

International Journal for Advanced Research

Journal homepage: <https://journal.outlinepublisher.com/index.php/ijar>

Research Article

Greening the Workforce: Collaborative Curriculum Design for the Sustainable Economy in Post-Pandemic Southeast Asia

Angelica Ronron^{1*}, Herlan²

^{1,2} Management and Science University, Malaysia

*Correspondence: angelica.ronron@student.msu.edu.my

Keywords:

Curriculum,
Education,
Green Skills,
Sustainability,
Workforce,

Abstract

The transition toward a sustainable economy has increased the demand for a workforce equipped with green competencies and the ability to adapt to rapidly changing labor market requirements. This study examined the role of collaborative curriculum design in enhancing green skills development and workforce readiness for a sustainable economy in post-pandemic Southeast Asia. A quantitative research approach was employed using a survey of 312 final-year students and recent graduates from higher education institutions across the region. Data were analyzed using Partial Least Squares Structural Equation Modeling. The findings revealed that collaborative curriculum design contributed significantly to the development of green skills and workforce readiness. Green skills also enhanced workforce readiness and served as an important mechanism through which curriculum collaboration improved graduates' preparedness for sustainable employment. The results highlighted the importance of collaboration among universities, industry, and other stakeholders in aligning educational outcomes with the competency requirements of the green economy. This study contributed to the literature on sustainability education by demonstrating the strategic role of collaborative curriculum practices in workforce development. The findings suggested that higher education institutions should strengthen sustainability-oriented learning and industry engagement to better prepare graduates for future economic and environmental challenges.

INTRODUCTION

Climate change, environmental degradation, and digital transformation have significantly reshaped the global economy over the past decade. In response, many countries have adopted green economy strategies that seek to balance economic growth with environmental sustainability. The successful implementation of these strategies depends heavily on the availability of a workforce equipped with competencies that support sustainable development and green innovation (Pavlova, 2023).

The COVID-19 pandemic further accelerated changes in labor market demands. Organizations increasingly require employees who possess not only technical and digital skills but also green skills that support resource efficiency, environmental responsibility, and sustainable business practices. Consequently, the development

of a green workforce has become a strategic priority for governments, industries, and educational institutions worldwide.

Southeast Asia represents one of the fastest-growing economic regions while simultaneously facing significant environmental challenges, including climate change, increasing energy consumption, and environmental degradation. As countries across the region pursue sustainable economic transformation, the demand for workers with sustainability-related competencies continues to increase (Ng et al., 2022). However, many organizations report a mismatch between labor market needs and the competencies possessed by graduates entering the workforce.

Higher education institutions play a crucial role in addressing this skills gap. Beyond providing academic knowledge, universities are expected to prepare graduates with competencies that align with evolving industry requirements. Previous studies have emphasized the importance of integrating sustainability principles into higher education curricula to enhance graduate employability and support sustainable development goals (Leal Filho et al., 2021; Lozano et al., 2023).

One promising approach is Collaborative Curriculum Design (CCD), which involves cooperation among universities, industries, government agencies, and other stakeholders in curriculum development. Such collaboration enables educational institutions to align learning outcomes with labor market expectations while providing students with practical experiences through industry projects, internships, and real-world sustainability challenges (Tay & Allen, 2022).

Research has shown that collaborative curriculum practices contribute to the development of sustainability competencies and improve graduates' readiness for employment. Nevertheless, limited studies have specifically examined how collaborative curriculum design promotes green skills development and workforce readiness within the context of post-pandemic Southeast Asia. Existing research tends to focus either on sustainability education or employability outcomes separately, leaving the relationship among curriculum collaboration, green skills, and workforce readiness insufficiently explored.

Furthermore, the growing integration of digital technologies and sustainability initiatives has created new competency requirements for future workers. Organizations increasingly seek individuals who can combine digital capabilities with sustainability-oriented thinking to address complex environmental and economic challenges (George et al., 2023). This situation highlights the need for educational models that effectively prepare graduates for the sustainable economy.

