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Sustainable Development Goals: Economy, Society, and Environment

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Abstract

This academic article aims to analyze the Sustainable Development Goals (SDGs) set by the United Nations for member states worldwide to collectively strive for progress and interconnectedness across social, economic, and environmental aspects to achieve these goals by 2030. The dimension of sustainable economic growth, leading to the well-being and quality of life of its citizens, must resemble a sustainable family, meaning it must have the ability to generate income, share or distribute income fairly, avoid excessive inequality, and its people must be united and not divided, free from pollution and natural disasters. These are the four dimensions of sustainable growth that all countries seek to raise the standard of living and quality of life of their citizens, which are the goals of national administration and economic policy. The social and economic dimensions create balance in development, meaning the economy has a solid foundation, is competitive, and self-reliant. The Sufficiency Economy philosophy, as envisioned by King Bhumibol Adulyadej (Rama IX), serves as the core concept, comprising three key components: economic growth, social participation, and environmental conservation. In other words, it means aligning human activities with the principles of nature. To put it simply, "sustainable development" in Thailand means development that creates balance or interdependent relationships across various dimensions. The elements that contribute to a good and happy human life include economic, social, political, cultural, and spiritual aspects, as well as natural resources and the environment for present and future generations.

Keywords: Sustainable Development Goals; Economy; Society; Environment

Introduction

Sustainability refers to the management of an organization to achieve sustainable business operations, balancing business, society, and the environment, based on sound governance principles, to maintain benefits for all stakeholders equally. The Sustainable Development Goals (SDGs) are a set of global development goals after 2015 that were endorsed by 193 member states of the United Nations on September 25, 2015, covering a period of 15 years to be achieved. It has been a development direction that all countries have been working on together since 2016 until 2030. The document that all member states have signed as a commitment is called "Transforming our world: the 2030 Agenda for Sustainable Development" or "2030 Agenda for Sustainable Development". Therefore, on occasion, the SDGs may be referred to by other names, such as Agenda 2030 or Global Goals (Khajuria et al., 2022).

The essence of the Sustainable Development Goals (SDGs) can be summed up in a simple phrase: "leaving no one behind," a principle that underlies all UN missions in Thailand. In January 2022, the United Nations Country Team in Thailand signed the Framework for Sustainable Development Cooperation 2022-2026 (UNSDCF) with the Royal Thai Government. The Framework outlines the development support the UN system is providing to Thailand to achieve its ambitious aspirations towards the Sustainable Development Goals by 2030 and become a high-income, inclusive, sustainable, and resilient country. The Framework is designed around the UN principles of leaving no one behind, human rights, gender equality, sustainability, and resilience. It is highly aligned with Thailand's 20-Year National Strategy and the draft 13th National Economic and Social Development Plan (Carlsen & Bruggemann, 2022). Thailand's 2025 Voluntary National Review represents the country's third submission to the High-Level Political Forum on Sustainable Development, demonstrating a consistent commitment to SDG implementation and transparent progress reporting (Thailand Ministry of Foreign Affairs, 2025). The review highlights Thailand's continued first place in ASEAN for SDG performance over six consecutive years (2019-2024), while acknowledging ongoing challenges that require innovative solutions.

Thailand has its own development framework that is currently being used to achieve the Sustainable Development Goals, the Sufficiency Economy Philosophy, based on wisdom and honesty, as well as the middle path, reasonableness, and prudence as conceived by His Majesty King Bhumibol Adulyadej. The focus of the Sufficiency Economy Philosophy is sustainability, and it has been recognized as a key principle of Thailand's National Economic and Social Development Plan since 2002. Contemporary analysis of Thailand's development approach reveals the innovative integration of the Sufficiency Economy Philosophy with the newly introduced Bio-Circular-Green (BCG) Economic Model, launched in 2020 as a post-pandemic recovery strategy. This BCG model capitalizes on Thailand's biological diversity and cultural richness, employing science, technology, and innovation to transform the country into a value-based, innovation-driven economy while maintaining consistency with traditional development wisdom (NXPO, 2025).

