Assessing the Pathways of Sustainable Development: A Structural Equation Modeling Investigation of Regulatory Framework, Innovation and Economic Indicators

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Abstract

The concept of sustainable development holds significant importance for both current and future generations. This research examines the different pathways and relationships among sustainable development, stock market performance, foreign direct investment, regulatory framework, and innovation. The structural equation modelling technique and analysis have been conducted using a sample of 24 countries that contributed around 65% of global greenhouse gas emissions over the period from 2000 to 2019. The empirical analysis, based on direct effects, confirms that innovation enhances stock market performance and necessitates stringent regulations. Conversely, innovation reduces foreign direct investment. Similarly, a set of regulations and stock market performance have an adverse impact on sustainable development. Additionally, the empirics of indirect effects reveal that innovation and stock market performance encourage foreign direct investment by using regulations as mediators. Moreover, innovation reduces sustainable development indirectly, considering stock market performance and foreign direct investment as mediators.

Keywords: Stock Market Performance, Innovation, Foreign Direct Investment, Regulatory Framework, Sustainable Development, Structural Equation Model.

Introduction

Since the 18th century, the Earth's temperature has witnessed a rising trend, particularly greenhouse gas emissions, which are becoming responsible for this upsurge (Balaram, 2023). According to NASA's Goddard Institute for Space Studies (GISS), the average global temperature on Earth has increased by at least 1.1° Celsius (1.9° Fahrenheit) since 1880. The majority of global warming has occurred since 1975, at a rate of roughly 0.15 to 0.20°C per decade. Only the twenty-four largest economies are contributing around 65 per cent of global greenhouse gas emissions. Presently, the globalized slogan of sustainable development has gained significant prominence among the global economies due to global warming. It reflects the collective aspiration of nations to achieve economic progress while simultaneously safeguarding the environment and promoting social equity (Paul, 2008; Reznichenko et al., 2018; Ngan et al., 2022; Sulehri, 2024). The pursuit of sustainable development often encounters a fundamental issue, which remains a primary objective for countries aiming to enhance living standards, environmental protection, and overall

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prosperity. Sustainable development has emerged as a critical global concern, necessitating an examination of the factors that contribute to its achievement in the present time (Kumar, 2023; Peiró-Signes et al., 2022; Rubin, 1999; Ali & Audi, 2016). Adding to the complexity of this issue, achieving the optimal level of financial development and stability is the need of the hour for every nation because there is an absence of financial stability around the globe (Sulehri et al., 2024; Sunaira, 2018).

In recent decades, sustainable development with a stable macroeconomic environment has become the prime concern of every economy. The process of development has led to multi-layered challenges, surrounding not only conflicts and political and socioeconomic volatility but also mounting environmental degradation and consequent calamities (Audi et al., 2020; Glasser et al., 2022). Humans' activities have had a harmful impact on the environment, exposing the survival of the planet and future generations to hazards. These circumstances have signaled behavioral adjustments aimed at more rational and efficient resource management that will result in a stable economy and reduced environmental degradation, leading to sustainable development. Achieving sustainable development has become a major global issue for all countries (Ali et al., 2022; Markanday & Galarraga, 2022; Sulehri & Ali, 2024). The idea of sustainable development, which emerged in the 1970s and 1980s in particular, is thought to encompass responsible behavior that will ensure the long-term utilization of resources without endangering future generations (Paul, 2008; Audi & Ali, 2023).

