

# Structural Equation Modeling of Green Economy Outcomes in Thailand's Manufacturing Industry

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## Abstract

*This research aimed to analyze the causal relationship model and outcomes of the Green Economy in Thailand's manufacturing industry. Data was collected through a questionnaire targeting small and medium enterprise (SME) operators in the Thai textile manufacturing industry, who are registered as legal entities and SME members. The statistical analysis involved confirmatory factor analysis (CFA) and structural equation modeling (SEM). The major findings revealed that the structural model was well-aligned with the empirical data. The study demonstrated that the Green Economy, market effectiveness, and competitive advantage all had significant positive effects on business performance. Further analysis showed that the Green Economy directly influenced market pressures and competitive advantage. Additionally, the study identified positive direct relationships between market pressures, green dynamic capabilities, and socially responsible leadership with the Green Economy.*

**Keywords:** *Green Economy, Market Effectiveness, Competitive Advantage, Business Performance, Manufacturing Industry.*

## Introduction

Due to the degradation of natural resources and the environment, a significant global issue that inevitably affects the existence of living beings both directly and indirectly, there has been a shift in the production and consumption paradigm towards sustainable practices. This shift has also led to stricter environmental conservation agreements and regulations, which are increasingly influencing international trade. This can be seen from the introduction of regulations and business operation guidelines, forcing Thai entrepreneurs to rapidly adapt to comply with these regulations and meet the demands of environmentally conscious consumers, whose influence on the global trade economy is growing. The concept of the green economy, therefore, plays a significant role and is increasingly emphasized globally. A green economy is developed with consideration for environmental sustainability, the appropriate use of resources, recognizing their value, and the equitable distribution of wealth. It represents economy activities that aim to develop the economy, society, and environmental preservation in a balanced manner to ensure stability and sustainability. Businesses in various industries are now prioritizing management under the green economy concept, which involves the efficient use of resources coupled with efforts to protect the environment, benefitting the business through a positive community and social image. A business operating under the green economy concept generally adheres to the principles as follows: 1) caring for the environment and the overall ecosystem, 2) aiming to improve human well-being and quality of life in society, and 3) focusing on energy and resource efficiency (National Science and Technology Development Agency, 2019).

According to research by various scholars, the green economy impacts marketing success and competitive advantage, particularly through improved organizational performance. For instance, Husted & Salazar (2006) found that the competitive advantage of green organizations entails an environmental positioning that competitors cannot replicate effectively, resulting in sustained benefits from environmental strategies that lead to organizational success. Similarly, Jabbar & Abid (2017) observed that organizational operations positively impact the environment, where performance results from management systems affecting the environment (Afagachie, 2013; Halkos & Sepetis, 2007). Moreover, the competitive advantage of green organizations positively affects organizational performance (Jia & Wang, 2019; Setyawati et al., 2017). Additionally, Kang & Hur (2012) discovered that businesses benefit from positioning environmentally conscious brands in consumers' minds, leading to enhanced loyalty or good customer relationships, as consumers are increasingly aware and concerned about environmental issues (Auger et al., 2003). This in

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turn contributes to a positive image and the building of long-term customer relationships (Chen et al., 2006; Hart, 1995; Peattie, 1995; Porter & van der Linde, 1996; Shrivastava, 1995; Chang & Fong, 2010).

Given the importance of the green economy as previously discussed, the researcher aims to study “The Causal and Outcome Relationship Model of the Green Economy in Thailand’s Manufacturing Industry.” The objectives are: 1) to examine the consistency of the causal and outcome relationship model of the green economy in Thailand’s manufacturing industry, and 2) to develop a model of the causal and outcome relationships of the green economy for businesses in this sector. The results of this research can provide data for businesses in Thailand’s manufacturing industry and other related businesses to manage under the green economy concept, leading to marketing success, competitive advantages, and improved organizational performance.

## Literature Review and Hypothesis Development

### *Concept Of Green Economy*

Green Economic is an economic system that affects the improvement of human livelihood and social equality. Meanwhile, it significantly reduces the risk of environmental harm and ecological scarcity by means of less carbon use and less carbon emission methods, effective use of resources and cooperation of people in the society (UNEP, 2011). Green economy is a resilient economy that provides a better quality of life for all within the ecological limits of the planet (Green Economy Coalition, 2010), and the International Chamber of Commerce defines green economy as an economy in which economic growth and environmental stability work together in a mutually reinforcing fashion while supporting progress on social development (International Chamber of Commerce, 2012). In addition, OECD (2011) defines green growth as fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which people well-being relies. Green growth is good economic progress for the environment on the basis of low greenhouse gas emissions and social participation support (UNESCAP, 2012). Green business means the efficient use of all resources together with efforts to protect the environment, which also benefits the business and produces a friendly image to society and communities that deserve to receive better management. In summary, latent variables in green economy consist of 3 observed variables, namely, 1) concern for the environment and ecosystem as a whole, 2) the goal to improve the livelihood and to elevate the quality of life of people in society, 3) emphasis placed on the efficacy of energy and resources use (National Science and Technology Development Agency, 2019).

