

# Ensuring Green Environment through Sustainable Development Goals in Thailand: Mediating Role of Supply Chain Integration

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**Abstract**— Increased global warming and industrial pollution have forced manufacturing organizations in Thailand to focus on sustainable practices. Such practices can come from Sustainable Development Goals (SDGs) which can contribute towards green environment either directly or indirectly. Supply chain integration can also play its role to bring all stakeholders at same page for ensuring green environment production. This study has investigated the impact of internal, customer and supplier sustainable development goals on environmental performance of manufacturing firms in Thailand. Furthermore, intervening role of supply chain integration has also been analyzed in relationship between SDGs and environmental performance. Data has been collected through questionnaire from middle level management of almost 49 manufacturing firms of Thailand which was subsequently analyzed on SPSS and AMOS for screening and path analysis. Results have confirmed the hypothesis that SDGs have significant impact on environmental performance and also flagged significant mediating role of supply chain integration in respective relationship. This research is original due to having a unique variable like supply chain integration and a completely different context of Thailand's manufacturing sector which was not explored previously. This study will have its contribution in theory, practice and policy along with future research indications.

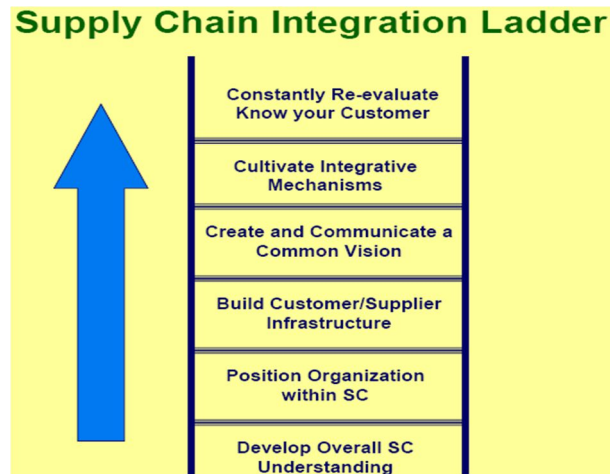
*Key Words: Sustainable Development Goals, Supply Chain Integration, Environmental Performance, Thailand*

## 1. Introduction

Environmental performance refers to the aspect that how much successful an organization is in minimum impacting the environment by the actions of businesses such as release of pollutants and other hazardous materials in the environment and other acts which are against environment laws [1]. It can also

be viewed as the improvement in products or procedures of a particular organization through certain decisions related to environment protection [28]. There has been a strong emphasis on the environmental performance by using products and processes which are not harmful for the environment [2]. There are different views in regard of the increase or decrease in costs of production while improving environmental performance. However, it is an important factor for the benefit of people which cannot be neglected in any case.

Sustainable development refers to the economic performance due to which environment is affected minimum. To attain this sustainability, many improvements in the business practices and supply chain are necessary [3]. There are three kinds of sustainable development; internal sustainable development, supplier sustainable development and customer sustainable development. Internal sustainable development means that the internal resources such as knowledge and skills are used to design processes which have the minimum negative impact on environment [4]. Supplier sustainable development means that the raw materials coming from the supplier must be of such quality that when processed must have minimum adverse effect on environment. Similarly, customer sustainable development means that the organization must provide information to customers which make the customers have positive impact on environment performance and in return the customers must cooperate with the organization in this matter. By combining all these components, internal, supplier and customer, environmental performance can be improved [5].



**Figure 1:** Supply Chain Integration

Figure 1 shows the necessary components of an integrated supply chain. Supply chain integration means the strong relationships of the actors involved in a supply chain starting from the purchase of raw materials, its processing and manufacturing of a product, transportation of the product to the market places and finally handing the products to the customers [6]. Supply chain involves all the inputs required to produce an output in the form of a product. Supply chain integration is an important concept in the manufacturing sector. The organization fixes the number of suppliers to provide a fixed amount of raw materials, that are required to produce a set amount of product at a given price. Sometimes this integration is so strong that the suppliers work only for a particular company and sometimes even merge themselves into the company [7]. Integration involves the transfer of information through secured mediums so that all the actors are well aware of each other's situation. Supply chain increases flexibility in different business processes and practices. When a smooth supply chain works, it results in the reduction of wastes that ultimately improves the productivity. In a nutshell, we can say that the performance of a company does not depend on one individual; it is a teamwork that is carried out through a carefully integrated supply chain [8]. All the actors in a supply chain are equally involved and responsible for the improvement and betterment of an organization.

