


**CONFIRMATORY FACTORS ANALYSIS OF THE SUSTAINABILITY OF CHEMICAL
INDUSTRY IN THAILAND**

Suradetch Wangthong^A, Nuttawut Rojniruttikul^B



ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 07 April 2023</p> <p>Accepted 07 July 2023</p>	<p>Purpose: The aim of this study is to study and analyze the confirmatory factor of the model of factors influencing sustainability of chemical industry in Thailand and to examine the harmonization of the confirmatory factor of the model of factors influencing sustainability of chemical industry in Thailand</p>
<p>Keywords:</p> <p>Sustainability; Transformational Leadership; Organizational Culture; Corporate Social Responsibility.</p>	<p>Theoretical Framework: The study “Structural Equation Model of Factors Influencing Sustainability of Chemical Industry in Thailand”, the researcher has researched from related research and various online information. This is to be able to define a more comprehensive and clearer conceptual framework that will guide the study. These include theories and concepts of sustainability, change leadership, organizational culture, and corporate social responsibility.</p>
	<p>Design/Methodology/Approach: A total of 317 responses were collected from the chemical industry in Thailand using a multi-stage sampling technique while AMOS has been employed for data analysis to analyze variance and covariance by applying this technique to Confirmatory Factor Analysis (CFA) to check the harmony, accuracy, or consistency of the gauge construction. The confirmatory factor analysis of the model of factors influencing sustainability of chemical industry in Thailand consisted of Sustainability, Transformational Leadership, Organizational Culture, and Corporate Social Responsibility. It was found that the consistency with the empirical data</p> <p>Findings: The results of all factors: Transformational Leadership, Organizational Culture, and Corporate Social Responsibility. The organization uses these factors to formulate policies, strategic plans, and budget allocations in a holistic manner in order to achieve sustainable development and achieve results that are greater than the consideration of the actions of each section.</p> <p>Research, Practical & Social Implications: This study revealed that Sustainability is not a single factor. It is caused by all factors, including transformational leadership, organizational culture, and corporate social responsibility. The organization uses these factors to formulate policies, strategic plans, and budget allocations in a holistic manner in order to achieve sustainable development and achieve results that are greater than the consideration of the actions of each section.</p> <p>Originality/Value: This study contributes to the sustainability model of chemical industry in Thailand for further academic and professional development. The industry sectors can use research findings and recommendations to formulate an organizational strategy for further sustainability development. The government can use research findings and recommendations as a guideline for reviewing sustainability development for the industrial sector in Thailand.</p> <p>Doi: https://doi.org/10.26668/businessreview/2023.v8i7.2331</p>

^A PhD Candidate in Industrial Business Administration. King Mongkut's Institute of Technology Ladkrabang Business School, King Mongkut's Institute of Technology Ladkrabang. Thailand.

E-mail: suradetw888@gmail.com Orcid: <https://orcid.org/0000-0003-0094-5779>

^B Doctor of Public Administration. King Mongkut's Institute of Technology Ladkrabang Business School, King Mongkut's Institute of Technology Ladkrabang. Thailand. E-mail: nuttawut.ro@kmitl.ac.th

Orcid: <https://orcid.org/0000-0003-3344-2406>

ANÁLISE DE FATORES DE CONFIRMAÇÃO DA SUSTENTABILIDADE DA INDÚSTRIA QUÍMICA NA TAILÂNDIA

RESUMO

Objetivo: O objetivo deste estudo é estudar e analisar o fator de confirmação do modelo de fatores que influenciam a sustentabilidade da indústria química na Tailândia e examinar a harmonização do fator de confirmação do modelo de fatores que influenciam a sustentabilidade da indústria química na Tailândia

Estrutura teórica: O estudo "Modelo de Equação Estrutural de Fatores que Influenciam a Sustentabilidade da Indústria Química na Tailândia", o pesquisador pesquisou a partir de pesquisas relacionadas e várias informações on-line. Isto é para ser capaz de definir um quadro conceitual mais abrangente e mais claro que guiará o estudo. Estes incluem teorias e conceitos de sustentabilidade, liderança de mudança, cultura organizacional e responsabilidade social corporativa.

Design/metodologia/abordagem: Um total de 317 respostas foram coletadas da indústria química na Tailândia usando uma técnica de amostragem multi-estágio, enquanto o AMOS foi empregado para análise de dados para analisar variância e covariância, aplicando essa técnica à Análise de Fator Confirmatório (CFA) para verificar a harmonia, precisão ou consistência da construção do medidor. A análise fatorial confirmatória do modelo de fatores que influenciam a sustentabilidade da indústria química na Tailândia consistiu em Sustentabilidade, Liderança Transformacional, Cultura Organizacional e Responsabilidade Social Corporativa. Verificou-se que a coerência com os dados empíricos

Resultados: Os resultados de todos os fatores: Liderança Transformacional, Cultura Organizacional e Responsabilidade Social Corporativa. A organização usa esses fatores para formular políticas, planos estratégicos e alocações orçamentárias de maneira holística a fim de alcançar o desenvolvimento sustentável e alcançar resultados que sejam maiores do que a consideração das ações de cada seção.

Investigação, implicações práticas e sociais: Este estudo revelou que a sustentabilidade não é um fator único. É causada por todos os fatores, incluindo a liderança transformacional, a cultura organizacional e a responsabilidade social corporativa. A organização usa esses fatores para formular políticas, planos estratégicos e alocações orçamentárias de maneira holística a fim de alcançar o desenvolvimento sustentável e alcançar resultados que sejam maiores do que a consideração das ações de cada seção.