### *Impact of Green Economy, Market Effectiveness, Competitive Advantage, that has an effect on Business Performance*

Business performance is an assessment based on a reflection of the outcomes resulting from its operations, indicating the status of business activities. It focuses on the benefits that the organization receives, measuring performance from management practices aligned with the green economy. These include growth in sales, market share expansion, increased profitability, and achieving set objectives. Jiménez-Jiménez & Cegarra-Navarro (2007) proposed that business performance represents the effectiveness of the organization, in line with Nunta, et al. (2012), who stated that business performance refers to monetary outcomes such as operational income and increased market share. Non-monetary outcomes include a positive image that boosts confidence in business operations and enhances competitive capabilities. Kaplan & Norton (1996) introduced the Balanced Scorecard theory, an business performance evaluation concept that assesses performance from four perspectives: financial, customer, internal processes, and learning and development. Literature reviews indicate that management under the green economy concept positively impacts business performance. Lalaeng & Subongkod (2022) studied green economy management practices in Thailand’s manufacturing industry and found that management under the green economy significantly influences performance, with a direct positive coefficient of 0.83 ( $p < .01$ ). This is consistent with Jabbar & Abid (2017), who noted that environmental impacts positively affect business performance. Similarly, Yousef Eiadat, et al. (2008) in their study “Green and competitive? An empirical test of the mediating role

of environmental innovation strategy” found that environmental innovation strategies lead to improved firm performance.

*This synthesis of literature leads to Hypothesis H1a: Green economy has a direct positive effect on Business Performance of Thailand’s Manufacturing Industry*

Market Effectiveness is a factor that affects the performance of a business. Creating a successful business isn’t just about continually finding new customers; maintaining old customers is equally important because the more loyal customers a business has, the faster it can achieve its goals. Kotler (1994) mentioned that Market effectiveness comes from 1) Customer Retention, which is the ability to keep your current customers or maintain customers that can increase your sales and profit, and 2) Customer Acquisition, which involves the process of attracting new customers and devising strategies to retain them, thereby encouraging repeat purchases. Literature review shows that Market effectiveness contributes to business performance. Eangchuan (2017) found that Market Effectiveness has a positive direct influence on sustainable operational outcomes, with a direct effect size of 0.12 and a total effect size of 0.12, statistically significant at the 0.05 level. Capturing market opportunities to benefit greatly in new markets leads to the development of strategies that enhance business operations. However, to gain a competitive advantage, one should consider market competition, which is a crucial factor. This includes consistently engaging in R&D, research, and development, to effectively withstand intense market competition pressures and help drive marketing success, thus positively impacting business operations (Lee, & Tsai, 2005).

*This synthesis of literature leads to Hypothesis H1b: Market effectiveness has a direct positive effect on Business Performance of Thailand’s Manufacturing Industry.*

Competitive advantage significantly influences business performance. Establishing a competitive advantage involves surpassing competitors by differentiating and leading change, employing effective personnel, and swiftly responding to customers' needs (Porter, 1990). Barney & Clark (2007) describe competitive advantage as what makes an organization distinct. This difference stems from an organization's core competencies, allowing it to perform tasks that others cannot duplicate or perform better. Fuller (2004) mentions that achieving competitive advantage involves surpassing competitors by leading in cost, being different, and responding quickly to customer demands. Healy et al. (2014) note that creating a competitive advantage enables a business to differentiate itself from competitors and find strategies that lead to better operational performance, aiming for business leadership. This includes differentiation, cost leadership, and rapid market-specific responses. Literature reviews confirm that competitive advantage leads to business performance. Navarro, et al. (2010) in their study Implications of perceived competitive advantages, adaptation of marketing tactics and export commitment on export performance found that the achievement of perceived competitive advantages in foreign markets, which positively influence export performance. This is consistent with the study of Halim et al. (2011) stating that effective strategies for creating competitive advantage enhance business operational efficiency. Healy et al. (2014) argue that building competitive advantage gives businesses unique capabilities and strategies suitable for superior operational outcomes, leading to leadership in their industries. Additionally, Mulyana (2016) indicates that competitive advantage significantly impacts financial performance.

*This synthesis of literature leads to Hypothesis H1c: Green economy has a direct positive effect on Business Performance of Thailand’s Manufacturing Industry*

*Impact of Green Economy that has an effect on Market Effectiveness*

Market Effectiveness that arises from the green economy-based management concept. Grundey, D., & Zaharia, RM. (2008) stated that green marketing under the concept of a green economy, refers to the promotion or advertisement of products or services that are environmentally friendly. Such products might be phosphate-free, recyclable, refillable, ozone-friendly, and generally eco-friendly. Moreover, a study by Sermchayut (2023) found a positive relationship between green marketing practices and business performance. In addition, a Nielsen Study (2015) reported that in 2015, 66% of global survey participants

were willing to pay more for sustainable products, an increase from 55% in 2014. This indicates that products and services associated with sustainability are perceived as more valuable, and this perception of sustainability value is increasingly consistent across all economy and social levels.