Sustainable development strategies have an impact on supply chain integration as all the actors of a supply chain are satisfied and comfortable working with each other. This ultimately affects the environmental

performance as all the actors of the supply chain work in collaboration with each other to put maximum effort to reduce environmental pollution and using processes that are least affecting the environment [9, 29]. Unfortunately, sustainable development is being used very less than what is required. This ultimately affects the supply chain integration as the supply chain actors do not connect with each other. This disconnection directly affects the environmental performance because no one will be willing and taking interest in environmental performance. Other than Thailand, developing and underdeveloped countries are also facing this situation because of less sustainability of development. If this problem is not eradicated as soon as possible, it will have a negative impact on the environment all over Thailand, which is not in the favor of the country [10]. Thus, steps must be taken to improve the developmental sustainability for the betterment of environmental performance. Many studies have been done in the past to study the environmental performance, and a few have been done to study the impact of sustainable development on environmental performance but no research has been conducted to study the mediating role of supply chain integration between the above-mentioned variables [11]. A research paper has recommended studying the mediating role of supply chain integration in this regard [12]. The main objectives of this research are:

- Analyze the significant impact of sustainable development on environmental performance in organizations of Thailand

- Analyze the significant mediating role of supply chain integration between sustainable development and environmental performance in organizations of Thailand

Thailand is very rich in natural resources which are the assets for economic growth. Different natural resources have been very helpful in manufacturing, exporting and tourism industries [13]. But recently the economic growth has affected these natural resources adversely and the environment has begun to degrade. In this alarming situation, steps must be taken to avoid these circumstances by improving environmental performance. There have been a lot of research and studies in this regard, which have helped the organizations adopt the processes and procedures that have minimum impact on environment [14]. The govt. of Thailand is also taking interest in this regard by making policies favorable for improvement of sustainable development and thus better environmental performance.

## 2. Literature review

### 2. Legal Theory and Resource Orchestration Theory

Sustainability Dominant development is considered one of the far-most analyzed concept on whose basis new light is being shed on the participles related to environmental factors, sustainable management and especially on the Theory of sustainability development [15; 30]. The current dominant legal theory (DLT) [16] of neo-liberalism and the rational inequality that is produced in the sustainable environment promotes the idea of sustainable development with a primary focus on counteracting radical inequality. There are studies that clearly elaborate the theoretical background of dominant legal theory along with the involvement of Resource Orchestration theory [17] that is used to portray successful human developing processing, human resources and which has a deep impact on environmental sustainability priorities. Sustainable developments is quite necessary for the protection of the environment, human rights, improving health and education system, eradicating extreme form of poverty and unemployment, these all aspects mutually reinforces the concept of dominant legal theory that is certainly relatable to the change in culture, change in environment and change in sustainable development. According to the theory of DL, Sustainable development (SD) might face a lot

of challenges which will definitely prevent its progress, but somehow challenges by the humanity and the planet both are catered by the implications of SD. Sustainable Development Goals (SDG) is considered as the set of targets and indicators relating to future international human and sustainable development, thus SDG were responsible in replacing various millennium development goals. SDG refers to the most causal issues of the environment and the surrounding that are always left unsolved and unresolved due to the weakness of the government, due to instable situation of the state and also due to the negligence of the relevant higher authorities. DL theory develops different agendas to promote the cause of sustainability development goals for the wellbeing of the people living in on estate or across the world by organizing different welfare programs to educate the authorities and government of underdeveloped and developed states. To obtain a sustainable environment authority have to ensure the availability of all kinds of resources including food, shelter, health facilities, education institutions, productive and sustainable economic growth and many other essential resources that will guarantee the positive growth outcomes of SD.