Originalidade/valor: Este estudo contribui para o modelo de sustentabilidade da indústria química na Tailândia para o desenvolvimento acadêmico e profissional. Os setores industriais podem utilizar os resultados da investigação e as recomendações para formular uma estratégia organizacional com vista a um maior desenvolvimento da sustentabilidade. O governo pode usar os resultados e recomendações da pesquisa como uma diretriz para analisar o desenvolvimento da sustentabilidade para o setor industrial na Tailândia.

Palavras-chave: Sustentabilidade, Liderança Transformacional, Cultura Organizacional, Responsabilidade Social Corporativa.

ANÁLISIS DE LOS FACTORES DE CONFIRMACIÓN PARA LA SOSTENIBILIDAD DE LA INDUSTRIA QUÍMICA EN TAILANDIA

RESUMEN

Objetivo: El objetivo de este estudio es estudiar y analizar el factor confirmatorio del modelo de factores que influye en la sostenibilidad de la industria química en Tailandia y examinar la armonización del factor que confirma el modelo de factores que influyen en la sostenibilidad de la industria química en Tailandia

Estructura teórica: El estudio "Modelo de ecuación estructural de factores que influyen en la sostenibilidad de la industria química en Tailandia", el investigador investigó a partir de investigaciones relacionadas y de diversas informaciones en línea. Esto permitirá definir un marco conceptual más amplio y claro que oriente el estudio. Estas incluyen teorías y conceptos de sostenibilidad, liderazgo en el cambio, cultura organizacional y responsabilidad social corporativa.

Diseño/Metodología/Enfoque: Se recogieron 317 respuestas de la industria química de Tailandia utilizando una técnica de muestreo en varias etapas, mientras que se utilizó AMOS para el análisis de datos para analizar la varianza y la covarianza, aplicando esta técnica al análisis de factores de confirmación (CFA) para verificar la armonía, precisión o coherencia de la construcción del contador. El análisis factorial confirmatorio del modelo de factores que influyó en la sostenibilidad de la industria química en Tailandia consistió en la sostenibilidad, el liderazgo transformacional, la cultura organizacional y la responsabilidad social empresarial. Se ha encontrado coherencia con los datos empíricos

Resultados: Resultados de todos los factores: liderazgo transformacional, cultura organizacional y responsabilidad social corporativa. La organización utiliza estos factores para formular políticas, planes

estratégicos y asignaciones presupuestarias de manera holística a fin de lograr el desarrollo sostenible y lograr resultados mayores que considerar las medidas de cada sección.

Investigación, implicaciones prácticas y sociales: Este estudio ha demostrado que la sustentabilidad no es un factor único. Es causada por todos los factores, incluidos el liderazgo transformador, la cultura organizativa y la responsabilidad social de las empresas. La organización utiliza estos factores para formular políticas, planes estratégicos y asignaciones presupuestarias de manera holística a fin de lograr el desarrollo sostenible y lograr resultados mayores que considerar las medidas de cada sección.

Originalidad/valor: Este estudio contribuye al modelo de sostenibilidad de la industria química tailandesa para el desarrollo académico y profesional. Los sectores industriales pueden utilizar los resultados y las recomendaciones de la investigación para formular una estrategia organizativa para seguir desarrollando la sostenibilidad. El Gobierno puede utilizar los resultados de la investigación y las recomendaciones como guía para analizar el desarrollo de la sostenibilidad para el sector industrial de Tailandia.

Palabras clave: Sostenibilidad, Liderazgo Transformacional, Cultura Organizacional, Responsabilidad Social Corporativa.

INTRODUCTION

Throughout the years of the development of Thailand's manufacturing industry, entrepreneurs or business owners have focused only on economic returns or "Economic Performance", also known as "Last Line Return or Bottom Line". For this reason, despite the rapid development of the country's industrial sector, which is already having a positive impact. It also clearly had a negative impact. That is to say, the emissions of pollutants into the atmosphere. There is competition for natural resources that are used as inputs, both directly and indirectly. It brings about problems such as water shortages, deterioration of water quality, an increase in industrial waste, and less forest cover. All these affect biodiversity and ecosystems. It has brought about the global climate change problem which not only Thai industry but also global industrial sectors are widely aware of the problem.

The Triple Bottom Line enables businesses to validate both social and environmental outcomes without conflicting with economic results. Hence, this concept is widely accepted. As it demonstrates a transparent vision, policy, and operational approach. The effective and successful implementation of the TBL concept measures corporate sustainability is possible. If the top management has the characteristics of the paradigm of "Transformational Leadership". Insight, attitude, and talent to create value for all business stakeholders. It is also believed that the eco-friendliness and sustainability of an organization's business are inextricably linked.

The chemical industry is one of the most important industries of the economy in Thailand. In the first quarter of 2020, there is an export value of US \$ 1,974 million, the second quarter of 2020 has a value of 1,848 million USD, and the third quarter of 2020 has a value of 2,110 million US dollars, respectively, which the overall picture is shrink compared to the previous year. As a result of the epidemic situation of COVID-19 virus resulted in the slowing

down of the industry. This causes the demand in both domestic and international markets to decline.

The above data illustrate the economic, social, and environmental problems and obstacles to operating in the chemical industry in Thailand. Therefore, it is necessary to study the factors influencing the sustainability of the chemical industry in Thailand. Moreover, there is not much research to study on this issue, of all the importance mentioned above. Therefore, the researcher has formulated the research questions, what are the factors that influence the sustainability of the chemical industry in Thailand?

