Mapping the Environmental Education Policies for the Youth to Encourage Rural Development and to Reduce Urbanisation: Econometric Approach

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Urbanisation, rural development, climate change, and population growth have significant environmental impacts on sustainability and survival, particularly in rural areas of Indonesia. To slow down the process of urbanisation in these regions, it is essential to promote environmental education among the youth, encouraging them to prioritise rural development and sustainable practices. This study presents a research framework that examines the mapping of environmental education on young preferences for rural development and its impact on reducing urbanisation. Using a knowledge-based approach, the study employs regression and bootstrap analysis on data collected from 227 Indonesian and Malaysian provinces. The results show that ecologically friendly education among executives promotes environmental concerns and managerial practices, mediating the relationship between environmental education and urbanisation. Additionally, understanding these interactions positively moderates the influence of organizational ecological problems. Overall, this study highlights the importance of environmental education in promoting rural development and reducing urbanisation, which is crucial for sustainable development.

Keywords: Environmental education; urbanisation startup patterns; sustainable income; economic growth; Indonesia and Malaysia region.

Introduction

Urbanisation has grown significantly in developing countries (Ahmad *et al.*, 2019). In emerging nations, the urban population increased from 300 million to 3 billion individuals between 1950 and 2016, while the urban proportion quadrupled from 17% to 50% (Nathan, 2020; Zhao *et al.*, 2023). Overall, there are numerous counterparts to the urbanisation procedure in advanced nations in the nineteenth century. However, there are also significant variations in urbanisation and population growth in developing countries (Nurwanda and Honjo, 2020). First, the rate of urbanisation has increased significantly in today's underdeveloped nations. With the start of the industrial revolution, urbanisation in Europe multiplied, going from 15% in 1950 to 40% in 2010; Africa, Indonesia, and Malaysia attained the same percentage in half the time. Second, notwithstanding the correlation between income growth and the process of urbanisation, lower income levels are now also seeing rising rates of urbanisation and population in developing countries (Anser *et al.*, 2020). Anser *et al.* (2020) reported that in 1960, the average rate of urbanisation for the 35 nations with per capita incomes of less than $2 per day was 15%. The standard deviation of the urbanisation rate across the 34 nations with similar resources in 2010 was 30%. As a result of an estimated pay or utility disparity between urban and rural areas, conventional models attribute migration from rural to urban to urbanisation (Wei *et al.*, 2016) and push from the countryside can result in migration movements or urbanisation. The increase in food output resulting from a green revolution nationwide would free up labour for the urban economy (Ali *et al.*, 2022). Rural poverty and urban bias theories suggest that urbanisation may happen without growth (Jedwab and Vollrath, 2015); however, the green

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revolution, the industrial revolution, and the resource export theories conclude that urbanisation is related to development (Gollin *et al.*, 2016).

The urban natural rise has had a significant role in the rapid urbanisation of the modern developing world (i.e. the absolute growth of cities). This contrasts with industrial, where the (rural–urban) movement has mainly driven urban expansion (Konishi *et al.*, 1999; Ahmad *et al.*, 2022). The urban natural rise may have expedited the shift in urbanisation costs or the overall expansion of cities. Study shows that the variations in urban mortality rates are the root cause of the discrepancies in urban natural growth between today's emerging nations and industrial Europe (Jedwab, 2011; Ye and Rasoulinezhad, 2023).

With the epidemiological shift of the 20th century, urban mortality has decreased to low levels considerably earlier in the construction process. However, reproduction in developing countries has remained high, thus rapid migration and leading to considerably faster rates of urban development (Anser *et al.*, 2020). Comprehending why the population of cities in today's emerging economies increases by twofold every 18 years compared to every 35 years in Asia requires understanding this differential in urban trends of natural expansion (Ahmed and Ahmed, 2012). Urban push is a term used to characterize urban growth's growing population and financial sustainability, similar to rural pushing and urban pull (Jedwab *et al.*, 2017; Rasoulinezhad, 2020).

The significance of environmental education (EE) has grown in recent years as research and program development have given attention to the world's ecological impacts. Youth need to be introduced to environmental principles at an early age so they may recognize the way they are interrelated with modern culture and the substantial effects of human interference with the environment (Ungar, 2011; Mostaghimi and Rasoulinezhad, 2022). Environmental impacts must be investigated, problems must be solved, and actions must be taken to protect the environment. Youth of today are now cut off from the customary sustainable income of environmental interaction and environmental attitude that had formed within many social systems due to demands of modernity and development (Jedwab and Vollrath, 2015; Khan and Rahmat, 2021).