### 2.1. Internal Sustainable Development Relationship with Environmental Performance

Studies Ketata, et al. [18] suggest that state can function and develop appropriately on the terms of preserving the external and internal sustainable development which develops a positive relationship with changing and sustainable environmental performance. Environmental performance can effectively rely upon the functions of sustainable development, which are however dependent upon the human settlements and strengthen the means of implementation and revitalize the global partnership for sustainable development. SD on one hand depends on the targets and indicators of goals created by DL theory while on the other hand it depends upon market fundamentalism which energizes human capital for better means. Effects of SD depend on the effective and compatible supply chain which results in cost reduction, environmental green efforts and financially profitable performance. Internal SD includes suppliers, customers, management, and other internal required resources that manage the outcomes generated from SD, having a positive impact on the environmental performance. According

to the resource orchestration theory, internal supplier and customer SD significantly affect each other, and by acting together, they further enhance the link between firm's lean productivity, green and profitable supply chain. The emerging of sustainable cooperation indicates a strategy that will drive the SD into the formation of extended supply chain which further promotes the activity of environmental performance. Sustainable cooperation, incorporate social, economic and environmental goals into product designing, operational concepts, purchasing logistics and other supply chain activities that clearly accelerates the affectivity of SD on environmental performance. Supply chain performance revitalizes the lifecycle of product formation that dominantly generates a strong relationship with EP to sufficiently anchor the needs of the environment and people living in that particular environment. Thus, the following hypothesis is proposed:

**H1:** Internal Sustainable Development has a significant impact on Environmental Performance

## **2.2. Customer Sustainable development relationship with Environmental performance**

As per past literature [2] written on the specific field of SD, researchers has briefly explained about the internal and customer involvement in making of SD along with promoting the cause of EP. CSD has a significant impact on the development of environmental performance due to the available empirical evidences regarding the theory of DL and resource orchestration (ROT).green supply chain depends on the internal supply chain that is made up of internal suppliers and internal customers to promote the environmental growth activity and to achieve sustainable environment benefits. Developing sustainable suppliers and customers can make the form greener, leaner and financially more stable. Theorists interlock the performance of sustainable suppliers and customers with the sustainable environmental performance to produce economic growth with the help of green supply chain management. Some of the CSD [19] strategies are shown to be positively related to the performance of environment because their effect can cause cost-saving capabilities related to firm productivity. Supply chain managers develops a compatible and competitive relationship with the customers and suppliers of green supply chain, which would

maximize the efficiency of EP and will generally increase green environmental operational performance outcomes. SD always has a positive impact on SSD practices on both accounting and profitability rate. Thus, the following hypothesis is proposed;

**H2:** Customer Sustainable Development has a significant impact on Environmental performance

## **2.3. Supplier Sustainable development Relationship with Environmental Performance**

Theory of RO and DL suggest a key involvement of supplier sustainable development in growth of green supply chain which further enhances the development of EP related to firm capabilities and performance. Past studies [3] has examined the role of supplier development in maintaining the sustainability criteria of EP with the help of SSD strategies and effective approaches. The effect of SSD has a positive effect on the cost-saving strategies and which further promotes financial performance. Studies [20] believe that supplier's resources are considered as external resources that can be easily organized by the focal firm to address environmental issues depending on its performance, abilities, and capabilities, these focal firms can only address these issues through a proper channel that might include, certification, legal rights, policies, accessibility, assistance, monitoring, and information exchange between different cooperating firms. Thus, the following hypothesis is proposed:

**H3:** Supplier Sustainable Development has a significant impact on Environmental performance.

## **2.4. Mediating Role of Supply Chain Integration between Internal sustainable development and environmental performance**

Orchestration theory [21] mitigates the role of a mediator between the performance of SD and environment. Supply chain integration act as a major component for increasing the economic growth as well as increasing the productivity of goods by the firm performance by reducing the cost-efficiency and simultaneously increasing the investment cost with the help of supply chain management. SCI develops a reliable connection between the two variables of ISD and EP. Sourcing of environment friendly resources for the welfare of the society is only because of the sustainability performance of SCI and EP [22]. Internal SD emphasizes strategic and operational