Since the economic crisis in 1997, the Sufficiency Economy Philosophy has been used as a key principle in efforts towards sustainable development in Thailand. It emphasizes a balance in the use of economic, social, environmental, and cultural capital. It is based on three principles that emphasize a middle path for all Thai people, from every family to the community, and to the country. Sustainable development helps to ensure the stewardship and conservation of natural resources sufficient for future generations, helps society to respond to the diverse needs of its people, promotes good health and well-being, builds social cohesion and participation, and creates opportunities for equality and justice. Economic stability and

sustainability, openness for all, and promotes good governance, promotes participation at all levels so that people can be creative. Recent bibliometric analysis of sustainable development research from 2019-2024 reveals that digitalization and artificial intelligence are increasingly recognized as critical enablers for SDG achievement, particularly in developing countries (Abdeldjalil, 2024). However, persistent barriers include inadequate data collection infrastructure, insufficient governance frameworks, and limited technological capacity, especially in developing nations. Thailand's response to these challenges through its BCG Economic Model represents an innovative approach to sustainable development that merits detailed examination.

The unreasonable and extravagant demand for goods and services leads to the excessive use of natural resources in production and services, exceeding the needs of a self-sufficient lifestyle. There are many leftovers that pollute the environment and deteriorate the quality of natural resources and the environment, resulting in an imbalance, even though this results in economic expansion (Phonthanukitithaworn et al., 2023).

The lack of community strength, acceptance of wrong cultures and ideas from abroad regarding extravagance, materialism, and consumerism, as well as lack of training and abandonment of traditional customs and traditions, causing society to change into a consumer society, accumulating, and accumulating, resulting in wasted business investments, resulting in adverse economic effects, social conflicts, and severe destruction of natural resources and the environment (Khalid et al., 2025; Nopsuwan, 2025).

The movement of capital from abroad has both positive and negative effects on the economic system and the environment, depending on the country's competitiveness and business networks. The economic crisis in late 1997 is a clear lesson that shows that economic development that relies on foreign capital without a solid internal foundation leads to an unprecedented collapse of the system (Kanchoochat et al., 2021). In addition, opening up investment in the chemical industry and energy-intensive industries such as the steel and paper industries without strong mechanisms or measures to monitor the impact of these industries, leads to Rapid deterioration of natural resources and the environment.

The government's policy of accelerating economic development in the past resulted in a large number of investments in infrastructure and large-scale projects without any environmental impact assessment. The resource base was used extravagantly, exceeding the rate at which natural systems recover, which affected the environment and the sustainability of the ecosystem (von Feigenblatt & Ricardo, 2023).

The problems that arose greatly affected the destruction of natural resources and the environment because Western culture and the capitalist system were brought into the country's administration, resulting in deterioration in almost every aspect, whether it was the environment, quality of life, morality, or ethics. This was a huge mistake. Sustainable development is the challenge of balancing economic, social, and environmental growth, particularly in addressing growing challenges such as climate change, pollution, poverty, inequality, and biodiversity loss, all of which are obstacles to achieving the global Sustainable Development Goals (SDGs) (Chiang & Chen, 2022).

Contemporary global assessments reveal persistent challenges in SDG implementation, particularly in developing countries. The Asia-Pacific region faces significant hurdles, with current projections indicating that none of the 17 SDGs will be achieved by 2030, with full achievement not expected before 2062, representing a 32-year delay (ESCAP, 2024).

These challenges manifest across multiple dimensions: data and monitoring challenges, where insufficient data availability significantly constrains progress assessment, with only 133 out of 231 SDG indicators possessing sufficient data for meaningful evaluation; governance and institutional barriers, where international surveys reveal that lack of proper governance constitutes the most significant obstacle; and financial and resource constraints, highlighted by a staggering $4 trillion annual financing gap that constrains development progress globally (United Nations, 2025).

Thailand has responded to these challenges through innovative platforms such as the Thai People Map and Analytics Platform (TPMAP), which identifies vulnerable groups and supports evidence-based policy making (Thailand VNR, 2025). This approach demonstrates the critical importance of investing in data infrastructure and technological capacity for effective SDG implementation, particularly for developing countries with limited traditional statistical infrastructure.