Sustainable development principles include socio-economic growth within ecological limits, resource redistribution to ensure everyone has access to them, and the use of long-term resources to ensure future generations' quality of life (Davies, 2013; Audi & Ali, 2023; Ashiq et al., 2023). The Triple Bottom Line concept implies a balance between the three pillars of sustainability: environmental sustainability, economic sustainability, and social sustainability. Environmental sustainability upholds the necessary environmental quality for economic activity and enhances people's quality of life. Economic sustainability means long-term economic growth without negatively impacting the environment (Audi et al., 2022, 2023). Social sustainability promotes human rights and equality, cultural identity preservation, and cultural diversity (Brundtland, 1987; Audi et al., 2024). For sustainable growth, all of these pillars must be balanced, but this is difficult to do because each pillar must respect the interests of others to avoid causing an imbalance. As a result, while one pillar of sustainable development may become stable, others may not, especially in terms of ecological sustainability, which is essential for the entire process of development (Carter & Rogers, 2008; Jenkins & Bauman, 2010; Ahmad, 2016; Willy, 2016; Naeem & Hameed, 2017; Sumaira, 2018; Klarin, 2018).

The United Nations established the Millennium Development Goals in September 2000 to attain sustainability as a framework to address global poverty and other critical issues by the target year of 2015 (Pogge, 2004). After the MDGs, the United Nations released their “2030 Agenda for Sustainable Development” in September 2015, which is a comprehensive action plan for achieving sustainable development, encompassing well-being, environmental preservation, and universal peace and partnership. It acknowledges poverty eradication as the primary global challenge and emphasizes the importance of inclusive partnerships among all countries and stakeholders. It seeks to free humanity from the shackles of poverty, address planetary concerns, and pursue transformative measures for a sustainable future.

To achieve sustainable development, there must be a set of economic, financial, regulatory, and innovation-related determinants. Every nation that innovates tends to create new goods, services, and procedures that improve its market position and competitiveness. Investors often perceive such

projects as possessing significant growth potential, thereby increasing demand for their stocks and enhancing stock market performance (Grieco, 2018; Senturk, 2017). Long-term prosperity depends on innovation, but innovation also carries risk and uncertainty because new projects or ideas do not always work out. Foreign investors may perceive increased innovation as a sign of increased uncertainty, potentially discouraging foreign capital inflows. Good regulatory environments can give investors assurance and certainty, which can encourage foreign investment inflows and market expansion. Similarly, regulations that promote innovation by protecting intellectual property rights and rendering benefits for research and development can enhance technical progress and improve financial market performance (Khan, 2018; Banyen, 2022; Olubiyi, 2023; Dempere et al., 2023; Ashiq et al., 2023).

A set of regulations that supports sustainable environmental practices like limiting emissions can encourage enterprises to take actions consciously to promote sustainable development (Zhang, 2016). Financial markets, like stock markets, play a vital role in economic growth and stability, which can encourage and motivate companies to invest in environmentally friendly initiatives and innovations to support sustainable development goals (Ali, 2015; Busch et al., 2016; Fatima & Zaman, 2018; Zeqiraj et al., 2020; Muhammad, 2023; Audi et al., 2022). Foreign direct investment promotes the inflow of foreign finance, technology, and experience that are supportive of sustainable practices and infrastructure to achieve sustainable development goals (William & Adam, 2016; Senturk et al., 2022; Ali, 2022; Aust et al., 2020). The major focus of this study is to examine different pathways to sustainable development and complex relationships among sustainable development, stock market performance, foreign direct investment, a set of regulations, and innovation (Sulehri & Ali, 2020; Audi et al., 2022). This research aims to investigate how innovation influences the outcomes of sustainable development, with foreign direct investment, stock market performance, and regulatory frameworks acting as mediators. Through empirical analysis, this research seeks to contribute insights into the complex interplay of these factors, shedding light on their role in shaping sustainable development paths.

Literature Review

Fundamentally, the idea of sustainable development emerged in the late 1970s and early 1980s. Proponents of sustainable development mention that human activities must be managed in such a way as not to jeopardize future generations. Basically, the notion of sustainable development is based on socioeconomic and financial development, with some consistent ecological restrictions and the redistribution of resources to ensure the quality of life for present and future generations (Sharpley, 2000). Following the triple bottom line idea, there are three pillars to sustainability, i.e., environmental sustainability, social sustainability, and economic sustainability (Brundtland, 1987; Carter & Rogers, 2008; Jenkins & Bauman, 2010; Ahmad, 2014; Klarin, 2018). There is a possibility of an uneven balance among the pillars of sustainable development, where one pillar may be stable while others may be unstable, particularly in the context of ecological sustainability (Rubin, 1999; Davies, 2013).

