TECHNOLOGICAL INNOVATION IN SECONDARY SCHOOLS AS A TOOL FOR SUSTAINABLE DEVELOPMENT IN KWARA STATE, NIGERIA

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Abstract

Technological innovation deals with using technology to address national problems through the use of resources without affecting future generations. At the same time, sustainable development covers economic, social, ecological, and environmental issues relating to the disposal of waste, provision of good drinking water, and food production. The study examined the impact of technological innovation on sustainable development in Kwara State. A descriptive survey was adopted. Five research questions were raised and answered. The population of the study comprised 2126 teachers while the sample consisted of 322 respondents selected through random sampling technique. Five hypotheses were formulated and tested at 0.05 level of significance. A structured questionnaire titled "Technological Innovation and Sustainable Development Questionnaire" (ILSDQ) was used to collect data for the study. Reliability analysis was carried out using the pilot test method and it yielded a coefficient of 0.71. Descriptive statistics methods of median were used to answer research questions while partial least squares structural equation modeling (PLS-SEM) was used to test the hypotheses. There was a high level of technological innovation that had a positive impact on sustainable development. The use of virtual reality and cloud computing was high. It was recommended that virtual reality and cloud computing should be used more to improve sustainable development.

Keywords: Technology, Innovation, Virtual reality, Waste Disposal, and Food Production

Introduction

Technological innovation has the potential to revolutionize the way we live, work, and interact with our environment, making it a crucial driver of sustainable development. However, effectively integrating technological innovation in secondary schools remains a significant challenge. Secondary schools play a vital role in shaping the minds and skills of future generations, and the incorporation of technical innovation in their curriculum and practices can equip students with the necessary tools to address complex sustainable development challenges. Nevertheless, numerous barriers, including inadequate infrastructure, limited resources, and insufficient teacher training, hinder the successful adoption of technical innovation in secondary schools.

Environmental problems such as global warming and the gradual reduction of available resources are general and threaten the continuous existence of the world (Hooks & Tang, 2013). Pollution is causing serious environmental issues due to improper disposal of waste. Hence, the United Nations is discussing the issue of sustainable development goals. The depletion rate of natural resources is alarming, which is detrimental to the survival of upcoming generations. Sustainable development is paramount for us since it acquaints us with requirements without compromising the ability of the forthcoming generations to provide for their requirements (Griggs et al., 2013). The fear of becoming extinct without natural resources is affecting the current generation, and they are changing towards sustainable development. We have reached a point where it is essential to ensure that human activities and the use of natural resources do not compromise the ability of future generations to enjoy a high quality of life. The increasing use of social media, virtual reality, and cloud computing in education reflects the growing role of technological innovations in advancing sustainable development.

Technological innovations can create an environment that fosters organizational growth by maximizing resource efficiency and gaining a competitive edge while managing operations with precision (El-Haddadeh, 2020; Klewitz & Hansen, 2014). The relationship between technological advancements and sustainable development is multifaceted, and influenced by various factors. Key innovations driving sustainable progress include virtual reality, social media, and cloud computing, all of which play pivotal roles in shaping a more sustainable future (Sampson, 2007). These technologies enable organizations to operate more efficiently, reduce environmental impact, and promote long-term sustainability.

Virtual reality (VR) is a sophisticated technology powered by intelligent computer systems, enabling users to experience three-dimensional environments in a simulated virtual world. This world, often built on imagination, symbols, and simulations, mirrors aspects of real life (Pallot, 2013). Virtual Reality is widely applied across various sectors, including education, entertainment, and agriculture, where it enhances learning, creativity, and problem-solving. One of VR's unique attributes is its ability to immerse users so deeply that they often forget the real world, responding to the virtual environment as if it were reality (Katy et al., 2016).

According to Bozgeyikli et al. (2016), VR creates a dynamic interaction between theoretical concepts and practical experiences within the virtual environment. Researchers have explored and developed numerous methods to make these virtual spaces more intuitive and user-friendly (Hale et al., 2014). Advancements in hardware technology, such as improved motion sensors and

interactive devices, have significantly enhanced the user experience, offering more seamless and immersive VR interactions (Boletsis, 2017).

In education, VR has become a powerful tool for helping students engage with and understand their surroundings. By offering realistic simulations, VR allows students to explore and solve real-world challenges, from local environmental issues to global concerns. For instance, Bozgeyikli (2016) highlights that students have been able to identify waste disposal challenges through VR simulations, learning the importance of proper waste management as a solution to this issue. As a result, students develop a strong awareness of environmental stewardship, growing up with a commitment to preserving the environment for future generations.