In summary, sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is a development that integrates three main dimensions: economic, social, and environmental, to create balance and a good quality of life for all in the long term. The United Nations has established 17 Sustainable Development Goals (SDGs) to serve as a framework and guidelines for all countries to achieve these goals by 2030, with the key principle being "leaving no one behind." Sustainable development aims to achieve balanced and sustainable development. It not only focuses on economic development, but also takes into account social and environmental impacts, so that current and future generations can have a sustainable and productive life.

Literature Review

Sustainable Development

Sustainable development means development that meets the needs of the present generation without affecting the ability of the next generation to meet their own needs (Ruggerio, 2021). The National Village and Urban Community Fund Committee (2003) explains Sustainable development as a form of development that meets the needs of the present generation without any compromises with the necessary needs that meet the needs of the future generations. As per the study of Uralovich et al. (2023), sustainable development means development that meets the basic needs of people in the present era and future eras and creates a balance between economic, social, human, and environmental development. Uralovich et al. (2023) defines sustainable development as conserving and using resources appropriately so that they can be used in the long term and distributing benefits to the majority of people, including close cooperation among those involved or have a stake.

Sustainable development means development that meets the needs of the present generation. Without causing future generations to compromise or reduce their ability to meet their own needs (Son et al., 2023). In summary, sustainable development is a development that creates a balance or interaction that supports each other between various dimensions, including economics, society, politics, culture, mind, as well as natural resources and the environment, which will be the elements that will be combined or integrated to make human life happy for both the current generation and the future generation. The sustainable development research landscape has evolved significantly since 2019, with increasing emphasis on integrated approaches and technological solutions. Contemporary systematic reviews highlight the growing importance of education for sustainable development (ESD) in higher education institutions, demonstrating significant positive correlations between ESD integration and students' sustainability behavior, emphasizing the critical role of educational institutions in promoting sustainable practices (Abdullahi et al., 2024).

This finding is particularly relevant for developing countries, where educational infrastructure serves as a foundation for sustainable development implementation.

Key Aspects of Sustainable Development

The vital principle of sustainable development is to create an order between 3 dimensions of development, namely 1) Resolutions on sustainable economic development, which is developing the economy to grow with quality, distributing income to benefit most people in society, especially people with low incomes. 2) The dimension of sustainable social development, which is developing people to have knowledge, competence, and higher productivity, promoting a society with potential and a learning society. 3) The dimension of sustainable environmental development, which is the use of natural resources in an amount that the ecosystem can recover to its original state, releasing pollution into the environment at a level that the ecosystem can absorb and destroy that pollution, allowing it to produce to replace those that can be used up. The role of governance in sustainable development has gained increased attention, with recent studies identifying a lack of proper governance as the primary barrier to SDG implementation in developing countries (80% of respondents), followed by financial resource constraints (71%) and inadequate training programs (58%) (Leal Filho et al., 2021). These findings underscore the importance of examining successful governance models, such as Thailand's integrated approach combining traditional philosophy with modern economic frameworks.

Sustainable Development Goals

The term 'Sustainable Development' has been continuously discussed at all levels and circles, be it global, national, social, industrial, or even educational. Why has 'sustainable development' become the keyword of the century? The National Economic and Social Development Council defines 'sustainable development' as "an approach to development that meets the needs of the present generation without compromising the ability of future generations to meet the needs (Hariram et al., 2023). There are three important elements to achieving sustainable development: economic growth, social inclusion, and environmental protection." Sustainable development has an integrated nature, that is, it creates a holistic whole, meaning that all related elements must come together completely and have another characteristic: there must be balance or, in other words, it makes human activities consistent with the criteria of nature." If we were to translate it into a simpler understanding, so that you can understand, Thailand's 'Sustainable Development' is "Sustainable development must be development that creates balance or interaction that supports each other among the dimensions that are the components that will make human life well-off, namely economic, social, political, cultural, mental, including natural resources and the environment, both for the current generation and the future generation" (von Feigenblatt & Ricardo, 2023).