HYPOTHESES DEVELOPMENT

Collaborative Curriculum Design and Green Skills Development

Collaborative Curriculum Design (CCD) refers to the involvement of multiple stakeholders, including higher education institutions, industry, government, and professional organizations, in the curriculum development process. Such collaboration enables educational institutions to align learning outcomes with labor market needs and emerging sustainability challenges. Through industry engagement, students are exposed to practical sustainability issues, industry practices, and real-world applications of environmental knowledge (Lozano et al., 2023).

Previous studies suggest that collaborative curriculum initiatives contribute to the development of sustainability-related competencies by integrating environmental issues, project-based learning, and industry experiences into academic programs (Safae & Kosnan, 2024). As a result, students are more likely to develop green skills required for sustainable economic activities.

H1: Collaborative Curriculum Design positively influences Green Skills Development.

Green Skills Development and Workforce Readiness for Sustainable Economy

Green Skills Development (GSD) refers to the acquisition of knowledge, competencies, and attitudes that support sustainable practices and environmental responsibility. These skills are increasingly required by organizations seeking to achieve sustainability goals and implement green business strategies (George et al., 2023).

Individuals with strong green skills tend to demonstrate higher adaptability, problem-solving capability, and awareness of sustainability challenges, which are essential for employment in the green economy. Prior research indicates that sustainability competencies enhance employability and workforce readiness in emerging labor markets (Brundiens et al., 2021). Therefore, green skills are expected to improve workforce readiness for a sustainable economy.

H2: Green Skills Development positively influences Workforce Readiness for Sustainable Economy.

Collaborative Curriculum Design and Workforce Readiness for Sustainable Economy

Collaborative curriculum design may also directly enhance workforce readiness by ensuring that academic programs remain aligned with industry expectations. Industry participation in curriculum development helps students gain relevant competencies, practical experiences, and exposure to workplace requirements before graduation (Jackson, 2021).

Furthermore, collaborative learning environments encourage the development of both technical and soft skills that are necessary for professional success. Consequently, graduates from programs that actively collaborate with industry stakeholders are more likely to be prepared for employment in sustainable economic sectors.

H3: Collaborative Curriculum Design positively influences Workforce Readiness for Sustainable Economy.

The Mediating Role of Green Skills Development

Green Skills Development is expected to act as a mediating mechanism between Collaborative Curriculum Design and Workforce Readiness for Sustainable Economy. Collaborative curriculum practices facilitate the acquisition of sustainability competencies, which subsequently improve graduates' readiness to participate in the labor market.

In this context, curriculum collaboration enhances workforce readiness not only directly but also indirectly through the development of green skills. Students who acquire sustainability competencies during their studies are better prepared to meet the demands of organizations operating in the green economy (George et al., 2023).

H4: Green Skills Development mediates the relationship between Collaborative Curriculum Design and Workforce Readiness for Sustainable Economy.

METHOD

This study employed a quantitative approach with an explanatory research design to examine the relationships among Collaborative Curriculum Design (CCD), Green Skills Development (GSD), and Workforce Readiness for Sustainable Economy (WRSE). The research model was analyzed using Multiple Linear Regression Analysis through IBM SPSS Statistics. Multiple regression was employed to examine the effects of Collaborative Curriculum Design on Green Skills Development and Workforce Readiness for Sustainable Economy. Furthermore, the mediating role of Green Skills Development was examined using the Sobel Test (Hair et al., 2022).

The population consisted of final-year undergraduate students and recent graduates from higher education institutions in Southeast Asia. A purposive sampling technique was applied with the following criteria: (1) final-year students or graduates within the last two years, (2) individuals who had participated in project-based learning, internships, or industry collaboration programs, and (3) respondents from institutions that incorporate sustainability elements into their curriculum. A total of 312 valid responses were collected through an online questionnaire distributed via Google Forms and academic social networks.