Social media platforms are web-based tools that allow individuals to create public or semi-public profiles within a bounded system and connect with others. These platforms enable users to share information, communicate, promote products, and interact beyond geographic and social boundaries. They are built on the principle of two-way communication, where users actively exchange content and ideas. Often referred to as Web 2.0 technologies, social media facilitates dynamic interaction by allowing people to share personal content and media, fostering ongoing collaboration and participation. Social media platforms have become essential spaces for global interaction, enabling users to connect with individuals from all corners of the world.

Ghermandi et al., (2023) noted that more than half of the global population actively uses social media, creating an unprecedented flow of information that has transformed the study of human relationships with their environment. Researchers are increasingly leveraging this data to explore technological innovations and sustainable development solutions. This includes analyzing key areas like food production, water sourcing, and waste management, aiming to reduce pollution and promote environmental sustainability.

In the field of education, schools utilize social media to raise awareness among students and parents about the importance of environmental preservation. Platforms such as Facebook, WhatsApp, and Instagram are used to disseminate information, highlighting the negative impacts of unsustainable practices and encouraging more eco-friendly behaviors. For example, Ghermandi et al., (2023) emphasized the role of social media in educating the public about the degradation of natural resources, the consequences of improper waste disposal, and the importance of providing clean drinking water, particularly in developing nations. These platforms are proving to be powerful tools in driving environmental consciousness and promoting sustainable development on a global scale.

Cloud computing plays a vital role in promoting sustainable development by reducing carbon emissions, optimizing resource efficiency, enabling remote work, and fostering innovation. As an evolving concept, cloud computing allows organizations to access all their information technology needs via the Internet, offering a cost-effective solution for schools and institutions with limited budgets for IT infrastructure. It enables rapid deployment, development, and testing without the need for expensive hardware, making it an attractive option for young educational institutions.

Cloud computing operates on the principle of on-demand network access, facilitating collaboration and improving accessibility. It is defined by five essential characteristics, supported by three

service models, and organized into a theoretical classification system (Biswas, 2015). The three primary models of cloud computing are public, private, and hybrid clouds, each offering different levels of accessibility and control depending on organizational needs. These models enable institutions to select the most appropriate infrastructure, balancing security, scalability, and cost-efficiency, ultimately contributing to sustainable technology practices.

Statement of the Problem

Despite the recognition of technological innovation as a crucial driver of sustainable development, secondary schools in Kwara State encounter significant challenges in integrating these innovations into their curriculum and practices. This has resulted in students being inadequately prepared to contribute effectively to sustainable development within their communities and the state at large. Pressing issues, such as food shortages that have driven up food prices, negatively impact students' ability to concentrate and learn. Additionally, improper waste disposal methods and a lack of access to clean drinking water continue to present major societal and environmental problems.

Adedigba (2019) conducted a study on sustainable development in Kwara, identifying a gap between policy formulation and action, which has hindered progress toward achieving sustainable development goals. Similarly, the Organization for Economic Co-operation and Development (OECD) in 2011 noted that the necessary processes for achieving sustainable development have not yet been fully implemented. This study explores how technological innovation in secondary schools can promote sustainable development in Kwara State, equipping students to tackle sustainability challenges locally and globally.

Purpose of the Study

The main purpose of the study was to examine technological innovation in secondary schools as a tool for sustainable development. Other purposes sought to find out: the state of:

1. virtual reality and sustainable development in Kwara State secondary schools.
2. social media and sustainable development in Kwara State secondary schools.
3. cloud computing and sustainable development in Kwara State secondary schools.
4. sustainable development in Kwara State secondary schools.
5. technological innovation in Kwara State secondary schools

Research Questions

The following research questions have guided the study.

1. What is the level of virtual reality in Kwara State secondary schools?
2. What is the level of social media in Kwara State secondary schools?
3. What is the level of cloud computing in Kwara State secondary schools?
4. What is the level of sustainable development in Kwara State secondary schools?
5. What is the level of technological innovation in secondary schools in Kwara State?

Research Hypotheses

The following research hypotheses were formulated and tested at 0.05 level of significance:

Ho_1: There is no significant relationship between virtual reality and sustainable development in Kwara State.