Contemporary analysis reveals significant variations in progress across the 17 SDGs. Thailand's performance in the 2025 SDG Index demonstrates both achievements and ongoing challenges, ranking 43rd globally while maintaining first place in ASEAN for six consecutive years (Thailand VNR, 2025). However, global trends indicate that Goals 1 (No Poverty) and 9 (Industry, Innovation and Infrastructure) show positive trajectories, while significant challenges remain in Goals 10 (Reduced Inequalities), 14 (Life Below Water), and 16 (Peace, Justice and Strong Institutions) (United Nations, 2024). Recent research emphasizes the interconnected nature of SDG achievement, with poverty identified as a central barrier affecting virtually all other goals. Studies indicate that SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), and SDG 6 (Clean Water and Sanitation) are most negatively impacted by persistent poverty conditions (Leal Filho et al., 2021).

This interconnectedness underscores the importance of holistic approaches to sustainable development, such as Thailand's integration of economic, social, and environmental considerations through the Sufficiency Economy Philosophy.

Concept of sustainable development

Sustainable development means improving the quality of human life under the potential of the world's ecosystem. Sustainable development is a development that is integrated to create a whole, that is, all related elements will be coordinated together completely. Another characteristic is that there is balance, that is, the natural environment and the economy must be integrated together. This will create a condition called sustainability in both the economy and the environment (Tsolakis et al., 2021). Environmental protection goes hand in hand with economic development, using humans as the core of development to create a balance between people, nature, and all things so that they can live together with mutual support and not destroy each other. Everything in the world will coexist peacefully, resulting in truly sustainable development. Thailand's Bio-Circular-Green (BCG) Economic Model represents a groundbreaking approach to sustainable development that integrates bioeconomy, circular economy, and green economy principles. The model focuses on four strategic industries: agriculture and food; medical and wellness; bioenergy, biomaterials, and biochemicals; and tourism and creative economy. These sectors currently contribute 3.4 trillion THB (approximately 21% of GDP), with projections to reach 4.4 trillion THB (24% of GDP) within five years through BCG implementation (NXPO, 2025). This economic transformation aligns directly with the UN Sustainable Development Goals while maintaining consistency with Thailand's Sufficiency Economy Philosophy.

Discussion

Thailand's BCG Model Implementation

Thailand's Bio-Circular-Green (BCG) economic model demonstrates practical sustainability through concrete implementations across multiple sectors (Sawangchai et al., 2025). The Nan Sandbox initiative exemplifies agroforestry integration, where deforested land is replanted with native medicinal plants, providing both environmental restoration and community livelihood enhancement. This project generated a 40% income increase for participating farmers while restoring 2,500 hectares of degraded forest land (Thailand Now, 2025). The Thai Eastern Industrial Land (TEIL) in Chonburi province operates as Thailand's first eco-industrial complex, converting biowaste from rubber processing into biogas for electricity generation. This circular approach reduces waste by 85% while generating renewable energy equivalent to powering 15,000 households annually (IIETA, 2023). Such innovations demonstrate the scalability of BCG principles across industrial sectors. In the medical and wellness sector, Thailand's integration of traditional medicine with modern biotechnology has created a $12 billion industry that contributes directly to SDG 3 (Good Health and Well-being) and SDG 8 (Decent Work and Economic Growth). Community-based herbal medicine production in Northern provinces now supports over 50,000 households while preserving indigenous knowledge systems (NXPO, 2025). Thailand's advancement in sustainable development monitoring leverages cutting-edge technologies to enhance policy effectiveness and transparency. The Thai People Map and Analytics Platform (TPMAP) utilizes big data analytics, artificial intelligence, and geographic information systems to identify vulnerable populations with 95% accuracy, enabling targeted interventions for SDG achievement (Thailand VNR, 2025).

Remote sensing technologies deployed through partnerships with international space agencies provide real-time monitoring of deforestation, water quality, and agricultural productivity.

AI-driven early warning systems have reduced environmental disaster response time by 60%, directly supporting SDG 13 (Climate Action) and SDG 15 (Life on Land) objectives. Blockchain technology integration in Thailand's agricultural supply chains ensures transparency and traceability, supporting sustainable consumption patterns under SDG 12. Over 200,000 farmers now participate in blockchain-verified sustainable production networks, receiving premium prices for certified sustainable products (ESCAP, 2024).