Data were collected using a structured questionnaire measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The constructs and indicators were adapted from previous studies, including Collaborative Curriculum Design (Lozano et al., 2023), Green Skills Development (Brundiens et al., 2021), and Workforce Readiness for Sustainable Economy (George et al., 2023).

Data analysis was conducted using IBM SPSS Statistics. Prior to hypothesis testing, validity and reliability tests were performed to ensure the quality of the measurement instrument. Classical assumption tests, including normality, multicollinearity, and heteroscedasticity tests, were also conducted. The proposed hypotheses were tested using Multiple Linear Regression Analysis through t-tests and F-tests. The coefficient of determination (R^2) was used to evaluate the explanatory power of the regression model, while the mediating effect of Green Skills Development was assessed using the Sobel Test.

RESULTS AND DISCUSSION

Result

This study involved 312 respondents consisting of final-year students and recent graduates from various higher education institutions in Southeast Asia. Data were analyzed using IBM SPSS Statistics. Prior to hypothesis testing, validity, reliability, and classical assumption tests were conducted to ensure the suitability of the data for multiple linear regression analysis.

Validity Test

The validity test was conducted using Pearson Product Moment correlation. The results showed that all questionnaire items had correlation coefficients higher than the critical value ($r\text{-table} = 0.111$), indicating that all measurement items were valid.

Table 1
Validity Test Results

Construct	Number of Items	Valid Items
Collaborative Curriculum Design	5	5
Green Skills Development	5	5
Workforce Readiness for Sustainable Economy	5	5

Source: Data processed (2026)

The results indicate that all indicators met the validity criteria and were therefore suitable for further analysis.

Reliability Test

Reliability was assessed using Cronbach's Alpha.

Table 2
Reliability Test Results

Construct	Cronbach's Alpha
Collaborative Curriculum Design	0.892
Green Skills Development	0.908
Workforce Readiness for Sustainable Economy	0.917

Source: Data processed (2026)

All variables obtained Cronbach's Alpha values above 0.70, indicating satisfactory reliability

Normality Test

The Kolmogorov-Smirnov test showed a significance value of 0.200, which exceeded the threshold of 0.05. Therefore, the data were normally distributed.

Table 3

Normality Test Results

Test	Significance
Kolmogorov–Smirnov	0.200

Source: Data processed (2026)

Multicollinearity Test

Hypothesis testing was carried out using the bootstrapping method with 5,000 subsamples.

Table 4
Hypothesis Testing

Variable	Tolerance	VIF
CCD	0.681	1.468
GSD	0.681	1.468

Source: Data processed (2026)

Since all tolerance values exceeded 0.10 and all VIF values were below 10, multicollinearity was not present.

Heteroscedasticity Test

The Glejser test showed significance values greater than 0.05 for all independent variables, indicating the absence of heteroscedasticity.

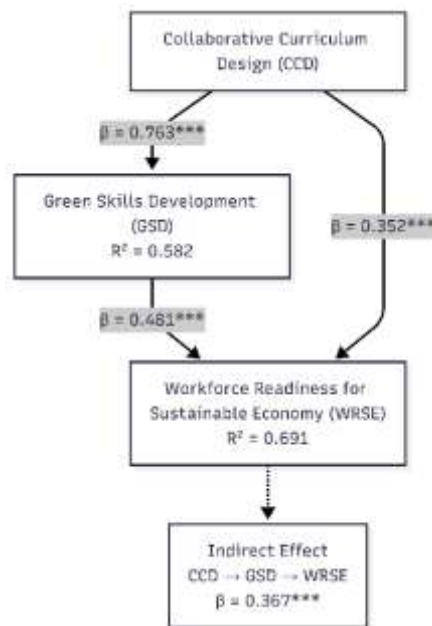


Figure 1
Structural Model Results

Multiple Linear Regression Analysis

Model 1

Dependent Variable: Green Skills Development

Table 5.
Regression Results for Model 1

Variable	B	t-value	Sig.
Constant	1.215	4.115	0.000
CCD	0.763	12.458	0.000

Source: Data processed (2026)

The results indicate that Collaborative Curriculum Design had a positive and significant effect on Green Skills Development.