LITERATURE REVIEW

In 1987, United Nations' World Commission on Environment and Development by The Brundtland Commission (1987) published a report entitled "Our Common Future" giving the concept of sustainable development for the first time. It defines sustainable development as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." In addition, many scholars have given many definitions of sustainability, many of which are consistent with the definitions of the Brundtland Commission by Wisner, Tan, and Leong (2019) define as "Sustainability can be defined as the ability to meet the needs of today's supply chain members without hampering their ability to meet the needs of future generations in terms of economic, environmental, and social challenges." Peng (2018) has stated that "Global sustainability is defined as the ability to meet current needs without compromising the ability of future generations to meet their needs. It means not only a sustainable social and natural environment but also means sustainable capitalism." And Heizer, Render, and Munson (2017) has defined "The term sustainability refers to meeting current needs without compromising the ability of future generations to meet their needs."

Triple Bottom Line is a business accounting term introduced by Elkington (1994) using abbreviations such as TBL, 3BL, 3Ps, and Three Pillars. The term Triple Bottom Line differs from traditional accounting terminology. (Prakash, Bisla & Arora, 2023) Traditionally used to represent profit or loss, Elkington intends for TBL to support its goals of holistic sustainability in its businesses in a broader context. This means that companies should be responsible for economic, social, and environmental performance. In other words, "People" means an assessment of how satisfying and fair business practices are for society. For example, companies employ disadvantaged people or people with disabilities. The company has fair

compensation and suitable social welfare. The term "Profit" refers to the economic value generated by the Company's business operations and the term "Planet" refers to the environmental measures a company uses as a standard to deal with the potential environmental impacts.

Bass (1985) expanded on Burns (1978) by describing the psychological mechanisms underlying transforming and transactional leadership. Bass also used the term "transformational" instead of "transforming." Bass added to the initial concepts of Burns (1978) to help explain how transformational leadership could include how it affects followers' motivation and performance. Leader academics and practitioners suggest that "Organizations today need leadership that inspires followers and empowers them to make revolutionary changes." "Transformational CEOs from businesses and non-profits have been credited with dramatic organizational change and have also been praised. Transformational leadership consists of three factors: charisma and inspiration, intellectual stimulation, and individual consideration which when combined will enable leaders to achieve broad change" (Nahavandi, 2015); (Udin, 2023).

Organizational Culture, it is defined as a system in which there is a common background, norms, values, or beliefs among the members of the group and the organization's climate is related to the members' personal reactions to the organization. Faliza, N. (2023); (Schein, 1985). Later, Schein (1996) stated that "Organizational culture which is sometimes called corporate culture is defined as a shared set of implicit assumptions that implicitly assume that a group exists and that determine how the group perceives, thinks, and responds to its environment." Lewis, Goodman, Fandt, and Michlitsch (2007) have stated that "Culture guides behavior and gives meaning to members of the organization. Therefore, it has a direct and powerful influence on what the organization does and what the people in the organization do." Organizational culture is shared beliefs, values, and norms. It connects people together and helps them understand the systems within the organization. The beliefs, values, and norms tell people that. The "how to do it" and "how to do it" culture develops within the organization as people interact and share ways of managing and coping. Jones and George (2019) define "A set of beliefs, expectations, values, norms, and collaborative routines that influence how members of an organization interact with each other and work together to achieve organizational goals." Cameron and Quinn (2011) have stated that "The Competitive Values Framework (CVF) is a practical guide for managers to understand, measure, and transform organizational culture. The CVF is reviewed by extensive research involving 1,100 companies.

Organizational culture is broken down into four categories: (1) clan, (2) adhocracy, (3) market, and (4) hierarchy.”

Lewis, Goodman, Fandt, and Michlitsch (2007) have stated that “Corporate social responsibility is a complex concept that goes against precise definitions.” In general, Corporate social responsibility can be considered as the interaction between a business and the existing social environment. More specifically, it refers to the obligations that the organization must perform in a way that is socially beneficial. Most would agree that every organization should operate in a socially responsible manner. (Hermawan, Sari, Biduri, Rahayu & Rahayu, 2023). However, stakeholders typically expect greater responsibility on the part of organizations, and managers’ own personal ethics are likely to set higher standards too. According to University of Georgia business scholar Archie B. Carroll, corporate social responsibility lies at the peak of the pyramid of corporate obligations, which lie on top of it with economic, legal, and ethical obligations. Some may regard a company's first and only function as profitability. However, Carroll (2004) suggests that “Corporate responsibilities in the global economy should be prioritized as follows: Economic Responsibility is the production of goods and services that society needs at a price that keeps the business alive and fulfills its obligations to investors. Legal Responsibility must comply with applicable local, state, federal, and international laws. Ethical Responsibility, including meeting other social expectations, is not written into the law. Philanthropic Responsibilities are the additional behavior and activities that society deems desirable and the values of the business support”.

