

# BIO-CIRCULAR-GREEN MODEL IN A DEVELOPING ECONOMY

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## Abstract

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The Bio-Circular-Green (BCG) economic model, adopted by governments throughout the world, including Thailand, is the prevailing economic development model to manage natural resources more effectively and with little environmental damage (Simachaya, 2021). This research intends to evaluate the administration and management of the BCG model implementation in Thailand, factors influencing the success of implementing the model, and recommendations for enhancing the BCG economy. According to the findings, the BCG Policy Board, the BCG Implementation Committee, and the BCG Implementation Subcommittee supervise the implementation of the BCG model in Thailand. Legalization and regulation, standards and quality assurance, financial aid, tax incentives, a BCG market environment, a strategic management organisation, and budget allocation are key elements influencing the effective implementation of the model. Future action plans proposed by experts include boosting local investments in BCG industries, enhancing financial aid, fostering collaboration amongst diverse sectors, performing systematic research, and integrating current innovation and technology. The paper suggests that laws and regulations should be amended to facilitate BCG businesses to the maximum extent feasible, that standards and quality assurance should be developed for all BCG companies, and that the BCG industry should embrace cutting-edge technology and innovation.

**Keywords:** Bioeconomy, Circular Economy, Green Economy, Sustainable Development

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## 1. INTRODUCTION

Climate change, food security, and the energy crises on our planet are intensifying (Usapein et al., 2022).

For instance, climate change is seen as a crucial problem since it impacts the economy, society, and ecology (All Around Plastics, 2021). The rise in food and energy costs has an impact on commodity

prices, threatening to worsen food insecurity in emerging nations (Khoiruddin et al., 2021). Thailand currently faces basic environmental problems such as waste, water pollution, and air pollution on an annual basis; thus, these are urgent issues that must be addressed right away. According to the climate risk index, Thailand is one of the 10 countries most affected by climate change worldwide (Eckstein et al., 2021). In order to address such concerns, Thailand has established the Bio-Circular-Green (BCG) economic model as a national priority for 2021 (Simachaya, 2021). This concept tries to manage natural resources more efficiently with little environmental impact. As the epidemic subsides, BCG employs a “whole of society” strategy in which the government, corporate sector, academics, and society collaborate to put Thailand back on track to develop a healthier, greener, and more inclusive economy.

Based on its economic basis and strengths, Thailand’s four priority sectors for the BCG model are:

- 1) food and agriculture;
- 2) medicine and wellness;
- 3) energy, materials, and biochemicals;
- 4) tourism and creative economy.

Thailand seeks to attain complete security in important sectors such as food, health, energy, employment, sustainable natural resources, and the environment by concentrating on the aforementioned areas. Each section of the BCG model resembles a supply chain pyramid for its respective industry. The base of the pyramid consists of production utilising fundamental knowledge and involving the biggest number of producers, whereas the upper layers of the pyramid demand more advanced technology for which fewer producers have the capacity. The objective is to assist the base to ascend the pyramid by increasing the value of their goods (Royal Thai Embassy in Amman, Jordan, 2021). For example, implementing biotechnology to produce breakthroughs and suit the requirements of global customers will improve the economic value of agricultural and food goods for the food and agriculture business. Technologies and human capital will be developed in the research and development of medical and pharmaceutical technology for the healthcare and wellness business. Bioenergy, biomaterials, and biochemicals will be encouraged in the energy, material, and biochemical industries. This also includes renewable energy derived from waste, biomass, and biogas, as well as community-based power plants connected by blockchain-enabled microgrids. Tourism will be connected to the country’s intellectual resources to establish niches and promote tourism in less-visited towns within the tourism and creative economy sectors (Thailand Board of Investment, 2021). BCG tried to focus on Thailand’s biodiversity across the supply chain by enhancing the abilities of local people and maximising the application of modern technology. In the meantime, science institutes farther up the supply chain are reshaping the industrial and service industries using current scientific methodologies and technology, as well as indigenous innovation. The objective is to concurrently advance the bio, circular, and green economies (Royal Thai Embassy in Amman, Jordan, 2021). Thailand intends to be more inventive and

eco-friendlier in order to increase profits. Even though these notions have existed in Thailand for some time, their synergistic execution is innovative. Thailand has been advocating for a number of development theories and models that are truly interrelated in order to achieve a balance between the conservation of natural resources and the production of value. BCG is the most recent model derived from evaluations of our existing status and desired goal along this path of growth.