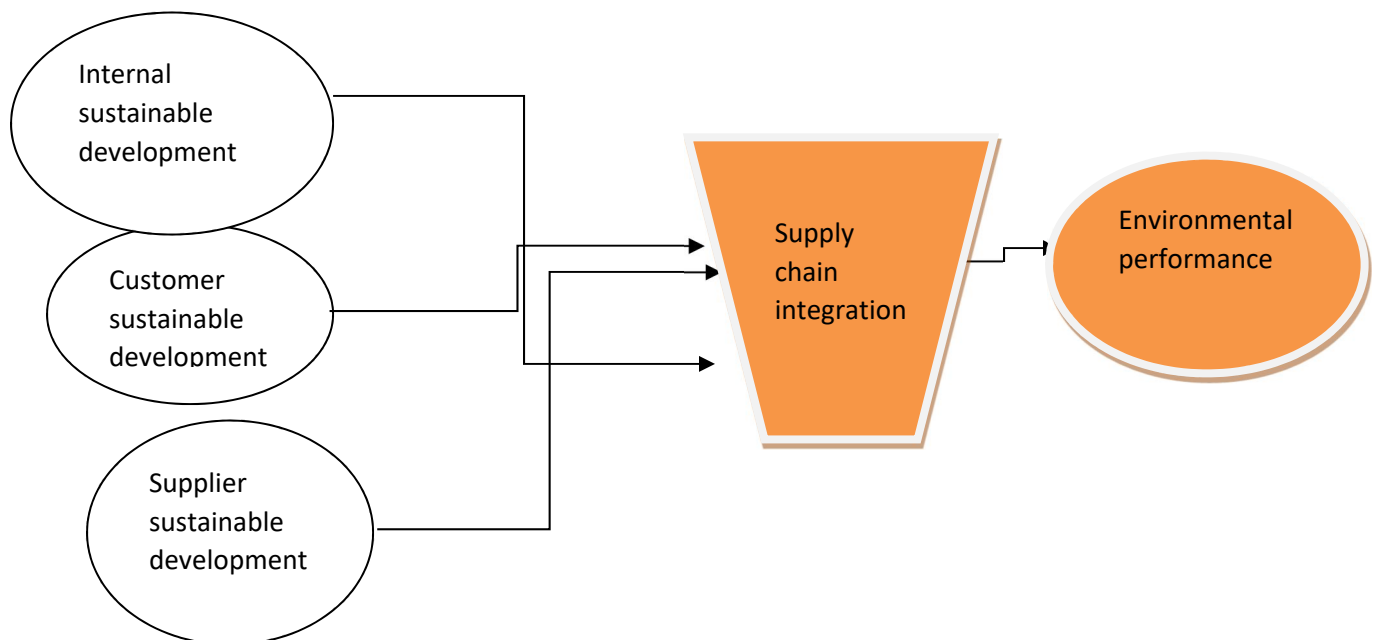
alignment within an organization such that internal sources (knowledge, beliefs, intentions, information etc.). This impact, upstream the internal resources implication for future use and for making up of a sustainable green environment, firmly driven by SCI. Thus, the following hypothesis is proposed:

**H4:** Supply chain integration has a significant mediating role between the relationship of internal sustainable development and Environmental performance.

### 2.5. Mediating role of Supply Chain Integration between Customer sustainable development and environmental performance

Studies by [9] suggest the developmental role of SCI between the CSD and EP. Customer resources are considered as external resources that can be orchestrated by multiple firms which will predominantly, address the environmental issues and problems. These environmental issues can only be solved with the help of SCI, to produce a positive impact on environmental performance. Customer resources [23] include promotion, checking the product quality, integrating the services of firm and

**Model:**



**Figure 2:** Model

increasing the demand of goods. CSD also integrates environmental goals that clearly depends upon social, economic and environment perspectives in order to promote the affectivity of SCI between CSD and Ep. Thus, the following hypothesis is proposed:

**H5:** SCI has a significant mediating role between the relationship of CSD and Environmental Performance.

### 2.6. Mediating Role of Supply Chain integration between supplier sustainable development and environmental performance

SCI plays a vital role between the development and performance of SSD and EP according to theoretical evidences [11] related to RO theory that first of all integrates supplier external resources with the supplier performance and information exchange between SSD and EP. Supplier resources generally create a platform for the development of economical strategies which is integrated by supply chain management [24] to promote the capabilities of environment along with its performance. Thus, the following hypothesis is proposed:

**H6:** SCI has a significant mediating role between the relationship of SSD and Environmental performance

### 3. Research Methodology

#### 3.1. Population and Sample Selection

This research study has been conducted in order to observe the impact of sustainability development goals in environmental performance, in mediating role of supply chain integration. Manufacturing sector of Thailand has been selected as a population of the study. Sample of this study consist of electronic, automotive and food manufacturing industries, because supply chain of these industries are fully developed and documented. Further, these industries are top rated manufacturing industries and have clear mandate about the supply chain implementation. Respondents which have been selected must have the knowledge about the environment management and about SSCD and they have to solve the questionnaire according to the perspective of environment management activities, firm's capabilities and supply chain performance. The sample has been selected, composed of automotive (54%), electronic (30%) and food industries (16%). Sample size has been selected on the bases of Klein (2015) idea which illustrate that figure obtained through formula number of questions\*10 accurately represent the sample size. 350 questionnaires have been distributed among the respondents, out of which 327 valid responses have been collected after deletion of the invalid responses.

#### 3.2 Data Collection methods

For the collection of primary and numeric data, data collection method has been used by researcher is questionnaire. Survey items have been used in questionnaire have to be in accordance with the aim of study. For this reason, survey instrument has been used as a starting point of questionnaire development. In questionnaire, researcher asked the questions about demographics, impact of sustainability development goal on environmental performance and asked about the mediating role of supply chain integration. Questionnaire first written in English language then converted into Thai language under back translation method. Content validity of scale has been confirmed by industrial practitioner. Techniques have been used for administering questionnaire include self-administered online and paper questionnaire for the convenience of respondent.

#### 3.3. Analysis of Reliability, Validity and Common Bias

For the assessment of reliability and validity, researcher have been used SPSS and AMOS respectively. Criterion such as Cronbach's  $\alpha$  should be higher than 0.70, as per [12] its values were strong at 0.75 or above 0.75, has been used by researcher of study in assessment of reliability through SPSS. As far as validity is concerned, both convergent validity and discriminant validity have been assessed through AMOS but criteria to examine that are different. Criteria for convergent validity includes (1) composite construct reliability and its threshold range is greater than 0.80, (2) items loading ( $\lambda$ ) which has to be higher than 0.70 and (3) average variance extracted, whose values has to be higher than 0.50 [23]. For the assessment of discriminant validity, criterion has been used states that square root of AVE must has to be greater than all other correlated constructs.

Every study has some novelty due to addition of explanatory variables. While using the previous measures, some modifications have to be required for ensuring the inexistence of bias of common method variance. As the common bias has been compounded when respondent used same measures for dependent and explanatory variables without observing the difference in nature of variables. Harman's single factor test has been used by researcher for minimizing the risk of common bias method. In this test researcher observed whether most of the constructs accounted for by single factor. If the 50% of variance accounted for by single factor, then common bias has been generated. Results report that 87% of variance interpreted by factor solution and only 20% of variance interpreted by one factor. Hence, inexistence of risk of common bias method has been ensured as the all the constructs accounted for by different factor.

#### 3.4. Hypothesis Testing

Significance of hypothesized relationships have great influenced in acceptance or rejection of hypotheses. If relationship between hypotheses is positive then hypotheses get accepted, on the other hand if the negative relationship has been observed between hypotheses then it gets rejected. Structure equation model which run on AMOS has been used by researcher for hypothesis testing. In this study, SEM

has been used for the testing of hypotheses such as impact of sustainability development goals on environment performance, in mediating role of supply chain integration. On the bases of direct, indirect and total effect and significance of relationship, researcher reports about the acceptance or rejection status of hypotheses.

### 3.5. Measures

ISD was measured with the scale developed by Christina Wong (2000), with the help of five items that were taken on a five-point Likert scale. Then CSD and SSD were assessed by the scale developed by the researcher [21] and here four items were taken on a five-point Likert scale and were assessed. SCI was measured by a scale developed by [22], four items were taken and measured on a five-point Likert scale. Finally, EP was measured by the scale developed by Elkington (1998) and five items were taken which were measured on a five-point Likert scale.