Ho_2: There is no significant relationship between social media and sustainable development in Kwara State

Ho_3: There is no significant relationship between cloud computing and sustainable development in Kwara State

Ho_4: There is no significant relationship between cloud computing and sustainable development in Kwara State

Ho_5: There is no significant relationship between technological innovation and sustainable development in Kwara State

Methodology

The study is a descriptive survey design of the correlational type. The population consisted of 26 senior secondary school teachers in Kwara State, which was estimated at 2,126 (National Bureau of Statistics, 2022)**.** Following the Research Advisor's (2006) Sample Size Table, for a population of 2,126, a sample of 322 is recommended at 95% and 5.0 margin of error. Thus, 291 respondents were randomly selected across various senior secondary schools in Kwara State. The schools were purposefully selected in the three senatorial districts of the state to represent the peculiarities of each region of the state. The instrument was an adapted structured questionnaire titled 'Technological Innovation and Sustainable Development Questionnaire' (TISDQ). The validity and reliability of the instrument were assessed using Cronbach's alpha, and the reliability coefficient was 0.71. The instrument was administered to the respondents by the researcher. The collected instrument was analyzed with descriptive statistics of mean, median, and standard deviation. The hypotheses were tested using inferential statistics of the Partial Square Structural Equation Model (PSSEM).

Results

Hypothetical Models

Research Question 1: What is the level of virtual reality in secondary schools in Kwara State LGA?

Descriptive statistics for all construct items were calculated using the median, given the ordinal nature of the dataset. The analysis utilized a four-point Likert response scale ranging from strongly disagree (1) to strongly agree (4) for measuring each item. Ordinal data analysis necessitates a distinct set of methods compared to other quantitative variables. These methods consider the inherent ordering of variables to prevent a loss of statistical power (Agresti, 2010; Ayanwale, 2023). It is crucial to note that calculating a mean or standard deviation for ordinal data is statistically challenging and discouraged. Instead, alternative measures such as median, mode, or quartile are recommended (Agresti, 2010). The descriptive statistics, represented by the median, were computed for each item of the construct. Table 1 illustrates the descriptive statistics for virtual

reality. For convenient scale interpretation, respondents' Likert scale responses were categorized into two groups: 1-2.49 as low and 2.5–4.0 as high.

Table 1: Descriptive statistics for the level of virtual reality

Statement	Median	Level
The virtual reality is fascinating for students	3.000	High
They forget everything around them	3.000	High
At times they are frustrated	3.000	High
It is a challenge to them sometimes	3.000	High
Various techniques in the navigation techniques are well integrated	3.000	High

Table 1 outlines the descriptive statistics pertaining to the level of virtual reality in secondary schools within Ilorin West LGA. The focus is on statements related to virtual reality, with median values consistently indicating a high level across various items. The consistent median value of 3.000 across all statements indicates a high level of agreement among respondents regarding the positive impact of technological innovation on students. This suggests a generally favourable perception of virtual reality in terms of its impressiveness and potential for students' engagement. While the high level is encouraging, the acknowledgement of occasional challenges and frustrations highlight areas for improvement. For educators and policy-makers in secondary schools in Ilorin West LGA, these findings imply an overall positive attitude toward the integration of virtual reality in education. Addressing challenges and frustrations can further enhance the effective implementation of technological innovations in the educational setting.

Research Question 2: What is the level of cloud computing in Kwara State secondary schools?

Table 2: Descriptive statistics for the level of cloud computing

Statement	Median	Level
I am aware of cloud computing	3.000	High
I understand how it works	3.000	High
Cloud computing is beneficial for sustainable development	3.000	High
Cloud computing is used to promote good sources of water provision	3.000	High
Cloud computing is used to encourage proper waste disposal	3.000	High

Table 2 provides an overview of the descriptive statistics for the level of cloud computing in secondary schools within Kwara State. The analysis focuses on several statements, and consistently, the median values reflect a high level across various items. Consistently high median values across all statements indicate a strong consensus among respondents in terms of their awareness, understanding, and positive perception of cloud computing. This suggests that individuals in secondary schools in Kwara State are well-versed in cloud computing, comprehend its functionalities, and recognize its potential benefits, especially in the context of sustainable development and specific applications like water provision and waste disposal. For educators and

policy-makers, these findings suggest a favourable attitude toward the integration of cloud computing in secondary education, highlighting the readiness of respondents to embrace its various applications.