The Thai government anticipates that by adopting the BCG model for economic growth, Thailand would be able to increase its gross domestic product (GDP) by 1 trillion THB over the next five years and create 20 million jobs in the four BCG industries (Meiksin, 2020). Through the implementation of the BCG economy model, it is anticipated that private sector investment in the BCG sectors would increase to 85% of the total 30 billion USD in new investment by 2030 (Thailand Board of Investment, 2021). Given that the BCG model is anticipated to be a key endeavour for Thailand’s sustainable economic growth, it is intriguing to investigate this model. Therefore, the purposes of this study are:

- 1) to investigate the administration and management for the adoption of the BCG model in Thailand;
- 2) to investigate the factors affecting the success of implementing the BCG model;
- 3) to suggest plans to improve the country’s economy through the BCG model.

To illustrate the paper’s structure, the study is divided into five sections. Section 1 is an introduction. Section 2 is literature reviews, while Section 3 is research methodology. Section 4 covers the research findings and related discussions. In Section 5, conclusions are given, along with limitations, implications, and suggestions for further research.

## 2. LITERATURE REVIEW

BCG is a model for future economic growth, with the advancement of science, technology, and innovation to increase competition and generate more revenue for people. It is derived from the term’s bio-economy, circular economy, and green economy. Two interesting issues emerged from a literature review: concept development and successful application of the BCG economy model concept in developing countries.

### 2.1. Concept development of the BCG model

According to Birner (2017), the evolution of bioeconomic concepts can be traced back to the early 1960s. Although the definition and scope of bioeconomic concepts have evolved over time, the underlying concept is the use of locally available bioresources to drive economic growth. Blomsma and Brennan (2017) proposed the concept of a circular economy. It all began with the management of waste materials and resources, as well as waste generated during the manufacturing process within the industrial plant. Following that, the concept expanded to include the ability to recycle waste from consumption, so that leftover materials from production and consumption can be used to create new values, circulating in a continuous cycle free of

waste. This concept has gained acceptance in today's world, as many countries are dealing with resource shortages, waste management issues, and environmental issues. Furthermore, the circular economy concept will aid in the effective resolution of environmental and natural resource issues. The above two ideas spawned the concepts of green economy and sustainable development.

Since the mid-1960s, people have been concerned about the effects of chemical use on ecosystems and the environment. This resulted in the 1972 United Nations Conference on Environmental Conservation in Stockholm, Sweden, and the establishment of the United Nations Environment Programme (UNEP) that same year. The UNEP is in charge of setting the global environmental agenda and promoting environmentally sustainable development. In 2009, the UNEP issued a white paper titled *"Rethinking the Economic Recovery: A Global Green New Deal"*, which addressed the issue of global development while ignoring its environmental impact. As a result, the UNEP proposes that countries reform their investments in ecosystems and the environment as public goods by using the price mechanism as a starting point for the transition of development toward a green economy. It defines the green economy as an economy that will lead countries to improve their quality of life and social justice and has the potential to help reduce environmental risks and ecological shortages (Barbier, 2010).

## 2.2. Successful worldwide application of the BCG model

Since 2013, the Netherlands has been researching circular economy policies based on knowledge, technology, and innovation, creating 54,000 jobs and generating 7.3 billion euros in revenue, as well as increasing competition. Later that year, the cabinet announced a circular economy policy that would be divided into two phases. The first phase aims to reduce the use of primary raw materials by half by 2030, with the government aiming to restore efficient reuse without releasing harmful substances into the environment by 2050. Moreover, the government of the Netherlands has pushed the policy mechanism to be successful in five areas in the key action plans for the years 2016 to 2020. The five areas include fostering registration and regulations, intelligent market incentives, financing, knowledge and innovation, and international cooperation. Fostering registration and regulations aims to improve laws that impede the implementation of circular economy policies, as well as to develop laws and regulations that encourage the invention of technology and innovations. Moreover, intelligent market incentives aim to stimulate markets in line with the circular economy's direction by using price mechanisms and issuing regulations to increase demand for biomaterials or recyclable products. In addition, education, research, knowledge creation, and feasibility studies of various technologies are prioritised in financing to support a circular business model. The area of knowledge and innovation seeks to inform those who play important roles in society by creating a body of knowledge and disseminating and exchanging information required for the transition to a circular