*This synthesis of literature leads to Hypothesis H2: Green economy has a direct positive effect on Market Effectiveness of Thailand's Manufacturing Industry.*

#### *Impact Of Green Economy That Has an Effect on Competitive Advantage*

According to Schermerhorn (2002), competitive advantage refers to the strategic methods that an organization plans to achieve its long-term goals within a selected scope. Prahalad & Hamel (1990) suggest that competitive advantage should be built upon core competencies by using distinctive and relevant capabilities to develop advantageous strategies. From literature reviews, it is evident that businesses operating under the green economy concept can benefit from competitive advantage and enhance their corporate image by creating environmentally friendly products and services, which can open up new markets (Chen et al., 2006; Hart, 1995; Peattie, 1995; Porter & van der Linde, 1996). Green products help businesses sustain the environment and boost their competitive efficiency (Pujari et al., 2003; Dangelico & Pujari, 2010). Additionally, Alhadid & Rumman (2014) found that green product innovations and green process innovations positively impact business performance, consistent with previous studies showing that green product innovations result in higher operational efficiency. Moreover, Chen (2011) observed that green innovations enhance the design of quality green products, offering a great opportunity to differentiate an organization's products, allowing for higher pricing and better returns. The concept of the green economy can create a competitive advantage for organizations by maintaining a position in environmental management or developing green innovations that competitors cannot easily replicate, thus gaining sustainable benefits from environmental strategies (Husted & Salazar, 2006). Green products help businesses sustain the environment and improve their competitive performance (Pujari et al., 2003; Dangelico & Pujari, 2010).

*This synthesis of literature leads to Hypothesis H3: Green economy has a direct positive effect on Competitive advantage of Thailand's Manufacturing Industry*

#### *Impact Of Market Pressures, Green Dynamic Capabilities, Socially Responsible Leadership That Has an Effect on Green Economy*

Market pressures focus on responding to customer needs and satisfaction by cultivating organizational behaviors aimed at adding value to customers and achieving superior business performance over competitors. This emphasis results in high customer satisfaction, impacting market success, competitive advantage, and enhanced business operations. Market pressures can arise from customers and consumers, particularly driven by environmentalism, which increases consumers' focus on environmental protection. A market-oriented culture within organizations is dedicated to consistently creating superior value for customers (Narver & Slater, 1990). Hunt & Morgan (1995) describe market orientation as the systematic collection and analysis of customer and competitor information to develop market knowledge that informs strategic decisions, aiming to meet customer and competitor needs. According to Narver & Slater (1990) and Rhee (2006), market orientation comprises three components: customer orientation, competitor orientation, and interdepartmental coordination. Research shows a direct and indirect relationship between market orientation and business performance through green economies. Lalaeng, C. (2017) study on green innovation strategies in Thailand's manufacturing industry found positive impacts of market orientation on green innovation strategies. This aligns with Hult & Scott (2003), who identified market orientation as a critical factor indicating an organization's innovative capabilities and profitability. Market-focused strategies enhance competitive advantages, supporting Lee & Tsai (2005), who noted the significant role of market orientation in indicating profitability and innovation capabilities. Morgan et al. (2009) further state that market orientation sources competitive advantages and positively influences business performance improvements, emphasizing that market orientation is a strategic approach aimed at fulfilling customer needs and satisfaction, leading to superior business outcomes.

*This synthesis of literature leads to Hypothesis H4a: Market pressures has a direct positive effect on Green economy of Thailand's Manufacturing Industry*

refer to the strategic focus of organizations on the importance of dynamic change and organizational learning. When an organization is capable of learning, it can adapt and improve its operations to keep up with environmental changes, ultimately achieving success and a sustainable competitive advantage (Winter, 2003). The concept of dynamic capabilities builds on the resource-based view, emphasizing the use of knowledge management capabilities to fully develop existing resources. These capabilities include 1) adaptive capability, 2) absorptive capability, and 3) innovative capability, as suggested by Teece (2007) and Rodrigo-Alarcón et al. (2018). Literature reviews indicate that green dynamic capabilities positively impact the green economy. Research by Chummi (2023) on the structural relationship model of green innovation for small and medium enterprises found a direct positive correlation between green dynamic capabilities and green product innovation, with a coefficient of 0.59. The model's fit indices were satisfactory, aligning with findings that green dynamic capabilities are purposefully built to expand or modify the resource base as per market demands, leading to green innovation. These capabilities encompass various aspects of "perceiving," "seizing," and "transforming" to design and implement business models adaptively (Teece, 2017).