## 4. Empirical Findings:

Data was collected from 327 employees of manufacturing sector in Thailand for research purposes and was included in data analysis. Prerequisite data analysis is needed to check the authenticity, fitness, reliability and normality of data before moving to further analysis. This is done by using different measures. Initially, the demographics of the data are studied. According to demographics, data from 133 males and 194 females was collected, among which 23 employees' qualification was graduation, 164 were post graduated, 130 employees had completed masters and 10 employees had other qualifications. Talking about age, maximum i.e. 274 employees were of the age from 21 years to 30 years, 42 employees were 31-40 years old, 9 employees were 41-50 years old and 2 employees were of the age above 50 years.

### 4.1. Descriptive Statistics:

TABLE 1. Descriptive Statistics

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness Statistic	Std. Error
SCI	327	1.00	4.90	3.5303	1.10702	-.813	.135
ISD	327	1.00	5.00	3.4557	1.17163	-.630	.135
CSD	327	1.00	5.00	3.5333	1.10773	-.741	.135
SSD	327	1.00	5.00	3.5341	1.09030	-.799	.135
ENP	327	1.00	5.00	3.4414	1.12928	-.550	.135
Valid N (listwise)	327						

Data from Table 1 (descriptive statistics) shows that there is no outlier in the data as the minimum and maximum values are within the range of 5 points Likert scale. In addition to that, skewness values of data are between -1 and +1, which is the threshold range for normality assumption, so we can conclude the normality of data. From this description, we can

say that the collected data is completely normal and fit for entering into further analysis.

### 4.2. Rotated Component Matrix:

This is used to measure the factor loading of all the indicators involved in the data. Following are the values for factor loading of indicators of our data:

TABLE 2. Rotated Component Matrix<sup>a</sup>

	Component				
	1	2	3	4	5
SCI1	.703				
SCI2	.763				
SCI3	.823				
SCI4	.844				
SCI5	.835				
SCI6	.823				
SCI7	.825				
SCI8	.807				
SCI9	.838				

SCI10	.808								
ISD1						.762			
ISD2						.805			
ISD3						.818			
ISD4						.840			
ISD5						.824			
CSD1								.811	
CSD2								.822	
CSD3								.875	
CSD4								.814	
CSD5								.785	
SSD1			.774						
SSD2			.785						
SSD3			.797						
SSD4			.853						
SSD5			.808						
SSD6			.862						
ENP1		.817							
ENP2		.856							
ENP3		.893							
ENP4		.883							
ENP5		.898							
ENP6		.889							

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

From Table 2 (rotation component matrix), we can see that all the indicators have factor loading of more than 0.7, which depicts our collected data completely eligible for further hypothesis testing as the factor loading is within the threshold range and a suitable sequence. We can also observe that there is no problem of cross loading in the rotation

component matrix table, which depicts its qualification for further hypothesis testing.

#### 4.3. Convergent and discriminant validity:

This is used to measure the convergent and discriminant validity of the research variables of our data. The values and results of both validities is as follows:

**TABLE 3.** Convergent and discriminant validity

	CR	AVE	MSV	MaxR(H)	ENP	SCI	SSD	ISD	CSD
<b>ENP</b>	0.965	0.821	0.232	0.970	<b>0.906</b>				
<b>SCI</b>	0.967	0.746	0.300	0.984	0.482	<b>0.863</b>			
<b>SSD</b>	0.946	0.748	0.306	0.990	0.413	0.544	<b>0.865</b>		
<b>ISD</b>	0.953	0.801	0.361	0.991	0.337	0.548	0.553	<b>0.895</b>	
<b>CSD</b>	0.942	0.764	0.361	0.992	0.403	0.503	0.407	0.601	<b>0.874</b>

Table 3 (convergent and discriminant validity) shows that the composite reliability CR of all our variables is more than 70% and average variance extracted AVE is more than 50%. In addition to this, discriminant validity of our data depicts that loading of each variable is discriminated from one another.

Both these validities show the authenticity and reliability of our data for further analysis.