Research question 3: What is the level of social media in Kwara State secondary schools**?**

Table 3: Descriptive statistics for the level of social media

Statement	Median	Level
I am a member of a social networking sites	4.000	High
I use both WhatsApp and Facebook	4.000	High
I have read about sustainable development on social media	3.000	High
I use social media to promote sustainable development (water, waste and food provision)	3.000	High
I encourage students to protect the environment	3.000	High

Table 3 provides an insight into the descriptive statistics for the level of social media engagement in secondary schools within Ilorin West LGA. The analysis focuses on various statements, consistently revealing a high level of involvement and utilization of social media platforms. Consistently high median values, especially with statements related to social media usage and membership in social networking sites, indicate a substantial level of engagement among respondents. This suggests active participation in platforms like WhatsApp and Facebook, utilizing them for various purposes, including the promotion of sustainable development. While the median value for reading about sustainable development on social media is slightly lower (3.000), it still implies a generally high level of awareness and information consumption. Overall, the findings suggest that social media plays a significant role in disseminating information about sustainable development, offering a potential platform for promoting environmental awareness and protection among students in secondary schools within Ilorin West LGA.

Research question 4: What is the level of sustainable development Kwara State secondary schools?

Table 4: Descriptive statistics for the level of sustainable development

Statement	Median	Level
Providing good water consumption is necessary	4.000	High
Preserving nature is necessary for sustainable development	4.000	High
Sustainable development requires that humans reduce all sorts of wastes	3.000	High
Water wastage assists sustainable development	3.000	High
Recycling of waste affects sustainable development	3.000	High
People have gardens to reduce food shortage	3.000	High
Water wastage is good for sustainable development	3.000	High
Use of more of nature's resources than we need does not threaten sustainable development	3.000	High

Table 4 furnishes descriptive statistics illuminating the level of sustainable development in secondary schools within Kwara State, addressing various statements. The consistent median values across different statements indicate a high level of understanding and commitment to sustainable development. The consistent median values of 4.000 for statements emphasizing the necessity of good water consumption and preserving nature showcase a high level of recognition among respondents regarding these fundamental aspects of sustainable development. While the median values for statements related to waste reduction and recycling are slightly lower (3.000), they still signify a generally high commitment to sustainable practices. The findings indicate a positive attitude and awareness of sustainable development principles among students in secondary schools in Kwara State. Integrating these principles into educational programs may further enhance environmental consciousness and encourage responsible behaviours among students.

Research Question 5: What is the level of technological innovation in Kwara State secondary schools?

Table 5: Descriptive statistics for the level of technological innovation

Statement	Median	Level
Technological innovation is well-known among staff and students	3.000	High
Virtual reality is used for sustainable development	3.000	High
Social media is a tool for sustainable development	3.000	High
Cloud computing is used by schools	3.000	High
Technological innovation is germane to sustainable development	3.000	High

Table 5 provides descriptive statistics highlighting the level of technological innovation in secondary schools within Ilorin West LGA, focusing on various statements. The consistent median values of 3.000 across different aspects indicate a high level of familiarity with and recognition of technological innovations. The consistent median value of 3.000 across statements related to technological innovation indicates a high level of familiarity and recognition among respondents, encompassing both staff and students. This high level suggests that technological innovation,

encompassing virtual reality, social media, and cloud computing, is widely acknowledged as instrumental in promoting sustainable development within secondary schools in Ilorin West LGA. The findings imply a positive attitude toward the integration of technological advancements into educational practices for the advancement of sustainable development. Schools in the region appear to actively embrace and employ various technological innovations, such as virtual reality, social media, and cloud computing, to enrich the learning environment and contribute to the attainment of sustainable development goals.

Additionally, Partial Least Squares Structural Equation Modeling (PLS-SEM), a methodology endorsed by recent studies (Ayanwale et al., 2022; Hair et al., 2020) was used for the data analysis. This multivariate analysis technique was chosen for its ability to estimate theoretically established relationships between cause and effect (Shah et al., 2022). SmartPLS software version 4 (Christian et al., 2023) was utilized to test the measurement and structural models. The first step involved evaluating the measurement model to ensure it met recommended quality cut-offs for internal consistency (Cronbach's alpha and composite reliability), convergent validity (outer loading and average variance extracted (AVE)), and discriminant validity (heterotrait-monotrait-ratio of correlation) across the variables. In the second step, the structural models were scrutinized to assess the hypothesis that variables are interrelated, employing bootstrapping with 10,000 re-samples to determine the significance of the path coefficient ($p < 0.05$).