*This synthesis of literature leads to Hypothesis H4b: Green dynamic capabilities has a direct positive effect on Green economy of Thailand's Manufacturing Industry*

Socially responsible leadership integrates transformational leadership theory with social and environmental awareness. It involves using personal behaviors and the art and science of vision creation, motivation, and positive influence on followers, with a consciousness of social and environmental responsibility to achieve organizational environmental goals (Flannery & May, 1994; Berry & Gordon, 2012). Socially responsible leadership emphasizes values centered on social responsibility, similar to ethical leadership that responds to moral scandals in management, corporate greed, and impacts on human life. It also arises from the awareness that multinational corporations and their leaders have significant potential to improve the world (Pless, 2007). Literature reviews indicate that socially responsible leadership impacts the green economy. Chen (2011) states that environmental leadership involves leaders influencing members to achieve environmental management and prevention outcomes, aligning with Augustine (2019), who found that environmental leadership enhances competitive advantages in green organizations. Socially responsible leadership is thus characterized by a commitment to social values, recognizing the potential of corporate leaders to positively impact the world (Pless, 2007).

*This synthesis of literature leads to Hypothesis H4c: Socially responsible leadership has a direct positive effect on Green economy of Thailand's Manufacturing Industry*

From the study of these theories, the researcher developed a conceptual framework to illustrate the relationships between all variables and links them to hypotheses, as shown in the figure.1

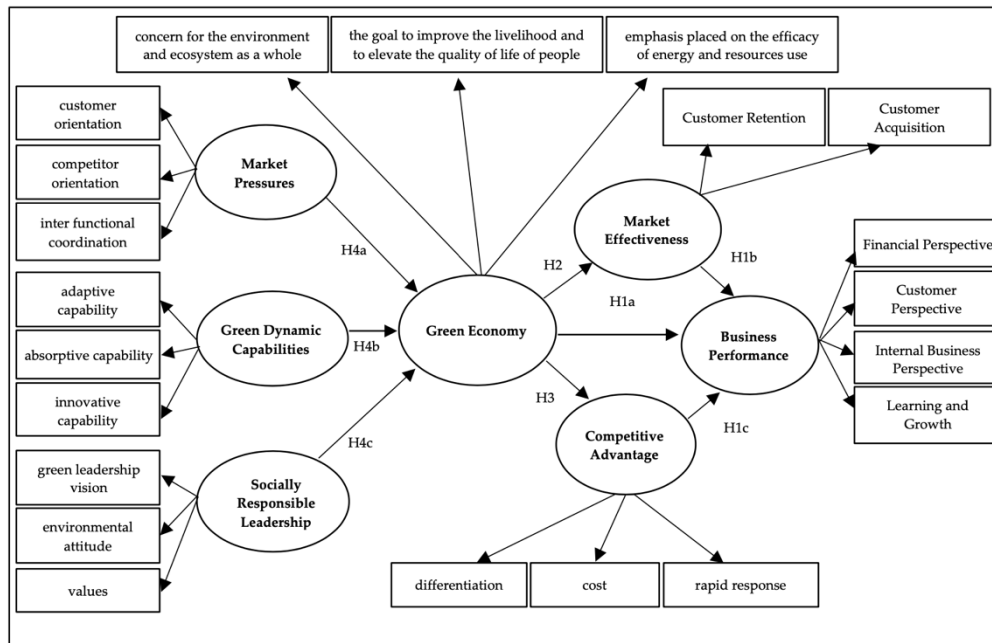


Figure 1 Conceptual Framework Showing Proposed Hypothesis

## Research Methodology

### *Population and Sample*

The population used in this study was 622 businesses in the Thailand's manufacturing industry that have been certified to ISO 14001 environmental standards. (List of organizations that have received ISO 14001 environmental management system certification., Thai Industrial Standards Institute (TISI), 2023). The unit of analysis of this research was at the organization level. This research used a postal data collection questionnaire, which has a response rate constraint to provide a good representation of information (Panayides, 2007). The researcher therefore studied the entire population. Determination of samples using G\*Power software, a program created with Cohen (1977) and has been inspected and certified for accurate and up-to-date sample size by several researchers (Howell, 2010; Wiratchai, 1999). The model has 21 observable variables,  $Df = 21(21+1)/2 = 215$ , Effect Size = 0.5 (Faul, et al., 2007), power of test = 0.80 (Hair, J. et al, 2010) and large effect size = 0.5 the sample size was 215 sample

### *Instrument Development and Validation*

The development and validation of instruments involved the use of a questionnaire designed based on the intended conceptual framework and operational definitions. The questionnaire is divided into 8 sections: Section 1 consists of questions related to personal information, utilizing both checklist and fill-in-the-blank formats. Section 2 addresses aspects of green economy, including (1) concern for the environment and ecosystem as a whole (2) the goal to improve the livelihood and to elevate the quality of life of people and (3) emphasis placed on the efficacy of energy and resources use. Section 3 focuses on Customer Retention, including (1) Customer Retention and 2) Customer Acquisition. Section 4 pertains to competitive advantage, including (1) differentiation, (2) low cost, and (3) rapid response. Section 5 relates to performance outcomes, including of (1) financial perspective, (2) customer perspective, (3) process perspective, and (4) learning and growth perspective. Section 6 relates to Market pressures, including (1) Customer orientation (2) Competitor orientation and (3) Inter functional coordination. Section 7 relates to Green dynamic capabilities, including (1) Adaptive Capability (2) Absorptive Capability and (3) Innovative Capability. Section 8 relates to Socially Responsible Leadership, including of (1) green leadership vision, (2) environmental attitude, and (3) values.

