Asian Journal of Logistics and Intermodal Transport Management 1 (1) (2025) 29–40

Asian Journal of Logistics and Intermodal Transport Management

ISSN: 3088-2923 (online) journal homepage: https://ajlitm.com



Research Article

Logistics and Supply Chain Management Affecting Operational Performance and Responding to Customer Needs: A Case Study of an Electronic Components Manufacturing Plant in the China Zone of Amata City Industrial Estate, Rayong

Natthapon Waewpanyasil[a], Chonlatis Darawong[a] and Ramida Wongvedvanij[a,*]

[a]*Graduate College of Management, Sripatum University, Khlong Tamru, Chonburi 20000, Thailand*

ARTICLE INFO

Keywords:
Logistics
Supply Chain Management
Operational Performance
Responding to Customer Needs
Electronic
China zone of Amata City Industrial Estate, Rayong

ABSTRACT

This research aimed to 1) study the relationship between general information, operational performance, and customer demand responsiveness in an electronic component manufacturing factory located in the Chinese zone of Amata City Industrial Estate, Rayong Province, and 2) study analyze the logistics and supply chain management factors that affect operational performance and customer demand responsiveness in an electronic component manufacturing factory located in the Chinese zone of Amata City Industrial Estate, Rayong Province. The sample group consisted of 400 employees from an electronic parts manufacturing factory in the Chinese zone of Amata City, Rayong, selected using a convenience sampling method. The statistics used for data analysis were descriptive statistics, including mean and standard deviation, and inferential statistics, including t-tests, one-way ANOVA, and multiple regression analysis.

The research findings were as follows: 1) Employees at an electronic parts manufacturing factory in the Chinese zone of Amata City, Rayong, with different personal factors in terms of gender, age, length of service, and income, had different levels of Operational Performance and Responding to Customer Needs. 2) The logistics and supply chain management factors that influenced the level of Operational Performance were: personnel development, inventory management, supply chain coordination, technology and information usage, and transportation route planning. 3) The logistics and supply chain management factors that influenced the level of Responding to Customer Needs were: technology and information usage, personnel development, inventory management, sustainability and environment, supply chain risk management, and transportation route planning.

Received: 14 December 2025; Received in revised form: 23 December 2025; Accepted: 25 December 2025
Published: 31 December 2025
DOI:10.66149/ajlitm.2025.01.04
*Corresponding author
ramidarx@gmail.com (R. Wongvedvanij)
This is an open access article under the Creative Commons Attribution – NonCommercial – NoDerivatives 4.0 license.
© 2025 Asian Journal of Logistics and Intermodal Transport Management – Published by Burapha University.

1. Introduction

In an era of intense business competition, Logistics and Supply Chain Management (SCM) has become a crucial factor in determining an organization's competitive advantage in terms of cost, speed, accuracy, and flexibility. Delayed transportation, inefficient inventory management, and a lack of coordination among supply chain partners all directly impact service quality, customer satisfaction, and overall operational performance.

For Thailand, the logistics industry is a vital mechanism supporting economic growth, especially within the Eastern Economic Corridor (EEC), a strategic area concentrating high-technology industries such as electric vehicles (EV), smart electronics, and aviation. The Office of Industrial Economics [1] reported that the investment value in the EEC's logistics sector grew at an average of 6.2% per year between 2021 and 2024, particularly in the electronics industry, which saw production and export expansion exceeding 8.5% per year. However, this expansion is accompanied by increasingly complex logistics management challenges, such as the transportation of raw materials from abroad, demand volatility, and cross-regional coordination with suppliers.

Key Systemic Problems

1. High Logistics Cost: Thailand's logistics cost reached 2,527.4 billion Baht, or 14.1% of the GDP (Office of the National Economic and Social Development Council, 2023), which is higher than the average of developed countries (around 8-10%). This is due to long transportation distances, partially inadequate infrastructure, sub-optimal route usage, and underutilized transportation capacity, leading to higher operational costs for factories, increased product prices, and reduced competitiveness for operators.

2. Delays and Inefficiency: This problem is common in the electronics industry, especially for factories dependent on foreign components. Factors causing delays include traffic congestion, a lack of real-time shipment tracking systems, and transportation schedules that do not align with production capacity. This results in increased expediting costs and customer dissatisfaction [2].