economy. Lastly, international cooperation focuses on collaborating with countries to advocate for policies and laws that foster a circular economy (Government of the Netherlands, 2022). Furthermore, in terms of process operations during the transition to a circular economy society, the government has divided strategic goals into three phases by allowing stakeholders in each industry to determine which phase they are in and how they should approach the transition agenda appropriately. Five industries were initially targeted for transition to a circular economy: biomass and food, plastics, manufacturing, construction, and consumer goods (General of Statistics Netherlands, 2011). By 2030, Finland will be a global leader in circular economy and a model for circular economy management. By promoting the export of circular economy products or services to the global market, the government expects to generate new economic growth and opportunities for entrepreneurs. To achieve the goals, two systemic transition strategies have been established. The first is to create a market within the country for circular economy goods and services for entrepreneurs to use as a testing platform for their products or services in order to develop them for export. The second is to make the circular economy the mainstream of the world through large-scale events or the establishment of an international circular economy forum (Finnish National Commission on Sustainable Development, 2016). The driving level is divided into three levels. First is the policy level, such as regulatory improvement, working process motivation, or initiatives. Second is the key project level, where the emphasis is placed on the selection of projects that directly and affect the transition in the industrial field. Third is the pilot project level, a project that is in the early stages of development and preparing for expansion. Finland desires to accelerate the distribution of pilot projects in order to operate quickly. It is a tool for spreading circular economy practices and innovations at the project level. To create a suitable environment, facilitate a circular economy, and encourage systemic change, there are five areas of focus in the economy: sustainable food systems, forestry-related activities, manufacturing-related activities, transportation and logistics, and supporting activities (Jäppinen & Heliölä, 2015).

The Ministry of Economy in Japan established a Circular Economy Vision 2020 working group. The Ministry of Economy, Trade, and Industry (METI) has representatives from the private sector, and the university is the main component. They have a duty to study and analyse industrial situation data related to a circular economy, including the direction of change and various challenges both domestically and internationally, in order to determine the direction of the country's circular economy policy in three ways. First is to change the business model to better reflect the principles of the circular economy by allowing the upstream business to focus on design that is appropriate throughout the life cycle, while the downstream business shifts from recycling to resourcing, bringing used materials back to be converted into high-quality materials to feed the upstream industry. The second is to gain market and societal acceptance by disseminating company-level

information that operates on principles that prioritise circular economy in order to gain recognition, attract investors, and create consumer acceptance. The third is to create a flexible circulation system both at home and abroad. Plastics, fibres, carbon fibre, batteries, and solar panels have been identified as vital industries that should be launched first (Office of National Higher Education Science Research and Innovation Policy Council, 2021).

In China, the Chinese government has developed a strategy for Chengdu to become the country's model public city under the concept of "Park City", which focuses on urban development and housing, as well as environmental protection and green industry development through the adoption of new technologies and processes. The government believes that protecting ecosystems and the environment has a direct impact on the quality of economic development, cities, and people's livelihoods, in accordance with the principles of sustainable development. In January 2020, President Xi Jinping reaffirmed his clear political intention to push Chengdu to become a key development area based on the concept of the "Park City Demonstration Zone", a sustainable urban development strategy, by increasing the area's travel efficiency. It is also constructing a green transportation system to effectively relieve city congestion and reduce environmental pollution. By developing a new city model based on green economy development, Chengdu will become a leading city in industrial development and green economy, as well as a low-carbon city in China (Gao et al., 2015).

It can be concluded that when the BCG model concept is applied in each country, government leaders and mechanisms will play a critical role in the movement, either by defining it as a national development strategy or by defining the policies of various states. Furthermore, there are changes to laws and regulations that impede the transition and establish organisations and departments to be directly responsible for driving both in terms of creating mechanisms to create a body of knowledge and clearly responsible for managing such factors. The Netherlands, Finland, Japan, and China have seen success in urban development and manufacturing.