CONCEPTUAL MODEL AND HYPOTHESES

Therefore, the research has hypothesized that

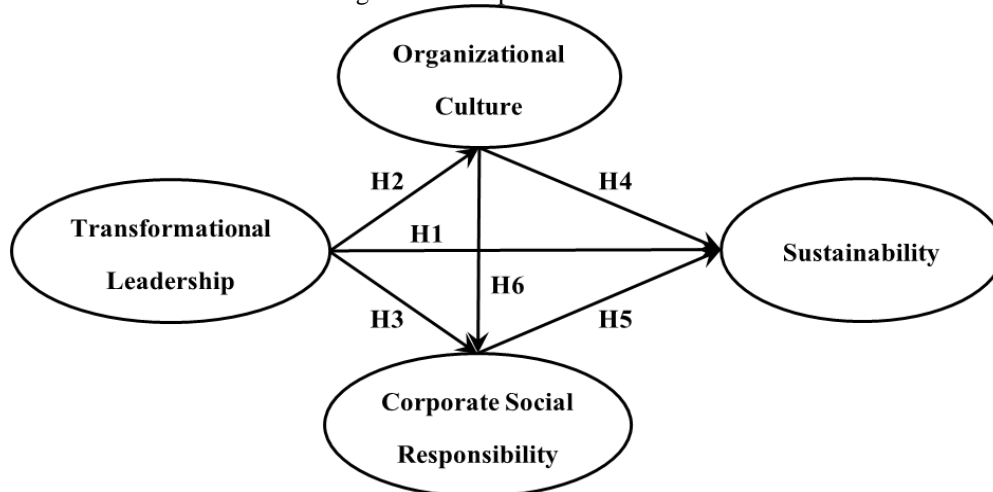
Hypothesis 1: Sustainability confirmative factors of Chemical Industry in Thailand are harmonized with empirical data.

Hypothesis 2: Transformational Leadership confirmative factors of Chemical Industry in Thailand are harmonized with empirical data.

Hypothesis 3: Organizational Culture confirmative factors of Chemical Industry in Thailand are harmonized with empirical data.

Hypothesis 4: Corporate Social Responsibility confirmative factors of Chemical Industry in Thailand are harmonized with empirical data.

Figure 1 Conceptual Framework



Source: Prepared by the authors (2023).

DATA AND METHODOLOGY

Population

The population in this research study is the top management of the chemical industry in Thailand in the downstream chemical industry. The downstream chemical industry in Thailand has a total of 2,573 factories, divided into 5 industrial groups as follows (Ministry of Industry, Department of Industrial Works, 2021): 1) Chemical fertilizer industry, 2) Chemical or other chemical materials industry, 3) Pharmaceutical industry, 4) Cosmetic industry, and 5) Paint industry and its associated products. The sampling method used in quantitative research aims to provide a representative sample of the target population. In this research, the target population is the top management of the downstream chemical industry in Thailand. The samples were obtained by multi-stage sampling of 317 respondents.

Research Variables

As the research structure, the questionnaires were developed on the basis of the relevant theories, literature, concepts, and research in order to the variable set for Transformational Leadership, Organizational Culture, and Corporate Social Responsibility influencing Sustainability which is divided into 3 parts as the following:

Part 1: Personal data of the respondents such as gender, age, highest education, management position, management experience, industrial groups, and business operation period. Nominal and ratio scales are applied.

Part 2: Questions about the latent variables in the research

1. Question about “Sustainability” is developed from previous studies. Ratio and Interval scales are applied, and the scale is classified into 5 levels.
 2. Question about “Transformational Leadership” is developed from previous studies. Ratio and Interval scales are applied, and the scale is classified into 5 levels.
 3. Question about “Organizational Culture” is developed from previous studies. Ratio and Interval scales are applied, and the scale is classified into 5 levels.
 4. Question about “Corporate Social Responsibility” is developed from previous studies. Ratio and Interval scales are applied, and the scale is classified into 5 levels.
- Part 3: Suggestion of respondents.

Research Instrument

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3. Question about “Organizational Culture” is developed from previous studies. Ratio and Interval scales are applied, and the scale is classified into 5 levels.
4. Question about “Corporate Social Responsibility” is developed from previous studies. Ratio and Interval scales are applied, and the scale is classified into 5 levels.

Part 3: Suggestion of respondents.

Instrument Quality Inspection

1. Content validity testing by using questionnaires developed by the researcher and presenting to five experts. Quality checking of content validity to determine the

consistency between the questions. Questions and Assumptions or Item Objective Congruence (IOC).

2. Reliability Testing: The researchers measured the reliability by computerized Cronbach's alpha coefficient (Cronbach, 1974).

Data Analysis

As the completed questionnaires, the researcher has to examine the basic data for compliance with the analysis agreement. For the statistical testing, the level of significance and acceptable error (α) is 0.05. The procedure and statistics for analysis are as following below.

1. The basics of statistical analysis of sample distribution by using descriptive statistics, i.e. percentage, mean, and the basic statistical analysis for developing the model.
2. Confirmatory Factor Analysis (CFA) to check the harmony, accuracy, or consistency of the gauge construction. The objective of the technique is to test the hypothesis of the relationship between latent variables and manifest variables, including studying the relationship between exogenous latent variables and endogenous latent variables (Ullman, 2001). The relevant statistics to assess the consistency of the conceptual framework and the empirical data, as shown in Table 1.