#### 4.4. Confirmatory Factor Analysis:

Confirmatory factor analysis is a measure, which is used to check the fitness of our hypothetical model of



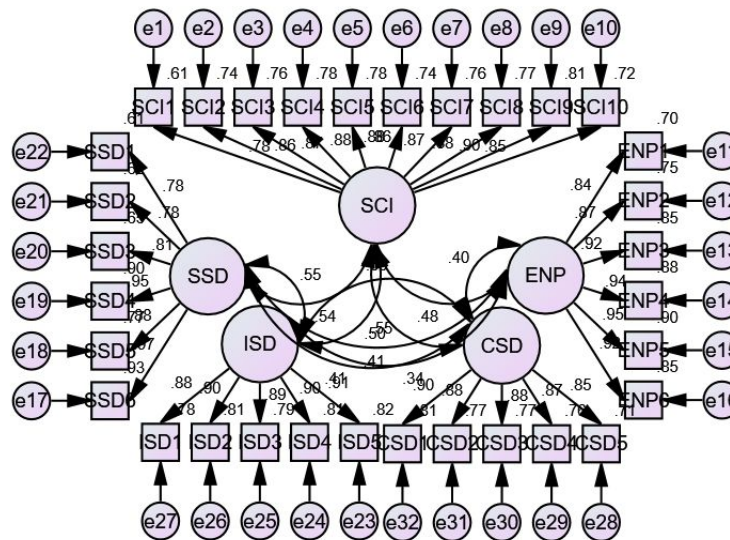
the research before structuring equation modeling. study:  
 Following are the values for each indicator for this

**TABLE 4.** Confirmatory Factor Analysis

Indicators	Threshold range	Current values
CMIN/DF	Less or equal 3	2.800
GFI	Equal or greater .80	.803
CFI	Equal or greater .90	.932
IFI	Equal or greater .90	.932
RMSEA	Less or equal .08	.074

Table 4 (Confirmatory factor analysis) shows that the current values of each indicator are within the threshold range. For example, the value of CMIN/DF is 2.8, which is less than 3, value of GFI is .803, which is greater then .80, CFI and IFI values are .923

each which are greater than .90 and finally the value of RMSEA is .074, which is less than .08. These within range values show that our hypothetical model is fit for further use. The following figure is screenshot of CFA:



**4.5. Structural Equation Modeling:**

Structural equation modeling, a multivariate regression analysis is used for the confirmation of the hypothesis made for research. This analysis gives

both direct and indirect regression tests at the same time. Following table shows the results of structural equation modeling:

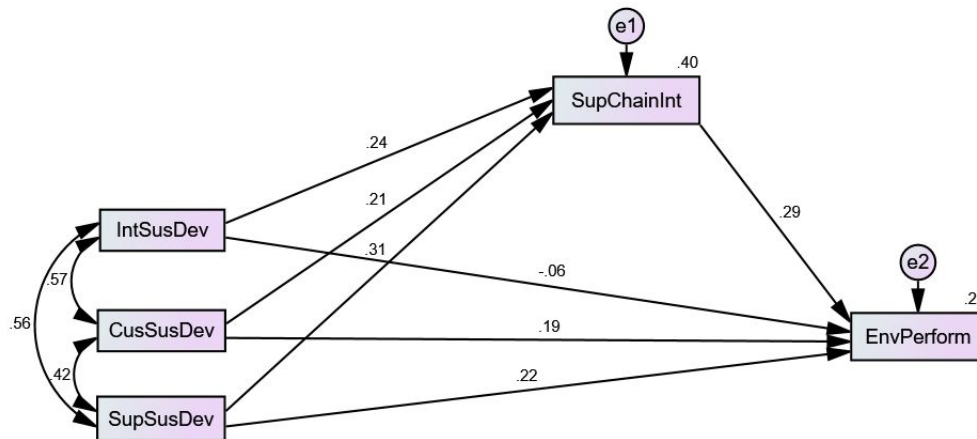
**TABLE 5.** Structural Equation Modeling

Total effect	SSD	CSD	ISD	SCI
SCI	.310***	.213***	.240***	.000
ENP	.316***	.250***	.008	.292**
Direct effect	SSD	CSD	ISD	SCI
SCI	.310***	.213***	.240	.000
ENP	.225***	.188**	-.062	.292**
Indirect effect	SSD	CSD	ISD	SCI