In this study, the BCG model was used as a conceptual framework. This model is the engine that drives the country's sustainable economic growth in this study, emphasising quality growth to balance not only the value-based economy and participation (inclusive growth) but also a society that uses circular resources.

### 3. RESEARCH METHODOLOGY

Document analysis and in-depth interviews were conducted in this qualitative study. In order to accomplish the study's objectives, the examination was separated into three sections. Section 1 studied administration and management for the adoption of the BCG model in Thailand, summarising and discussing the results through document analysis. This section examined the responsible agencies and their roles in relation to the implementation of the BCG

model in Thailand. Section 2 examined the factors affecting the success of implementing the BCG model, while Section 3 provided some practical recommendations and the present and future intentions of the Thai government for strengthening the BCG economy in Thailand. Both sections (Sections 2 and 3) are based on expert interviews through in-depth interviews. The in-depth interviews in this study are semi-structured interviews, which is one of the most effective methods of data collecting because it provides consistency in how it is performed and allows respondents to be asked questions about specific topics that are significant to the study (Siripipatthanakul et al., 2022). The data in both sections were gathered through online interviews with 25 experts and relevant individuals with extensive BCG model expertise and knowledge. The samples were selected by purposive sampling. Given that this is an in-depth interview that relies on the participants' knowledge and experiences, the sample size of 25 is sufficient and representative. The samples were divided into five groups:

1) business owners in four industries for the BCG model, including food and agriculture, medicine and wellness, energy, materials, and biochemicals, and tourist and creative economies;

2) local politicians in regions where the BCG model has been adopted;

3) senior government officials working in government agencies that supervise the implementation of the BCG model, such as the Ministry of Industry, Ministry of Agriculture and Agricultural Cooperatives, Ministry of Natural Resources, Ministry of the Interior, and Ministry of Health;

4) policymakers who have created BCG model adoption policies at any level, such as for Thailand's national plans or for businesses in the BCG industry;

5) academicians in specialties relevant to the BCG model.

Table 1 outlines the sample size.

**Table 1.** The sample size of key informants

<i>Key informants</i>	<i>N</i>
Business owners	5
Politicians	5
Senior government officers	5
Policymakers	5
Academicians	5
Total	25

In Section 2, all experts were asked, "What factors contribute to the successful adoption of the BCG model in Thailand?" Then, the majority-mentioned factors were chosen for more consideration. According to the respondents' opinions, the discussions are tied to how to improve these factors to achieve success. In Section 3, a primary question was asked during the in-depth interviews what plans should the Thai government and key sectors have to increase the adoption of the BCG model for the sustainable economic growth of the country? The basic question was accompanied by additional specific questions.

## 4. RESULTS AND DISCUSSION

### 4.1. Administration and management for the adoption of the BCG model in Thailand

Thailand has three administrative and management levels for the BCG model's implementation: the BCG Policy Board, the BCG Implementation Committee, and the BCG Implementation Subcommittee.

The Prime Minister is the chairman of the BCG Policy Board, and the National Science and Technology Development Agency (NSTDA) acts as the board's secretariat (NSTDA, 2022). As Vice President, the Deputy Prime Minister oversees the Ministry of Higher Education, Science, Research, and Innovation. In addition, ministers from the Ministry of Tourism and Sports, the Ministry of Higher Education, Science, Research, and Innovation, the Ministry of Industry, the Ministry of Agriculture and Agricultural Cooperatives, the Ministry of Natural Resources, the Ministry of Energy, the Ministry of the Interior, and the Ministry of Health are members. There are also the Secretary-General of the Office of the National Economic and Social Development Board, the director of the Bureau of Budget, representatives from the private sector, nine specialists in specialised fields, and the director of the NSTDA, who serves as both a director and secretary, for a total of 23 directors (National Science and Technology Development Agency [NSTDA], 2020). This committee's responsibility is to set, push, and drive policy in the same way that the Eastern Economic Corridor Policy Committee does to achieve unified work and an operation that is aimed at the same goal by defining Vision 2027: to generate sustainable and high-quality growth via research, technology, and innovation and to increase income and living quality while preserving a balance between exploitation and protection of biological and environmental resources (NSTDA, 2022).