Table 1 Statistics for evaluating the consistency of the conceptual framework

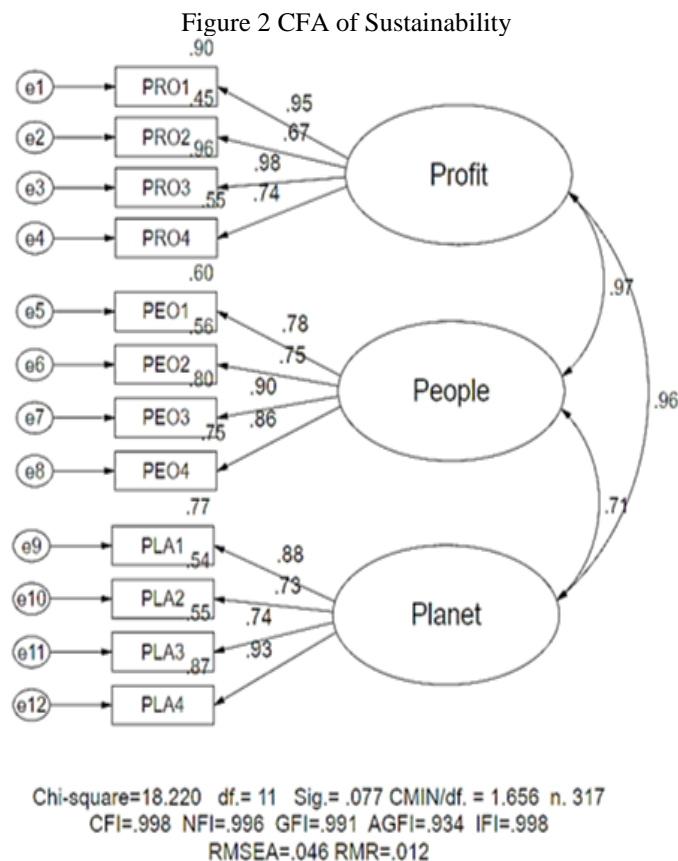
Statistic	Symbol	Objective	Statistics for the conceptual framework with empirical data
Chi-square	λ^2	To test the null hypothesis, the conceptual framework is consistent with the empirical data.	$p > 0.05$
Relative Chi-square	λ^2/df	To prove the conceptual framework is consistent with empirical data.	$\lambda^2/df < 2.00$
Goodness of Fit Index	GFI	To measure the level of harmonious harmony between 0-1.00.	≥ 0.90
Adjusted Goodness of Fit Index	AGFI	To measure the level of harmonious harmony between 0-1.00.	≥ 0.90
Root Mean Square Error of Approximation	RMSEA	To inform the tolerances of the conceptual framework, the root form of the mean square of the estimated error between 0 -100.	< 0.05

Source: Hair et al. (2006); Schumacker and Lomax (2010)

RESULTS AND DISCUSSION

Results

1. The results of the analysis of general data of 317 respondents in the gender samples. Most were 240 males, representing 75.71%, and 77 females, representing 24.29%, mostly aged 41-50 years old, 107 respondents, representing 33.76%. From the highest education, a bachelor's degree is a greater number of respondents for 185 respondents, representing 58.36%. Most of them have management positions as managers of 194 respondents, representing 61.20%. The management experience 5 - 10 years, 132 respondents, representing 41.64%. Most of the respondents came from the chemical fertilizer industry, 92 respondents, representing 29.02%, The business has the most operating period of 11-20 years, with 141 respondents, representing 44.48%.
2. The results of the CFA of the model of factors influencing sustainability of chemical industry in Thailand for Sustainability, there were 3 variables, namely profit (PRO), people (PEO), and planet (PLA), including 12 observable variables. It was found that the consistency with the empirical data was good. Chi-Square was 18.220, df was 11.0, Sig. was $0.077 > 0.05$, and CMIN/df was $1.656 < 2.0$. The consistency and statistical with CFI was $0.998 > 0.90$, GFI was $0.991 > 0.90$, AGFI was $0.934 > 0.80$, RMSEA was $0.046 < 0.05$, SRMR was $0.012 < 0.05$, NFI was $0.996 > 0.90$, and IFI was $0.998 > 0.90$. These indices were said to have met a predetermined threshold indicating that the model in this measurement was accurate (Validity) as shown in Figure 2.

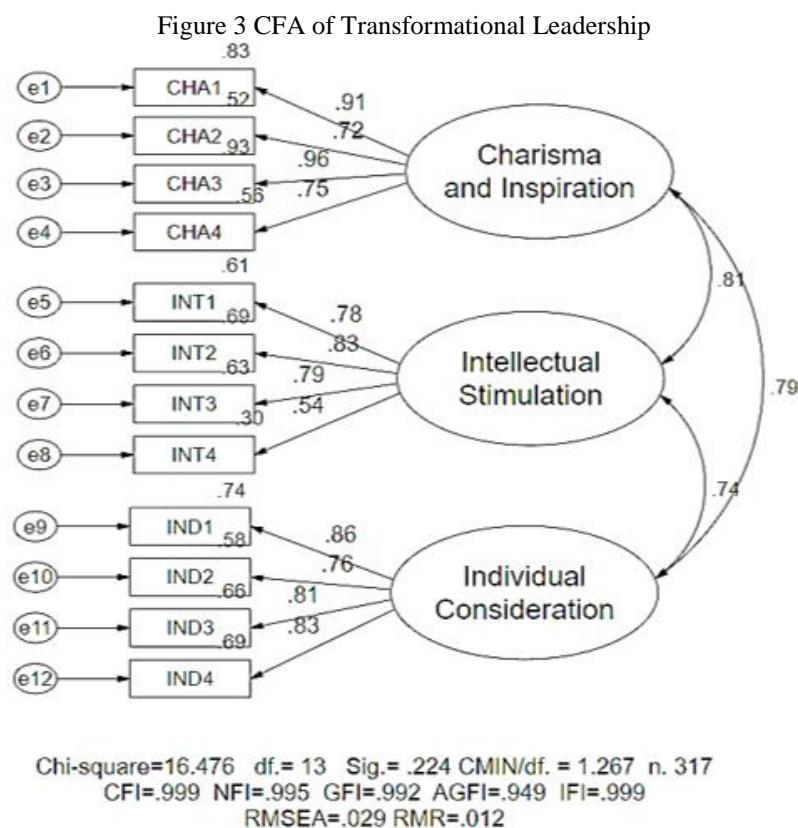


Source: Prepared by the authors (2023).

