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STRUCTURAL EQUATION MODELING OF SUPPLY CHAIN MANAGEMENT, EMPLOYEE INVOLVEMENT, AND EMPLOYEE WORK PERFORMANCE IN THAILAND'S AUTO PARTS INDUSTRY

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***Keywords*:** supply chain management, employee involvement, employee work performance, Thailand's auto parts industry
Abstract: The objective of this research was to analyse the structural equation modelling (SEM) of supply chain management, employee involvement, and employee work performance in Thailand's auto parts industry. The sample group included 383 employees operating in the aforementioned industry using SEM processing by the AMOS program as the tool. From the research, the latent variable of supply chain management had a direct positive influence on the latency of employee involvement and employee work performance with statistical significance. Simultaneously, the latency of employee involvement had no direct positive influence on the latency of employee work performance. Therefore, the latency of supply chain management did not indirectly influence the latency of employee work performance through the latency of employee involvement.

1 Introduction

The automotive industry in Thailand is one of the national strategic industries that generate revenues for the country. Thailand has developed for more than 40 years from an assembler of auto parts to top automotive manufacturing and exports. However, huge disruptive forces to the auto parts supply chain, such as the rise of electric vehicles, causing many conventional parts will be useless. In particular, auto parts that are related with engine, gasoline tank and air intake and exhaust systems are affected. The development of a supply chain to support the disruption is needed urgently [1] in addition. Labour-intensive production is normally found in auto parts industry. These employees are skilled workers. Auto parts suppliers, therefore, need their collaboration, i.e., executing tasks following work standards and self-development to maintain more effective at work [2].

During 2017-2019, the auto parts industry of Thailand displayed a tendency to continually increase. In the fourth quarter of 2017, Thailand's export value of automobiles and auto parts amounted to USD 2,361.92 million, an increase of 12.35% (%YoY) compared with the same quarter of the previous year. In comparison in the fourth quarter of 2018, Thailand's export value of automobiles and auto parts amounted to USD 212.07 million, an increase of 32.88% (%YoY) compared with the same quarter of the previous [1].

Even though the automotive industry in the recent two-three years has increasingly grown, the world's economic fluctuation and other factors have affected the industry; for instance, the energy issue that is tending to change automotive manufacturing from fuel vehicles to electric vehicles has resulted in entrepreneurs in this industry dealing with the change. In particular, the auto parts groups that belong in the supply chain must adjust to the automotive manufacturers because the parts of the automotive system and related systems must be changed. In consequence, if not well-prepared for the supply chain of the automotive industry, this would probably affect the business operation and they might not be able to compete. As a result, this research attentively studied the supply chain of Thailand's auto parts industry in order to prepare for dealing with the oncoming changes as aforementioned. [3].

The current supply chain management is an essential issue of the business since it is the key to a sustainable business operation by depending on collaboration in organisations that differs from the past operation that focused on achieving their own goals [4]. Supply chain management is the core of business alliances from the beginning to the end. The organisations would collaborate in planning the strategy, share resources and benefits fairly. Then, when every unit in the supply chain operates efficiently, the competitive performance would increase and they would be able to survive through every business change. This is different from the stand-alone organisation, as they take one main role as buyer or seller focusing on obtaining quality products but at a low price [5,6]. This sometimes affects a short-period of collaboration and leads to a change of partners. Partnerships for the development of the product and working process, therefore, may take a long time, but the business preparation to manage the

change could be difficult. In other words, supply chain management is the key to emphasising the connection of collaboration among the stakeholders for effective performance in sharing information and benefits; for example, activity coordination that is related to procurement, production, and transportation. As the supply chain accelerates the speed of information, product, and investment flow while decreasing the working time and value in managing the inventory, the operational result of supply chain management would lead to advantages in the stability over rivals and reduce job repetition [7].

On the other hand, even if the concepts or systems are beneficial, the personnel of the organisation would be the driver and the motivator, which means every principle must be accepted or has employee involvement [8,9]. The people would see the benefits for themselves and the organisation when they follow the concepts; consequently, the operation would be effective. However, if the people disapprove or refuse to participate, the application would find some difficulty to be successful and the quality of jobs would not be as expected [9]. To conclude, employee involvement and the appropriate operating system of the organisation share critical roles in the success of the application or systems and quality of the work [10,11].

In compliance with the aforementioned, this has become the background of this study to find the relationship of supply chain management, employee involvement, and employee work performance in Thailand's auto parts industry and to analyse the structural equation modeling (SEM) of the three latent variables to describe how employee work performance would lead to an efficient operation.

1.1 Objectives

To study and analyse the SEM of supply chain management, employee involvement, and employee work performance in Thailand's auto parts industry.

1.2 Research scope

The scope of the study on the SEM of supply chain management, employee involvement, and employee work performance in Thailand's auto parts industry would comprise the concepts, theories, and related research as shown in Figure 1.