The chairman of the BCG Implementation Committee is the Minister of Higher Education, Science, Research, and Innovation. The committee is made up of the permanent secretaries of eight ministries: the Ministry of Tourism and Sports; the Ministry of Higher Education, Science, Research, and Innovation; the Ministry of Industry; the Ministry of Agriculture and Agricultural Cooperatives; the Ministry of Natural Resources; the Ministry of Energy; the Ministry of the Interior; and the Ministry of Health. In addition, nine representatives from government agencies, 10 representatives from the private sector, and the director of the National Science and Technology Development Agency serve as directors and secretaries, for a total of 29 directors (NSTDA, 2020). This committee is responsible for implementing the policy and developing strategies and methods to encourage BCG development, infrastructure investment, human resource development, ecosystem development, a regulatory framework to enable BCG development, and a monitoring and evaluation system (NSTDA, 2022).

The BCG Implementation Subcommittee has 11 faculties structured by the economic branch. The first is the subcommittee on driving economic development BCG model, the legal branch, which has 14 members, all of whom are lawyers or experts in

related fields from both the public and private sectors. The second subcommittee is the BCG model for driving economic development in tourism and the creative economy. There are 30 directors representing the public and private sectors in related fields. The third is the agriculture branch's subcommittee on driving economic development using the BCG model. There are 13 members in total, representing the government and private sectors in related fields. Fourth, there is a subcommittee on driving the BCG model's economic development and biodiversity. In total, there are 13 directors representing the public and private sectors in related fields. The fifth is the medical devices branch's subcommittee for driving economic development using the BCG model. There are 21 committees in related fields, with representatives from the government and private sectors. The sixth is the subcommittee driving economic development through the BCG model, the innovation branch. There are 15 members from the government and private sectors who work in related fields. The seventh is a subcommittee for driving economic development through the BCG model in medicines and vaccines. There are 22 members in total, representing the government and private sectors in related fields. The eighth is the economic development driving subcommittee BCG model, circular economy branch. There are 18 committees in total, with representatives from both the public and private sectors. The ninth is a subcommittee for driving economic development through the BCG model, energy, materials, and biochemistry. There are 17 directors representing the government and private sectors in related fields. The tenth subcommittee is the driving economic development BCG model, food sector, with 17 members representing government and private sectors in related fields. The last is the driving economic development BCG model, person or personnel development, with 22 directors representing government and private sectors in related fields (NSTDA, 2020).

In addition, the assessment and monitoring process is established to guarantee that the implementation follows the action plan and timetable for achieving the objectives. The process data and information will be evaluated and analysed for performance enhancement. As part of the national plan, the outputs, results, and effects of the BCG model will be monitored and evaluated by the Office of the National Economic and Social Development Council (NESDC) using the Electronic Monitoring and Evaluation System of National Strategy and Country Reform (eMENSCR) (NSTDA, 2022).

### 4.2. The factors affecting the success of implementing the BCG model

According to the opinions of respondents, seven key variables influence the successful implementation of the BCG model: 1) legalisation and regulation; 2) development of standards and quality assurance; 3) financial assistance; 4) tax incentives; 5) developing a BCG market environment; 6) formation of a strategic management organisation; and 7) budgetary allocation to accelerate a BCG economy.

The improvement of each factor is summarised as follows.

1. On the legal front, it was discovered that the old law should be unlocked and implemented as follows:

- allow for the production of high-value biochemical products for industrial use;
- provide city planning to facilitate the development of bio-industry biorefinery creation and recycling business;
- facilitate the transportation of leftovers to be used as raw materials in factories;
- request permission to manufacture and register food and animal feeds;
- improve definitions of "Indigenous Plant Varieties" in the Plant Protection Act to facilitate breeding;
- offer the purchase of biomass electricity to facilitate the sale of electricity generated by small biomass power plants;
- strictly enforce the law prohibiting the disposal of waste and industrial waste into the environment;
- strictly enforce the law prohibiting waste disposal in waterways.

Furthermore, it is recommended to intensify the push for new laws. The following are the suggested actions:

- promoting the use of genetically modified (GM) plants and controlling emissions from them;
- promoting the use of research and innovation;
- supervising cell therapy, which facilitates the use of GM plants, research and development (R&D), and the implementation of treatment methods to properly serve patients.

