing on the status quo. This focus influences budgets but is frequently measured using questionable metrics rather than actual processes, resulting in graduates who are not fully functional. To achieve quality education, research KPIs must align with the expansion of knowledge and the improvement of teaching, curricula, and assessment. This will support talent development and national growth.

Effective talent identification and development build autonomous learners who can synthesise ideas and address sectoral challenges, especially in education. To achieve this, strong academic skills are required to close foundational gaps in literacy and numeracy. Accordingly, Hayasyi et al. (2025) cite restoring literacy and numeracy as the second of four vital steps to improve education in Asia. Without these basic improvements, key GDP-contributing sectors stay vulnerable.

Grassroots Reality

The absence of devoted educators with the necessary knowledge and commitment to help students navigate learning creates uncertainty in teaching quality (Havis, 2023; Mansor et al., 2020), which distances the nation-building mission. The situation puts students grappling with learning in jeopardy, exacerbating their disengagement from their studies. Such a situation not only contributes to the challenges nations face with acute international ranking issues like PISA but also diminishes the spirit of learning and erodes public trust. In this regard, the World Bank's records consistently show a severe deficit in STEM (science, technology, engineering, and mathematics) worldwide (Bustillo & Patrinos, 2023), including in agricultural science (Haddad et al., 2024).

Mandating work to unfit people risks inefficiency and economic loss. Equality, transparency, and integrity must replace rising misconduct caused by a lack of skills (Kisamore et al., 2007; Ghazali & Aziz, 2021). Enforcing institutional standards is crucial and possible when enough capable people serve as the first defence against unethical behaviour (Markus, 2023). In stalling systems, attracting 'right calibre' people curbs rising dropouts (Carlo et al., 2024; Anis, 2024; Lim, 2023; NCES, 2020) and aligns institutions with national needs. Hayasyi et al. (2025) state that upskilling teachers is the third step for Asia to improve education. Talent hubs must fix problems in key sectors as the global population grows (Neme et al., 2020; World Bank, 2024). As a long-term investment, in 2026, the education sector secured MYR66.2 billion to improve infrastructure and teacher development for national 'rejuvenation' (The Edge, 2025).

The study visualises circularity in human talent management for the countries left behind, using the achievements of the championing nations as the benchmark. In doing so, we elaborate on talent management as a corrective measure for the existing manpower. Reshuffling talents to achieve the full-fledged potential of civil servants is also recommended. The goal is achieved by adopting an empirical methodology described in the subsequent section.

METHODOLOGY

Longitudinal Approach

The study employs a mixed-methods approach, utilising both qualitative and quantitative empirical research, and incorporating conceptual and analytical systems of data collection, given the recognised dynamics of empirical evidence in curriculum design and education policymaking (Bustillo and Patrinos, 2023). The appended data on issues related to academic misconduct serve as the primary motivation for this study. In terms of the gravity of the cases (Appendix 1a), a cumulative effect is expressed as “Intensity” in Figure 2A (Appendix 2), considering the domino effect the past cases have on the emerging issues (Appendix 1b). The issues were collected by gathering expert opinions, analysing literature on research and current issues, engaging in dialogue, and maintaining a record of information over a 35-year time span. Table 1A (Appendix 1a) condenses misconduct and other disciplinary cases involving public university students in Malaysia. Due to the observed cumulative trend of misconduct as the work culture is passed on to the next generation, the number of cases from individual terms is summed over the years.

The qualitative data gathered expert opinions from individuals aged 17 to 95, including book authors, a historian, and scientists, all of whom are associated with the education sector. Respondents’ identities are treated with confidentiality. Data interrogation was executed indirectly by longitudinal monitoring of responses. For personal interaction, a two-year interaction was made through kinship. Expert opinion of public figures, on the other hand, was charted for over 35 years. An example of findings can be extracted from https://www.youtube.com/watch?v=eKRP_z7R4Lg.

International Metrics and Circularity Practices

The primary data sources were supplemented with quantitative statistical data from specialised literature. The trend is cross-checked with PISA 2022 and PISA 2025 to compare developed nations with the three grappling nations, using the Times Higher Education ranking, Freedom of Speech (FOS), Corruption Index (CI), Global Innovation Index (GII), and qualitative tracing of the detected circularity practices in talent management. The countries’ performances are mapped to the accessible information on circularity implementation in teaching and practices.

Programmes organised by nations implementing the circularity principles and commercial practices in the tertiary curriculum and industrial practices were reviewed. In addition to education topics on circularity, elements such as teaching methods to instil circularity were captured and translated into tangible outputs. The country's educational standing is evaluated based on the performance of its youth in international assessments, compared to the behavioural aspects of adults related to FOS and the CI. Twenty-nine countries, which achieved above-average scores in the PISA 2022 ranking, served as the basis for comparison. The analysis is designed to assess the intellectual achievement of working adults managing the industry and the youth whom the adults are grooming.

The rich content of ERASMUS’ boosting bioeconomy initiatives, which are part of the curricular projects of higher education institutions (HEIs) established by approximately 20 European countries and several Asian partners, was analysed. Like the harvestable impact of the MAKING4.0 projects described elsewhere (Ghazali & Zbiec, 2022), the contents of FOEBE (Fostering Entrepreneurship for a Sustainable and Innovative Bioeconomy) and CLABIO (Creative Learning for Boosting Bio-Economy within HEIs’ Curricula) were analysed to capture the transformative elements for incorporation in and recommendation from the current study.

Asia-Pacific Economic Cooperation, APEC, 2024 Workshop, *Promoting Circular Economy in the Construction Industry within the APEC Region Using Industrial Symbiosis Approach*, wrapping up the critical assessment of circular industrial practices, was analysed to chart the advanced achievements, challenges, and solutions, implying the nations’ acumen in troubleshooting circularity issues to actualise the ideas for sustainability. All selected projects are now mature zero-waste startups that have successfully commercialised and stood the test of time to date. The maturity of practices and curricular commitment is tracked against the aforementioned global metrics, such as GII, CI, and FOS, for a fair assessment.