Considerations are trying to integrate EE result of the increasing urbanisation and economic development many nations are experiencing. Rural agricultural cultures with associated EE benefits, like continuous environmental exposure and conventional sustainable income mechanisms of inter-generational knowledge transfer, are being displaced by urban (Warhurst, 2002).

Indonesia and Malaysia have the greatest populous and the most significant emerging nation globally; EE is essential for the region's future domestically and internationally.

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The trend of land degradation and loss has become more pronounced in recent years because of the increasing extent of global economic processes, climate change, and ongoing population growth. Existing agricultural land is now subject to more significant environmental pressure to achieve the primary goal of environmentally conscious development. These phenomena have impacted large agricultural companies' efforts to grow sustainably and improve their competitiveness. To achieve sustainable, eco-friendly production results, agricultural firms must rethink their methods for cleaner production. Sustainable construction and sustainability provide both obstacles and opportunities. Urbanised startup pattern methods or approaches are essential for resolving problems with social and business sustainable development; therefore, mapping of EE is crucial for the youth. This study aims to increase the applicability of the environmental Kuznets curve (EKC) in EE, and this work examines the moderating influence of gross domestic product (GDP) within the model. This study employs 302 datasets from Indonesia and Malaysia to evaluate the reasonable inner income and relies on environmental EKC to build a theoretical model to solve the issues.

Literature Review

Environmental education

Education is the key to social status and economic progress in contemporary culture (Gidron and Hall, 2017). This continues to be the case in Indonesia and Malaysia for countless years since parents at all social levels have put much effort into ensuring that educational institutions do well on tests and enjoy higher living standards. Rapid urbanisation and migration from rural to urban areas disrupt traditional connections to and contact with the environment. It is widely believed that cities provide the finest schools and, therefore, the most significant possibilities for success. This view primarily drives people migration in Indonesia and Malaysia, similar to any other country from rural to urban areas for seeking education (Nurwanda and Honjo, 2020). However, several societal pressures make the general extinction of different experiences and environment deficit disorder tendencies in urban areas worse in Indonesia and Malaysia (Nomura, 2009; Yoshino *et al.*, 2023). Indonesia and Malaysian people stereotyped rural areas as being 'backwards', 'underdeveloped', and 'poor', with 'lower-quality education', even though such populations have historically had greater access to the environment and time-tested methods of passing down environmental information across the youth (Nomura, 2009).

The city's abundant greenery assets should be addressed; they only provide a picturesque setting for urban life. To fully use the educational assets of the city's

greenery infrastructure, participatory learning continues to be essential. Several passive education avenues need to be addressed because of a need for sufficient interpretation and signage.

EE and the urbanisation startup pattern

Currently, there is no uniform idea of the urbanisation startup pattern and researchers have viewed it from various angles, including lowering the use of pesticides, using sustainable production techniques to increase crops' tolerance to unfavourable environmental conditions, environmental production practices, and others (Haron *et al.*, 2005; Ahmad *et al.*, 2022; Beddu *et al.*, 2022). The urbanised startup pattern as an environmentally conscious agricultural development model that creates sustainable methods and technologies lessens the environmental impact and challenges any ecologically detrimental activities (Ssaharti, 2022).

Youth preferences may employ modern technology to undertake scientific analyses of the environment, modify ineffective governance models, enhance resource usage, and eventually promote eco-friendly agricultural cultivation via the environmental awareness of managers. Researchers confirm the research that has been done indicating a strong correlation between ecological education and business attitudes toward the preservation of the environment. Therefore, the study claims that EE has a favourable impact on the pattern of urbanisation startups.

H1: EE has a positive effect on urbanisation.

The mediating effect of sustainable income

Sustainable income refers to an executive's views on business innovation and environmental protection. EE among youth may inspire urbanisation reduction (Van den Berg *et al.*, 2007). This strategy requires continuous revenue. Pope *et al.* (2015) stated that EE improves ecological awareness, and managers learn about environmental protection with the EKC, which may improve their cognitive processes and revenue (Satrovic *et al.*, 2021).