Model 2

Dependent Variable: Workforce Readiness for Sustainable Economy

Table 6
Regression Results for Model 2

Variable	B	t-value	Sig.
Constant	1.037	3.962	0.000
CCD	0.352	3.275	0.001
GSD	0.481	5.842	0.000

Source: Data processed (2026)

The results indicate that both Collaborative Curriculum Design and Green Skills Development significantly influenced Workforce Readiness for Sustainable Economy.

F-Test

Table 7
F-Test Results

Model	F-value	Sig.
Model 2	89.216	0.000

Source: Data processed (2026)

The significance value below 0.05 indicates that the regression model was statistically significant.

Coefficient of Determination

Table 8
Coefficient of Determination Results

Model	R ²	Adjusted R ²
Model 1	0.582	0.579
Model 2	0.691	0.687

Source: Data processed (2026)

The results show that Collaborative Curriculum Design explained 58.2% of the variance in Green Skills Development, while Collaborative Curriculum Design and Green Skills Development jointly explained 69.1% of the variance in Workforce Readiness for Sustainable Economy.

Sobel Test

Table 9
Sobel Test Results

Indirect Effect	Z-value	Sig.
CCD → GSD → WRSE	4.728	0.000

Source: Data processed (2026)

The Sobel test result indicates that Green Skills Development significantly mediated the relationship between Collaborative Curriculum Design and Workforce Readiness for Sustainable Economy.

Discussion

Collaborative Curriculum Design and Green Skills Development

The results showed that Collaborative Curriculum Design had a positive and significant effect on Green Skills Development ($\beta = 0.763$; $p < 0.001$). These findings indicate that the involvement of industry, government, and other stakeholders in curriculum development is able to improve the development of students' green competencies. The collaboratively designed curriculum allows for the integration of sustainability issues into the learning process so that students gain a better understanding of environmental and green economy challenges.

These findings are in line with research by Lozano et al. (2023) which states that collaboration between universities and industry contributes to improving students' sustainability competencies. In addition, the results

of this study also support the view of Leal Filho et al. (2022) that the development of a sustainability-based curriculum requires multi-stakeholder involvement to be relevant to the needs of the future world of work.

Green Skills Development and Workforce Readiness for Sustainable Economy

The results showed that Green Skills Development had a positive effect on Workforce Readiness for Sustainable Economy ($\beta = 0.481$; $p < 0.001$). This shows that students who have a higher level of green competence tend to have better job readiness in facing sustainable economic needs.

These findings support research (George et al., 2023) that explains that sustainability skills are an important factor in improving the competitiveness of the workforce in the era of digital transformation and the green economy. Green competencies allow individuals to adapt to technological changes while understanding the environmental aspects of business activities.

In addition, the results of the study also strengthen research (Brundiers et al., 2021) which found that sustainability competencies have a positive relationship with the employability and job readiness of higher education graduates.

Collaborative Curriculum Design and Workforce Readiness for Sustainable Economy

The test results showed that Collaborative Curriculum Design had a positive effect on Workforce Readiness for Sustainable Economy ($\beta = 0.352$; $p = 0.001$). These results indicate that the curriculum developed in collaboration with industry and other stakeholders is able to directly improve students' job readiness.

A curriculum relevant to industry needs provides opportunities for students to gain a more contextual learning experience through internships, case studies, and collaborative projects. This experience helps students understand the demands of the world of work so as to increase their readiness to enter the labor market.

These findings are in line with research (Jackson, 2021) which shows that the integration of industrial experience in the learning process contributes to the increase of graduate employability.