RESULTS AND ANALYSIS

EU Championing Circularity Talent through Curricula & Pedagogy

Industrial sustainable practices related to circularity are emerging, with Poland, Austria, Germany, Italy, Lithuania, Hungary, the Czech Republic, and Croatia recording industrial success (ICE, 2023) by bolstering efforts to reduce waste use and dependency on new materials. The 2024 Environmental Performance Index (EPI), based on the waste recycling rates, ranked Switzerland with 100%, followed by Denmark at 99.9%, Finland at 99.4%, and Sweden at 99.2% among the top five (WPR, 2024). The fruit of EU3.8 billion funding, which enables the circular bioeconomy (CBE) implementation from the European Investment Bank (EIB, 2024). Specifically in capacity building, various EU-funded projects, especially within Horizon programmes, address broader aspects of the bioeconomy from a scientific perspective. They prepare and turn ideas into manageable blueprints, which

subsequently translate into directives. Initiatives like Transition2Bio (<https://www.transition2bio.eu>) build upon the most relevant communication and education.

EU-funded projects and initiatives play a pivotal role in advancing the updated EU Bioeconomy Strategy, driving the transition toward a more sustainable and resilient Europe. Bioeconomy alliances, such as the European Bioeconomy Network (EuBioNet <https://eubionet.eu>), are proactive alliances comprising 150 EU-funded projects and initiatives focused on promoting, communicating, and supporting the bioeconomy. The primary objectives of such initiatives are to maximise efforts, increase knowledge sharing, foster networking, facilitate mutual learning, and coordinate joint activities and events.

From an educational standpoint, it is necessary to mention initiatives like the European Bioeconomy University, EBU (<https://european-bioeconomy-university.eu>). An alliance of eight leading European universities works as an umbrella for other initiatives. Not only is EBU a think tank for knowledge generation, but it is also a creative hub for knowledge transfer, transforming diversity into creativity. EBU offers a wide range of study programmes on the master's level as well as individual modules covering all thematic areas of the bioeconomy, including agriculture, animal and primary production, food, forestry, biology and biotechnology, marine, ecology, numerous engineering topics, and many others, including classic university degrees like economics.

Other activities, such as FOEBE and FOEBE+, are ERASMUS projects focused on equipping bioeconomy students with sustainable entrepreneurship skills, thereby accelerating the European expansion of the bioeconomy sector. These projects focus on designing skills portfolios and curricula for entrepreneurship in the bioeconomy, teaching practices, creating a dedicated eLearning platform with add-on modules, and conducting mixed-mode training. Courses conclude with an Intensive Study Week, which has been organised so far in Bologna, Warsaw, and Wageningen (Figure 1). During these weeks, students have attended complementary lectures, conducted site visits, and completed a final project that led to a startup idea.

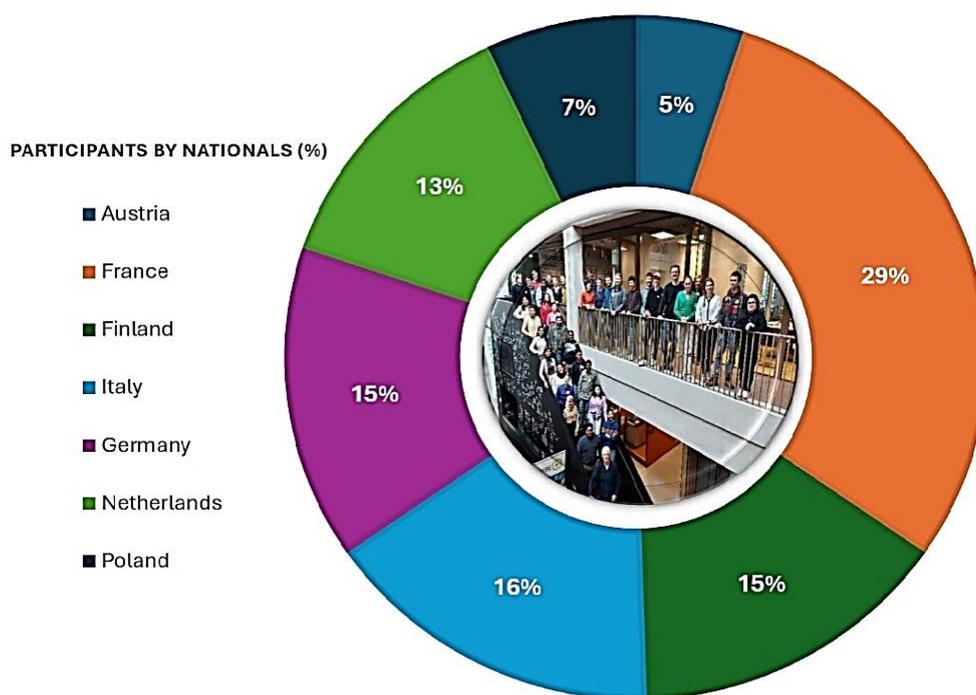


Figure 1. FOEBE participants by their nationals, at the university-led entrepreneurial mentorship programme in Europe (Wubben, 2024).

Through the programme, students are scaffolded by mentors and practitioners. The polished versions of the project output serve as a prototype for students to translate into their entrepreneurship or startup. The history of success (startups, employment in startups, and awards) can be traced on LinkedIn groups, where cohort members are usually connected, reporting activities, reviewing courses, and sharing achievements and success stories.

The earlier-stage education initiative by the Creative Learning for Boosting Bio-Economy within HEIs' Curricula (CL4BIO) project aims to bring together educators and students from diverse backgrounds to explore the intersection of bio-economy and Creative Learning Methodology (CLM). The project aims to inspire the next generation of students by providing a unique learning experience, where participants will have the opportunity to engage in hands-on creative learning tools, cutting-edge research, and collaborative projects. At the time of writing, the extent of the effort is in the analysis progression. The team is experimenting with developing teaching practices

for lecturers, designing training modules for trainers, and learning practices for teachers. The continuous sharing of good practices on creative learning and bioeconomy by experts is pivotal. The recent in-person meeting on *Active Learning and Teaching* at the University of Aveiro, Portugal, which engaged undergraduates and educators in an “Open Workshop,” is one illustration. A wealth of information on subsequent events, descriptions, and testimonies is presented in the blog at <https://cl4bio.web.ua.pt/index.php/category/news/> and on the LinkedIn group.

Known for championing TVET (Technical and Vocational Education and Training) and the circular bioeconomy through the TVET ERASMUS project, the leading EU countries (Figure 5) continually seek to enhance manpower and industrial capabilities. EU experts aim to promote circularity in the curriculum (Drejerska, 2024; Cavallasca, 2024) by incorporating not only science topics related to circularity but also pedagogy, continuous assessment, and experiential learning. A fascinating insight into accepting rejection as a means of empowerment, combined with the unwavering concept of teachers wearing various hats, provides a wealth of corrective avenues within the learning ecosystem. The idea reemphasises educators’ devotion and awareness in engaging with the student’s learning process as coach, mentor, peer, and counsellor to facilitate meaningful learning.