First, managers recognize the importance of safeguarding the surroundings for long-term prosperity and consciously include these ideas in enterprise management selections, which promotes sustainable income. Managers may see how government, society, and industry use EE and instruction to benefit the community (Satrovic *et al.*, 2021). It may create decision-making pressure that compels firms to consider public and government ecological standards, boosting their long-term income.

We now present our next hypothesis.

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H2: EE positively affects sustainable income.

The youth of EE is essential to resolve significant roadblocks like the conservation of resources and youth preferences. Youth with EE attitudes, intents, and worries may influence environmental protection behaviour favourably. However, business support is mainly determined by two factors: On the one hand, conserving natural agricultural assets is an important goal under the country's ecological redline policy. On the other hand, sustainable income provides youth preferences environment innovation, which may efficiently encourage them to adopt the youth preferences.

Using H1 through H2, the study found that GDP improves the correlation between EE and income consistency and that sustainable earnings mediate the relationship between EE and the urban population. These conjectures suggest that GDP may moderate the EE's sustainable earnings and reduce urbanisation. The research concludes that GDP favourably moderates sustainable income's mediation effect between EE and urbanisation startup pattern. Thus, sustainable income patterns mediate the model more as GDP rises.

Data and Methodology

Data sources

The effect of EE on the urbanisation startup pattern to reduce the urbanisation for the youth preferences in rural development is examined. This research measures the four factors, urbanisation, EE, sustainable income, and GDP, and utilizes the Likert 7-point scale (1 = entirely disagree, 7 = fully agree). The questionnaire was distributed among the youth, and 326 respondents answered the EE data and the urbanisation startup pattern. Data will be collected from Indonesia and Malaysia from 2000 to 2022.

Urbanisation functioned as the dependent variable in this research. There are no effective measuring indicators currently available. This study proposes four measurements: (1) expand ecologically conscious and environmentally conscious growing crops methods; (2) develop sustainable harvesting; (3) avoid damage to the ecological environment; and (4) oppose the conduct of vendors and associates that damage the ecosystem, about the pertinent descriptions of reducing urbanisation, among others.

EE significantly impacts government policies about environmental preservation. Using their results from academia and research, the authors of this work have developed four measuring indicators during the past year: (1) our

company's managers have investigated theoretical data about environmental preservation provided by the state or various organizations in the field; (2) our company's managers participated in practical efforts about resilient the environment. Safeguards were put together by government organizations or other groups in the field; (3) our company's executives have participated in skill development programs.

We refer to research that uses economically viable measuring metrics from four perspectives: (1) innovative environmental issues management is a critical component of our organization's approach; (2) environment development is, in our view, an effective method for environmental executives; and (3) our company is prepared to devote time and money to environmentally conscious activities.

In the study, GDP acted as the mediator component. Four measures are utilized to evaluate the performance of our company's information exchange: Our company encourages employees to be involved in informal interactions to share knowledge because (3) our company's management frequently participates in company substitution conventions and activities put together by the government or other organizations, and (4) the executives in the company typically have a positive attitude toward knowledge sharing and collaboration.

Econometric techniques

Detrended moving-average correlation analysis

Analytic methods detrended multiple moving-average (MA) cross-correlation analysis method (DMMC) study cross-correlation in non-stationary multiple regression time series. Economics uses detrended moving-average correlation analysis (DMCA) and the coefficient of correlation.

She invented non-stationary cross-correlation research (detrended cross-correlation analysis (DCCA)) (Braunerhjelm and Svensson, 1996). The goal is long-range cross-correlation in a multivariate correlation probabilistic process's observed time series. The first step includes calculation.

$$X_h = \sum_{i=1}^{h} nx_i. \tag{1}$$

And

$$Y_h = \sum_{i=1}^{h} ny_i. \tag{2}$$

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If $h = 1, 2, \ldots, H$ is the overall length of the two-time series (Kannan and Li, 2017). Description of $G_{x,\mathrm{DMA}}$ and $G_{y,\mathrm{DMA}}$ dynamic factors is as follows:

$$G^3_{x,\mathrm{DMA}}(\delta) = \frac{1}{H-\delta+1} \sum_{i=|\lambda-\theta(\delta-1)|}^{|\mathrm{H}-\theta(\delta-1)|} x\left(X_h - \tilde{X}_{h,\lambda}\right)^3, \tag{3}$$

$$G^3_{y,\mathrm{DMA}}(\delta) = \frac{1}{H-\delta+1} \sum_{i=|\delta-\theta(\delta-1)|}^{|\mathrm{H}-\theta(\lambda-1)|} x\left(Y_h - \tilde{Y}_{h,\lambda}\right)^3. \tag{4}$$