For exploring sustainable development, Silvestre and Tirca (2018) mention that sustainable development can make lives, businesses, and supply chains better. Boscoianu et al. (2018) mention a framework for designing strategies for sustainable development using enterprise systems engineering, dynamic capabilities, and option thinking. The findings of the study indicate that dynamic capabilities and real options allow for a dynamic image of relative performance during a complex process and suggest the need for interdisciplinary research to understand and integrate sustainability into the innovation process. Mores et al. (2018) analyze the innovation process in

the production of green plastic and highlight the importance of collaborations in the supply chain for product development. In addition to this, industrial cooperation and different activities that play a significant role in facilitating the manufacturing of environmentally friendly plastic were analyzed.

Grieco (2018) investigates the correlation between stock market performance and innovation, finding that investing in radical innovation leads to higher stock returns and high stock prices. Additionally, similar results have been observed in the case of endogenous innovation and the reverse risk attitude. Moreover, to check the association between the role of financial markets and sustainable development, Busch et al. (2016) investigated this relationship. They found that participants in financial markets consider environmental, social, and governance practices in their decisions but make no real shift to sustainable business practices. Furthermore, the authors highlight the need to consider long-term sustainable business practices and trustworthy ESG data required for empirical testing and policymaking.

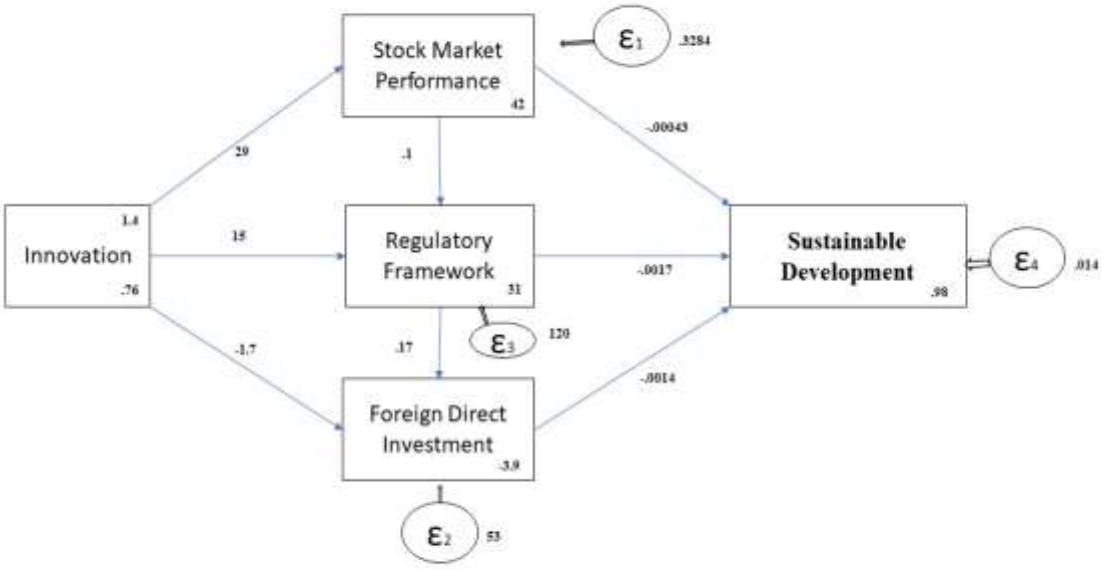
While investigating the relationship between foreign direct investment and sustainable development, Aust et al. (2020) find that foreign direct investment promotes basic infrastructure, renewable energy, water, and sanitation but has an adverse effect on sustainable development goal 13, climate action. However, Zeqiraj et al. (2020) investigate the impact of stock market development on low-carbon economies, and the results reveal that there is a negative relationship between stock market development and low-carbon economies in the long run. However, technological innovation is considered a driving factor in achieving low-carbon economies in the long run.