Vocational activities offered at Centres of Vocational Excellence (CoVEs) are another model. CoVEs aim to drive innovation and excellence in vocational education by bringing together a spectrum of local partners. They strive to provide high-quality vocational skills, support entrepreneurial activities, diffuse innovation, and act as knowledge and innovation hubs for companies, particularly SMEs. Initiatives like the Allview project and the CoVE for the European wood and furniture industry were developed by the European Commission under Erasmus+ Key Action 3. A large consortium of 22 partners from the EU undertook a complex activity, aiming to address new and emerging challenges for the sector, including digitalisation, Industry 4.0, circular economy, and corporate social responsibility. Activities consist of mapping companies, HEI and VET schools, and connected organisations, and bringing them together with numerous activities, starting from independent add-on courses, student and teacher exchanges, innumerable publications and workshops, ending with connecting online platforms providing educational content for schools and companies, professional support, and securing jobs within EU companies. The said activities are traceable at <https://allview.eu>. Pedagogical effectiveness is critically emphasised in the mentioned projects. On-site programmes that enable student-entrepreneur interactions are also highlighted, enriching pedagogies with online, in-person, and hybrid learning modes tailored to learning needs.

A balanced teacher-centred and student-centred approach (Newman & Gentile, 2025) would enhance the effectiveness of learning. Enabled by a massive private monetary injection, one of the first University-in-Industry, with a focus on logistics, offers a similar student-SME interaction. Availed by a Malaysian logistics company collaborating with a UK University. Big names in the sector participate in the “millionaire mentorship”, training students to skilfully serve the logistics and related industries in their race to cultivate youths with Industry 4.0 skills. The pioneering step is proactive remedial action for preparing youths who intend to pursue a career in logistics.

Circularity Champion and Challenges in the APEC Block

Hempblock, Block Texx, and Sustainability Victoria (Shooshtarian, 2024) are industrial symbiont partners in the construction industry that have identified challenges and outlined strategies for thriving through accounting hiccups. Australia’s highest-emission construction industry has now defined solutions through circular economy principles, simultaneously complying with the four ISO standards developed by the EU (Shooshtarian, 2024). With a similar philosophy, AgriProve is Australia’s first soil carbon farming to reduce emissions and enhance agricultural productivity (AgriProve, 2024).

In Southeast Asia, Singapore has set a high benchmark for resource management efficiency, as evidenced by its lowest waste volume among other Asia-Pacific Economic Cooperation (APEC) partners (Figure 2). Zero Waste SG (2024) is an example of a firm creating a zero-waste, resource-efficient atmosphere that transforms Singapore into a glorious land of profit from trash-for-cash. For the past half-decade, Singapore has been waste-free, as incinerated solid waste (Liu, 2024) is converted into bricks for road construction, while the gases are utilised for electrification, enabling closed-loop resource management. With the incineration with energy recovery, IER, Singapore, secured a 96.7% score for the Environmental Performance Index, EPI (WPR, 2024). Despite being a tiny red dot on the world map, Singapore's trash-free status reflects its successful execution of circularity, proving its talent for actualising a circular economy.

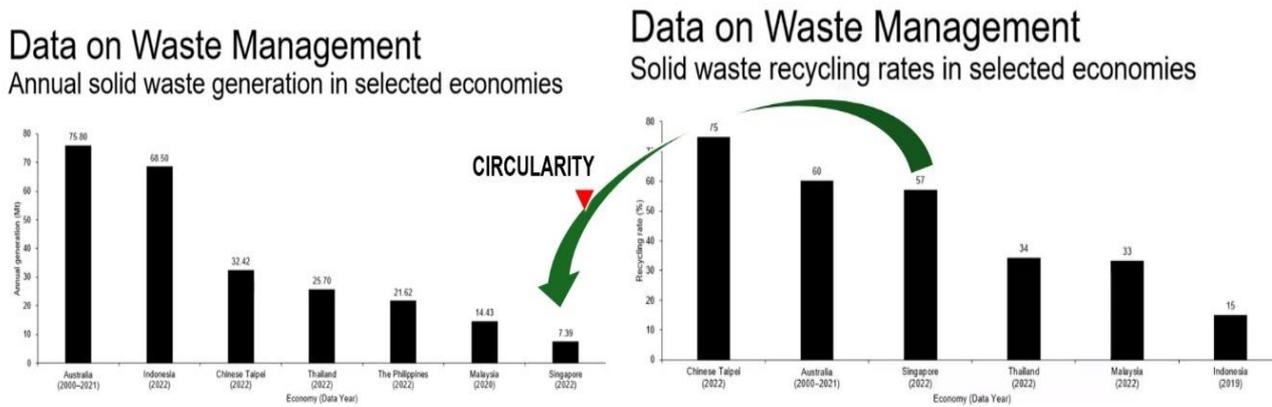


Figure 2. Construction industrial waste as a source of wealth through recycling (Al-Qudsy, 2024).

Despite contributing 0.03% to GDP from agriculture (Tradingeconomics, 2025), Singapore, through its synthetic biology nexus, offers a window for a circular bioeconomy. The biotechnology start-up, Allozymes, focusing on bio-product manufacturing (SEDB, 2023) to curb food security issues, correlates with intellectual achievement measured in the Global Innovation Index, GII, and other matrices built upon talent gauges such as THE, as well as PISA 2022 (Figure 3), repeatedly with circular bioeconomy deployment. A sneak peek at the youth performance seems to suggest the merit of Singapore as a nation.