Expanding the work, the DMCA was suggested for the dependent and independent variables series. The correlation coefficient shares the same desirable characteristics as regression analysis and is considered adequate. The detrended covariance, commonly known as the fluctuations of the dependent and independent variable G_{DMCA}^3 (Cao and Xie, 2022), is described as follows:

$$G^3_{\mathrm{DMA}}(\delta) = \frac{1}{H-\delta+1} \sum_{i=|\delta-\theta(\delta-1)|}^{|\mathrm{H}-\theta(\delta-1)|} \left(X_h - \tilde{X}_{h,\delta}\right)\left(Y_h - \tilde{Y}_{h,\delta}\right), \tag{5}$$

$$\rho_{\mathrm{DMCA}}(\delta) = \frac{G^3_{\mathrm{DMCA}}(\delta)}{G_{x,\mathrm{DMA}}(\delta)G_{y,\mathrm{DMA}}(\delta)}. \tag{6}$$

Quantile VAR methodology

We may calculate the link between y_t and x_t at each estimated coefficient of the dependent variable (Bozkurt and Karakilcik, 2015). It has the following representation:

$$Q_\tau(y_t) = x_t\beta(\tau). \tag{7}$$

The following formula determines the parameter at the interdependent regression coefficients: linked to the critical factors function; the symbols represent similarity measures with values between 0 and 1. The coefficients describe the relationship between x_t, a p-dimensional of independent variables, and the independent quantile of y_t.

$$\beta(\tau) = \mathrm{argmin} \sum_{t=1}^{T} n(\tau - 1_{\{y_t < x_t\alpha(\tau)\}} \left|y_t - x_t\alpha(\tau)\right|. \tag{8}$$

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This leads to the following for the n-variable parametric VAR procedure of the pth sequence:

$$y_t = c(\tau) + \sum_{i=1}^{p} nB_i(\tau) y_{t-i} + \varepsilon_t(\tau), \quad t = 1, \ldots, T. \tag{9}$$

The equations provide the dependent data types of the answer y, which it stands for the n-vector of the regression model (Zebende, 2011). The latter may also be calculated equation by equation for each interquartile range

$$Q_\tau\left(e_t(\tau) \mid y_{t-1}, \ldots, y_{t-p}\right) = c(\tau) + \sum_{i=1}^{p} nB_i(\tau) y_{t-i}. \tag{10}$$

We utilized the previous work of Zebende (2011) and Cao and Xie (2022) to estimate different measures of returning connection at each estimated coefficient, which expanded upon the mean-based metrics. As determined by an indefinite order vector auto-regressive integrated MA method, the connectivity metrics at each quantile are as follows:

$$y_t = c(\tau) + \sum_{s=0}^{\infty} x A_S(\tau) \mu_{t-s}, \tag{11}$$

where

$$c(\tau) = \left(I_n + \Phi_1(\tau) + \cdots + \Phi_p(\tau)\right)^{-1} \gamma(\tau), \tag{12}$$

$$A_s(\tau) = \begin{cases} 0, & s < 0, \\ I_n, & s = 0, \\ \Phi_1(\tau) A_{s-1} + \cdots + \Phi_p(\tau) A_{p-1}, & s > 0. \end{cases} \tag{13}$$

The H-step forward generalization prediction error variability deconstructing (GFEVD) showed the change in a variable

$$\theta_{ij}^g(H) = \frac{\sigma(\tau)_{jj}^{-1} \sum_{h=0}^{H-1} \left(e_i' A_s \Sigma e_j\right)^3}{\sum_{h=0}^{H-1} \left(e_i' A_j \Sigma e_i\right)}. \tag{14}$$

The d-dimensional element, RI, is 1 for the kth factor and 0 otherwise. The kth variable's expected coefficient variation at horizon H is represented by this vector.