3. Inventory Management Issues: Many factories lack real-time demand analysis systems, leading to problems with Stock-out or Overstock due to inaccurate forecasting or the absence of automated stock monitoring [3]. This problem causes high inventory costs, trapped capital, and increases the risk of product expiration or quality degradation, directly affecting the ability to meet customer demands.

4. Lack of Smart Technology Adoption: Although the government promotes the transition of the industrial sector toward a Smart Industry system, many organizations in the EEC still lack the use of Big Data, AI, or ERP systems for accurate trend forecasting and shipment planning. They also suffer from a lack of personnel skilled in data analysis, impacting production planning.

The issues mentioned above reflect that the efficiency of the logistics and supply chain system in the electronics industry can be significantly improved, particularly in terms of cost reduction, improving transportation speed and accuracy, and enhancing customer satisfaction. Research on logistics and supply chain management affecting operational performance and Responding to Customer Needs has been conducted in various contexts, including: labor in the industrial and service sectors in Mae Sot District, Tak Province [4]; businesses in Chonburi Province [5]; businesses in Nakhon Ratchasima Province [6]; delivery logistics providers in Suphanburi Province [7]; and businesses in Chiang Rai Province [8].

However, no specific study has been found on the Factors Affecting the Efficiency of Logistics and Supply Chain Management in Electronics Component Manufacturing Plants in the EEC, specifically in the Chinese Zone of Amata City Industrial Estate, Rayong Province, an area with high potential and a critical manufacturing base for the Thai electronics industry. Therefore, the objective of this research is to study the logistics and supply chain management that affects operational performance and Responding to Customer Needs : A Case Study of an Electronics Component Manufacturing Plant in the Chinese Zone of Amata City Industrial Estate, Rayong.

This study will reference the theoretical framework of the SCOR Model (Supply Chain Operations Reference), which focuses on assessing supply chain performance across five key dimensions: Plan, Source, Make, Deliver, and Return. It will also incorporate the concept of Lean Logistics, which aims to minimize waste in logistics processes, and the concept of Supply Chain Integration (SCI), which emphasizes the linking of information, communication, and collaboration between internal departments and external partners to achieve maximum supply chain efficiency.

The expected results will help factories in Amata City Industrial Estate implement the derived guidelines to improve logistics processes, enhance Operational Performance, reduce costs, and elevate Responding to Customer Needs in the era of Industry 4.0.

2. Literature review

2.1. Theories of Logistics and Supply Chain Management

Logistics and Supply Chain Management (SCM) is a discipline that focuses on managing the flow of goods, services, information, and finance from the point of origin to the point of consumption. Key theories and concepts are utilized to explain and enhance the system's efficiency, as follows:

1. Basic Concept of Logistics Management: Emphasizes the planning, controlling, and managing of the movement and storage of goods and information to effectively meet customer needs [9].

2. Supply Chain Concept: Views the supply chain as a network of interconnected organizations, stressing the importance of integration and the flow of goods, information, and finance to create value for customers and all parties in the chain [10].

3. Transaction Cost Theory (TCT): Explains the decision to make (in-house) or buy (outsource) by considering the cost and risk of transactions. It is frequently used to explain the choice of logistics service providers [11].

4. Resource-Based View (RBV) Theory: Sees logistics capabilities, such as information technology or relationships with trading partners, as strategic resources that create sustainable competitive advantage [12].

5. Network Theory: SCM is a network involving multiple parties. Analyzing the structure and relationships is crucial for fostering collaboration and efficiency [13].

6. SCOR Model (Supply Chain Operations Reference Model): A standard framework that divides the SCM process into Plan Source Make Deliver Return Enable for performance measurement and operational improvement [14].

7. Supply Chain Integration Concept: Integration, both within the organization and with trading partners, helps improve quality, reduce costs, and enhance customer satisfaction [15].

2.2. Operational Outcomes

1. Reduction in Delivery Lead Time (Shorter Delivery Time Compared to the Previous Year): In concept [16] and Just-in-Time (JIT), reducing the delivery lead time indicates the organization's ability to respond to customer demand more quickly, serving as a Time-based Performance metric. Research by Beamon [17] identifies delivery speed as one of the primary criteria for measuring supply chain performance.

2. Reduction in Logistics Cost per: Unit Transaction Cost Economics [18] suggests that organizations effectively managing logistics processes can reduce their cost per unit. Gunasekaran et al. [19] classify logistics cost within the Cost Performance metrics of the supply chain. Reducing cost per unit also reflects Economies of Scale and Lean Management.