Measurement model assessment

The evaluation of hypothesis validity and reliability is conducted based on the measurement model before hypothesis testing. Sarstedt et al. (2021) recommend assessing indicator reliability through their respective factor loadings on the underlying construct. They argue that an item is considered reliable if its factor loading is greater than the standard of 0.70, but a loading of 0.50 is also deemed acceptable. Referring to Table 6 and Figure 1, it is observed that all outer loadings remain above 0.50 even when excluding ten items (cloud1 = 0.225, cloud2 = 0.148, cloud3 = 0.368, soc4 = 0.152, sus1 = 0.277, sus2 = 0.325, sus3 = 0.172, sus4 = 0.436, vir3 = 0.193, and vir4 = 0.313) that fall below this threshold value (Sarstedt et al., 2021). Table 6 also presents Variance Inflation Factors (VIF) for the analyzed variables, employed to assess the presence of multicollinearity in the study. According to Hair et al. (2011), a VIF value lower than 5 is considered significant, indicating the absence of potential multicollinearity concerns. Therefore, the VIF values suggest that there is no significant issue with multicollinearity in the study.

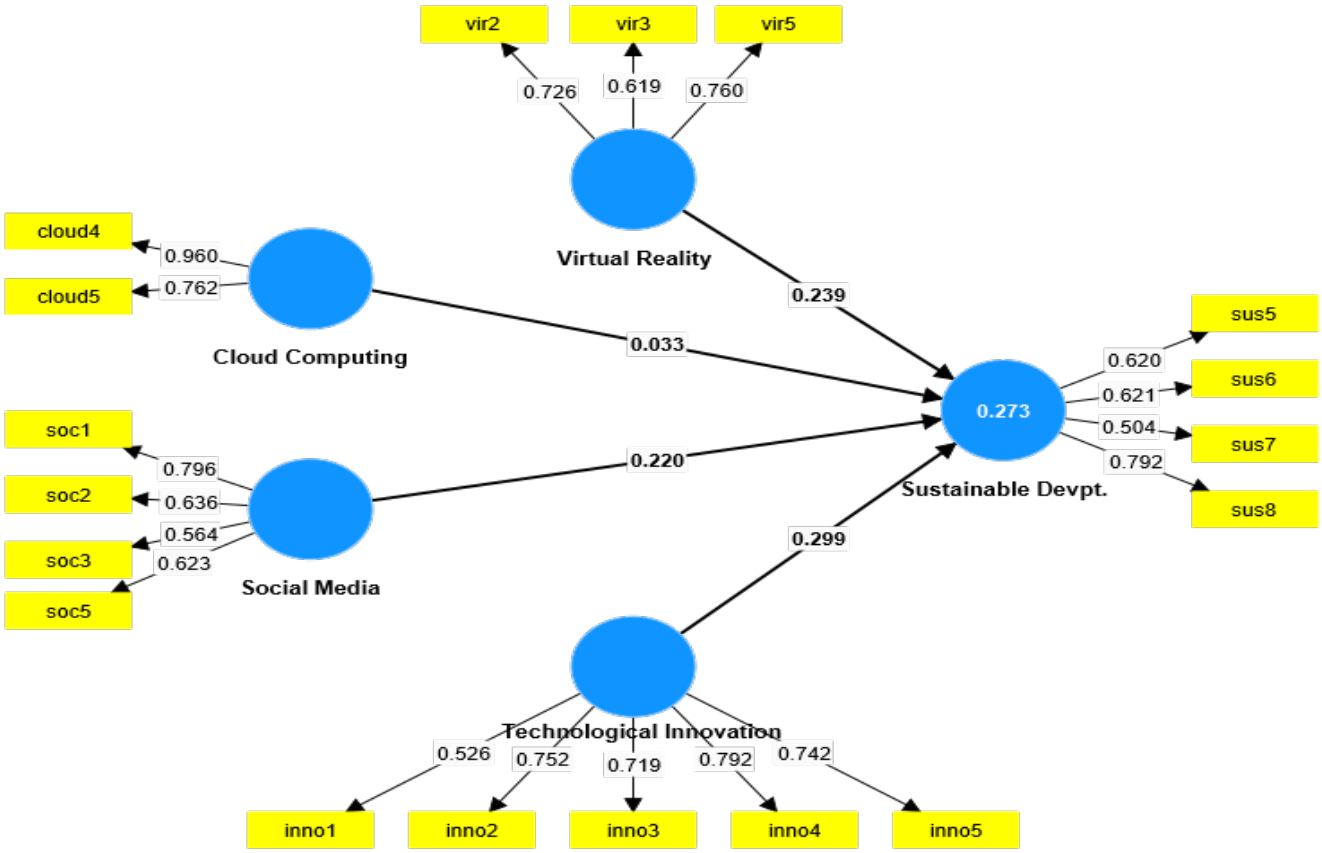

Figure 1: Measurement model for the factor loadings

Table 6: Item loadings

Indicators	Statements	Cloud Computing	Technological Innovation	Social media	Sustainable Devpt.	Virtual Reality	VIF
cloud4	Cloud computing is used to promote good sources of water provision	0.960					1.435
cloud5	Cloud computing is used to encourage proper waste disposal	0.762					1.435
inno1	Technological innovation is well-known among staff and students		0.526				1.171
inno2	Virtual reality is used for sustainable development		0.752				1.415

inno3	Social media is a tool for sustainable development		0.719				1.557
inno4	Cloud computing is used by schools		0.792				1.612
inno5	Technological innovation is germane to sustainable development		0.742				1.715
soc1	I am a member of a social networking sites			0.796			1.193
soc2	I use both WhatsApp and Facebook			0.636			1.240
soc3	I have read about sustainable development on social media			0.564			1.183
soc5	I encourage students to protect the environment			0.623			1.126
sus5	Recycling of waste affects sustainable development				0.620		1.143
sus6	People have gardens to reduce food shortage				0.621		1.116
sus7	Water wastage is good for sustainable development				0.504		1.133
sus8	Use of more of nature's resources than we need does not threaten sustainable development				0.792		1.155
vir2	They forget everything around them					0.726	1.170
vir3	At times they are frustrated					0.619	1.127
vir5	Various techniques in the navigation techniques are well integrated					0.760	1.083