In his investigation of the impact of regulatory frameworks on greenhouse gas emissions in the electricity sector of China, Zhang (2016) finds that regulatory measures to control pollution still need to be fully realized due to a lack of coordination and the conflict between central and local governments. Due to these issues, regulatory policies are not conducive to the deployment of supply- and demand-side solutions. Additionally, Dempere et al. (2023) monitor the impact of innovation on self-employment, foreign direct investment, and gross domestic product and find that innovation promotes domestic institutional framework, local knowledge and technology, GDP, and creative outputs but has an adverse effect on self-employment and an insignificant impact on foreign direct investment.

Theoretical and Conceptual Framework

The idea of sustainable development gained importance in the late 1970s when policymakers raised concerns about how economic growth affects the natural environment and society. A variety of fields, including economics, ecology, sociology, and political science, can provide the theoretical foundations of sustainable development. Holling (1973) presents resilience theory and explains how systems might adapt to shocks like climate change and natural disasters. However, Brundtland (1987) provides three pillars for sustainability, i.e., economic development, environmental protection, and social equity, to consider in the “our common future” report produced for the World Commission on Environment and Development. Later, Wackernagel and Rees (1998) point out how ecological footprints link the utilization of natural resources with waste absorption. Following Holling (1973), Brundtland (1987), Wackernagel and Rees (1998), Dempere et al. (2023), Zhang (2016), Aust et al. (2020), Busch et al. (2016), and Grieco (2018) the conceptual model of this study becomes as:

Figure 1: Theoretical Ideologies



Following the theoretical and conceptual ideologies, the mediation econometric models can be written as:

$SMPit = \beta0+\beta1Innoit + \varepsilon it1$ (1)

$FDIit = \gamma0+\gamma1RF+ \gamma2Invit + \varepsilon it2$ (2)

$RFit = \delta0+\delta1SMPit + \delta2Innoit + \varepsilon it3$ (3)

$SDit = \beta0+\beta1SMPit + \beta2FDIit + \beta3RF\ it + \varepsilon it4$ (4)

SD= Sustainable Development
RF = Regulatory Framework
SMP = Stock Market Performance
FDI = Foreign Direct Investment
Inno= Innovation

Methodology

The following twenty-four countries have been used for empirical analysis that contribute around 65% of global greenhouse gases emission. Those countries include the United States, United Kingdom, Japan, Germany, Switzerland, Hong Kong, Singapore, France, Canada, Australia, China, South Korea, India, Brazil, Mexico, Russia, Netherlands, Italy, Spain, South Africa, Indonesia, South Arabia, Turkiye, Poland, Pakistan, and Argentina. Furthermore, we collected data from 2000 to 2019, prior to the COVID-19 pandemic. Karl Gustav Joreskog, a Swedish statistician, first presented the concept of structural equation modeling (SEM) in 1969. His research established the basis for structural equation modeling (SEM) as a comprehensive statistical method for examining intricate connections between variables in social science studies (Jöreskog, 1969).

In this research paper, structural equation modeling (SEM) is used to understand the empirical relationship between exogenous, endogenous, and mediating variables like stock market performance, regulatory framework, and foreign direct investment. This method reveals basic structural relationships for observed variables and has different methodologies to check the goodness of fit of the model like comparative fit index (CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA), standard root mean square residual (SRMSR) and Chi-square test (Jenatabadi, 2015; Cain, 2021).

To measure sustainable development, following methodologies and formulas have been used to construct sustainable development index.