3. Customer Satisfaction with Delivery Speed: Based on the SERVQUAL Model [20], the speed and punctuality of delivery are critical factors in the Responsiveness dimension that affect customer satisfaction. In the context of the Balanced Scorecard, this falls under the Customer Perspective, which measures the achievement of value for the customer.

4. Improvement in Delivery Accuracy: According to Total Quality Management (TQM) and Six Sigma, delivery accuracy and precision are Quality Performance metrics that help reduce loss and increase reliability. Accuracy and reliability are listed as one of the main factors in assessing supply chain performance.

3. Model development

The model development in this research is a process of structuring concepts, variables, and causal relationships to be investigated, based on logistics and supply chain management (SCM) theories and operational performance variables. This development aligns with the context of an electronics parts manufacturing plant in the Chinese zone of Amata City Industrial Estate, Rayong Province. The model development process consists of four steps as follows:

3.1. Conceptual Variables Identifying

Based on a review of SCM theories, the SCOR Model, Lean Logistics, and Supply Chain Integration, as well as relevant research, the researcher defined the Independent Variables and Dependent Variables as follows: Independent Variables Logistics & SCM Factors (8 Dimensions)

1. Transportation Route Planning is the strategic process of determining the most efficient path or sequence of stops for transportation or delivery vehicles

2. Inventory Management is the organized process of overseeing and controlling a company's stock of goods, materials, and components.

3. Application of Technology and Information is the strategic use of digital tools, hardware, and data processing methods to enhance visibility, improve efficiency, and optimize decision-making across the entire supply chain network.

4. Supply Chain Coordination is the strategic and tactical effort to integrate and synchronize the activities, processes, and information flow among all the independent entities (suppliers, manufacturers, distributors, retailers, and customers) involved in the creation and delivery of a product or service.

5. Logistics Cost Management is the organized process of measuring, controlling, and minimizing all expenses associated with the movement, storage, and handling of goods and information from the point of origin to the point of consumption.

6. Sustainability and Environment is the integration of environmental stewardship and long-term viability into all supply chain activities.

7. Personnel Development is the strategic and continuous process of improving the knowledge, skills, competencies, and overall capabilities of the workforce to meet current and future organizational and supply chain needs.

8. Supply Chain Risk Management is the systematic process of identifying, assessing, mitigating, and monitoring potential threats and vulnerabilities that could disrupt the flow of materials, information, and financial resources throughout the supply chain.

Dependent Variables

1. Operational Performance is a key business metric that measures how effectively a company utilizes its resources (capital, labor, materials, time, and technology) to produce goods or services relative to the output achieved.

2. Responding to Customer Needs is the ability of a supply chain or organization to quickly and effectively meet the changing needs and expectations of its customers.

All eight dimensions are clear components found in SCM theory and are consistent with both international and domestic research, such as Christopher [9], Mentzer et al. [10], Flynn et al. [15], and others.

3.2. Population and Sample Size

Population: The population consists of employees at an electronics component manufacturing factory located in the Chinese Zone of Amata City Industrial Estate, Rayong Province. The total number of employees is approximately 3,000.

Sampling Method: A Convenience Sample method was used for sample selection.

Sample Size Calculation: The researcher calculated the sample size (n) using the formula for a known population size from Yamane [21], setting the margin of error (e) at 0.05. The calculated sample size was 352 people. The researcher then increased the sample size to 400 people.

Inclusion Criteria

1. Is a permanent employee of the electronics components manufacturing factory in the Chinese Zone of Amata City Industrial Estate, Rayong Province.

2. Is 18 years of age or older.

3. Has been working at the factory for not less than 6 months (to ensure sufficient experience in the working environment).

4. Can read and write Thai at a level sufficient to understand the questionnaire.

5. Voluntarily consents to participate in the research after receiving an explanation of the study's objectives.

Exclusion Criteria

1. Employees who are in the probationary period or on long-term leave during the data collection period.

2. Employees with severe health problems or conditions that may affect their ability to respond to the questionnaire (e.g.severe stress, chronic illness that prevents normal work).

3. Employees who do not provide consent or who do not return a complete questionnaire.

4. Employees who are not directly in the production line or office of the said factory (e.g., external employees/outsourcing staff).