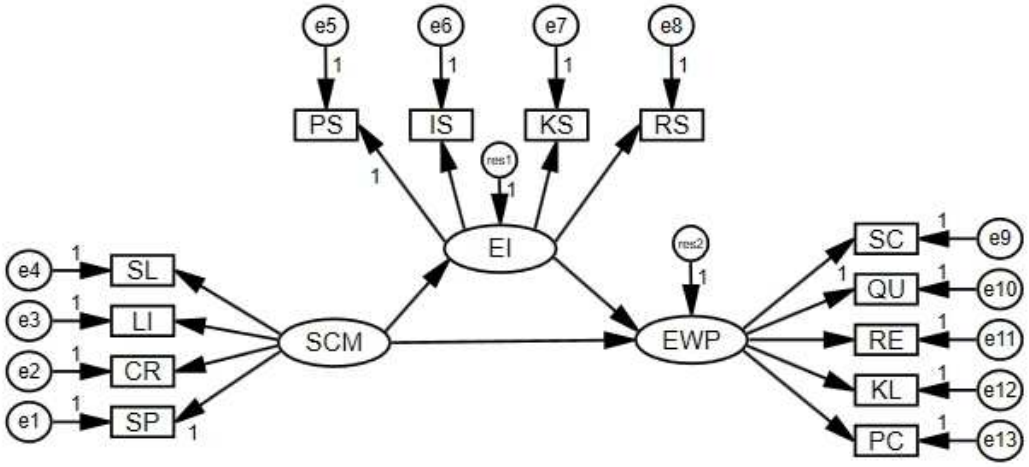

Figure 1 Scope of the research

Hypotheses:

Hypothesis 1: Supply chain management directly affects employee work performance.

Hypothesis 2: Supply chain management directly affects employee involvement.

Hypothesis 3: Employee involvement directly affects employee work performance.

Hypothesis 4: Supply chain management indirectly affects employee work performance and employee involvement.

1.3 Theories and literature review

The Situation of Thailand's Auto Parts Industry

Automotive manufacturing is a major industry that has increased the economic value to Thailand with the proportion of the domestic product value in the production industry being 10%, resulting in the direct employment of over 500,000 skilled human resources [2]. Furthermore, the country was placed as the top leading automotive manufacturer of ASEAN and ranked fifteenth in the world in 2011. Additionally, this has become an interesting regional manufacturing base of automobiles and auto parts. In 2017, Thailand's export value of automobiles and auto parts amounted to USD 2,361.92 million, an increase of 12.35% (%YoY) compared with the same quarter of the previous year. In terms of domestic investment, the country is regarded as the center of the global automotive manufacturers and as the top manufacturing base of pickup vehicles and motorcycles of the world. As for the exports of Thailand in 2020, the value of automobile exports was ranked the second top, second to jewelry and accessories,

with the export value amounting to THB 216,357.7 million approximately USD 7,091,37 million [1].

1.4 Concept of supply chain management

Supply chain means the business process that stresses the collaboration of partnership in product and service production and distribution. This starts from the origin upstream, raw materials to transport, inventory, delivery, and customers downstream with efficiency and effectiveness in the cost and delivery duration.

Supply chain management has also continuously evolved. The heart is to emphasise the product and service delivery to the customers with rapidity, accuracy, and appropriate cost. To succeed, supply chain management depends on the collaboration of all units from upstream to downstream. What connects these elements in the supply chain, which is regarded as the success factor, is good business relations. Thus, this results in reliability that guides the business alliance; therefore, the internal process goes smoothly; specifically supply chain management concerns the long-term operating result of a business that would produce benefits for all. Moreover, this would sustain the supply chain rather than focus on a short-term goal [12]. Supply chain management consists of 1. strategic supplier partnership, 2. level of information sharing, 3, customer relationship, and 4 service level. These are detailed as follows:

1.4.1 Strategic supplier partnership

Strategic supplier partnership is to make a plan in the *supply chain operations reference* (SCOR) model. This is the primary step to balance resources in the organisation as demanded. Planning, communication and connection, and strategic supplier partnership would make the objective of the operators, who are entrepreneurs and distributors, achieve the same goal. Moreover, these processes: return, source, make, and delivery; rules and regulations in business management; supply chain performance measurement; data collection; inventory level; transport; structural planning, and demand would become more efficient.

Table 1 Theories and literature review for supply chain management

Author (Year)	Four Criteria of Supply Chain Management			
	Strategic Supplier Partnership	Customer Relationship	Level of Information Sharing	Service Level
Sriprasert (2007) [25]	✓	✓	✓	✓
Ding et al., (2018) [24]	✓	✓	✓	✓
Zhu et al., (2018) [26]	✓	✓	✓	✓
Boiko et al., (2019) [23]	✓	✓	✓	✓
Gong et al., (2019) [5]	✓	✓	✓	✓
Hong et al., (2019) [4]	✓	✓	✓	✓
Jia et al., (2020) [6]	✓	✓	✓	✓

1. **Level of information sharing** is one of the SCOR model's steps relating to the procurement, delivery scheduling, receiving, inspection, product transportation, and payment approval for the raw material suppliers. Information sharing with partners would result in better process accuracy and to examine other details; such as, rules and regulations in terms of business, capacity evaluation of raw material suppliers, information confidentiality, management of inventory, assets, new products, raw material supplier connection, demands for imports and exports, and agreement of raw material suppliers.
2. **Service level** is one of the SCOR model's aspects relating to the production process (Make), which involves storage, made-to-order, and inventory management. The service level means to construct a measurement to respond to the customers' demand. This affects the production schedule, product design, production and testing, packaging, storage, and product approval for delivery; all are set by the customers. In addition, this includes the management of the factory's rules and regulations, productivity, information of production, work-in-process products, tools and facilities in transport, production network, and the consistency of the rules and regulations in production.
3. **Customer relationship** is one of the SCOR model's steps that is related to delivery and return. It includes product delivery in advance, made-to-order, customer's claiming management process, transport route management, vehicle selection: size selection, lowest cost, rules of receiving; for example, delivery capacity, information flow, inventory management, capital

assets, transport, product cycle, demand for imports and exports, product errors, or return problems. Customer relationship, therefore, takes an important role because it means to satisfy customers to operate the business.