The SDI formula can be described as follows:

$$\text{SDI} = \frac{\text{Development Index}}{\text{Ecological Index}}$$

The detail measurement methodologies of development index and ecological impact index have been given as follows:

Development Index

To calculate the development index, similar Human Development Index (HDI) calculations followed, with a sufficiency threshold on income.

$$\text{Development Index} = \sqrt[3]{life\ expectancy\ Index * Education\ Index * Income\ Index}$$

$$\text{Life Expectancy Index} = \frac{\text{LE}-20}{85-20}$$

$$\text{Education Index} = \frac{\frac{\text{MYSI}+\text{EYSI}}{2}}{}$$

$$\text{Income Index} = \frac{\ln(\text{GNIpc})-\ln(100)}{\ln(20{,}000)-\ln(100)}$$

MYSI = Mean Years of Schooling Index

EYSI = Expected Years of Schooling Index

Ecological Impact Index

$$\text{Ecological Impact Index} = 1 + \frac{e^{AO}-e^{1}}{e^{4}-e^{1}}$$

If AO greater than 4, then EII = AO – 2

$$\text{A0} = 2\sqrt{\left(\frac{MF}{\text{Boundary}} \geq 1\right) * \left(\frac{CO2}{\text{Boundary}} \geq \text{I}\right)}$$

Material footprint=MF

CO2=Carbon emission

AO=Average overshoot

e=exponential function

This strategy assures that the SDI is a reliable predictor of long-term sustainability. Countries cannot utilize low ecological impact to compensate for poor human development performance. Data for the components of the development index has been taken from the United Nations Development Programme; data for material footprint has been taken from the UN International Resource Panel Global Material Flows Database; and for CO2 emissions, the data has been taken from the EORA MRIO database with PRIMAP (Hickel, 2020).

A regulatory framework, commonly known as a country's regulatory structure, comprises a collection of legal statutes, rules, guidelines, and standards formulated by a government or regulatory body. Its purpose is to oversee various aspects of a particular industry, sector, or the

entire national economy. Regulatory framework data has been taken from the Index of Economic Freedom, and that index is comprised of property rights, judicial effectiveness, and government integrity indices (Dempere et al., 2023; Zhang, 2016). Foreign direct investment is the net inflow of investment to acquire a lasting management interest (10 per cent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital, as shown in the balance of payments. Data collected from the World Bank shows foreign direct investment as a per cent of GDP (Sattar et al., 2022).

Innovation refers to novel ideas, methods, products, or services that bring about significant advancements, improvements, or disruptions in various fields. It involves creative thinking, problem-solving, and the application of new technologies or approaches to address existing challenges or meet evolving needs through research and development, ultimately driving progress and growth. Innovation data has been collected from the World Bank, which is comprised of research and development expenditures as a percentage of GDP (Todaro & Smith, 2006; Grieco, 2018). Stock market performance refers to the overall behavior and movement of stock prices in a financial market, reflecting the collective value and returns of traded equities. Data related to stock market performance has been taken from the World Bank, which comprises stock market capitalization as a per cent of GDP (Montes & Tiberto, 2012; Grieco, 2018).

Findings and Discussions

In Table 1, the results of the structural equation model (SEM) reveal several significant relationships among the key variables like stock market performance, innovation, foreign direct investment, regulatory framework, and sustainable development, as hypothesized in the study. Countries that innovate typically create new products, services, and processes, boosting their competitiveness and market position, which investors view favorably due to the perceived growth potential, leading to higher demand for their stocks and improved stock market performance. Firstly, the analysis demonstrates a robust positive association between innovation and stock market performance, with a coefficient value of 28.77 and a p-value of 0.001, indicating that increased innovation activities lead to enhanced stock market performance. The inherent nature of innovation as a driver of economic growth and competitiveness accounts for the robust positive association between innovation and stock market performance (Dempere et al., 2023; Grieco, 2018). Additionally, the intercept, with a value of 42.2899, represents the baseline level of stock market performance in the absence of innovation, indicating that there is still some level of stock market performance even without innovation, influenced by various other factors such as economic conditions, the regulatory environment, or market sentiment.