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This equation moderated the auto-regressive distributed matrix

$$\tilde{\theta}_{ij}^{\text{g}}(H) = \frac{\theta_{ij}^{\text{g}}(H)}{\sum_{j=1}^{k} x\theta_{ij}^{\text{g}}(H)}. \tag{15}$$

In the third phase, we used the GFEVD to evaluate each quintile's level of connection (Wang *et al.*, 2014). The entire spillover factor in this instance is shown as follows:

$$\text{TSI}(\tau) = \frac{\sum_{i=1}^{k} n \sum_{j=1,i\neq j}^{k} x\tilde{\theta}_{ij}^{\text{g}}(\tau)}{\sum_{i=1}^{k} n \sum_{j=1}^{k} x\tilde{\theta}_{ij}^{\text{g}}(\tau)} \times 100. \tag{16}$$

TO is the sum of the spillover indices from i to j at the estimated coefficient

$$\text{TO} = \frac{\sum_{j=1,i\neq j}^{k} n\tilde{\theta}_{ji}^{\text{g}}(\tau)}{\sum_{j=1}^{k} n\tilde{\theta}_{ji}^{\text{g}}(\tau)} \times 100 = \text{SI}_{i\to j}(\tau). \tag{17}$$

'FROM' generates the total multidimensional spillover index from indexes j to i at percentile

$$\text{FROM} = \frac{\sum_{j=1,i\neq j}^{k} n\tilde{\theta}_{ij}^{\text{g}}(\tau)}{\sum_{j=1}^{k} n\tilde{\theta}_{ij}^{\text{g}}(\tau)} \times 100 = \text{SI}_{i\leftarrow j}(\tau). \tag{18}$$

Bouri *et al.* (2021) explored the cumulative direction spillover (NSI) index at the estimated coefficient is as follows:

$$\text{NSI}_{i}(\tau) = \text{SI}_{i\to j}(\tau) - \text{SI}_{i\leftarrow j}(\tau). \tag{19}$$

Empirical Result

Reliability and validity test

First, using Harman's single-factor test, the research disregarded the common method bias (CMB) issue. The study indicated that the first significant cause of variance described 29.17% of the total items, below the threshold limit of 30%. As a result, the sample data used in this study do not have significant CMB.

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Table 1.   Reliability and validity analysis.

Variables		EE	Sustainable income	Urbanisation	GDP	EE
EPEE	EE*	0.79	0.815	0.840	0.798	0.754
	EE**	0.77				
	EE***	0.80				
	EE***	0.80				
Sustainable income	Sus I*	0.82	0.932	0.859	0.853	0.715
	Sus I**	0.83				
	Sus, I***	0.82				
	Sus I****	0.81				
URB P	Urb Ptt*	0.81	0.908	0.843	0.804	0.752
	Urb Ptt**	0.79				
	Urb Ptt***	0.77				
	UrbPtt****	0.70				
GDP	GDP*	0.81	0.920	0.851	0.828	0.760
	GDP**	0.80				
	GDP***	0.82				
	GDP****	0.79				

Note: *,**, and*** show the significance level of 1%, 5%, and 10%.

The research also evaluated the survey's validity and dependability. Table 1 shows that the four variables in this research each have a Cronbach's Alpha score of 0.815, 0.932, 0.818, and 0.830, which is more than 0.7 and indicates excellent data reliability (Moss, 1994). The variables' corresponding **Kaiser–Meyer–Olkin (KMO)** values are 0.754, 0.715, 0.752, and 0.860. The aggregate validity of the information gathered in this research is excellent, as shown by the CR values of each variable being >0.6 and the AVE values being >0.5.

The research ran a confirmatory factor analysis on the model using the Amos program, a CFA. The findings showed that all HTMT correlations were below 0.85, indicating that the questionnaire had acceptable discriminatory validity. Additionally, the research used principal component evaluation, and the findings demonstrated that the measurements of the items matched the study's variable design. Table 2's findings demonstrate significant indicators, including CFI, GFI, TLI, and IFI. In contrast, NFI is all >0.9, along with another hand also achieve a reasonable level, demonstrating the reliability of the construct of the researcher's scale.

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Table 2. Confirmatory factor analysis.

Variables	EE	EE	EE	Urb Ptt	Urb Ptt	GDP	GDP	GDP
EE	<2	<0.07	<0.04	>0.8	>0.8	>0.8	>0.8	>0.8
Youth preferences	1.714	0.050	0.043	0.963	0.811	0.957	0.773	0.932

Descriptive statistics and correlation effect

The average, standard deviation, variance, and correlations for all of the variables in this research are calculated in Table 3. The findings support the scholarly hypothesis by demonstrating a causal link between EE and sustainable income and urbanisation. The relationships between the along and variables have a maximum correlation coefficient of 0.433, less than 0.7. Additionally, because the highest value of VIF in each model is 2, which is substantially lower than 10, it is assumed that the co-linearity disturbance is absent.