Additionally, Ayanwale et al. (2023) and Hair et al. (2017) proposed a minimum threshold of 0.40 for the estimated average variance extracted (AVE), considering 0.50 as substantial. The AVE generated by the measurement model surpasses the benchmark value of 0.40, making it acceptable for the current analysis (refer to Table 7). Moreover, a construct is deemed reliable when the reliability coefficient for the predictive model is 0.6 or above. Both the composite reliability values (following Hair et al., 2020) and Cronbach's alpha values (according to Hair et al., 2013) exceed the recommended 0.60 level, establishing internal consistency reliability (see Table 7).

Table 7: Reliability and validity of the construct

Constructs	Cronbach's alpha	Composite reliability (rho_c)	AVE
Cloud Computing	0.710	0.856	0.751
Social media	0.691	0.753	0.436
Sustainable Devpt.	0.648	0.733	0.413
Technological Innovation	0.753	0.835	0.507
Virtual Reality	0.603	0.746	0.496

Furthermore, the evaluation of divergence validity incorporated the use of the heterotrait-monotrait ratio of correlation (HTMT). This method addresses limitations in the preceding steps and aims for a correlation coefficient below 0.85, as recommended by Oluwadamilare & Ayanwale (2021) and Henseler et al. (2015). As detailed in Table 8, all HTMT values fall below the specified threshold of 0.85. Consequently, the measurement model remains free from divergent validity concerns even after the exclusion of ten items. In conclusion, the identified constructs and indicators from the evaluation process are deemed appropriate for hypothesis testing and model assessment.

Table 8: Discriminant validity – HTMT

Constructs	Cloud Computing	Social media	Sustainable Devpt.	Technological Innovation	Virtual Reality
Cloud Computing					
Social media	0.203				
Sustainable Devpt.	0.251	0.520			
Technological Innovation	0.470	0.412	0.523		
Virtual Reality	0.131	0.373	0.571	0.272	

Structural Model Assessment

Following the analysis of the structural model, the next phase involved evaluating the model's predictive accuracy through the examination of the coefficient of determination (R^2 value). The proposed model, encompassing technological innovation, cloud computing, virtual reality, and social media, demonstrated the ability to account for 27.3% of the observed variance in sustainable

development. This suggests a moderate level of predictive accuracy (Ayanwale et al., 2023; Hair et al., 2017). Additionally, the significance of path coefficients was assessed by testing hypotheses through a bootstrapping procedure with 95% bias-corrected confidence intervals. This involved utilizing 10,000 samples and excluding sign-change options to ensure robust statistical testing.