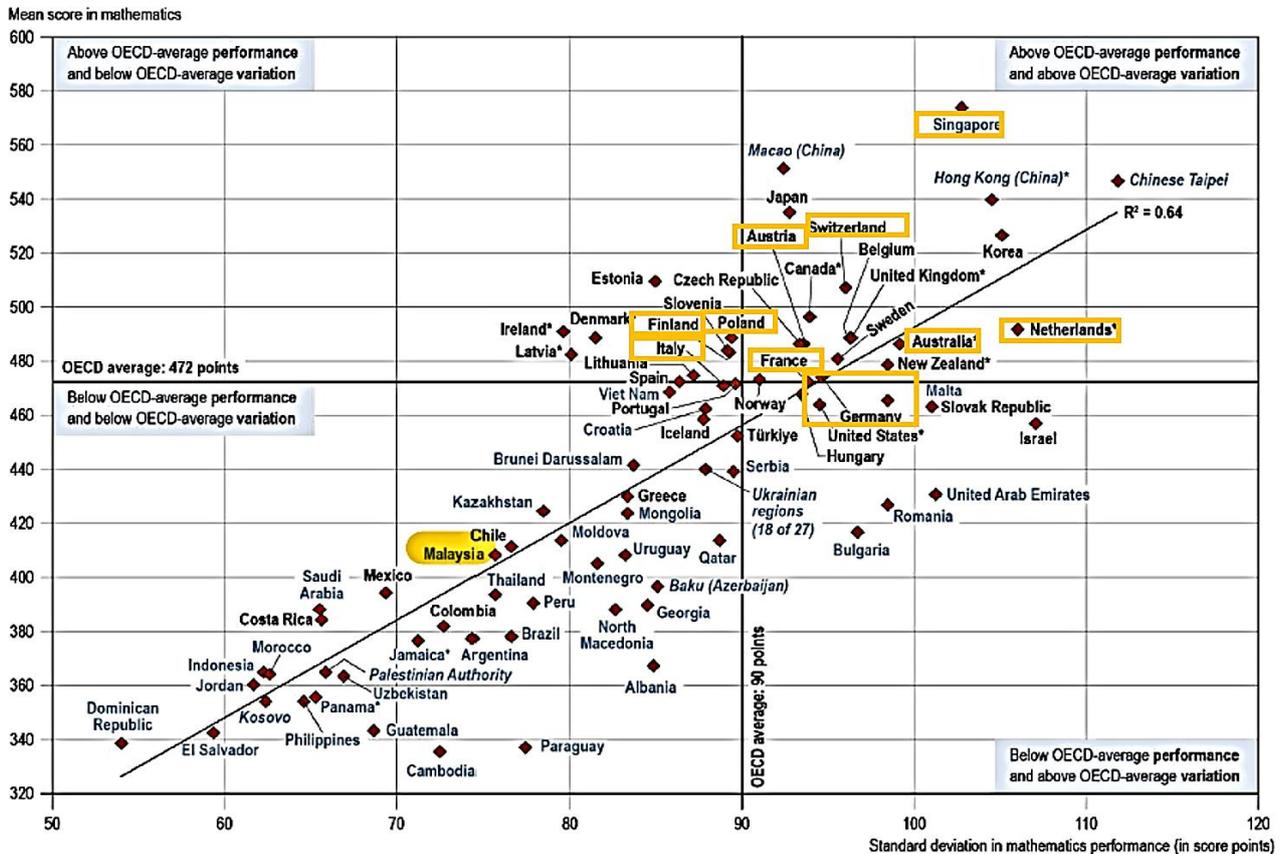


Figure 3. Teenagers' performance in PISA 2022 Mathematics is the gauge of creative thinking needed in problem-solving (OECD, 2023a; OECD, 2023b).

The success of the top-tier countries' strategy of having at least one university ranked among the world's top universities (THE, 2024) demonstrates a proven approach to achieving learning outcomes. The fruit implies the nation's adult contribution to generational intellectual maturity. Most of these nations champion circularity practices and are featured in the World Population Review (2024b) EPI rankings.

Critical agro-commodity exporters, Malaysia, Thailand, and Indonesia, face challenges such as poverty affecting smallholders in rubber, oil palm, and paddy crops. Operational and marketing issues put farmers in debt, making earnings barely enough to cover expenses. Suppressive elements, such as brokers or middlemen who earn

the most, have hardly been resolved. In paddy fields, harvesting and planting tools are leased, taxing poor farmers with unreasonable expenses. The elements of inequity have extended the polarity between the rich and the poor. Corruption and integrity issues may be the contributing factors. In such a situation, circularity practices that require adopting innovation and changing behaviour and farming culture may not be effectively adaptable. Figure 4 is evidence of mismanagement leading to uncalculated loss – the loss that remains unrealised without the awareness and fundamental knowledge of circularity. Open burning alone (Figure 4a) predicts resistance to change, which can be overcome by understanding the economic and environmental importance of circularity in carbon accounting.

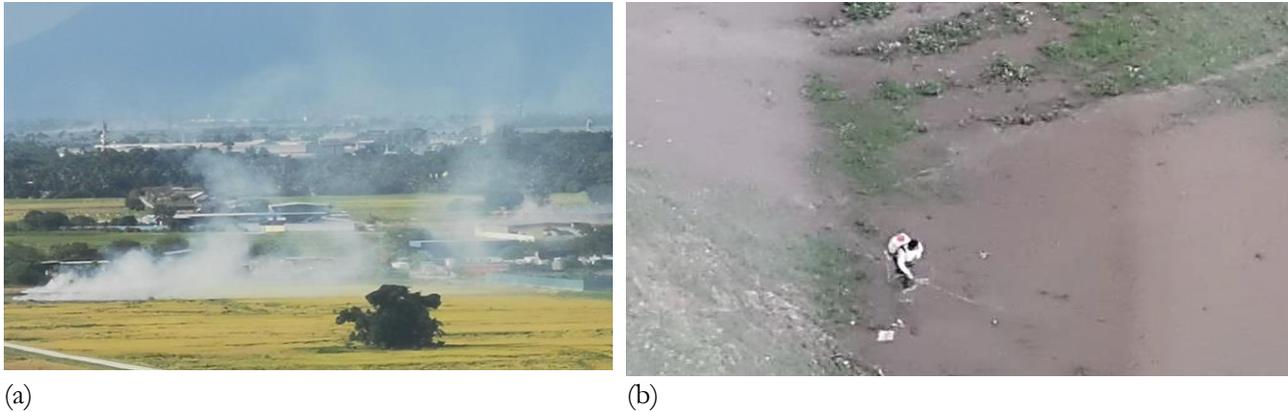


Figure 4. Disturbing paddy field landscape ensuing (a) rice straw open-burning on dryer days. The residue mismanagement adds to the emissions from (b) extensive pesticide use, seeping poisons into the human food chain.

Anokhin and Schulze (2009) identified corruption as one of the barriers to innovation, consistent with recent findings that report a hindrance to intellectual development due to academic cheating (Young, 2025; Deslauriers, 2025). A sneak peek at the CI for an impression of integrity is presented alongside FOS among the selected nations in Figure 3, which are superimposed to illustrate the overall trend.