1.4.2 Employee involvement

Employee involvement means the employees of the organisation obtain the authority to control their job under responsibility [11,13] and for the quality management system, employee engagement must be supported. Employees of every level participate in the decision-making depending on the scope of their work, and they can voice an opinion for the design or suggestion of the work they are responsible for [10,14]. The stimulation for employee engagement and the quality management system directly affect the increase of the organisation's performance [11]. job satisfaction, and organisation's satisfaction [15].

The past compression of employee involvement was to allow employees engage in the decision-making for the operation and their roles were reserved for the high levels. Later, this concept was broadened, and the definition included the employees of all levels to take part in setting the goal, solving problems, and giving information. The organisation must stimulate them to have this behavior by offering the opportunity for them to join in the activities. Employee involvement also benefits the development of the organisation and personnel [15,16]. as follows:

Benefits for the organisation's development:

1. To clarify the ambiguous issues because it means to brainstorm ideas from the related people.
2. As a pathway to brainstorm for creativity that could be adapted in the organisation's operation.
3. To prevent potential problems and conflicts that might occur.
4. The organisation would make a more all-inclusive plan due to the variety of attitudes toward the operation or systems thinking.

Benefits for employees' development:

1. To expand new knowledge of the executives by listening to experienced people.
2. To encourage collaboration between the executives and the employees. Sometimes, the executives might be the advisor or supporter. This would be regarded as exchanging experiences.
3. The employees perceive their existence, as they can engage with the issues operated by the organisation.
4. The employees have determination in their jobs because they engage in the decision-making process.

After the literature review of engagement support toward the application of a quality management system, it was found that employee involvement consisted of the following four aspects: 1. power-sharing, 2. information sharing, 3. knowledge sharing, and 4. reward sharing. The description of every aspect is as follows:

Table 2 Theories and literature review for employee involvement

Author (Year)	Four Criteria for Employee Involvement			
	Power Sharing	Information Sharing	Knowledge Sharing	Reward Sharing
Maciariello et al., (1989) [27]	✓	✓	✓	✓
Wilkinson et al., (1998) [28]	✓	✓	✓	✓
Sun et al., (2000) [13]	✓	✓	✓	✓
Taylor and Wright (2003) [15]	✓	✓	✓	✓
Kaynak (2003) [29]	✓	✓	✓	✓
Lin (2006) [30]	✓	✓	✓	✓
Maurer et al., (2008) [31]	✓	✓	✓	✓
Cheung and To (2010) [10]	✓	✓	✓	✓
Lee et al., (2016) [8]	✓	✓	✓	✓
Lei et al. (2018) [9]	✓	✓	✓	✓
Pitafi et al. (2018) [32]	✓	✓	✓	✓

1. **Power sharing** defines employee engagement in the decision-making for the organisation that influences the improvement of their performance and the improvement of organisational performance.
2. **Information sharing** refers to the access to essential information of the organisation for employees' performance development and unit development, including transferring the information to their teams and the authorised people to efficiently make a

decision; for example, data relating to their performance, competitive condition, and new ideas of technology that could develop their performance and the organisation's products and services.

3. **Knowledge Sharing** defines the employee involvement in skills development and knowledge enhancement; for instance, to present the topic they want to be trained or to open the chance for them to exchange knowledge with internal and external units for dimensional learning and flexibility because the organisation must depend on the diversity of the employees' skills.
4. **Reward Sharing** means that the employees receive rewards from their performance with appropriateness and fairness. The rewards include intrinsic rewards with a mental effect; for instance, rewards for the success of work and for praising, and extrinsic rewards as many forms of returns; such as, income, bonus, promotion, good welfare, and honest performance evaluation.

1.4.3 Employee work performance

Work performance with efficiency and effectiveness is what the organisation expects from all employees, specifically the effectiveness relating to better output or equivalent to the goal set by the organisation. If considering the capability of employees' performance in accordance with the objective, this would indicate how much the job description affects the result. The efficiency of work performance infers the activities that the employees participate in the transformation process. Additionally, input means resources used in the operation; namely, raw materials, machines, human resources, management process, and capital cost, to receive the output which could be a product or a service, for the highest benefit of the organisation. The evaluation of the employee's work performance is to review the relationship between performance and the organisation's output in comparison with its standard criteria or the working goal. This is a means to realise the working level of employees and to improve the working process that follows the policy of the organisation [17]. however, apart from the evaluation of employee's performance by regarding the efficiency, there are appraisals in other dimensions. According to the related studies, performance output means the result from the behavior of the employees in the organisation, which indicates the relationship between competency and personnel efficiency. The performance appraisal is to assess under the standard criteria for the personnel's efficient performance and the achievement of the organisation's goal. With regard to the authors, they have explained the related concepts of efficiency in performance into five aspects that are success, quality, responsibility, knowledge, and process.