The results of the CFA of the model of factors influencing sustainability of chemical industry in Thailand for Sustainability consisted of profit (PRO), people (PEO), and planet (PLA) with a Factor Loading (λ) between 0.67 – 0.98 greater than 0.40, a Standard Error (SE) between 0.03 – 0.06, a Multiple Correlation Coefficient (R^2) between 45.0% - 96.0%, Average Variance Extracted (AVE) was 0.677 – 0.717, which was greater than 0.50. It was said that “the measurement model had good convergence and that the variables had good unity” and the Composite Reliability (CR) between 0.895 – 0.908 was greater than 0.60. It was shown that the observed and latent variables in all sustainability confirmation factor models had high discriminative fidelity, indicating the latent variable unity that satisfies the criterion. It could import a structural equation model of factors influencing sustainability of chemical industry in Thailand statistically significant at 0.01.

3. The results of the CFA of the model of factors influencing sustainability of chemical industry in Thailand for Transformational Leadership, there were 3 variables, namely charisma and inspiration (CHA), intellectual stimulation (INT), and individual consideration (IND), including 12 observable variables. It was found that the consistency with the empirical data was good. Chi-Square was 16.476, df was 13.0, Sig.

was $0.224 > 0.05$, and $CMIN/df$ was $1.267 < 2.0$. The consistency and statistical with CFI was $0.999 > 0.90$, GFI was $0.992 > 0.90$, AGFI was $0.949 > 0.80$, RMSEA was $0.029 < 0.05$, SRMR was $0.012 < 0.05$, NFI was $0.995 > 0.90$, and IFI was $0.999 > 0.90$. These indices were said to have met a predetermined threshold indicating that the model in this measurement was accurate (Validity) as shown in Figure 3.

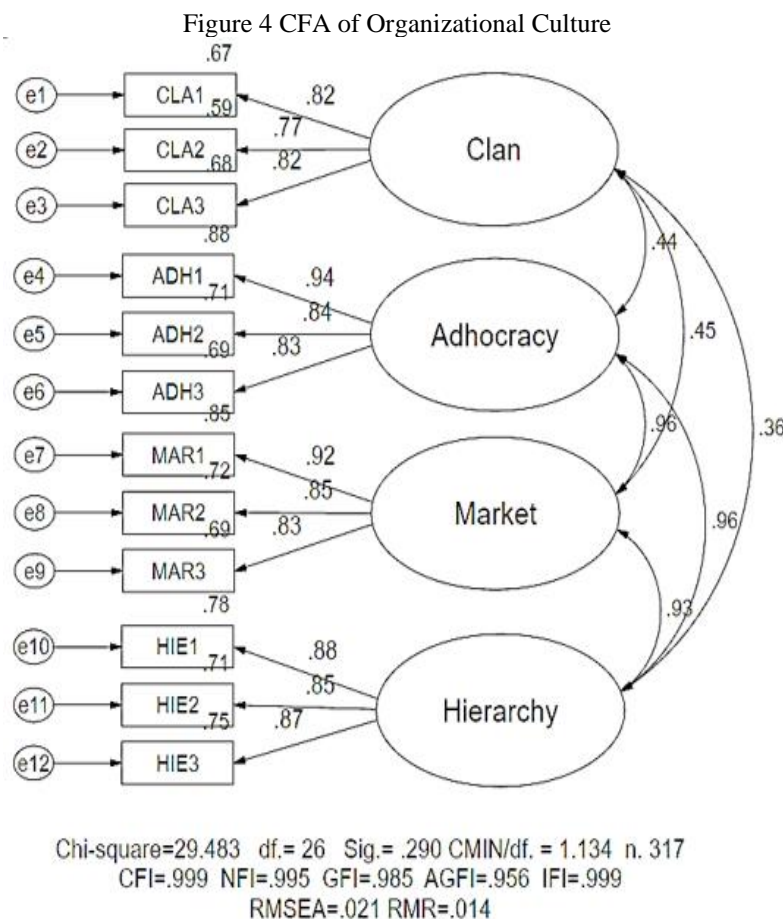


Source: Prepared by the authors (2023).

The results of the CFA of the model of factors influencing sustainability of chemical industry in Thailand for Transformational Leadership consisted of charisma and inspiration (CHA), intellectual stimulation (INT), and individual consideration (IND) with a Factor Loading (λ) between 0.54 – 0.96 greater than 0.40, a Standard Error (SE) between 0.04 – 0.07, a Multiple Correlation Coefficient (R^2) between 30.0% - 93.0%, Average Variance Extracted (AVE) was 0.555 – 0.709, which was greater than 0.50. It was said that the measurement model had good convergence and that the variables had good unity and the Composite Reliability (CR) between 0.803 – 0.906 was greater than 0.60. It was shown that the observed and latent variables in all transformational leadership confirmation factor models had high discriminative fidelity, indicating the latent variable unity that satisfies the criterion. It could import a structural

equation model of factors influencing sustainability of chemical industry in Thailand statistically significant at 0.01.