Total effect	SSD	CSD	ISD	SCI
SCI	.000	.000	.000	.000
ENP	.091*	.062*	.070*	.000

In table 5, the total effect portion shows that there is significant impact of internal sustainable development, customer sustainable development and supplier sustainable development on supply chain integration, which means that with one unit increase in SSD, SCI will increase 31%, with 1% increase in CSD, SCI will increase 21.3% and with 1% increase in ISD, SCI will increase by 24%. In the same way, impact of SSD and CSD is significant on environmental performance but ISD has insignificant impact on ENP. It also shows that supply chain integration has significant mediating role between

SSD, CSD and ISD, and ENP. In direct effect, the impact of SSD and CSD on ENP is significant, but impact of ISD on ENP is insignificant leading towards the rejection of this hypothesis. Indirect effect portion shows the significant mediating role of SCI on ENP, which means that ENP will increase by 9.1%, 6.2% and 7% with 1% increase in SSD, CSD and ISD respectively. So, the hypothesis of significant moderating role of SCI between SSD, CSD and ISD, and ENP will be accepted. Following is the screenshot of SEM:



## 5. Discussion and Conclusion

### 5.1. Discussion

The aim behind conducting this research was to analyze the impact of Internal Sustainable Development (ISD) on Environmental performance (EP), the impact of Customer Sustainable Development (CSD) on EP, impact of Supplier Sustainable Development (SSD) on EP. This study took Supply Chain Integration (SCI) as a mediator between ISD and EP, CSD and EP, SSD and EP. The study proposed the following hypothesis, the first hypothesis proposed was that, “ISD has a significant impact on EP”, this hypothesis is accepted, Greta Zeender concluded that ISD promotes internal system’s and economic growth without causing damage to natural environment and resources that positively impact EP [25]. The second hypothesis proposed was that, “CSD has a significant impact on

EP.” This hypothesis is accepted according to Greta Zeender as customer base development with minimum amount of resource depletion from the environment, enhances EP. The third hypothesis proposed was that, “SSD has a significant impact on EP”, this hypothesis is accepted as well, on the basis of the results of study conducted by E. Nordheim, SSD impacts positively on EP when SSD is enhanced keeping the benefits of environment in account [26]. The fourth hypothesis proposed was that, “SCI significantly mediates between ISD and EP”, this hypothesis is accepted, Eirik Nordheim stated that SCI integrates, aligns and coordinates all function of supply chain in which ISD is aligned in a way that no damage is caused to environment so EP is impacted positively. The fifth hypothesis proposed was that, “SCI significantly mediates between CSD and EP”. Antony Paul raj states that when customers are

controlled through shared management information system, CSD will be positively coordinated through SCI and it will impact EP positively [27]. The last hypothesis proposed was that, "SCI significantly mediates between SSD and EP". This hypothesis is accepted as well as Antony Paul raj stated that SCI coordinates the supplier base in a way that is beneficial for EP, thus impacts EP positively.

## 5.2. Conclusion

The study aimed to know about the impact of ISD on EP, the impact of SSD on EP, impact of CSD on EP, the study took SCI as a mediator between these. Study was conducted in Thailand's electronic, food and automotive manufacturing industries. Data was collected from almost 350 respondents, 327 responses were valid from each sector and then it was analyzed critically. The results showed that ISD, SSD, CSD positively impact EP and SCI plays a very coordinating and significant mediating role between ISD, SSD, CSD and EP.

## 5.3. Implications of the Study

The study highlights the importance of presence of a SCI system in any supply chain system in the manufacturing sector of not only Thailand but any country as this study shows that how SSD, ISD and CSD has can be positively implemented through SCI in order to improve the EP. SSD, ISD and CSD systems can be applied through SCI system in order to promote economic growth without causing any damage to the environment. Sustainable development systems should be included in the policies of manufacturing industries in order to promote healthy and sustainable growth that is better, both for the economy and the environment.

## 5.4. Limitations and Future Research Indications

This research was confined to only three of the manufacturing industries of Thailand, whereas, future researches can expand the industry types. This research can be conducted outside of Thailand as well in order to know and share a general perspective about the same variables. Moreover, supply chain management can be taken as a mediator between the same dependent and independent variables next time.

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