This structured questionnaire serves as the primary tool for gathering data relevant to the research objectives, ensuring comprehensive coverage of the key variables under investigation.

### *Data Analysis*

The statistics used in data analysis include: 1) Basic statistics, such as percentage, mean, and standard deviation; 2) Statistics used to check the quality of research tools, including the assessment of Content Validity through the calculation of the Index of Item-Object Congruence (IOC) based on the evaluation of the tool's quality by three experts, and the determination of tool reliability by calculating Cronbach's Alpha Coefficient; 3) Statistics used in testing the basic conditions of the developed Structural Equation Modeling (SEM), including 3.1) Testing for normal distribution of data by considering Skewness and Kurtosis values, where Skewness should be between -3 and +3, and Kurtosis should be between -10 and +10, indicating that the variables are normally distributed (Wanichbancha, 2014); 3.2) Testing for Multicollinearity by using Pearson's Product Moment Correlation, where the correlation coefficient of variables should not exceed 0.90, ensuring no excessive correlation between variables (Pallant, 2010) 3.3) Testing for the independence of these variables with the Kaiser-Meyer-Olkin (KMO) measure, which ranges between 0 and 1, and is equal to 1 when each variable can predict others without error (Hair et al., 2010), and the Bartlett's Test of Sphericity to check the suitability of the variable group to see if the variables are related. If the Bartlett's Test of Sphericity is statistically significant, it indicates that the variables are related and can be analyzed (Hair et al., 2010); and 4) Statistics used in testing research hypotheses, including 4.1) Confirmatory Factor Analysis using the Model Fit Index, Composite Reliability (CR), Average Variance Extracted (AVE), and Standardized Factor Loading; 4.2) Analysis of the research model using the same Model Fit Index as mentioned in 4.1, and the values of Direct Effect, Indirect Effect, and Total Effect.

## **Result and Discussion**

### *Preliminary Data Analysis*

The testing of tool quality includes: 1) Content validity testing, which found that the Scale-Content Validity Index/Average (S-CVI/Ave) was 0.98, meeting the acceptable criteria set by Polit & Beck (2006), who suggested that the S-CVI/Ave should not be lower than 0.90; 2) Discrimination power, determined by the item-total correlation method, ranged from 0.350 to 0.860, consistent with Nunnally & Bernstein (1994), who stated that values should be 0.30 or higher; 3) Reliability testing showed that the Cronbach's Alpha Coefficient was 0.972, which is considered acceptable as it is higher than 0.70 (Nunnally, 1978; George & Mallery, 2010), following the clarity rule for evaluating Cronbach's Alpha Coefficient (George & Mallery, 2010).

The correlation coefficient analysis to test the correlation between the observed variables revealed that the correlation was between 0.264 – 0.670, which is less than 0.80 (Cooper & Schindler, 2006). It was shown that observables have no correlation. The results of the confirmation component analysis showed a structural validity of less than 5.00 was therefore acceptable (Wheaton et al. 1977) and consistent with the CFI and TLI analysis results of more than 0.900. The RMSEA and SRMR index values were less than 0.08, thus recognizing that the model was harmonious with the empirical data (MacCallum, Browne & Sugawara, 1996; Diamantopoulos & Siguaw, 2000) (Table 1)

**Table 1 Factor Loading, Indicators Reliability, Cronbach's alpha, AVE and Composite Reliability for the Measurement Model**

Observable variables	Factor loading	Indicator's Reliability	Cronbach's alpha	AVE	CR
1.1 Green Economy (GE)	0.72	0.88	0.84	0.67	0.89

1.1 concern for the environment and ecosystem as a whole	0.78	0.86			
1.2 the goal to improve the livelihood and to elevate the quality of life of people in society	0.88	0.87			
1.3 emphasis placed on the efficacy of energy and resources use					
2. Market Effectiveness (ME)					
2.1 Customer Retention	0.75	0.84	0.80	0.67	0.90
2.2 Customer Acquisition	0.78	0.86			
3. Competitive Advantage (CA)					
3.1 differentiation	0.73	0.79	0.88	0.60	0.92
3.2 cost	0.84	0.80			
3.3 rapid response	0.85	0.82			
4. Business Performance (BP)					
4.1 Financial Perspective	0.74	0.82			
4.2 Customer Perspective	0.79	0.79	0.87	0.61	0.87
4.3 Internal Business Perspective	0.84	0.84			
4.4 Learning and Growth Perspective	0.80	0.88			
5. Market Pressures (MP)					
5.1 customer orientation	0.79	0.80	0.84	0.65	0.86
5.2 competitor orientation	0.87	0.86			
5.3 inter functional coordination	0.82	0.87			
6. Green Dynamic Capabilities (DC)					
6.1 adaptive capability	0.77	0.82	0.87	0.68	0.90
6.2 absorptive capability	0.89	0.80			
6.3 innovative capability	0.82	0.82			
7. Socially Responsible Leadership (SRL)					
7.1 green leadership vision	0.79	0.78	0.89	0.69	0.91
7.2 environmental attitude	0.89	0.84			
7.3 values	0.87	0.89			