The nations with a general impression of thinking talents (Figure 3) generally show more leeway in expressing their thoughts (FOS in Figure 5). Non-stringent dominion over the citizens, as indicated by freedom of verbal expression, provided a favourable impression of the ruling system. In this regard, Carmichael (2024) linked FOS with mental health, psychological growth, intelligence, and the ripple effect on political correctness and peace (Provocative, 2020). Malaysian youth, on this front, is failing mental health with staggering records of 60% depressive symptoms and 30% experiencing anxiety, and a 120% increase in youths having suicidal thoughts in 2020 (TYRES and UNICEF, 2024; WHO, 2025). Disciplinary cases that began in the 1970s (Long, 2020) escalated to unthinkable issues by 2025 (Shahar, 2025; BS, 2025; Sipalan, 2025; Business Today, 2025). Except for Singapore, whose data are inaccessible, the intellectually outstanding nations (including the 29 PISA2022 above-average nations) are the ones staging FOS and simultaneously achieving low corruption (Figure 6). Scientists, in this regard, illuminate the inverse relationship between intellectual standing and misconduct (Yang et al., 2005) due to the players' awareness of the risk and long-term repercussions.

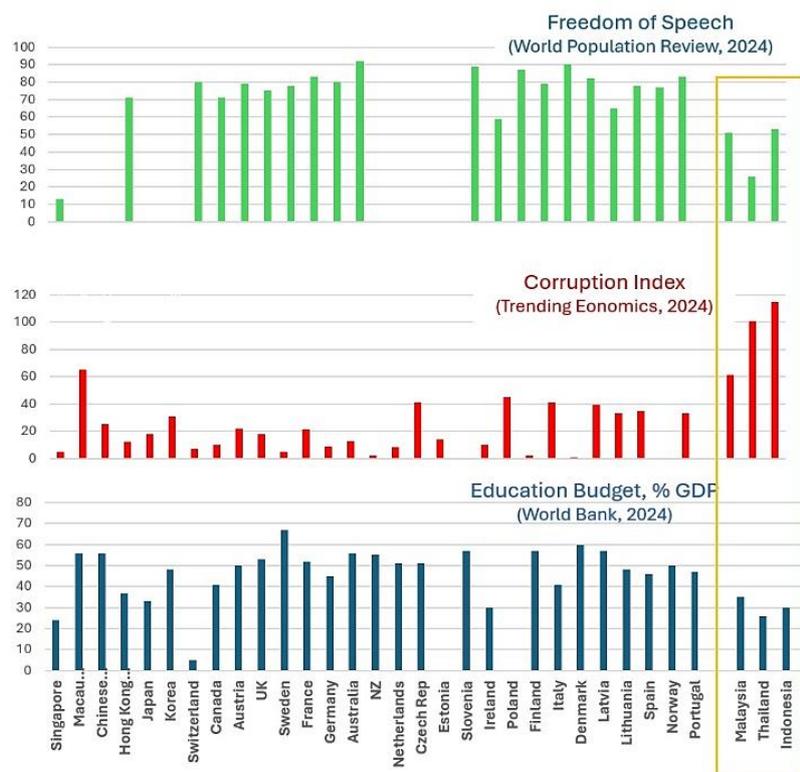


Figure 5. Trends in Freedom of Speech (FOS), Corruption Index (CI), and Education Budget, excluding the EU-funded projects.

The inverse relation between corruption and innovation (Anokhin & Schulze, 2009), as testified in Figure 5, also contributes to the slow-paced development of certain countries. In light of the lived reality presented in Figure 4, talents are also required to promote profitable, circular agro-residue management, addressing the persistent issues in post-harvest residue management. Mismanagement contributing to the emission and loss of carbon that should have been sequestered is an environmental and economic loss. With the continuous wastage and shrinking agricultural land (NST, 2024; Hamsudin, 2024; Pearce, 2023; Subedi et al., 2022; Liu et al., 2019; Liu et al., 2022; Prishchepov, 2020), the countries might be delisted as global exporters, especially under the unresolved pressures of middleman and wealth misuse at the critical downstream-upstream juncture connecting the players.

Understanding effective methods for soil fortification, mechanisation, the carbon cycle, carbon capture, and the impact of traditional practices on global warming is essential before engaging in open burning. In addition, adopting new practices will help farmers address disease and extreme weather challenges associated with climate uncertainties. Innovative solutions that reduce paddy field management costs can provide significant financial benefits. With their extensive experience, farmers are well-positioned to drive innovation and improve the EPI, which remains low for Malaysia, Thailand, and Indonesia at 32.2%, 26%, and 3.1%, respectively (WPR, 2024b). Since EPI includes waste recovery rates, coordinated efforts to convert waste into products are necessary.

The notable trends in FOS, CI, and Education Budget of high-revenue countries also show contrasting outcomes. Despite having the smallest GDP allocation for education, Switzerland topped the GII 2023 (Table 1), indicating a strongly embraced culture of innovation.

Table 1. Top 12 Countries for 2023 and 2024 Global Innovation Index, GII, and Environmental Performance Index, EPI.

2023 Rank by Economy		GII Score		2023 Rank by Economy		GII Score	
1	Switzerland	67.6		7	Netherlands	60.4	
2	Sweden	64.2		8	Germany	58.8	
3	United States	53.5		9	Denmark	58.7	
4	United Kingdom	62.4		10	Republic of Korea	58.6	
5	Singapore	61.5		11	France	56.0	
6	Finland	61.2		12	China	55.3	
2024 Rank by Economy		Score		2024 Rank by Economy		Score	
		GII*	EPI			GII*	EPI
1	Switzerland	67.5	100	7	Finland	59.4	99.4
2	Sweden	64.5	75.2	8	Netherlands	58.8	97.2
3	United States	62.4		9	Germany	58.1	98.9
4	Singapore	61.2	96.7	10	Denmark	57.1	99.9

5	U.K.	61.0	85.2	11	China	56.3	4.5
6	Republic of Korea	60.9	82	12	France	55.4	75.2

Source: GII (WIPO, 2023), GII* (WIPO, 2024), EPI (WPR, 2024b).

The inverse proportionality to FOS and CI creates a better focus on prominent areas. According to the Global Innovation Index (GII), Malaysia (36), Thailand (43), and Indonesia (61) appear to be making strides in non-agricultural sectors. Thailand and Indonesia's performances exceeded expectations for their level of development (WIPO, 2023). Despite the dire performance of youth (Shahar, 2025; Yatim, 2025), adult contributions to innovation and social enterprise represent a new avenue for talent craftsmanship. Technology licensing for circular food waste management (Guan et al., 2024) is trending in Southeast Asia, and such initiatives need to multiply to impact GII significantly. A detailed scrutiny of the licensed technology is necessary to avoid superficial assessments. Systems that recognise scholarship values, from the practices of evaluating students and educators, must be in place at their core to initiate a meaningful journey to sustainability. The corrective steps for nations that have fallen behind require meticulous groundwork to enhance the knowledge input process, which directly translates to improved performance in other sectors.