Objectives of Sustainable Development

The objectives of sustainable development are development that creates a balance of the economy, society, natural resources, and the environment for the well-being of the people forever (Ministry of Foreign Affairs of Thailand, 2016). An economic aspect that fosters a balance of development is an economy with a solid foundation, competitiveness, and self-reliance, grounded in the sufficiency economy concept initiated by His Majesty the King. Society, culture, and local wisdom are the way of life of society that allows people to adapt and live with the local environment without destroying the environment, including religious principles, which are the mental discipline of people in society that allows society to live peacefully. Natural resources refer to everything around humans, both living and non-living, that are interconnected as an ecosystem that can give benefits or harm to humans, depending on the balance or imbalance of the ecosystem. The environment refers to everything around humans, both living and non-living, that is interconnected as an ecosystem that can give benefits or harm to humans, depending on the balance or imbalance of the ecosystem. The balance and connection between the economy, society, natural resources, and the environment, with development goals that enable people to live happily and sustainably. Education for Sustainable Development (ESD) has emerged as a critical enabler for achieving the 2030 Agenda. UNESCO's ESD for 2030 programme emphasizes empowering people with the knowledge, skills, values, attitudes, and behaviors necessary for sustainable living (UNESCO, 2025). Contemporary challenges in ESD implementation include integrating sustainability across all educational levels, developing appropriate pedagogical approaches, and building educator capacity. The integration of digital technologies and innovative teaching methods has shown promise in enhancingeffectiveness, particularly in developing countries where traditional educational resources may be limited.

Elements of sustainable development

Sustainable development comprises three main components: economic, social, and environmental, which are interrelated. The purpose of sustainable development, according to Edward Barbier, is to achieve the best results of these three components. Since society cannot reach the highest goals in all components, it is necessary to reduce the goals of some components in order to increase the goals of other components (Tsolakis et al., 2021). This depends on the prioritization of the components, which component is given higher priority than the others. For example, if economic growth is prioritized first, it may have to compensate by reducing social and environmental goals. Society must create growth that generates appropriate income streams while maintaining the stock of man-made capital, human capital, and natural capital. The three basic goals of the economic system are the following: an increase in the production of goods and services, satisfying the basic needs of the people, reducing poverty, and creating a more equitable distribution of income. These three basic goals must be implemented in a sustainable manner (Niyommaneerat et al., 2023).

A society of sustainable development must be based on two principles: the principle of justice and the principle of equality. To achieve long-term development, access to resources and opportunities for people in society must be equal. Human rights and other benefits such as food, health, education, housing, and opportunities for self-development. This social justice means equal

opportunities for all people to receive education and to contribute to the productivity of society (Liao et al., 2022). These things will help achieve the social goals of cultural diversity, social justice, gender equality, and public participation. Environment means the sustainable use of resources, the preservation of the stock of natural capital, such as forests, rivers, mountains, and minerals, which are natural environments that should exist to enable the economic and social components to operate efficiently without affecting the stability of the world's ecosystem.

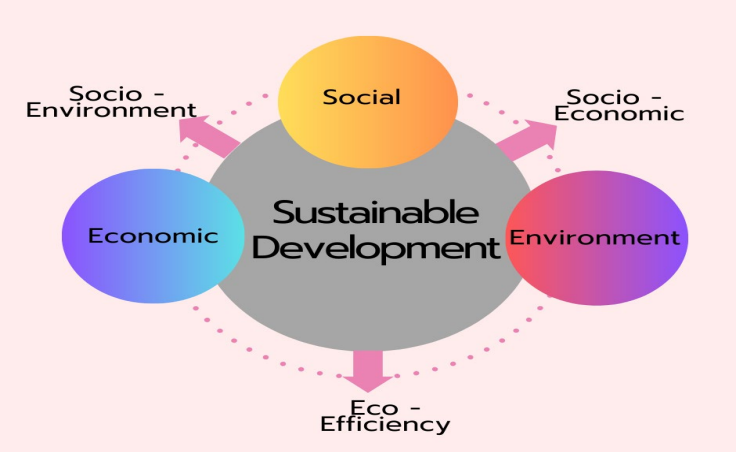

Figure 1. Components of sustainable development.