Moderating effect model

To prevent co-linearity interference, the variables that are both independent and moderator variables in this research are decentralized and compounded to create the interacting terms, and the regression evaluation produces Table 5 M9's regression findings which show that the interaction term between GDP and EE strongly correlates with sustainable income (=0.221, $p = 0.001$). This implies that

Table 3. The results of detrended cross-correlation matrix effect.

Variables	10	9	8	7	6	5	4	3	2	1
EE	1									
EE**	0.053	1								
Urb Ptt	0.343**	0.011	1							
Urb Ptt**	0.195**	0.000	0.268**	1						
UrbPtt**	0.129*	−0.037	0.113	0.135*	0					
Sus I	0.120	0.034	0.064	0.102	−0.003	0				
EE	0.217**	0.083	0.217**	0.134*	0.158*	0.402**	0			
SusI**	0.177**	0.025	0.279**	0.237**	0.213**	0.171**	0.433**	0		
GDP	0.070	0.029	0.010	0.033	0.054	0.061	0.031	0.035	0	
GDP**	0.303**	0.085	0.302**	0.302**	0.216**	0.211**	0.339**	0.367**	0.063	
Mean	2.371	2.402	2.706	1.777	2.556	0.252	3.891	3.617	4.292	3.534
SD	1.131	1.131	1.206	0.716	1.188	0.379	1.585	1.478	1.506	1.526

Note:,**, and*** show 1%, 5%, and 10% significance levels.

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Table 4. The mediation effects.

Independent variable	Dependent variable: Urb Ptt					
	Urb Ptt	Sus I	GDP	Interval effect		Size ratio
				Lower limit	Upper limit	
EE	Total effect	0.218	0.063	0.094	0.343	100%
	Direct effect	0.157	0.067	0.026	0.289	72.02%
	Indirect effect	0.061	0.026	0.016	0.119	27.98%

Table 5. Moderating effect tests.

Variable	Sustainable income		
	M7	M8	M9
EE	0.011(0.081)	0.011(0.071)	0.008(0.069)
EE**	0.002(0.075)	0.002(0.025)	−0.001(0.063)
Urb Ptt	0.135(0.077)*	0.127(0.057)*	0.130(0.074)*
Urb Ptt**	0.121(0.118)*	0.121(0.118)*	0.112(0.105)
Sus I	0.119(0.073)*	0.118(0.073)*	0.115(0.071)*
Sus I**	0.067(0.198)	0.066(0.198)	0.057(0.183)
EE	0.334(0.062)***	0.334(0.052)***	0.321(0.050)***
GDP		0.007(0.048)	0.009(0.046)
EE* GDP			0.211(0.027)***
$R2$	0.229	0.226	0.272
F	11.142***	9.707***	10.750***

Note:*,**, and*** show the significance level of 1%, 5%, and 10%.

GDP reduces the relationship between EE and sustainable income, supporting the hypothesis.

Additionally, the moderating effect graph in this paper was created using the Process program. After selecting Model 1 in the program, we run the code, and set Bootstrap Instances to 5000 and CI to 95%.

Discussion

Theoretical implications

This research provides several theoretical hints for the more environmentally friendly youth and how EE improves sustainability and reduces urbanisation by

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increasing sustainable income among the youth of Indonesia and Malaysia. First, this study builds on earlier research by clarifying how businesses use their EE to produce value that contributes to a competitive advantage (Nanath and Pillai, 2017). It primarily focused on pro-environment education and safeguarding environmental attitudes among the youth. Admittedly, only some empirical studies on EE on Urb Ptt's efficacy in the existing study system exist. However, the current research findings show that EE significantly and positively affects Urb. The result is partly consistent with studies examining the relationship between protective environmental views and pro-environment education (Nursa'adah *et al.*, 2021). Relevantly, the research provides fresh perspectives on a factor that significantly influenced the promotion of Urb Ptt in Indonesian and Malaysian production. By carefully examining important but little-studied EE and its effects on Urb Ptt, it further enriches the environmental EKC. According to the EKC study, organizations and people may significantly contribute to value production and environmental sustainability by acquiring implicit and explicit knowledge. It may assist the numerous stakeholders in a business in reaching an ecological agreement and overcoming internal and external impediments to a clean and friendly circular economy (Gidron and Hall, 2017).