2. It is suggested that standards and quality certification be established by:

- labelling products from the bioeconomy and circular economy, particularly those developed through domestic research;
- recycling standards and recycling-friendly product designs;
- high-value packaging made of recycled plastic for beverages and food;
- a traceability system to prevent raw material imports from abroad;
- determining the quality of biofuel B100 to meet international standards;
- product labelling, information, and recycling method management by material type.

3. It is suggested that financial support be provided to:

- establish a smart farmer development fund;
- encourage new BCG entrepreneurs, such as bioplastic producers, particularly small plastic processing operators, and social enterprises that promote and support businesses in community tourist attractions, as well as start-ups or entrepreneurs who link waste to further development to create additional value;
- provide high-tech assistance to waste processing businesses or modernise machinery;
- subsidise foreign technology development or transfer through technology licensing or joint investment to extend the research to industrial production.

4. Tax benefits are essential. Three recommendations should be followed:

- tax exemption for BCG research experts;
- reduction of import taxes on raw materials used in R&D and machinery modernisation;
- use of special economic zones to promote community tourism.

5. In order to create a BCG market environment, the following actions should be taken:

- implement government procurement measures (procurement privilege) for BCG products;
- expand into Association of Southeast Asian Nations (ASEAN) countries, such as pharmaceuticals, biologics, and vaccines;
- support the use of B10 biofuels and support to expand into high-value biochemical products;
- push Thai tourist attractions to be certified as tourist attractions by international organisations.

6. The formation of a strategic management organisation, or a strategic unit, should be based on the branches of the BCG economy, which are agriculture, food, medicine, health, energy, biomaterials, and chemicals, service tourism and creative economy, circular economy, and digital platform. Each strategic unit operates independently within the policy framework established by the board of directors. However, there is a link and simultaneous development of work under the coordination of the Office of Economic Development BCG. To transition from centralised command to participatory management, project implementation must be driven by a quadrilateral mechanism comprised of four sectors: the public sector, the private sector and community, the university and research institute, and a network of foreign partners.

7. In terms of budget allocation to drive a BCG economy, which has the potential to increase GDP value from 21% to 24%, or from 3.4 trillion THB to 4.4 trillion THB, in five years. However, increasing GDP value by one trillion THB requires the country to invest more in order to be consistent with the added value of each branch. In the past, agricultural and food products added approximately 40% of the value of the produce, while products in other fields added approximately 30% of the production value. Even so, combining science, technology, and innovation with creativity has the potential to increase the value of all branches by 5% to 20% over the value of traditional products and services. The Ministry of Higher Education, Science, Research, and Innovation budgeted 2.5 billion THB for BCG in the fiscal year 2020. In order to ensure continuity, governments must provide additional funding, focusing on areas that generate significant economic value and have a broad impact.

#### 4.3. Plans for strengthening the BCG economy in Thailand

According to key informants' perspectives, a summary of suggested plans for strengthening the BCG economy in Thailand is shown in Table 2.

**Table 2.** Suggested plans for strengthening the BCG economy in Thailand, categorised by groups of interviewees

Key informants	Plans
Business owners	<ul style="list-style-type: none"> <li>- The state must invest more in proportion to the value added for each BCG industry. In the past few years, agriculture and food products supplied around 40% of the value added to the gross output, while products from other industries contributed approximately 30%;</li> <li>- to ensure continuity, the Thai government must give additional fiscal assistance, concentrating on industries that create considerable increases in economic value and have widespread effects;</li> </ul>
Politicians	<ul style="list-style-type: none"> <li>- BCG economic development and the execution of various initiatives must be led by a four-party mechanism comprised of the government sector, the business sector and communities, universities and research institutions, and a network of international partners;</li> </ul>
Senior government offices	<ul style="list-style-type: none"> <li>- systematic research is needed in order to get an in-depth comprehension of the issues and constraints in BCG economic growth. The results of systematic research will assist in the formulation of policies, the allocation of budgets, and the development of relevant action plans;</li> <li>- the Eastern Economic Corridor of Innovation (EECI) should be developed to become Thailand's center of innovation. Currently, the Thai government has committed 1,100 million THB in the first phase to stimulate investment of 2,643 million THB in the region. The government intends to invest an additional 3,410 million THB to build Biopolis in the EECi region during the second phase. This progress is consistent with the BCG economic system's objective of fostering national development;</li> </ul>
Policymakers	<ul style="list-style-type: none"> <li>- the applications of science, technology, and innovation should be encouraged to facilitate the growth of all BCG economic sectors;</li> <li>- the integration of science and technology with creativity has the potential to raise the value of traditional products and services by 5 to 20 percent across all BCG sectors;</li> <li>- to propel the BCG economy toward sustainability, the appropriate technology must be implemented, industrial sectors and entrepreneurs at all levels must be supported, and investments and human resource development must be addressed at all levels;</li> </ul>
Academicians	<ul style="list-style-type: none"> <li>- the BCG economy has the potential to rise from 21% of GDP to 24% of GDP, or from 3.4 trillion THB to 4.4 trillion THB during the next five years, adding 1 trillion THB to Thailand's GDP.</li> </ul>