Groundwork for Preventing Systemic Talent Deficit through Circularity

Fostering creative problem-solving (and all the enabling factors) is key to a circular economy. The higher-order thinking skill needs to be nurtured slowly from an early age, and this process should formally begin in primary and secondary schools. When Prime Minister Goh Chok Tong envisioned quality education for Singaporeans, he initiated the Thinking School, Learning Nation (NLB, 2024) campaign in the 1980s. Put such a reskilling strategy in Malaysia, Thailand, and Indonesia through redesigned talent hubs that nurture thinking and integrity, the desirable output may be expected to surface in 10-20 years. Notable is the domino economic loss arising from a serious numeracy error of Malaysia's commercialisation projects (Ghazali et al., 2024) involving the use of oil milling residue. The record sent a shockwave to the already declining commercialisation activities, reducing them from 8% to 5% (MRANTI, 2021). The rising momentum of 8%-9% (MRANTI, 2023; TEW, 2024) is portrayed by sectors attracting all-time bright talents. Still, the performance is inferior compared to the rates achieved in Korea and China (30%), as well as in highly developed nations like the United States of America and Japan, both of which record a 60% rate. Besides remodelling schools, HEI recruitment and promotion processes must also consider foundational literacy and numeracy skills (Figure 6) in the critical decision-making steps. In their analysis of global national education rankings, Hayasyi et al. (2025) used benchmarking against international metrics as the first step to improve youth education performance. Focus on learners' foundational literacy and numeracy skills (LNS) was envisioned as a way forward, in agreement with the plan to hand over the teaching task to skilled next-generation teachers. In this regard, the higher-scoring Vietnamese student population demonstrates readiness for an advanced imagery (Quynh & Tri, 2025) approach to idea synthesis and communication, which doubles learning enthusiasm and creativity.

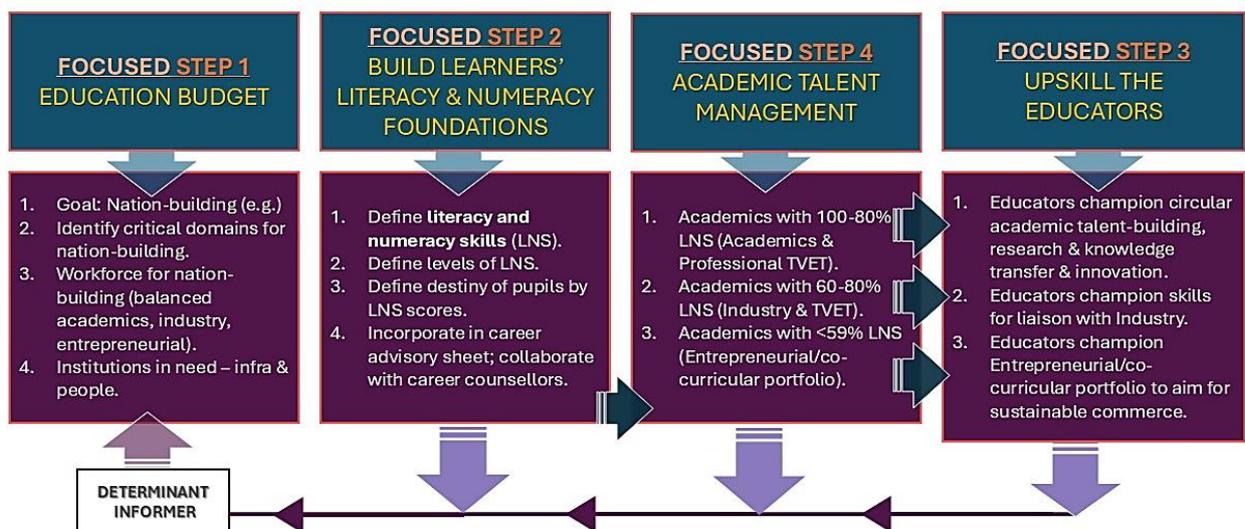


Figure 6. Corrective measures for the fallen system aim to address the foundational skills of teachers and learners, ensuring continuous talent development and preventing resources from going to waste.

Defining skilled intellectuals as a national need is the cornerstone to cease dysfunctionality. For a talent development programme to be sustainable, it must provide the necessary skills to the human resources. From a corrective strategies standpoint, reskilling or upskilling may be costly due to system shutdowns necessary for

educator training. Reshuffling the existing critical mass may be a more rational approach, given the educator's readiness to function based on their already built strengths. By relocating to portfolios relevant to the group's strengths (Focused Step 3, Figure 6) and resetting the KPIs to achieve realistic goals, HEI will serve its customers efficiently. In resource-efficient talent management, false claims of achievement—a form of misconduct—can be reduced while simultaneously enforcing integrity in the sector, necessitating amendments.

Analysis of the timeline described by Sirat (2023) reveals that Malaysia achieved its educational splendour when teachers belonged to the baby boomer generation and early Gen X. The national policy at the time mandated that youths study abroad to bring back the knowledge, skills, and values learned from developed nations. In the local scenario back then, teaching was a pleasurable profession (Disha, 2025; Fullfabric, 2025), and academic dishonesty was relatively insignificant, not to the extent of causing the systemic fatigue (Shahar, 2025) that is encountered today. The outcome of strong foundational literacy and numeracy skills was achievable, as evidenced by the low failure rate of Malaysians studying in Australia and the United Kingdom, particularly in the 80-100% qualitative, in-person examination systems.

Deploying an innovative system for the rectification process is not an option, as it involves detoxification (Wolor et al., 2022). The uneconomic cost of poor talent management (Drouvelis & Pearce 2023; Santini, 2024) is also reflected in the high education budget (Figure 5) not translating to high-performing youths and high-performance HEIs. A circular economy in talent management, therefore, requires careful selection, robust assessment, and boldness to eliminate the unskilled from the core educating roles. Earlier analysis (Ghazali & Fadzlee, 2024) reveals an inverse correlation between misconduct and the global ranking of mature institutions, re-emphasising the importance of acting against all forms of misconduct to restore the high ethical standards of an educational institution.