Table 3 Theories and literature review for employee work performance

Author (Year)	Five Criteria of Employee Work Performance				
	Success	Quality	Responsibility	Knowledge	Process
Porter and Lawler (1985) [17]	✓	✓	✓	✓	✓
Steers (1977) [33]	✓	✓	✓	✓	✓
Tuomi et al., (2005) [34]	✓	✓	✓	✓	✓
Pitafi et al. (2018) [32]	✓	✓	✓	✓	✓
Sujatha and Krishnaveni (2018) [35]	✓	✓	✓	✓	✓
Kloutsiniotis and Mihail (2019) [36]	✓	✓	✓	✓	✓
Stollberger et al., (2019) [37]	✓	✓	✓	✓	✓
Peiró et al., (2020) [38]	✓	✓	✓	✓	✓

2 Methodology

2.1 Population and sample selection

The population in this research comprised employees from 227 factories in the auto parts industry of Thailand. Most worked in the Eastern Industrial Estate and Bangkok and the surrounding vicinity. The research selected the formula of to specify the number of the samples, which was 383 people, using non-probability sampling. [18]. The sample group was categorised by the location of the factories in each province (Table 4) using convenience sampling to collect data by using a questionnaire.

Table 4 Number of the sample population categorised by the location of the industrial estate

Area (Province)	Number (Company)	Number (Participants)
1. Bangkok	17	29
2. Pathum Thani	4	7
3. Samut Prakan	33	56
4. Chachoengsao	31	52
5. Chon Buri	128	215
6. Rayong	14	24
Total	227	383

Source: [2].

Variables

According to the literature review, the authors could summarise two independent variables: supply chain management and employee involvement, and one dependent variable: employee work performance. These could be regarded as latent variables and observed variables (Table 5).

Table 5 Variables for the initial model

Latent Variable	Observed Variable
Supply Chain Management (SCM)	Strategic supplier partnership (SP), customer relationship (CR), level of information sharing (LI), and service level (SL).
Employee Involvement (EI)	Power sharing (PS), information sharing (IS), knowledge sharing (KS), and reward sharing (RS).
Employee Work Performance (EWP)	Success (SC), quality (QU), responsibility (RE), knowledge (KL), and process (PC).

The methodology began by studying the basic data from the primary data source in order to design the research scope and create the initial model before collecting data from the sample group with the questionnaire. The questionnaire was divided into 4 parts, namely, general characteristics of the sample, Supply Chain Management (SCM), Employee Involvement (EI), and Employee Work Performance (EWP). An analysis was processed by these computer programs: SPSS and AMOS. The statistics applied in this research were descriptive statistics to describe the data and the characteristics of the key informants by the mean and percentage. The results were displayed in tables. As for the inferential statistics, SEM for testing the hypotheses was used and searched for the relationship from the model of supply chain management, employee involvement, and employee work performance of Thailand's auto parts industry. In the initial stage, the relationship model of the variables was planned and indicated the variable path based on the literature review before analysing the data from the survey following the initial model; and considering the statistics, if the model of the empirical data conformed to the model of the literature review or not (Hair et al., 2010).

The model fit was evaluated in order to examine the goodness of fit measures between the casual model of the literature review and the empirical model of the data survey. The results are shown in Table 6.

Table 6 Statistics recommended value for the model fit

Index (Goodness of Fit Measures)	Description	Recommended Value	References
p (χ^2) (CMIN)	Chi-square	ns. (p > .05)	[39]
χ^2-test statistics/df (CMIN/DF)	Relative Chi-square	≤ 3.00	[40]
GFI	Goodness of fit index	≥ .90	[40,41]
AGFI	Adjusted goodness of fit index	≥ 0.9	[40,42]
CFI	Comparative fit index	≥ 0.9	[42,43]
NFI	Normed fit index	≥ .90	[39,42,43]
RMSEA	Root mean square error of approximation	≤ 0.08	[40,44,45]

3 Analytical results

3.1 Analysis of the primary statistics of the sample's general characteristics

The results of the personal factor analysis of the sample group in this research, totaling 383 participants, could be divided in detail as follows: (1) Gender: There were more males than females or 55.1% and 44.9%, respectively. (2) Age: Participants aged 25-35 years were the main group or 34.7%, followed by under 25 years, 26-45 years, and over 45 years, or 31.1%, 19.8%, and 14.4%, respectively. (3) Education: Those who graduated with a bachelor's degree or equivalent were the main group (51.2%), followed by high school level and postgraduate degree or, 33.7% and 15.1%, respectively. (4) For working experience (only the duration at the current factory), it was found that most had one-five years' experience or 42.8%, followed by those with five-10 years' experience, less than one year, and over 10 years, or 27.4%, 19.3%, and 10.4%, respectively. (5) Monthly income: the majority of the sample group or 37.9% earned THB 20,001-30,000, followed by THB 15,000-20,000, THB 30,001-40,000, more than THB 40,000, and less than THB 15,000, or 26.9%, 18,0%, 15.7%, and 1.6% respectively. (6) Working unit: Most of the samples (18.8%) worked in the production division, followed by inventory/delivery, research and development, marketing/sales, purchasing/procurement, office, human resource, and accounting/financing, or 12.8%, 12.5%, 11.7%, 11.2%, 11.2%, and 10.4%, respectively (Table 7).