It is quite obvious when we focus on research and development activities that pertain to novel ideas, emerging technologies, uncertain business practices, and a set of rules and regulations to ensure consumer protection and stable markets. The empirical results of structural equation modelling show a positive and significant influence of innovation on the regulatory framework, with a coefficient of 15.13203 and a p-value of 0.000. Moreover, stock market growth is an indication of economic growth, and stability demands regulations to ensure consistency, maintain market integrity, and foster investors' trust in the long run. The empirics show that stock market performance demands and promotes a regulatory framework with a coefficient of 0.1035 and a p-value of 0.000, which is highly significant (Dempere et al., 2023; Gulyamov & Narziev, 2021).

Moreover, investment in emerging technologies, novel ideas, and uncertain and new business practices enhances business activities that promote economic growth but also increase levels of

risk and uncertainty among market participants. The structural equation modelling results show that innovation has a negative and significant influence on foreign direct investment, with a coefficient of -1.7317 and a p-value of 0.005. Market participants' risk-averse behavior may be the main underlying cause of the adverse relationship between innovation and foreign direct investment (Dempere et al., 2023). However, a positive set of rules and regulations increases investors' confidence, protects intellectual property rights, and renders a set of incentives and benefits that promote foreign finance inflow and ultimately foster economic growth, local infrastructure, and market efficiency. This research finds that the regulatory framework raises foreign direct investment, with a positive coefficient of.16889 and a p-value of 0.000, which is highly significant, indicating a conducive regulatory environment that attracts foreign direct investment and promotes market growth (Arabic et al., 2013).

Furthermore, the ultimate objective of shareholders and market participants is to maximize profit. However, short-term profit maximization prioritizes rapid financial incentives at the cost of lower sustainable development and an increased level of environmental degradation. The empirical results show that stock market performance reduces the level of sustainable development, with a negative coefficient of -.00043 and a p-value of 0.000 highly significant, which indicates that stock market expansion decreases slightly sustainable development (Mushafiq & Prusak, 2023; Zeqiraj et al., 2020; Busch et al., 2016). So, when countries impose strict sets of regulations for protecting the environment and promoting human and societal well-being, ultimately imposing financial burdens on corporations could affect their investment decisions and profitability. Subsequently, a strict regulatory framework could decrease economic growth and human development, deteriorating long-term sustainable development. The negative coefficient of -.0071 and p-value of 0.000 are highly significant, indicating that a strict set of regulations hinders sustainable development (Zhang, 2016). However, the negative and insignificant coefficient of foreign direct investment in relation to sustainable development could be due to the uncertainty not included in the model. Technically, foreign direct investment fosters basic local infrastructure, increases employment and fosters economic growth. However, fewer regulations or inefficiencies may create adverse consequences, including environmental degradation and social inequalities (Aust et al., 2020). To formulate policies, all stakeholders and policymakers should consider these results before adopting a comprehensive approach that includes economic, social, and environmental aspects.

Table 1: Structural Equation Model

Endogenous Variables
Number of Observations = 480
Estimation Method = Maximum Likelihood
Log likelihood = -6357.9169

	Coefficient	OIM Std. Error	Z	P>|z|	[95% Conf. Interval]	
Structural						
SMP <-						
Inno	28.77388	2.997905	9.60	0.000	22.89809	34.64966
Cons	42.28985	4.942289	8.56	0.000	32.60314	51.97655
RF <-						
SMP	.1034754	.0087153	11.87	0.000	.0863937	.1205572
Inno	15.13203	.6249505	24.21	0.000	13.90715	16.35691
Cons	31.07119	1.013117	30.67	0.000	29.08552	33.05686
FDI <-						
RF	.1688932	.0265834	6.35	0.000	.1167906	.2209957
Inno	-1.731714	.612819	-2.83	0.005	-2.932817	-.5306106
Cons	-3.863829	1.130814	-3.42	0.001	-6.080184	-1.647475
SD <-						
SMP	-.0004336	.0001076	-4.03	0.000	-.0006445	-.0002227
RF	-.0071001	.0003354	21.17	0.000	-.0077575	-.0064428
FDI	-.0013626	.000747	-1.82	0.068	-.0028266	.0001015
Cons	.9819763	.017518	56.06	0.000	.9476417	1.016311
Var (e.SMP)	3283.926	211.9765			2893.667	3726.818
Var (e.FDI)	52.53997	3.391441			46.29616	59.62586
Var (e. RF)	119.7297	7.728519			105.5011	135.8773
Var (e.SD)	.0139978	.0009036			.0123343	.0158857