### Structural Model

The analysis of the structural model's fit to empirical data revealed that the model was consistent with observed data. This was indicated by the  $\chi^2/df$  value being less than 5, along with the CFI and TLI indices being close to 1 ( $> 0.90$ ), and the RMSEA and SRMR indices being lower than 0.08 (Hu & Bentler, 1999), supporting the primary hypothesis that the theoretical model aligned with empirical data, or that the model was accurate. Considering the magnitude of the direct effect of predictor variables on business performance, it was found that the green economy had a positive direct effect with a coefficient of 0.569 ( $\beta = 0.569$ ) at the .01 level of significance (hypothesis H1a was accepted). Predictor variables in the model could explain 52.0% of the variance in business performance ( $R^2 = 0.52$ ). The market effectiveness directly affected business performance with a positive effect coefficient of 0.356 ( $\beta = 0.356$ ) at the .01 level (hypothesis H1b was accepted). Predictor variables in the model could explain 35.0% of the variance in business performance ( $R^2 = 0.35$ ). And competitive advantage also directly affected business performance with a positive effect coefficient of 0.625 ( $\beta = 0.625$ ) at the .01 level as well (hypothesis H1c was accepted). Predictor variables in the model could explain 66.0% of the variance in business performance ( $R^2 = 0.66$ ).

Upon examining the magnitude of direct influence between variables, it was found that green economy had a positive direct influence on Market Effectiveness, with a coefficient of 0.526 ( $\beta = 0.526$ ) at the .01 level as well (hypothesis H2 was accepted). Predictor variables in the model could explain 68.0% of the variance



in business performance ( $R^2 = 0.68$ ). Green economy had a positive direct influence on competitive advantage, with a coefficient of 0.340 ( $\beta = 0.340$ ) (at the .01 level as well (hypothesis H3 was accepted). Predictor variables in the model could explain 78.0% of the variance in business performance ( $R^2 = 0.78$ ). Market pressures had a positive direct influence on green economy, with a coefficient of 0.356 ( $\beta = 0.356$ ) at the .01 level as well (hypothesis H4a was accepted) Furthermore, green dynamic capabilities had a positive direct influence on green economy, with a coefficient of 0.314 ( $\beta = 0.314$ ) (at the .01 level as well (hypothesis H4b was accepted). Lastly, socially responsible leadership had a positive direct influence on green economy, with a coefficient of 0.398 ( $\beta = 0.398$ ) (at the .01 level as well (hypothesis H4c was accepted). All predictor variables in the model could explain 59.0% of the variance in business performance ( $R^2 = 0.59$ ).

When considering the indirect influence through market effectiveness, it was found that green economy significantly influenced business performance indirectly at the .01 level, with a positive coefficient of 0.310 ( $\beta = 0.310$ ). Similarly, the indirect influence through Competitive Advantage, it was found that green economy also significantly influenced business performance indirectly at the .01 level, with a positive coefficient of 0.289 ( $\beta = 0.289$ ).

Similarly, the indirect influence through green economy, it was found that market pressures also significantly influenced business performance indirectly at the .01 level, with a positive coefficient of 0.367 ( $\beta = 0.367$ ). Green dynamic capabilities also significantly influenced business performance indirectly at the .01 level, with a positive coefficient of 0.357 ( $\beta = 0.357$ ). Socially responsible leadership also significantly influenced business performance indirectly at the .01 level, with a positive coefficient of 0.370 ( $\beta = 0.370$ ). All predictor variables in the model could explain 78.0% of the variance in green economy and 60.0% of the variance in competitive advantage ( $R^2 = 0.59$ ), respectively (Table 2 and Figure 2).

**Table 2 The Magnitude of Direct Influence, Indirect Influence, And Overall Influence in The Causal Model of Variables.**

Variables	effect size											
	Green Economy (GE)			Market Effectiveness (ME)			Competitive Advantage (CA)			Business Performance (BP)		
	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE
1. Market Pressures (MP)	0.356*	-	0.356*	-	-	-	-	-	-	-	0.367*	0.367*
2. Green Dynamic Capabilities (GDC)	0.314*	-	0.314*	-	-	-	-	-	-	-	0.357*	0.357*
3. Socially Responsible Leadership (SRL)	0.398*	-	0.398*	-	-	-	-	-	-	-	0.370*	0.370*
4. Green Economy (GE)	-	-	-	0.526*	-	0.526*	0.340*	0.289*	0.600*	0.590*	0.310*	0.870*
5. Market Effectiveness (ME)	-	-	-	-	-	-	-	-	-	0.356*	-	0.356*
6.. Competitive Advantage (CA)	-	-	-	-	-	-	-	-	-	0.625*	-	0.625*