Table 7 Frequency and percentage of general characteristics of the sample group (n=383)

Details	Frequency	Percentage
Gender		
Male	211	55.1
Female	172	44.9
Age (Years)		
Under 25	119	31.1
25-35	133	34.7
36-45	76	19.8
Over 45	55	14.4
Education		
High school level	129	33.7
Bachelor degree or equivalent	196	51.2
Postgraduate degree	58	15.1
Working Experience (only the duration at the current factory) (Years)		
Less than one	74	19.3
One to five	164	42.8
From five to 10	105	27.4
More than 10	40	10.4
Monthly Income (Baht)		
Less than 15,000	6	1.6
15,000-20,000	103	26.9
20,001-30,000	145	37.9
30,001-40,000	69	18.0
More than THB 40,000	60	15.7
Working Unit		
Marketing/Sales	45	11.7
Accounting/Financing	40	10.4
Purchasing/Procurement	43	11.2
Office	43	11.2
Human Resource	43	11.2
Research and Development	48	12.5
Production	72	18.8
Inventory/Transport	49	12.8
Total	383	100.0

3.2 *Reliability analysis of the observed variables and bivariate correlation*

The reliability test of the questionnaire in this study used the Cronbach's Alpha method [19]. The result of 383 questionnaires showed the reliability at 0.96, which meant that the credibility of the questionnaire was at a very good level. As for the question analysis of the observed variables used to measure every latent variable, it was found that the result passed the recommended value because the corrected item-total correlation was 0.2-0.8 [20]. and the Cronbach's Alpha's value was over 0.7. In consequence, the data could be applied in the survey, and the result could be exerted in the next analysis.

The relationship analysis of the observed variables regarding multicollinearity found that the relationship value of every pair variable was 0.450-0.700, which was lower than 0.750 [21]. In conclusion, the variables used in the analysis had the relationship value not over the recommendation.

3.3 *The confirmation factor analysis of supply chain management*

Supply chain management as the latent variable from the literature review could measure four observed variables: (1) Strategic supplier partnership, (2) customer relationship, (3) level of information sharing, and (4) service level. From the confirmation factor analysis (CFA), there were four observed variables. In conclusion, the analytical result from the data of the sample group conformed to the literature review with significance. The results of the CFA as aforementioned are displayed in Figure 2.

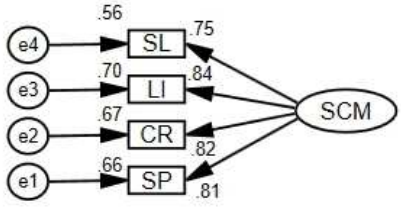

Figure 2 Confirmation factor analysis of supply chain management

The CFA of supply chain management found four observed variables that conformed to the literature review with Variable LI having the highest factor loading at 0.836, while Variable SL had the lowest factor loading at 0.749. The factor loading of all variables had the significance less than 0.001 (Table 8).

Table 8 Statistics showing the relationship consistency of the supply chain management model

Goodness of Fit Measures	Recommended Value	Structural Model (Result)
χ^2 -test statistics/df	≤ 3.00	2.081 (p=0.125)
GFI	≥0.90	.995
AGFI	≥0.90	.973
CFI	≥0.90	.997
NFI	≥0.90	.995
RMSEA	≤ 0.08	.053

To consider the overview of the CFA, it was found that the supply chain management model was p = 0.124 while the structural model (Result) passed the recommended value as shown in Table 8. To conclude, the supply chain management model conformed to the data of the literature review, and it could be used in the next SEM analysis.

3.4 *The confirmation factor analysis of employee involvement*

Employee involvement as a latent variable received from the literature review and applied in the research could measure four observed variables: (1) Power sharing, (2) information sharing, (3) knowledge sharing, and (4) reward sharing. According to the CFA of the survey data, the four observed variables were found. In conclusion, the CFA result conformed to the data of the literature review with significance. The result as aforementioned can be seen in Figure 3.

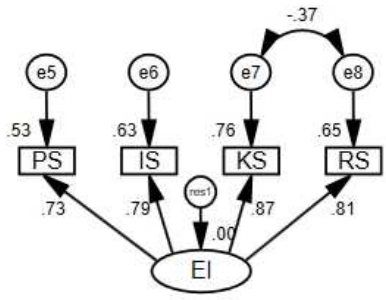

Figure 3 The confirmation factor analysis of employee involvement

According to the CFA of the latent variable, employee involvement, four observed variables were found, and they conformed to the literature review with Variable KS having the highest factor loading at 0.786, while Variable PS had the lowest factor loading at 0.769. The factor loadings of all variables had statistical significance less than 0.001 (Table 9).

Table 9 Statistics showing the relationship consistency of the employee involvement model

Goodness of Fit Measures	Recommended Value	Structural Model (Result)
χ^2 -test statistics/df	≤ 3.00	.716 (p=0.397)
GFI	≥0.90	.999
AGFI	≥0.90	.991
CFI	≥0.90	1.000
NFI	≥0.90	.999
RMSEA	≤ 0.08	.000

When considering the overall CFA result, it was found that employee involvement was p = 0.397, and the structural model (Result) passed the recommended value as shown in Table 9. It could be concluded that the SEM of employee involvement conformed to the literature review, and it could be applied to the next SEM analysis.