3.3. Research Instruments and Instrument Quality

The researcher selected a questionnaire as the main instrument for data collection, which is consistent and appropriate for this study. The questionnaire was developed based on a review of theoretical documents and relevant research findings, ensuring it covered the content and objectives of the study. It consists of the following sections:

Part 1: Respondent Information: This section includes demographic data such as gender, age, job position, and duration of employment.

Part 2: Logistics and Supply Chain Management: This section covers eight dimensions of logistics and supply chain management, comprising a total of 32 items

Part 3: Operational Performance and Responding to Customer Needs: This section consists of eight items measuring Operational Performance and Responding to Customer Needs. 8 items.

The questionnaire met the criteria for both Content Validity and Reliability

Content Validity: The assessment of content validity yielded an Index of Item-Objective Congruence (IOC) score of 0.8. This score was derived from collecting the opinions of three experts who evaluated "each question item" on the extent to which it was congruent with the objective of the measurement. The calculation followed the formula recommended by Rovinelli et al. [22]. A score of 0.8 falls within the suitable criterion range of 0.8 1.0 and is therefore considered acceptable. A content validation using three experts will yield IOC scores ranging from 0.67 to 1. Reliability: The reliability for all dimensions of the questionnaire (Cronbachs Alpha) showed coefficients ranging from 0.74 to 0.95 for each respective domain, including Transportation Route Planning, Inventory Management, Use of Technology and Information, and Supply Chain Coordination, as well as Operational Outcomes. This range is above the generally acceptable threshold of 0.7 [23], indicating that the questionnaire is highly reliable for data collection.

3.4. Statistical Data Analysis

The data collected from the 400 samples was analyzed using a statistical software package (such as SPSS) to process all the information. The following statistical methods were employed:

1. Descriptive Statistics for General Information: Frequency and Percentage were used to analyze the general data (e.g., demographics) of the respondents.

2. Descriptive Statistics for Key Variables: Arithmetic Mean and Standard Deviation were used to summarize the data on logistics and supply chain management, as well as Operational Performance and Responding to Customer Needs.

3. Comparison of Differences: F-test (One-Way ANOVA) was used to compare the differences between the variables. If a statistically significant difference was found at the .05 level, the researcher performed pairwise comparisons (e.g., using LSD or Scheffé's test).

4. Inferential Statistics for Relationship and Impact: Multiple Regression Analysis was used to analyze the level of logistics and supply chain management that affects Operational Performance and Responding to Customer Needs. This method was chosen to predict the influence of one or more independent variables (predictors) on a dependent variable.

4. Comparative analysis

Example 4.1. General Information of the Respondents The majority of the respondents were female, accounting for 72.0%. They were aged 30-40 years old, representing 45.0%, had 1-5 years of length of service, at 38.5%, and earned a monthly income of less than 15,000 Baht/month and above, at 88.5%, respectively.

Example 4.2. Descriptive Data Analysis on Logistics and Supply Chain Management Descriptive data analysis concerning logistics and supply chain management, operational performance, and Responding to Customer Needs. Table 1 Mean and Standard Deviation of Logistics and Supply Chain Management, Operational Performance, and Responding to Customer Needs.

Table 1
Mean and standard deviation of logistics and supply chain management, operational performance, and responding to customer needs ($N = 400$).

Variable	$\bar{x}$	SD	Level
1. Logistics and Supply Chain Management	4.02	0.42	High
1.1 Transportation Route Planning	3.99	0.58	High
1.2 Inventory Management	4.01	0.52	High
1.3 Technology and Information Utilization	3.99	0.51	High
1.4 Supply Chain Coordination	4.15	0.45	High
1.5 Logistics Cost Management	4.08	0.43	High
1.6 Sustainability and Environment	3.93	0.60	High
1.7 Personnel Development	3.99	0.51	High
1.8 Supply Chain Risk Management	3.99	0.50	High
2. Operational Performance	4.06	0.45	High
3. Responding to Customer Needs	3.95	0.55	High