## 5. CONCLUSION

The global challenges of climate change, food security, and energy are escalating. The BCG economic model is the current economic development model adopted by several governments in an effort to manage natural resources more effectively and with minimal environmental impact. To maximise earnings, Thailand aspires to be more innovative and environmentally responsible. Therefore, the BCG economic model has been designated as a national priority for 2021. The Thai government predicts that by implementing the BCG economic development model, Thailand would be able to raise its GDP by 1 trillion THB over the next five years and generate 20 million employments in the four BCG industries. This study is divided into three sections: administration and management for the BCG model implementation in Thailand, variables impacting the effectiveness of adopting the model, and future suggestions for improving the BCG economy of the nation.

The BCG Policy Board, the BCG Implementation Committee, and the BCG Implementation Subcommittee oversee the BCG model's implementation in Thailand. In order to reach the same goal, the board is responsible for formulating and pushing policies, as well as encouraging integration and cohesiveness among organisations. The committee is tasked with implementing the policy into the action plan and formulating measures and mechanisms to promote BCG development, infrastructure investment, human resource development, ecosystem development, regulatory framework to facilitate BCG development, and monitoring and evaluation system. The BCG Implementation Subcommittee is responsible for the BCG industries' outputs. Additionally, the NESDC was entrusted with monitoring the outputs, results, and effects of the model. In this study, seven key factors impact the successful implementation of the BCG model include legalisation and regulation, the development of standards and quality assurance,

financial assistance, tax incentives, the creation of a BCG market environment, the formation of a strategic management organisation, and the allocation of financing sources to accelerate a BCG economy. According to the viewpoints of chosen respondents, the following is a summary of future action plans to enhance the BCG economy in Thailand: Business owners recommend encouraging local investments in BCG industries and requesting financial assistance from the federal government, whereas politicians emphasise the collaboration of many sectors to advance BCG economic growth and the implementation of various programmes. Senior government officials propose doing a systematic study and establishing the EECI as Thailand's innovation centre. To assist the expansion of all BCG economic sectors, policymakers emphasise innovation and technological implementation. Academics provide projections for Thailand's GDP driven by BCG industries.

Following are the recommendations based on the findings. Since laws and regulations are one of the most influential variables in the adoption of the BCG model, the government should enact new laws and regulations that can enable BCG industries to the greatest extent possible. Consequently, these industries will contribute to the nation's GDP and result in sustained economic growth. Additionally, standards and quality assurance should be implemented for all enterprises in the BCG sector in order to assure product quality and preserve the excellent reputation of the country's exported goods. Furthermore, for the adoption of the BCG model to yield exceptional results, the BCG industry should employ cutting-edge technology and innovation. This is a qualitative study that cannot quantitatively assess the variables of interest. Therefore, this may represent a shortcoming of the study. The results are based on secondary data, which is not always updated, and the results of an in-depth interview may be biased according to the interviewer's personal background. In order to increase the reliability of future research findings, it

is thus advised that both quantitative and qualitative methodologies be employed. For instance, linear regression analysis may be performed to analyse the variables influencing the BCG model's implantation. This research may provide policymakers and BCG companies with recommendations to

improve the application of the BCG model based on its findings. However, individuals in other disciplines can also benefit from this research because it explains the broad concept of the BCG model and its straightforward applications.

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