A clear talent management scheme aligns educators' KPIs with national needs as instructed by the set KPI. Tailoring the reward system with transformation efforts is a valuable step for national empowerment. A good performance management ecosystem that ensures work value compatibility will attract skilled manpower and reduce brain drain (da Azevedo, 2022). Without such a move, the multidisciplinary nature of circularity, which requires a work culture that bridges technological gaps and fosters innovation and implementation of a circular bioeconomy across various sectors, is diminished. A significant focus on literacy skilling will be the cornerstone mandated for the national think hubs. For a circular economy to be actualised, meticulous empowerment from reassessing skills for reshuffling (Focused Step 3, Figure 6) and realigning the moral and technical compass, leading to educators' functionality (Focused Step 4, Figure 6), must be in place.

In the context of pure nation-building that embraces social responsibility, the necessary intersection of cross-sectoral sciences and arts must be actualised, while the misconception of agriculture as a sector for the poor and uneducated (Pearce, 2023; Miwil, 2024) needs to be reworked. Table 2 illustrates a unique correlation between the modern agriculture practices of high-revenue nations and their minimal dependency on agricultural production, as shown by the low percentage of GDP, except for China.

Table 2. Agricultural Prominence versus Land Use.

Agricultural National vs % Land Use		GDP (%)	Agro-Produce
Australia	55	2.7	Cereals, grains, seeds, Legumes.
Austria	32	1.4	Wheat, Maize, Soybean, Sunflower (oil).
China	55	7.1	Rice, Wheat, Potatoes, etc.
Denmark	65	1	Cereal, Barley Grains.
Finland	6.5	2.3	Dairy, Cereals, Potatoes.
Italy	42	2.1	Olive, Fruits, Vegetables.
Japan	20	1	Rice.
Netherlands	66	1.5	Cereal.
New Zealand	40	6	Meat, Dairy, Wine, Dairy, Fruits.
Poland	50	2.1	Rye, Potatoes, Grains.
United Kingdom	69	0.6	Wheat, Barley, Potatoes, Vege.
Malaysia	16	7-9	Rubber, Palm Oil, Cocoa.
Indonesia	34	13	Palm Oil, Coffee, Rice, Cocoa.
Thailand	46	8.8	Rice, Palm Oil, Sugarcane, Cassava.

While farming is unpopular among youths, including Malaysians, Indonesia is blessed with talented youths devoted to creative, modern agriculture, promising a positive change in the near future (Pearce, 2023). Consistent with FOS and CI trends, developed nations with a positive track record in implementing the circular bioeconomy also set a hallmark for advanced agricultural practices through numerous initiatives, including the mentioned EU capacity-building projects. Plausibly due to immense intellectual achievements, sectors like manufacturing and services are booming, reducing dependence on agro-production. The dependency of GDP on agro-produce is

risky unless climate-resilient technology is adopted. Readiness to adapt to modern next-generation farming also happens through today's talent management.

On a similar score, Turkiye's commitment to erect an agrovoltaic (AV) system for 2-in-1 cash crop and energy generation demonstrates a bootstrapping strategy to generate profit by capitalising on situational issues (like heat waves and global warming). The Turkish talents advocate for realising the idea first coined by two German scientists, Goetzberger and Zastrow, in 1982, for the sector to maximise the heatwave and excessive solar (Figure 7) for growth (Cosgun et al., 2024).

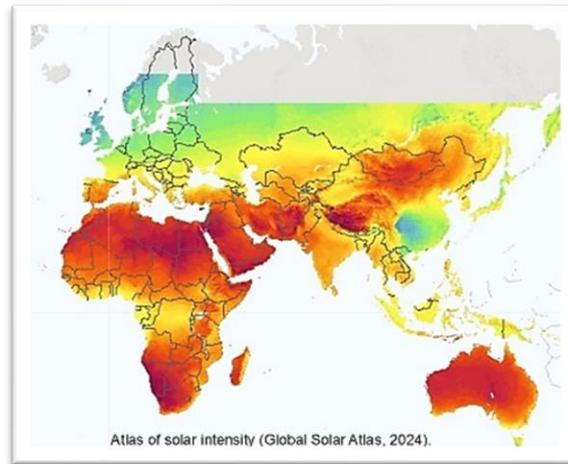


Figure 7. Regional map with solar intensity indicator bootstrapped at scale by the Turkish.

Similarly, regions blessed with a wealth of rain should consider harnessing the embedded energy to store the harvestable power. Ao et al. (2025) reported the possibility of capitalising on rain for electricity generation in this regard. The concept, based on a nature-gifted precursor, can be proven practical in off-grid, decentralised systems, demonstrating the feasibility of a green transition, analogous to electrification attempts through decentralised biofuel use elsewhere in forest regions (Halis et al., 2024). Besides aligning with resource efficiency, the strategy may be effective in ruling out flood-related issues (Firdaus, 2020; Gaiss, 2023; Hall, 2023; Zhang et al., 2023; Bernama, 2024a; Zulkifli, 2024) and power outages. Bootstrapping is indeed the way to thrive in circularity, and addressing concerns over talent shortages due to KPI-nation-building misalignment means pausing and reversing the development of foundational skills. Data that educators may be reluctant to discuss is just as essential.

CONCLUSION AND RECOMMENDATION

In essence, countries that invest in education and talent development lead in industrial, agricultural, and new technology sectors through capacity building. In talent management, circularity refers to grooming talent effectively, much like strengthening industry and modern agriculture, by reducing waste and extending the useful lifespan of resources. A nation's readiness is a significant obstacle to applying circularity. While metrics like FOS, CI, GII, and EPI predict capacity for circularity, European countries stand out with their strong knowledge transfer and hands-on support for circular economy startups and industrial growth, offering a model for quality education. Nations struggling with youth disengagement and weak thinking skills should review and improve educators' foundational skills. This avoids closing institutions, which would worsen student disinterest. The goal is to reduce waste from big budgets with low achievement. Missing the right opportunities risks further waste and could harm an already fragile sector. Clearly defined national needs and goals can guide the rebirth of talent hubs and help revive the roles of higher education. This can help create circular talent for cross-sector innovation and support a reservoir of creative, modern solutions.

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APPENDIX 1a

Table 1A. Talent Development Issues and Problem Statement.