3.5 The confirmation factor analysis of employee work performance

Employee work performance as a latent variable received from the literature review and applied in the research could measure five observed variables: (1) Success, (2) quality, (3) responsibility, (4) knowledge, and (5) process. The result as aforementioned can be seen in Figure 4.

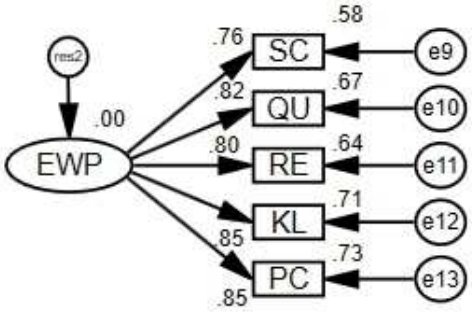

Figure 4 The confirmation factor analysis of employee work performance

Table 10 Statistics showing the relationship consistency of the employee work performance.

Goodness of Fit Measures	Recommended Value	Structural Model (Result)
χ^2 -test statistics/df	≤ 3.00	2.969 (p = 0.018)
GFI	≥0.90	.988
AGFI	≥0.90	.954
CFI	≥0.90	.993
NFI	≥0.90	.990
RMSEA	≤ 0.08	.072

According to the CFA of the latent variable, employee work performance, five observed variables were found, and they conformed to the literature review with Variable QU having the highest factor loading at 0.833, while Variable SC had the lowest factor loading at 0.778. The factor loadings of all variables had statistical significance less than 0.001 (Table 10).

When considering the overall CFA result, it was found that employee work performance was p = 0.018, and the structural model (Result) passed the recommended value (Table 10). It could be concluded that the SEM of employee work performance conformed to the literature review, and it could be applied in the next SEM analysis.

3.6 The structural equation modeling in the full model

The CFA confirmed the ability of the observed variables to be the measurement of the latent variables; in other words, the measurement model. The analysis could conclude the values of the observed variables as aforementioned, while the SEM in the full model was the analysis of the empirical data obtained from the survey. This inferred examining how much data conformed to the literature review. The approach started from the data analysis of the initial model designed by the research scope intending to consider if the statistics completely passed the recommended value or not. If it failed, the model must be improved until it passed. After that, the model obtained from the empirical data would be assessed to examine the consistency and the conformity to the literature review before concluding the SEM following the hypotheses of the research.

3.7 The structural equation modeling under the research scope (initial model)

The SEM regarding the initial model was the analysis of every variable obtained from the literature review and the empirical data according to the research scope. There were three variables: supply chain management, employee involvement, and employee work performance. A total of 13 variables were observed for each latent variable, which could be demonstrated through a linear relationship (Figure 5). In regard to the SEM to find the statistics for testing the initial model under the research scope, it was

found that most values obtained from the SEM analysis of the initial model were unable to pass the recommended values (Table 11). Only CFI, NFI, and RMSEA passed the statistical criteria with modest scores; however, other statistics could not pass. In consequence, the result that the empirical data conformed to the model of the literature review was unable to be concluded. In addition, the values in Figure 5 could not describe the relationship between the variables. As a result, the model had to be improved until it passed the criteria before the discussion of the influence or the relationship of the variables [22].

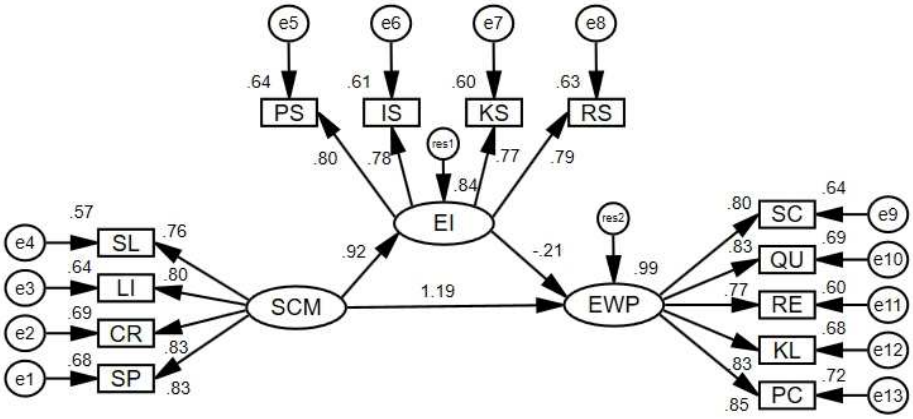

Figure 5 The structural equation modeling analysis under the research scope (initial model)

Table 11 Statistical evaluation of the structural equation modeling under the research scope (initial model)

Goodness of Fit Measures	Recommended Value	Structural Model (Result)
χ^2 -test statistics/df	≤ 3.00	3.366 (p=0.000)
GFI	≥0.90	.923
AGFI	≥0.90	.886
CFI	≥0.90	.962
NFI	≥0.90	.946
RMSEA	≤ 0.08	.079

3.8 The structural equation modeling after improvement (fit model)

The improvement of the structural model from the initial model had been proceeded by data reduction. In other words, the pair of variables that shared the high relationship value and caused the model to be unacceptable were considered. However, data reduction was indispensable to be utilised [22]. The model improvement until passing the recommended values is shown in Figure 6 and Tables 12 and 13, respectively.