Note: \* mean  $p < .05$ , \*\* mean  $p < .01$ ,

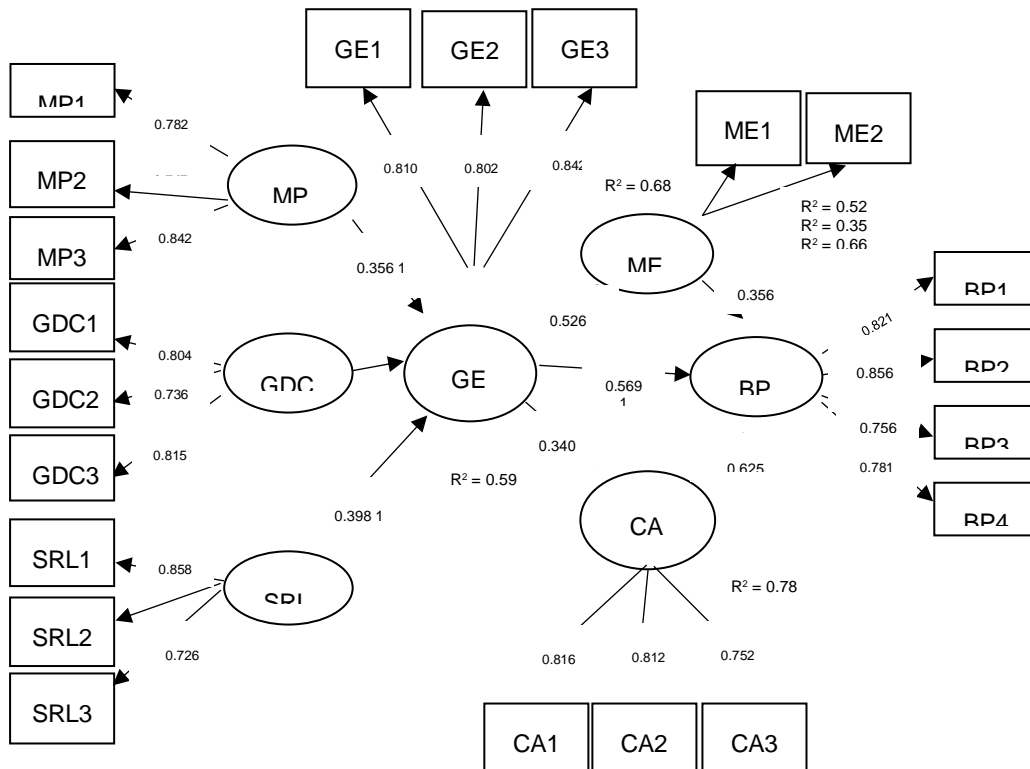


Figure 2 Measurement Model

According to inferential statistics analysis to test the hypotheses about “the causal relationship model and outcomes of green economy in Thailand’s manufacturing industry business”, the hypothesis test results are as follow:

Table 3 Analysis results The Causal Relationship Model and Outcomes of Green Economy in Thailand’s Manufacturing Industry Business

Hypothesis	Relationship	Estimate $\beta$	P-Value	Result
H1a	GE $\rightarrow$ BP	0.569**	0.004	Accepted
H1b	ME $\rightarrow$ BP	0.356**	0.001	Accepted
H1c	CA $\rightarrow$ BP	0.625**	0.001	Accepted
H2	GE $\rightarrow$ ME	0.526**	0.000	Accepted
H3	GE $\rightarrow$ CA	0.340**	0.004	Accepted
H4a	MP $\rightarrow$ GE	0.356**	0.001	Accepted
H4b	GDC $\rightarrow$ GE	0.314**	0.000	Accepted

H4c	SRL → GE	0.398**	0.000	Accepted
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Note: \* mean  $p < .05$ , \*\* mean  $p < .01$ ,

## Discussion

The analysis the causal relationship model and outcomes of green economy in Thailand's manufacturing Industry business, developed from theoretical assumptions, is consistent with empirical data. The influence of the green economy on business performance aligns with Lalaeng & Subongkod (2022) studied green economy management practices in Thailand's manufacturing industry and found that management under the green economy significantly influences performance, with a direct positive coefficient of 0.83 ( $p < .01$ ). This is consistent with Jabbar & Abid (2017), who noted that environmental impacts positively affect business performance. Similarly, Yousef Eiadat, et al. (2008) in their study "Green and competitive? An empirical test of the mediating role of environmental innovation strategy" found that environmental innovation strategies lead to improved firm performance.