LR test of model vs. saturated: chi2(2) =8.72, Prob > chi2 =0.0128

By using structural equation modelling (SEM), the results of indirect effects show that research and development activities like novel ideas, emerging technologies, and uncertain and new business practices demand a set of rules and regulations to ensure consumer protection and stable markets. The empirical results in Table 2 reveal that innovation has a positive and highly significant impact on the regulatory framework, with a coefficient of 2.9774 and a p-value of 0.000 when considering stock market performance as a mediator. This indicates that research and development activities promote stock market performance, boost investors' confidence, and ultimately encourage regulators to create an effective and efficient regulatory environment for the protection of market integrity and stability (Dempere et al., 2023; Grieco, 2018; Gulyamov & Narziev, 2021; Qamruzzaman & Wei, 2018; Huan & Qamruzzaman, 2022).

Moreover, empirical results show that stock market performance has an indirect positive and significant impact on foreign direct investment mediated by the regulatory framework, with a coefficient of .01748 and a p-value of 0.000 highly significant. It indicates that stock market performance promotes economic activities and investors' confidence, ultimately requiring an effective set of regulations that attract foreign capital inflow (Arabic et al., 2013; Omar et al., 2022). Similarly, innovation has an indirect positive and significant effect on foreign direct investment mediated by the regulatory framework, with a coefficient of 3.0586 and a p-value of 0.000 highly significant. It indicates that an increased level of research and development activities

improves economic development and business activities, ultimately motivating regulators and policymakers to create an effective regulatory framework that attracts foreign direct investment. The direct effect of innovation on foreign direct investment is negative. However, the inclusion of a regulatory framework as a mediator reduces uncertainty and level of risk, which ultimately attracts foreign investors to capture market opportunities (Dempere et al., 2023).

Innovation becomes a source of technological progress, economic growth, and opportunities for investment in emerging markets. It attracts foreign investors to invest their capital for maximum profitability. However, these investments could have adverse effects on environmental degradation if they are not properly regulated and monitored, eventually having an adverse effect on sustainable development. The empirical results show that innovation has an adverse effect on sustainable development, with a coefficient of -.1429 and a p-value of 0.000, highly significant after the inclusion of foreign direct investment as a mediator (Lee et al., 2021; Huan & Qamruzzaman, 2022). Moreover, the core function of the set of regulations is to ensure that technological progress and economic growth are in line with environmental protection, social welfare, and long-term sustainability goals while investing in research and development activities. The negative value of the coefficient (0.00023) with a p-value of 0.080 indicates the insignificant and indirect impact of innovation on sustainable development with regulatory framework mediation. It confirms that a set of regulations does not mitigate adverse outcomes of innovation on sustainable development (Ashford & Hall, 2011; Shabir et al., 2023). Finally, research and development initiatives like investment in novel startups, emerging technologies, and new business practices promote economic growth and financial markets, increase investors' confidence, and eventually attract prospective investors who are actively seeking chances for financial benefits. However, in the absence of sustainability measures and a lack of responsible corporate practices, which could result in environmental degradation, social and governance disparities ultimately decrease sustainable development(Mushafiq & Prusak, 2023). To formulate policies, policymakers should consider these results before adopting a comprehensive approach that includes economic, social, and environmental aspects.