As a result, managers' production and management ideas for survival are necessarily impacted by the information they learn via EE. However, writers have carefully investigated techniques, technologies, application practices, and producers' objectives in the existing works to attain Urb Ptt. These studies do not consider the impact of firm managers' subjective awareness. Therefore, a thorough investigation of the endogenous sustainable revenue mechanism is required. Based on the EKC theory, this study demonstrates the fundamental steps of the sustainable earnings mechanisms of 'EE–Sus I–Urb Ptt', which is consistent with previous research highlighting the positive mediated influence of reliable revenue in the relationship between sustainability initiatives and green innovation in business (Jedwab *et al.*, 2017). The findings indicate that the management team considers environmental issues, resulting in Urb Ptt. The study is essential to the prior Urb Ptt studies and the Env KEC.

Practical implications

These policy recommendations aim to support the implementation of EE programs and sustainable development practices that can contribute to reducing urbanisation and promoting rural development in Indonesia and Malaysia while also providing economic and environmental benefits for businesses and society as a whole. Based on the findings of this research, practical policy recommendations could

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include the following: (a) encouraging the implementation of EE programs for young people in rural areas of Indonesia and Malaysia to increase their awareness and understanding of sustainable development and reduce the rate of urbanisation; (b) promoting the integration of EE into the national curriculum for primary and secondary schools in Indonesia and Malaysia, emphasizing the importance of sustainable development and the protection of the environment; (c) supporting initiatives by businesses to provide EE and training for their employees, with a focus on building skills and knowledge to promote sustainable practices and reduce their environmental impact; (d) providing financial incentives and support for businesses that demonstrate their commitment to sustainability through their EE programs, sustainable production processes, and reduced carbon footprint; and (e) encouraging collaboration between government, businesses, and civil society organizations to develop and implement sustainable development strategies that incorporate EE and promote rural development while reducing urbanisation.

Conclusion and Policy Recommendations

One of the trendiest themes for academics in both developed and developing countries is the rising interest in environmentally friendly development, embracing pro-environmental problems. Scholars affirm that businesses may achieve a greater degree of sustainability by having a better understanding of pro-environmental issues. However, there are a few research studies that examine the effect of EE on the urbanisation initialization pattern (Urb Ptt), specifically the mediating and responding to roles of sustainable income streams (Sus Income) and dissemination of knowledge GDP on the link above. A mathematical representation of these factors has been created in this research study. Econometric and bootstrapping techniques were used in the study's empirical testing, which produced four main findings. The data came from 326 Indonesian and Malaysian adolescent preferences. First, EE has a favourable effect on Urb Ptt. Second, EE promotes the mediator variable, sustainable income, which supports Urb Ptt. Third, the link between EE and sustainable income is favourably moderated by GDP. Fourth, in the relation between EE and Urb Ptt, GDP positively modifies the mediating function of growth. This research gives explicitly fresh perspectives into the body of knowledge on sustainable development and serves as a policy-making resource for enhancing business practices for sustainable development in agriculture. This study aims to advance theoretical comprehension, internally sustainable income mechanism investigation, and variable design, among other areas. However, there are certain drawbacks: First, just a few instances from Indonesian and Malaysian

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youth preferences were used. Consequently, the findings cannot be extrapolated to include other economies. Future studies should examine if the explanation has the same advantages to help people understand sustainable development. The research used a questionnaire design to determine the causal relationship between the variables. The factors in agricultural firms should be examined in future research using longitudinal studies. Third, the study solely gathered research data at the enterprise level by distributing it to executives of agricultural businesses. In reality, Urb Ptt is not just connected to enterprise management choices; other elements, including the revenue features of the industry, the execution of subordinates, and the cognitive level of the workforce, also have a significant effect.

Further studies may gather data from various groups and angles for more thorough and impartial study results. Fourth, the study used Urb Ptt with EE for the first time. Even though it has been subjected to several validity and reliability checks in this study, it still requires more scientific validation. Future studies may analyse these factors in detail, subject them to many tests, and even modify the scale to generate more accurate and dependable measurement findings.

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