Market effectiveness have an influence on business performance, consistent with Eangchuan (2017) found that Market Effectiveness has a positive direct influence on sustainable operational outcomes, with a direct effect size of 0.12 and a total effect size of 0.12, statistically significant at the 0.05 level. Capturing market opportunities to benefit greatly in new markets leads to the development of strategies that enhance business operations. However, to gain a competitive advantage, one should consider market competition, which is a crucial factor. This includes consistently engaging in R&D, research, and development, to effectively withstand intense market competition pressures and help drive marketing success, thus positively impacting business operations (Lee, & Tsai, 2005)

Competitive Advantage have an influence on business performance, aligns with Navarro et al. (2010) explored the impact of perceived competitive advantage, marketing strategy adaptation, and commitment to exporting on export performance, finding a relationship between performance and competitive advantage. Additionally, Halim et al. (2011) stating that effective strategies for creating competitive advantage enhance business operational efficiency. Healy et al. (2014) argue that building competitive advantage gives businesses unique capabilities and strategies suitable for superior operational outcomes, leading to leadership in their industries. Additionally, Mulyana (2016) indicates that competitive advantage significantly impacts financial performance.

Green economy have an influence on Market Effectiveness, consistent with Sermchayut (2023) found a positive relationship between green marketing practices and business performance. In addition, a Nielsen Study (2015) reported that in 2015, 66% of global survey participants were willing to pay more for sustainable products, an increase from 55% in 2014. This indicates that products and services associated with sustainability are perceived as more valuable, and this perception of sustainability value is increasingly consistent across all economy and social levels.

Green economy has an influence on competitive advantage, consistent with Alhadid & Rumman (2014) found that green product innovations and green process innovations positively impact business performance, consistent with previous studies showing that green product innovations result in higher operational efficiency. Moreover, Chen (2011) observed that green innovations enhance the design of quality green products, offering a great opportunity to differentiate an organization's products, allowing for higher pricing and better returns. The concept of the green economy can create a competitive advantage for organizations by maintaining a position in environmental management or developing green innovations that competitors cannot easily replicate, thus gaining sustainable benefits from environmental strategies (Husted & Salazar, 2006). Green products help businesses sustain the environment and improve their competitive performance (Pujari et al., 2003; Dangelico & Pujari, 2010).

Market Pressures affect green economy, aligning with the research by Lalaeng, C. (2017) study on green innovation strategies in Thailand's manufacturing industry found positive impacts of market orientation on

green innovation strategies. This aligns with Hult & Scott (2003), who identified market orientation as a critical factor indicating an organization's innovative capabilities and profitability. Market-focused strategies enhance competitive advantages, supporting Lee & Tsai (2005), who noted the significant role of market orientation in indicating profitability and innovation capabilities. Morgan et al. (2009) further state that market orientation sources competitive advantages and positively influences business performance improvements, emphasizing that market orientation is a strategic approach aimed at fulfilling customer needs and satisfaction, leading to superior business outcomes.

Green Dynamic Capabilities affect green economy, aligning with the research by Chummi (2023) on the structural relationship model of green innovation for small and medium enterprises found a direct positive correlation between green dynamic capabilities and green product innovation, with a coefficient of 0.59. The model's fit indices were satisfactory, aligning with findings that green dynamic capabilities are purposefully built to expand or modify the resource base as per market demands, leading to green innovation. These capabilities encompass various aspects of "perceiving," "seizing," and "transforming" to design and implement business models adaptively (Teece, 2017).

Green Dynamic Capabilities affect green economy, aligning with the research by Chen (2011) states that environmental leadership involves leaders influencing members to achieve environmental management and prevention outcomes, aligning with Augustine (2019), who found that environmental leadership enhances competitive advantages in green organizations. Socially responsible leadership is thus characterized by a commitment to social values, recognizing the potential of corporate leaders to positively impact the world (Pless, 2007).

## Conclusions and Recommendations

The analysis of the causal relationship model and outcomes of the green economy in Thailand's manufacturing industry demonstrates consistency between theoretical assumptions and empirical data. It reveals that the green economy significantly enhances business performance, supported by studies showing direct positive effects on firm outcomes through green management practices and environmental innovation strategies. Market effectiveness, influenced by capturing market opportunities and consistent R&D, also positively impacts performance, aligning with findings that market effectiveness directly contributes to sustainable operational outcomes. Furthermore, competitive advantage, built through unique strategies and market adaptation, enhances business performance, as shown by various studies. The green economy's influence extends to market effectiveness and competitive advantage, with green innovations and sustainable products perceived as valuable across different economic and social levels. Market pressures and green dynamic capabilities further drive green innovation and competitive advantage, emphasizing the importance of market orientation and environmental leadership in achieving superior business outcomes.

From the finding that the green economy influences business performance, market effectiveness and competitive advantage, businesses should focus on the green economy, including concern for the environment and the overall ecosystem, aiming to improve well-being and elevate the quality of human life in society, with an emphasis on energy and resource efficiency.

From the finding that market pressures, green dynamic capabilities, and socially responsible leadership influence green economy, businesses should focus on:

- Market pressures, including customer orientation, competitor orientation, inter functional coordination.
- Green dynamic capabilities, including adaptive capability, absorptive capability, innovative capability.
- Socially responsible leadership, including green leadership vision, environmental attitude, values.

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