Table 2: Indirect effects

	Coefficient	OIM Std. Error	Z	P>|z|	[95% Conf. Interval]	
Structural						
SMP <-						
Inno	0	(no path)				
RF <-						
SMP	0	(no path)				
Inno	2.977389	.3988952	7.46	0.000	2.195569	3.75921
FDI <-						
SMP	.0174763	.0031198	5.60	0.000	.0113616	.023591
RF	0	(no path)				
Inno	3.058558	.4938095	6.19	0.000	2.090709	4.026407
SD <-						
SMP	-.0007585	.000073	-10.39	0.000	-.0009015	-.0006155
RF	-.0002301	.0001313	-1.75	0.080	-.0004874	.0000271
FDI	0	(no path)				
Inno	-.142864	.007394	-19.32	0.000	-.1573559	-.128372

Table-3 shows chi-square value for the model compared to the saturated model (chi2_ms) is 8.720 with a p-value of 0.013, indicating a good fit of the model because p-value is greater than.05. The RMSEA value is 0.08, almost equal to the desirable threshold of 0.08. However, the 90% confidence interval ranges from 0.033 to 0.144, indicating some uncertainty. The p-value associated with RMSEA (0.122) suggests that the RMSEA value is not significantly different from 0.05, indicating an acceptable fit. The Comparative Fit Index (CFI) value is 0.995, and the Tucker-Lewis Index (TLI) value is 0.973. Both values are close to 1, indicating good incremental fit improvements over the baseline model. The Standardized Root Mean Squared Residual (SRMR) value is 0.023, which is well below the threshold of 0.05, suggesting a good fit in terms of residual variability (Hu & Bentler, 1999; Jenatabadi, 2015).

Table 3: Overall goodness of fit

Fit Statistic	Value	Description
Likelihood ratio |		
chi2_ms (2)	8.720	Model vs. Saturated
p > chi2	0.013	
chi2_bs (10)	1240.695	
p > chi2	0.000	Baseline vs. Saturated
Population error		
RMSEA	0.08	Root mean squared error of approximation
90% CI, lower bound	0.033	
upper bound	0.144	
pclose	0.122	Probability RMSEA <= 0.05
Baseline comparison		
CFI	0.995	Comparative fit index
TLI	0.973	Tucker-Lewis index
Size of residuals		
SRMR	0.023	Standardized root mean squared residual
CD	0.628	Coefficient of determination

Conclusions

This research article presents different paths to sustainable development and investigates the complex relationship between exogenous and endogenous variables. In the beginning, the study confirms that innovation has a strong positive relationship with stock market performance and regulatory framework, indicating that increased research and development expenditures and technological progress lead to better stock market performance and an effective set of regulations. Whereas innovation has an adverse impact on foreign direct investment, the inclusion of a regulatory framework as a mediator between innovation and innovation confirms a positive and significant impact on foreign direct investment. This statement highlights the significant importance of effective rules and regulations that increase investors' trust in driving foreign capital inflow and economic stability. The regulatory framework has a direct positive and significant impact on foreign direct investment. High levels of business activities and financial market performance demand an efficient regulatory framework, as stock market performance has a positive and significant impact on a set of regulations.

Furthermore, stock market performance and regulatory framework have an adverse impact on sustainable development, which indicates that financial markets do not follow sustainable

environmental practices and prefer profit maximization at the cost of sustainable development. A strict regulatory environment depresses investors from enhancing business and economic activities in line with sustainable environmental practices. Additionally, foreign direct investment has an adverse and slightly insignificant impact on sustainable development. Finally, the indirect effects of innovation on sustainable development will be investigated, including the mediating role of stock market performance, foreign direct investment, and regulatory framework. The empirical results reveal adverse effects on sustainable development due to ignoring sustainable environmental practices and an inefficient regulatory framework. It is recommended that policymakers and higher authorities focus on research and development initiatives that should be aligned with sustainable environmental practices and responsible corporate practices and assure an effective and efficient regulatory framework to achieve the desired level of sustainable development. Further research can be undertaken to answer why innovation and research and development initiatives have an adverse effect on sustainable development.

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