Table 8: Summary of path coefficient

Hypotheses	Relationship	Original sample	Sample mean	STD	T	p-values
H1	Technological Innovation -> Sustainable Development	0.299	0.299	0.079	3.794	0.000
H2	Social media -> Sustainable Devpt.	0.220	0.223	0.059	3.740	0.000
H3	Virtual Reality -> Sustainable Devpt.	0.239	0.249	0.056	4.311	0.000
H4	Cloud Computing -> Sustainable Devpt.	0.033	0.043	0.055	0.602	0.274

Table 8 and Figure 2 present the results of the structural model analysis revealing significant insights into the relationships between different factors and their impact on sustainable development. The positive and statistically significant path coefficient (T-statistic = 3.794, P-value < 0.05) suggests that technological innovation plays a crucial role in enhancing sustainable development. As technological innovation increases, there is a corresponding improvement in sustainable development. Also, a positive and statistically significant path coefficient (T-statistic = 3.740, P-value < 0.05) indicates a substantial positive association between social media and sustainable development. The findings suggest that an increase in social media usage is linked to improvements in sustainable development. With a positive and statistically significant path coefficient (T-statistic = 4.311, P-value < 0.05), the results highlight the positive impact of virtual reality on sustainable development. An increase in virtual reality adoption is associated with advancements in sustainable development. Although the path coefficient for cloud computing is positive, it is not statistically significant (T-statistic = 0.602, P-value > 0.05). This suggests that, in the context of the study, the relationship between cloud computing and sustainable development may not be substantial. The findings underscore the importance of prioritizing technological innovation, leveraging social media, and integrating virtual reality to drive sustainable development initiatives. However, it is crucial to note that, in the specific context of the study, cloud computing may not significantly contribute to sustainable development. Policy-makers and practitioners can use these insights to inform strategies for promoting sustainability through targeted technological interventions.