The figure shows the components of sustainable development, which must consist of 3 main parts: economic system, social system, and ecological environment, all related and dependent on each other. Sustainable development will occur in the overlapping part of the three components or shaded areas in the picture, namely economic development, social development, and environmental protection at the same time. There are three important basic components of sustainable development: economic, social, and environmental components. These three components are interconnected according to the concept of Edward Barbier. In order to achieve the goals of all three components as best as possible, it is necessary to reduce the goals of some components in order to increase the goals of other components. The social aspect of sustainable development must be placed (Pradidthaprecha et al., 2023).

The social aspect of sustainable development must be based on two principles: the principle of justice and the principle of equality. In order to achieve long-term development, access to resources and opportunities for people in society must be equal; human rights and other benefits such as food, public health, education, housing, and opportunities for self-development (Kulkov et al., 2024).

The environmental aspect means the sustainable use of resources, the preservation of natural capital stocks such as forests, rivers, mountains, and minerals, which are natural environments that should exist and enable economic and social components to operate without affecting the stability of the world's ecosystem. While the economic aspect means that society must create growth that generates appropriate income streams, it can meet people's basic needs or reduce poverty and create a more equitable distribution of income (Uralovich et al., 2023).

The development of robust methodologies for assessing sustainable development progress has evolved significantly since 2019. The Sustainable Development Methodology developed by the Initiative for Climate Action Transparency (ICAT) provides a comprehensive framework for evaluating policy impacts across multiple dimensions, including economic, social,

and environmental considerations (GHG Protocol, 2022). This methodology supports both qualitative and quantitative assessment approaches, enabling flexible application based on available resources and data capacity. Recent methodological advances emphasize the importance of integrated impact assessment that considers synergies and trade-offs among different SDGs.

Analysis of global SDG progress reveals significant regional variations and emerging trends that inform best practices for sustainable development implementation. The Asia-Pacific region demonstrates both remarkable achievements and persistent challenges, with countries like Thailand leading in ASEAN while facing continued obstacles in specific SDG areas. The role of international partnerships in facilitating the achievement of SDGs has become increasingly critical, particularly given the significant financing gaps identified in recent assessments. Strategic alliances that combine financial resources, technological expertise, and institutional capacity offer promising pathways for accelerating progress toward the 2030 Agenda.

Conclusion

Sustainable development is a development that emphasizes that humans should be mindful of the limitations of natural resources on Earth and carry out development in conjunction with the conservation and restoration of natural resources and the environment, so that it is a development that responds to the needs of people in the present era and the future era equally. For Thailand, in addition to development in 3 dimensions: economy, society, and environment according to the SDGs, Thailand also emphasizes the cultural dimension.
To achieve the success of the sustainable development goals, His Majesty the King, a widely recognized developer both domestically and internationally, has granted a development compass for all sectors to appropriately apply, which is the philosophy of the Sufficiency Economy, which is a royal initiative based on the foundation of Thai culture. It is
a development guideline based on the middle path and caution, taking into account moderation, reasonableness, building self-immunity, and using knowledge and morality as the foundation of life, which will lead to happiness in life and create true sustainable development results.

Sustainable development is a complex undertaking and requires collaboration across all sectors, including the public, private, and civil society, to address structural issues and emerging challenges, striving to create a balanced and just future for present and future generations. Contemporary analysis of global SDG progress underscores both the urgency and complexity of achieving the 2030 Agenda. With only 17% of targets currently on track for achievement by 2030, innovative approaches such as Thailand's integration of the Sufficiency Economy Philosophy with the BCG Economic Model offer valuable insights for sustainable development implementation worldwide (United Nations, 2024). The Thai experience demonstrates that successful sustainable development requires integration of traditional wisdom with contemporary innovation, comprehensive governance frameworks, and multi-sectoral collaboration. The BCG model's emphasis on leveraging biological and cultural diversity through science and technology provides a replicable framework for other developing countries seeking to achieve sustainable development while maintaining cultural identity and environmental integrity.