#	Year	HEI Issues				
1	1970s	Increasing disciplinary cases in public schools (Long, 2020)				
2	1980s (late)	(a) "Quota system" imposed upon foreign Malaysian students by aware nations. Narratives from the funding body. (b) International matriculation students are routed to Canadian universities due to quota. (c) Fine-tuning of the International Matriculation in Malaysia – quota system lifted. (d) National examination leak issue (confessed in 1992-1993)	Metrics in Check: <ul style="list-style-type: none"> • PISA2022 – for selection of developed nations vs the three grappling nations. • Time Higher Education ranking • Freedom-of-speech • Corruption Index • Commercialisation Rate • Circularity Practices • Grappling nations versus developed nations. 			
3	1990s	(a) Collusion plagiarism involving MFC - snapshot from an international lecturer. (b) Domino effect: 2(d) translating into MFC cheating and inability to independently produce originals in varsity and planning postgraduate cheating in the home country (c) Contract cheating (MFC) (d) Plagiarism amongst MHC in a Malaysian university raised quality questions. Systemic paralysis was projected.				
4	2000s	(a) Verbatim plagiarism in students' written assignments. (b) Instructions on skill outsourcing for laying year-end output. (c) Quantitative analysis of staff - reliant on number, not academic skills.				
5	2010s	(a) University staff leaked the national examination questions. (b) Income generation recognised and set as a prerequisite for promotion (THER score for teaching 43%; Industry 53%; Research Environment 27%).				
6	2020s	(a) Cases of plagiarists allowed to pass project-based assessment by silencing and backfiring the supervisor as assessor. (b) Leak of examination question involving international university due to time zone. (c) Plagiarism Backfire: Supervisor failing student for misconduct lost court trial. (d) Repercussions of misconduct surfacing in PISA2022, THER. (e) Indirect confession of copying and cutting corners ("taking") in navigating promotion - ASEAN online programme. (f) High-ranking university publicised misconduct and the ensuing penalties (Retraction Watch). (g) Uncontrolled misuse of ChatGPT by students and staff. (h) Academic misconduct resolved with lenient legal order - SEA. (i) Disciplinary Issues (Murder, Bullying, etc. involving HEI public university students) – 2025. Examples 'My son was beaten' – Mum rejects seizure claim in cadet death, 6 former cadets in M'sia sentenced to death for murder of schoolmate, victim's parents grateful - Mothership.SG - News from Singapore, Asia and around the world.				
MFC	≡	Malaysian students in foreign countries.		MHC	≡	Malaysian students in home country.
PISA	≡	Programme for International Students Assessment		SEA	≡	Southeast Asia
THE	≡	Times Higher Education		THER	≡	Times Higher Education Ranking.

APPENDIX 1b.

Total Undergraduates Students by Rounded Numbers for Assessing Learning Culture in 19 Years (Appendix 1a items 4-6).

Project	Subject Code	Year	Student Count
10 (IWA313)	IWK307+IWA383	2006	10+80
10 (IWA313)	IWK307+IUK303	2007	50+50
10 (IWA313)	IWK307+IUK303	2008	30+50
10 (IWA313)	IWK307+IWK103	2009	30+50
5 (IWA313)	IWK307+IWK103	2010	30+50
5 (IWA313)	IWK307+IWK103	2011	30+50
5 (IWA313)	IWK307+IWK103	2012	30+50
5 (IWA313)	IWK307+IWK103	2013	20+20
5 (IWA313)	IWK307+IWK103	2014	20+20

2 (IWA313)	IWK307+IWK103	2015	15+20
1+6 (IWA313 + SHE101)	IWK307+IWK103	2016	20+20
1+6 (IWA313 + SHE101)	IWK307+IWK103	2017	20+20
1+6 (IWA313 + SHE101)	IWK307+IWK103	2018	20
1+6 (IWA313 + SHE101)	IWK307+IWK103	2019	10
1+4 (IWA313 + SHE101)	IWK307+IWK103	2020	5
1+4 (IWA313 + SHE101)	IWK307+IWK103	2021	15
2 (IWA313 + SHE101)	IWK307+IWK103+IWK204	2022	15
1+8 (IWA313 + HFE224)	IWK307+IWK103+IWK204	2023	30+50
3+7 (IWA313 + HFE224)	IWK307+IWK103+IWK204	2024	36+70
4+8 (IWA313 + HFE225)	IWK307+IWK103+IWK204+IWK100	2025	24
80 PROJECT STUDENTS			1060
GRAND TOTAL OF 1000 UNDERGRADUATE STUDENTS*.			

Note: *Sample size allowing coaching, kinship, and understanding learning culture/challenges.

Appendix 2. Impression from Longitudinal Data: 2-35 Years Kinship & Analysis.

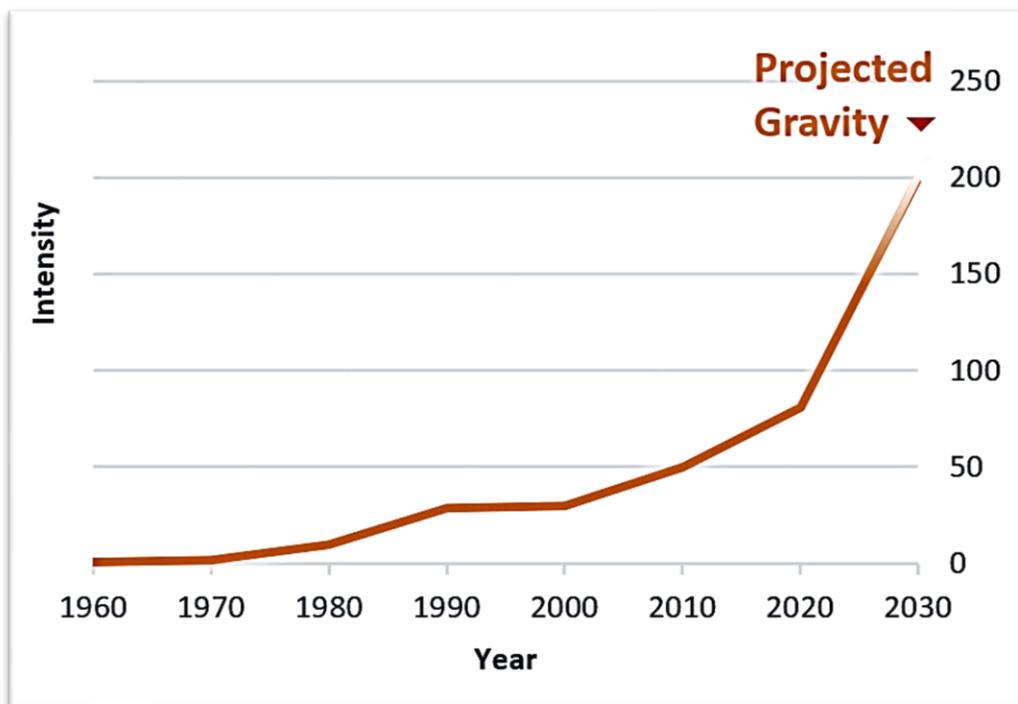


Figure 2A. Accumulated academic misconduct cases are projected to intensify if policymakers do not take action.