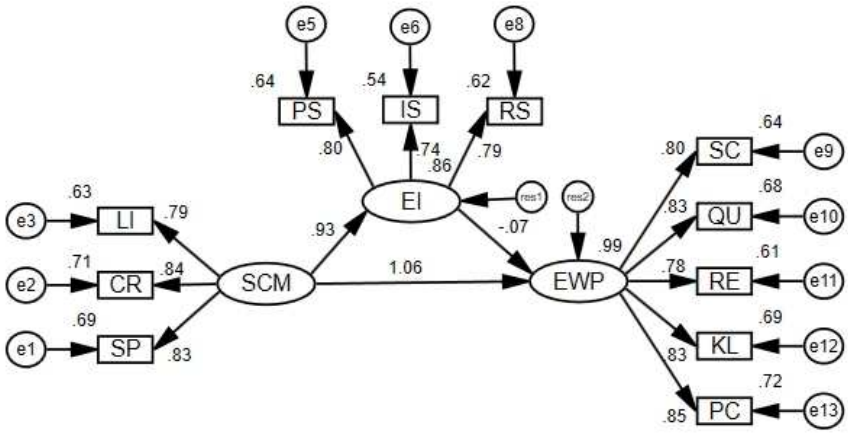

Figure 6 The structural equation modeling after improvement (fit model)

Table 12 The statistical evaluation of the structural equation modeling after improvement (fit model)

Goodness of Fit Measures	Recommended Value	Structural Model (Result)
χ^2 -test statistics/df	≤ 3.00	2.546 (p=0.000)
GFI	≥0.90	.953
AGFI	≥0.90	.924
CFI	≥0.90	.980
NFI	≥0.90	.967
RMSEA	≤ 0.08	.064

Table 13 The structural equation modeling result after improvement (fit model)

Variable	Estimate		Standard Error	Critical Ratio	P
	Influence Coefficient	Standardised Influence Coefficient			
EL <--- SCM	.882	.927	.054	16.251	***
EWP <--- EL	-.073	-.074	.159	-.458	.647
EWP <--- SCM	.997	1.062	.159	6.255	***
SP <--- SCM	1.000	.829			
CR <---SCM	1.003	.844	.049	20.351	***
LI <--- SCM	.841	.791	.046	18.414	***
PS <--- EI	1.000	.800			***
RS <--- EI	.993	.787	.060	16.476	***
QU <--- EWP	1.000	.826			***
RE <--- EWM	.891	.779	.050	17.884	
KL <--- EWP	1.012	.829	.052	19.625	***
PC <--- EWP	1.040	.847	.051	20.311	***
SC <--- EWP	.938	.800	.050	18.597	***
IS <--- EI	.890	.737	.059	15.211	***
$R^2_{EI} = 0.86$, $R^2_{EWP} = 0.99$					

*** Having statistical significance less than 0.001.

From Table 12, according to the consistency validation of the developed models from the literature review and the empirical data, the models passed the recommended values as Chi-Square = 2.546, P = 0.000, GFI = 0.953, AGFI = 0.924, CFI = 0.980, NFI = 0.967, and RMSEA = 0.064. Therefore, it could be concluded that the model obtained from the empirical data conformed to the data of the literature review. The results of the relationship and influence of variables are shown in Table 13 and Figure 6.

Supply Chain Management had three observed variables for measurement: (1) Strategic supplier partnership, (2) customer relationship, and (3) level of information sharing. Their factor loadings were .829, .844, and .791, respectively. According to the study, supply chain management had a positive direct influence on employee involvement with statistical significance with a standardised influence coefficient at .927 and P-value less than 0.001.

Employee Involvement had three observed variables for measurement: (1) Power sharing, (2) information sharing, and (3) reward sharing. Their factor loadings were .800, .737, and .787, respectively. According to the study, employee involvement had no direct influence on employee work performance with statistical significance.

Employee Work Performance had five observed variables for measurement: (1) Success, (2) quality, (3) responsibility, (4) knowledge, and (5) process. Their factor loadings were .800, .826, .779, .829, and .847, respectively.

4 Result of the hypothesis testing

From Table 14, it could be seen that the testing of the hypotheses showed that the study results conformed to two hypotheses.

Table 14 Research hypotheses and result

Research Hypothesis	Result
H_1 Supply chain management directly affects employee work performance.	Direct influence with significance.
H_2 Supply chain management directly affects employee involvement.	Direct influence with significance.
H_3 Employee involvement directly affects employee work performance.	No direct influence with significance.

Research Hypothesis	Result
H_4 Supply chain management indirectly affects employee work performance through employee involvement.	No indirect influence with significance.

4.1 Discussion

According to the supply chain management by the improved SEM analysis, supply chain management as a latent variable had a positive direct influence on employee involvement and employee work performance with statistical significance, while employee involvement had no positive direct influence on employee work performance. In consequence, supply chain management did not indirectly affect employee work performance through employee involvement. It could be interpreted that supply chain management significantly stimulated employee involvement in the organisation to perform any activity with efficiency. Likewise, supply chain management was the key to the organisational operation that directly influenced employee work performance in Thailand's auto parts industry. Nowadays, industrial operations depend on each other rather than stand alone, particularly in the auto parts industry in which the products must be assembled, and the field needs the diversity of knowledge. The collaboration with efficiency in the supply chain that consists of stakeholders from several groups, for instance, suppliers, customers, or internal units, would stimulate the employees to exchange knowledge and understand the problems. Furthermore, this would reduce the use of predictive information because data sharing would make them realise the strengths and weaknesses of the allies in the supply chain. Thus, they could plan to prepare for the incoming problems in advance, and the performance of the employee would be improved. In regard to the study results, this could be discussed following the variables in the SEM as follows:

Strategic supplier partnership is a part of the operation and policy planning to make the objective of the project lead to the same direction. This would result in data exchange in terms of theory, skills, knowledge, and new techniques to develop the organisation and the supplier's competency; this would also increase the competitivity in the market and work success with quality due to the collaboration of the operation and strategic planning. The reason why strategic supplier partnership would elevate the employee's performance is the employees would have unambiguous appropriate guidelines for their jobs. When other partner units in the supply chain have a comprehensible appropriate strategy that conforms to the other organisation in the same chain, the employees would cooperate with efficiency and reliability to each other, as well as use resources together. Furthermore, strategic supplier partnership with the product and service manufacturers for the organisation would correctly respond to the demands and reduce errors; for example, the product does not respond to the demands or the market. If the organisation has a strategic supplier partnership to guide their working process that corresponds with each other, each party would look for the co-market to sell a chain of products and services. In other words, they would have the same direction. If the organisation could sell products, the suppliers could do it, too because the products would be purchased from the supplier to produce the products and services. This would result in an exchange of knowledge and skills that would support the stable growth of the organisation and the supplier. As a consequence, this would lead to long-term collaboration [5,6,23,24].

Customer relationship is an important stage in the service process. The building of customer relationship in accordance with the supply chain management starts from the design of the products and services to the customers' demand, the production, purchasing and delivery to the customers, times and volume of the transport, product imports or exports, product errors or problems of return management or reverse logistics, and planning of the future product and service demand tendency. Customer relationship has a major role because it builds satisfaction to customers. Consequently, the operation that could manage a good relationship with the customers would affect the goal achievement without doing a forecast analysis or prediction of the customers' demands. Therefore, there would be no information confidentiality or informing for the negation, no over-demanded supplied products, and a decrease in errors with efficiency. This would be because the customers do not specifically mean the final consumers, but every unit in the supply chain or every related division. This would also involve the next unit or the closer unit, who could be customers to each other, from both internal or external units. Therefore, to send a job to the next unit would require quality inspection and to accept the return of the products or pieces if they did not match the conditions. This would be to inform the error incident, and the waste in the process would be reduced because every employee would have checked the quality by themselves before sending the product. In addition, managing a good relationship benefits the employee work performance; for instance, the communication or job transfer would become more efficient, have work performance enhancement, good comprehension of the present and future customers, work better or be able to satisfy the customers. In terms of the benefit to the organisation, the costs could be reduced due to the decrease of errors; as a result, the organisation could retain a good long-term relationship with customers, which would lead to good collaboration and profit in the future operation [4,5,23,25,26].

Level of information sharing with the business partners is related to every division; for instance,

purchasing, procurement, raw material transport, delivery scheduling, receiving, inspection, product transfer, and payment approval to the raw material suppliers. Information sharing would increase the accuracy of the operating process and examine the consistency of the related issues. As a result, information sharing with customers is important to the operation of the employee from purchasing and procurement, product monitoring, and delivery because if the employees acknowledge information; for example, the demand, production status, inventory volumes, and future production and operating plan, their work performance would be more efficient and they could coordinate with other units in the same chain well. Furthermore, if sharing information about good management and the operation method, the employees in other units of the supply chain could possibly apply to develop this as their own. In the industry, large automotive manufacturers organise the project to send their personnel to help develop or to be trained with the suppliers' employees. This idea is if the supplier has the quality, they would produce quality products for the company. Moreover, the company would help the supplier to develop the products per its demand. Additionally, information sharing of feedback would be very indispensable in the development of products and services to respond to the demand of the trading partners because they could realise the errors of the products and services rapidly, whether it be the product or service quality, or transport quality under the standardised time scope, this would affect the development of employee work performance and the organisation's stable growth [4,6,24,25].

Nevertheless, regarding the consideration of the SEM after improving the observed variables, service level could not be summarised with statistical significance that it influenced employee work performance. The reason was the service level was the rules or the basic regulations of the co-business. This would be regarded as the practice that all employees of the organisation must follow, and the practice scale must be at the same standard. If each unit in the supply chain regulated a stricter service level, it would be nearly impossible to build a good relationship for the collaboration. Similarly, making supply chain management possible would also be difficult, too. However, if the service level is excessively relaxed, the errors would increase and this would cause more waste or mistakes in the process. For that reason, a suitable service level would mainly affect the success of the supply chain management, and the rules would have to be clear, which every employee would have to respect and follow. In this topic, the service level was unable to demonstrate that it could directly influence employee work performance.

5 Recommendations

This research studied the SEM of supply chain management, employee involvement, and employee work performance in Thailand's auto parts industry. The author presented the results by applying general data analysis, CFA, and SEM. Therefore, the results could be described only under the scope of the research. In conducting future research, qualitative data analysis could be added by collecting in-depth data from an interview or other approaches, where the result might be more detailed. Alternatively, other variables that could affect the automotive and auto parts industries could be further added; for example, a lean production system that could reduce the waste process resulting in a higher efficient working process, and quality of working lift would be the system that could create a balance between the work and private life of the employee for better efficiency, thus resulting in good physical and mental work performance.

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