4. The results of the CFA of the model of factors influencing sustainability of chemical industry in Thailand for Organizational Culture, there were 4 variables, namely clan (CLA), adhocracy (ADH), market (MAR), and hierarchy (HIE), including 12 observable variables. It was found that the consistency with the empirical data was good. Chi-Square was 29.483, df was 26.0, Sig. was $0.290 > 0.05$, and CMIN/df was $1.134 < 2.0$. The consistency and statistical with CFI was $0.999 > 0.90$, GFI was $0.985 > 0.90$, AGFI was $0.956 > 0.80$, RMSEA was $0.021 < 0.05$, SRMR was $0.014 < 0.05$, NFI was $0.995 > 0.90$, and IFI was $0.999 > 0.90$. These indices were said to have met a predetermined threshold indicating that the model in this measurement was accurate (Validity) as shown in Figure 4.

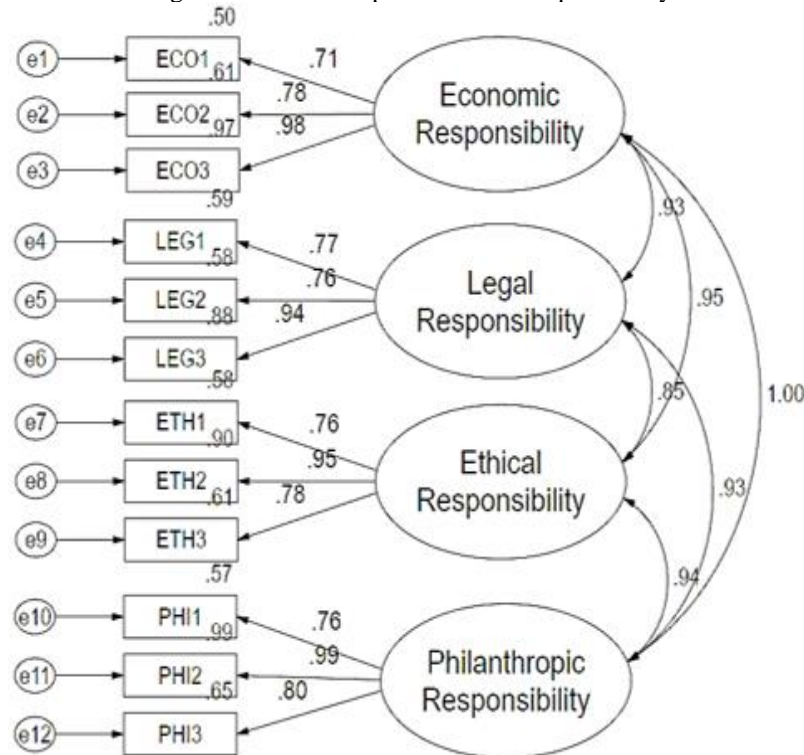


The results of the CFA of the model of factors influencing sustainability of chemical industry in Thailand for Organizational Culture consisted of clan (CLA), adhocracy (ADH),

market (MAR), and hierarchy (HIE) with a Factor Loading (λ) between 0.77 – 0.94 greater than 0.40, a Standard Error (SE) between 0.01 – 0.11, a Multiple Correlation Coefficient (R²) between 59.0% - 88.0%, Average Variance Extracted (AVE) was 0.643 – 0.762, which was greater than 0.50. It was said that “the measurement model had good convergence and that the variables had good unity” and the Composite Reliability (CR) between 0.844 – 0.905 was greater than 0.60. It was shown that the observed and latent variables in all organizational culture confirmation factor models had high discriminative fidelity, indicating the latent variable unity that satisfies the criterion. It could import a structural equation model of factors influencing sustainability of chemical industry in Thailand statistically significant at 0.01.

5. The results of the CFA of the model of factors influencing sustainability of chemical industry in Thailand for Corporate Social Responsibility, there were 4 variables, namely economic responsibility (ECO), legal responsibility (LEG), ethical responsibility (ETH), and philanthropic responsibility (PHI), including 12 observable variables. It was found that the consistency with the empirical data was good. Chi-Square was 17.553, df was 11.0, Sig. was 0.093 > 0.05, and CMIN/df was 1.596 < 2.0. The consistency and statistical with CFI was 0.999 > 0.90, GFI was 0.991 > 0.90, AGFI was 0.938 > 0.80, RMSEA was 0.043 < 0.05, SRMR was 0.019 < 0.05, NFI was 0.997 > 0.90, and IFI was 0.999 > 0.90. These indices were said to have met a predetermined threshold indicating that the model in this measurement was accurate (Validity) as shown in Figure 5.

Figure 5 CFA of Corporate Social Responsibility



Chi-square=17.553 df.= 11 Sig.= .093 CMIN/df. = 1.596 n. 317
 CFI=.999 NFI=.997 GFI=.991 AGFI=.938 IFI=.999
 RMSEA=.043 RMR=.019

Source: Prepared by the authors (2023).

The results of the CFA of the model of factors influencing sustainability of chemical industry in Thailand for Corporate Social Responsibility consisted of economic responsibility (ECO), legal responsibility (LEG), ethical responsibility (ETH), and philanthropic responsibility (PHI) with a Factor Loading (λ) between 0.71 – 0.99 greater than 0.40, a Standard Error (SE) between 0.06 – 0.08, a Multiple Correlation Coefficient (R²) between 50.0% - 99.0%, Average Variance Extracted (AVE) was 0.685 – 0.735, which was greater than 0.50. It was said that the measurement model had good convergence and that the variables had good unity and the Composite Reliability (CR) between 0.866 – 0.891 was greater than 0.60. It was shown that the observed and latent variables in all corporate social responsibility confirmation factor models had high discriminative fidelity, indicating the latent variable unity that satisfies the criterion. It could import a structural equation model of factors influencing sustainability of chemical industry in Thailand statistically significant at 0.01.