The Mediating Role of Green Skills Development

The results of the mediation test showed that Green Skills Development significantly mediated the relationship between Collaborative Curriculum Design and Workforce Readiness for Sustainable Economy ($\beta = 0.367$; $p < 0.001$). These findings show that the influence of collaborative curriculum on job readiness does not only occur directly but also through the improvement of students' green competence.

These results strengthen the theory of Human Capital which states that investment in education and competency development will increase productivity and individual readiness to face the needs of the job market. In the context of this study, collaborative curriculum design functions as an educational mechanism that produces green skills, which further increases workforce readiness.

Thus, universities in the Southeast Asian region need to strengthen collaboration with industry and other stakeholders in curriculum development. This step will help produce graduates who have green competencies and are ready to contribute to sustainable economic development after the pandemic.

Conclusion

This study concludes that collaborative curriculum design plays an important role in preparing a sustainable workforce in post-pandemic Southeast Asia by fostering green skills development and improving workforce readiness for the sustainable economy. The findings suggest that collaboration among higher education institutions, industry, government, and other stakeholders contributes to learning environments that better align educational outcomes with the evolving demands of green and digital economies. Furthermore, green skills serve as an important mediating mechanism through which collaborative curriculum practices enhance workforce preparedness, emphasizing the need to integrate sustainability competencies into higher education programs. The study implies that universities and policymakers should strengthen industry engagement, experiential learning opportunities, and sustainability-oriented curriculum initiatives to ensure graduates are equipped for future labor market challenges. Nevertheless, this research was limited to higher education students and recent graduates in Southeast Asia; therefore, future studies are encouraged to examine additional factors such as digital competencies, organizational support, and policy frameworks, as well as to expand the research context to other regions and professional sectors to provide a broader understanding of workforce development for sustainable economies.

References

- Brundiers, K., Barth, M., Cebrián, G., Cohen, M., Diaz, L., Doucette-Remington, S., & Zint, M. (2021). Key competencies in sustainability in higher education. *Sustainability Science*, 16(1), 13–29.
- George, G., Merrill, R. K., & Schillebeeckx, S. J. D. (2023). Digital sustainability and entrepreneurship. *Journal of Business Venturing*, 38(1), 106265.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2022). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R*. Springer.
- Jackson, D. (2021). Employability skill development in work-integrated learning. *Higher Education, Skills and Work-Based Learning*, 11(5), 1033–1048.
- Leal Filho, W., Salvia, A. L., Paço, A., & Brandli, L. L. (2021). Sustainability in higher education: A review of efforts and barriers. *International Journal of Sustainability in Higher Education*, 22(5), 1123–1145.
- Leal Filho, W., Lange Salvia, A., Eustachio, J. H. P. P., & Will, M. (2022). Digital transformation and sustainable development in higher education. *Sustainability*, 14(3), 1248.
- Lozano, R., Barreiro-Gen, M., Lozano, F. J., & Sammalisto, K. (2023). Teaching sustainability in higher education. *Sustainability*, 15(2), 1027.
- Ng, T. H., Lim, Y. M., & Rahman, A. A. (2022). Green economy transition and workforce development in Southeast Asia. *Sustainability*, 14(19), 12456.
- Pavlova, M. (2023). Green skills as the agenda for the competence movement in education. *Technical and Vocational Education and Training*, 31(2), 45–59.
- Safee, N. B., & Kosnan, N. M. B. (2024). Challenges in developing green skills in higher education: A narrative literature review. *Journal of Education and Learning Sciences*, 3(2), 45–58.
- Sekaran, U., & Bougie, R. (2021). *Research Methods for Business: A Skill Building Approach* (9th ed.). Wiley.
- Strietska-Ilina, O., Hofmann, C., Haro, M. D., & Jeon, S. (2021). Skills for green jobs: Global perspectives. *International Labour Review*, 160(3), 321–339.
- Tay, V., & Allen, J. (2022). Industry collaboration in curriculum design and graduate employability. *Studies in Higher Education*, 47(8), 1614–1628.