Future research should focus on longitudinal assessment of the BCG model's effectiveness, comparative analysis of similar integrated approaches in other developing countries, and investigation of scalability potential for different cultural and economic contexts. Additionally, continued development of robust monitoring and evaluation frameworks will be essential for tracking progress and adapting strategies as global conditions evolve. The path to achieving the Sustainable Development Goals by 2030 requires sustained commitment, innovative approaches,

and international collaboration. Thailand's experience provides valuable lessons for the global community while highlighting the importance of context-specific solutions that honor local wisdom while embracing global best practices.

5. Implications of the study

5.1 Theoretical implications

This study contributes to the theoretical understanding of sustainable development by reinforcing the integrated nature of economic, social, and environmental dimensions. The analysis demonstrates that sustainable development is not merely a sequential process but a holistic system where each pillar influences and is influenced by the others. The application of Edward Barbier's model, which acknowledges the necessity of trade-offs between economic, social, and environmental objectives, provides a theoretical foundation for understanding the complexities of achieving balanced development. The integration of Thailand's Sufficiency Economy Philosophy with the Bio-Circular-Green (BCG) Economic Model offers a novel theoretical framework that bridges traditional wisdom and modern economic approaches, highlighting the importance of cultural context in sustainable development theory.

The study further advances governance theory by identifying governance as the primary barrier to SDG implementation, emphasizing the need for robust institutional frameworks and multi-level coordination. The research underscores the importance of meta-governance functions, such as deliberation, coordination, monitoring, and stakeholder engagement, in ensuring effective achievement of the SDGs. This theoretical contribution challenges conventional approaches by advocating for a more dynamic and adaptive governance model that can respond to the interconnected challenges of sustainable development.

5.2 Practical Implications

The practical implications of this research are significant for policymakers, educators, and practitioners involved in sustainable development initiatives. The identification of specific barriers—such as fragmented governance, inadequate financing, and insufficient data infrastructure—provides actionable guidance for policy reform. The Thai People Map and Analytics Platform serves as a replicable model for developing countries, demonstrating how technology solutions can overcome data scarcity and enable evidence-based policymaking.

For higher education institutions, the study highlights the need for curriculum integration, faculty development, and institutional support to foster sustainability literacy and competency. The barriers identified—such as institutional resistance, inadequate faculty training, and fragmented curriculum design—inform practical strategies for implementing Education for Sustainable Development (ESD) at multiple levels. The research suggests that institutions should embed sustainability within strategic plans, develop interdisciplinary curricula, and provide professional development opportunities for faculty.

The BCG Economic Model's practical application across sectors offers concrete templates for economic transformation in developing economies. The Nan Sandbox initiative, Thai Eastern Industrial Land, and community-based herbal medicine production demonstrate how integrated approaches can simultaneously address environmental, social, and economic challenges. These examples provide replicable models for other regions seeking to achieve sustainable development through innovation and cultural preservation.

The study also emphasizes the importance of robust monitoring infrastructure and multi-stakeholder partnerships. The deployment of remote sensing technologies, blockchain for supply chain transparency, and integrated reporting systems are practical solutions for tracking progress and managing trade-offs. The research highlights the necessity of collaboration across public, private, and civil society sectors to ensure effective implementation and resource mobilization.

In conclusion, this research provides both theoretical and practical insights that can inform the development of sustainable policies and educational programs. The integration of traditional wisdom with modern economic models, the emphasis on robust governance, and the practical examples of successful implementation offer valuable lessons for achieving the Sustainable Development Goals in diverse contexts.

Limitations and Future Recommendations

This study acknowledges several limitations that may influence the interpretation of findings. First, the focus on Thailand's nationally specific development approach may limit the transferability of results to other countries with different cultures and resources. Second, the use of official government reports as primary sources may involve bias, emphasizing progress over challenges. Third, the recent inception of the BCG model limits the availability of long-term data and complicates the isolation of pandemic effects. Fourth, sociocultural nuances at the community level require qualitative inquiry for a fuller understanding. Future research should emphasize longitudinal and comparative studies evaluating the impacts of the BCG model and related frameworks. Investigation into social innovation and behavioral approaches to sustainability promises further insights. Policymakers should prioritize transparent independent monitoring, build local capacity, and strengthen regional and global partnership mechanisms that facilitate knowledge exchange and innovative, culturally adapted financing models to accelerate SDG achievement.

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