DISCUSSION

1. Sustainability: In the results of the CFA of Sustainability, there were 3 variables, namely profit, people, and planet. It was found that the consistency with the empirical data. It could import a structural equation model of factors influencing sustainability of chemical industry in Thailand in accordance with the concept of Elkington (1994) presented “the Triple Bottom Line to support the goals of holistic business sustainability in a broader context, meaning that companies should be responsible for economic, social and environmental performance” and in accordance with the concept of Swink, Melnyk, and Hartley (2020), which said that “The growing importance of sustainability has led many companies to adopt a "Triple Bottom Line" approach to performance measurement.” This approach consists of three different measurements of profit and loss: 1. Profit—the monetary result of operations 2. People—the social impact of operations, and 3. Planet—the environmental impact of operations.

2. Transformational Leadership: In the results of the CFA of Transformational Leadership, there were 3 variables, namely charisma and inspiration, intellectual stimulation, and individual consideration. It was found that the consistency with the empirical data. It could import a structural equation model of factors influencing sustainability of chemical industry in Thailand in accordance with the concept of Wang et al. (2011), which said that “The three factors are charisma and inspiration, intellectual stimulation, and individual consideration to enable leaders to make the necessary changes in the organization” and in accordance with the concept of Nahavandi (2015), which said that “Transformational Leadership consists of three factors: charisma and inspiration, intellectual stimulation, and individual consideration which when combined will enable leaders to achieve broad change.”

3. Organizational Culture: In the results of the CFA of Transformational Leadership, there were 4 variables, namely clan, adhocracy, market, and hierarchy. It was found that the consistency with the empirical data. It could import a structural equation model of factors influencing sustainability of chemical industry in Thailand in accordance with the concept of Cameron and Quinn (2011), presented “the Competitive Values Framework (CVF) is a practical guide for managers to understand, measure, and transform organizational culture. The CVF is reviewed by extensive research involving 1,100 companies. Organizational culture is broken down into 4 categories: (1) clan, (2) adhocracy, (3) market, and (4) hierarchy.” And in accordance with the concept of

Hughes, Ginnett, and Curphy (2019), which said that “the Competitive Values Framework is designed to help organizations become more intent on identifying a culture that is more likely to be successful based on the relevant circumstances and in transitioning to that culture.”

4. Corporate Social Responsibility: In the results of the CFA of Transformational Leadership, there were 4 variables, namely economic responsibility, legal responsibility, ethical responsibility, and philanthropic responsibility. It was found that the consistency with the empirical data. It could import a structural equation model of factors influencing sustainability of chemical industry in Thailand in accordance with the concept of Carroll (2004), presented “the Pyramid of Global Corporate Social Responsibility and Performance can be categorized as Economic Responsibility, Legal Responsibility, Ethical Responsibility, and Philanthropic Responsibility.” And in accordance with the concept of Bateman, Snell, and Konopaske (2019), which said that “Economic Responsibility: To produce goods and services required by society at business continuity prices and fulfill obligations to investors. Legal Responsibilities: Comply with applicable local, state, federal, and international laws. Ethical Responsibility: Meeting other social expectations, not written as law. Philanthropic Responsibilities: Additional behaviors and activities that society deems desirable and business values support.”

Sustainability is not caused by one factor but by the result of all factors: transformational leadership, organizational culture, and corporate social responsibility. The organization uses these factors to formulate policies, strategic plans, and budget allocations in a holistic manner in order to achieve sustainable development and achieve results that are greater than the consideration of the actions of each section.

CONCLUSION

The results of the CFA of the model of factors influencing sustainability of chemical industry in Thailand consisted of Sustainability, Transformational Leadership, Organizational Culture, and Corporate Social Responsibility. It was found that the consistency with the empirical data was good with all Factor Loading (λ) passing the specified criteria and Average Variance Extracted (AVE) for all 4 variables greater than 0.50. It was shown that the observed and latent variables in all confirmation factor models had high discriminative fidelity, indicating the latent variable unity that satisfies the criterion. It could import a structural equation model

of factors influencing sustainability of chemical industry in Thailand. The results of data analysis for testing Multicollinearity are correlated and the correlation of all variables is positive.

This study is the starting point of examining the linkage of factors influencing the sustainability of the chemical industry in Thailand. Future studies should aim to examine the relationships among the factors influencing the sustainability of the chemical industry in Thailand to understand the significance of all factors influencing sustainability. This is for the sustainable development of the chemical industry in Thailand. In addition, this study contributes to the sustainability model of chemical industry in Thailand for further academic and professional development. The industry sectors can use research findings and recommendations to formulate an organizational strategy for further sustainability development. The government can use research findings and recommendations as a guideline for reviewing sustainability development for the industrial sector in Thailand. However, this study is limited to only the chemical industry in Thailand, to apply it to other industries, it is necessary to consider the unique characteristics of each industry, such as the economic conditions of the industry, the image of society toward the industry, and the impact of the industry's operations on that of the environment. These all shape the roles and activities that the industry will take to improve its sustainability.

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