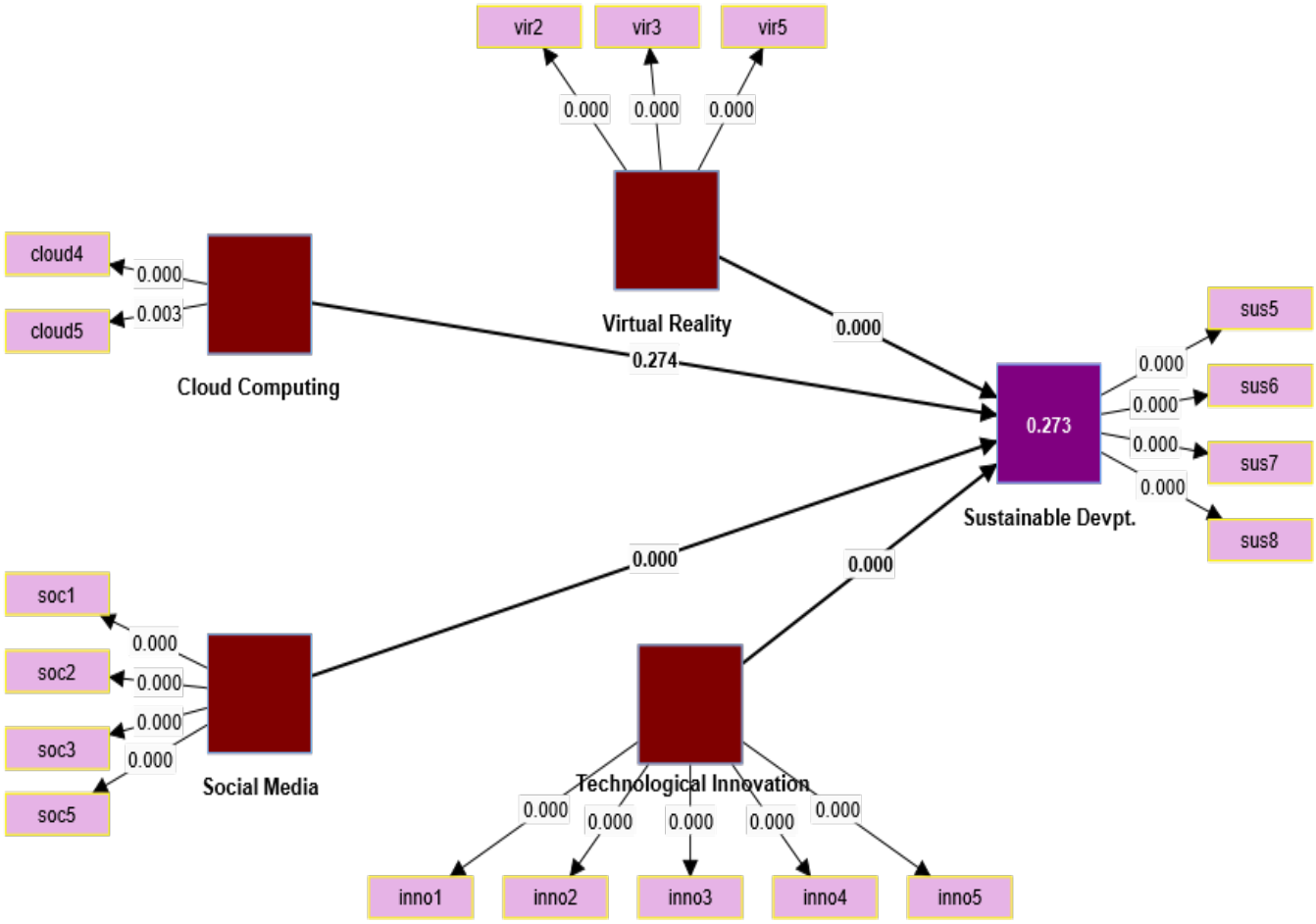

Figure 2: Structural model

Furthermore, a thorough evaluation of the model's predictive accuracy was conducted by the researchers, assessing both the indicator level and the composite score level, as recommended by Sanusi et al. (2024) and Danks et al. (2017). This comprehensive approach allowed the researchers to gain insights into the overall predictive power of the model. In assessing predictive performance, various statistics such as mean absolute error (MAE) and root mean squared error (RMSE) were considered. While RMSE is commonly used for this purpose, the analysis also considered the distribution of prediction errors. To gauge the model's performance, we compared RMSE (or MAE) values for each indicator with those of a naive linear regression model (LM) benchmark. This comparative analysis served as a key determinant of our model's predictive capabilities. Specifically, if all indicators in the PLS-SEM analysis exhibited lower RMSE (or MAE) values compared to the LM benchmark, it indicated a high level of predictive power. A scenario where most indicators in the PLS-SEM analysis showed lower RMSE (or MAE) values suggested a medium level of predictive power.

Table 9: Summary of PLS prediction result

Indicators	Q^2predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
sus5	0.053	0.812	0.614	0.802	0.607
sus6	0.077	0.789	0.639	0.781	0.623
sus7	-0.001	0.891	0.696	0.866	0.701
sus8	0.198	0.807	0.632	0.800	0.621
	Q^2predict	RMSE	MAE		
Sustainable Devpt.	0.220	0.889	0.703		

Conversely, if only a minority of indicators displayed lower prediction errors than the LM benchmark, the model's predictive power was considered low. In the absence of any indicators exhibiting lower prediction errors than the LM benchmark, it implied a lack of predictive power in the model. As a result, Table 9 provides a comprehensive summary of the PLS predict outcomes, focusing on key indicators such as Q^2predict, PLS-SEM_RMSE, PLS-SEM_MAE, LM_RMSE, and LM_MAE. The individual Q^2predict values illuminate the predictive significance of the model for each indicator, while the cumulative Q^2predict for sustainable development points towards a moderate level of predictive accuracy. The reduced RMSE and MAE values signify enhanced overall predictive capability. These findings highlight the varying degrees of predictive significance across different indicators, emphasizing the need for a nuanced understanding of the model's effectiveness for each variable.

Conclusion

In the epilogue, technical innovation in secondary schools has the potential to drive sustainable development in Kwara State by equipping students with the skills and knowledge necessary to address complex challenges. All the statements raised for virtual reality, social media, and cloud computing revealed the involvement of schools in the use of technological innovations. Therefore, the students are taught how to improve and preserve the environment for the next generation through the use of sustainable methods. Thus, proper waste disposal, provision of water, and food production are made known to the students and the community.

Recommendations

Based on the findings of the study the following recommendations were made:

1. Virtual reality in schools among students should be maintained for greater improvement of sustainable development in Kwara State.
2. The use of social media platforms to educate people about the dangers of improper waste disposal should be on the rise.
3. Schools should continue to embrace the use of cloud computing to manage and promote information sharing about sustainable development.

4. Sustainable development should be advocated for among students in order to ensure the safety of the upcoming generation.
5. Technological innovations should be encouraged to improve sustainable development in Kwara State
6. Government should use her political will to promote policies which support waste management through the means of technological innovation aimed at sustainable development.

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