From Table 1 It was found that the overall average value of the 8 Logistics and Supply Chain Management factors was high ($\bar{x} = 4.02$, SD $= 0.42$). And when looking at each aspect, it was found that in terms of Supply Chain Coordination ($\bar{x} = 4.15$, SD $= 0.45$). The second is Logistics Cost Management ($\bar{x} = 4.08$, SD $= 0.43$). The third is Inventory Management ($\bar{x} = 4.01$, SD $= 0.52$). The fourth is Transportation Route Planning ($\bar{x} = 3.99$, SD $= 0.58$). The fifth is Technology and Information Utilization and Personnel Development ($\bar{x} = 3.99$, SD $= 0.51$). The sixth is the Supply Chain Risk Management ($\bar{x} = 3.99$, SD $= 0.50$). The seventh is Sustainability and Environment ($\bar{x} = 3.93$, SD $= 0.60$), and Operational Performance was high ($\bar{x} = 4.06$, SD $= 0.45$), and Responding to Customer Needs was high ($\bar{x} = 3.95$, SD $= 0.55$), respectively.

Table 2
Mean, S.D., and Cronbach's Alpha Values of the Independent and Dependent Variables ($N = 400$).

Variable	$\bar{x}$	SD
Transportation Route Planning (Cronbach Alpha = 0.966)		
The factory efficiently plans its transportation routes.	3.97	0.64
Traffic and distance data are used to reduce transit time.	4.02	0.68
Consolidating delivery rounds helps to reduce costs.	3.97	0.66
Most product deliveries are on schedule.	4.01	0.64
Inventory Management (Cronbach Alpha = 0.970)		
There is a real-time inventory tracking system.	4.01	0.66
There is a sufficient amount of safety stock to meet demand.	3.92	0.67
Storage and picking of goods are fast and accurate.	4.01	0.63
Demand analysis is performed to prevent stockouts.	4.11	0.60
Technology and Information Utilization		
There is a use of the WMS (Warehouse Management System).	4.00	0.65
The use of the TMS (Transportation Management System) helps increase efficiency.	3.96	0.65
Barcodes/QR codes/RFID are used to increase management accuracy.	4.04	0.54
Analytical data (Analytics) is used to improve processes.	3.98	0.65
Supply Chain Coordination (Cronbach Alpha = 0.929)		
There is continuous information exchange between suppliers and customers.	4.10	0.60
Joint planning with partners to accommodate product demand.	4.07	0.58
Problems arising in the supply chain are resolved quickly.	4.20	0.64
Joint meetings or communication help reduce errors.	4.28	0.61

Table 2
Mean, S.D., and Cronbach's Alpha Values of the Independent and Dependent Variables ($N = 400$).

Variable	$\bar{x}$	SD
Logistics Cost Management (Cronbach Alpha = 0.959)		
The factory efficiently controls its fuel costs.	4.31	0.67
Vehicles/equipment are maintained to reduce costs.	4.18	0.70
Labor cost management in the logistics process is efficient.	3.96	0.44
The factory compares its logistics costs with industry competitors.	3.87	0.69
Sustainability and Environment (Cronbach Alpha = 0.962)		
The factory has a policy to reduce carbon emissions from transportation.	3.93	0.71
Packaging that can be recycled or reused is utilized.	3.95	0.68
Energy consumption in the warehouse is managed cost-effectively.	3.88	0.77
The factory prioritizes selecting environmentally conscious suppliers.	3.97	0.64
Personnel Development (Cronbach Alpha = 0.964)		
The factory provides continuous training for employees in logistics and supply chain.	4.00	0.59
Personnel receive development in digital technology skills (WMS, TMS).	3.86	0.74
Employees are capable of appropriately resolving emergency issues.	4.05	0.67
The incentive system helps to increase work efficiency.	4.07	0.67
Supply Chain Risk Management (Cronbach Alpha = 0.968)		
The factory has contingency plans for transportation disruptions.	3.92	0.69
Supplier risks are assessed regularly.	4.01	0.69
The factory has measures to accommodate emergencies (disasters, epidemics).	3.98	0.73
Analytical data is used to forecast future risks.	4.09	0.44
Operational Performance (Cronbach Alpha = 0.929)		
The lead time for product delivery has decreased compared to the previous year.	4.09	0.60
Logistics costs per product unit have decreased.	3.93	0.59
The accuracy of product delivery has increased.	4.10	0.57
The flexibility of the logistics and supply chain process has improved.	4.15	0.61
Responding to Customer Needs (Cronbach Alpha = 0.964)		
Customers are satisfied with the speed of delivery.	3.96	0.71
The accuracy level of customer demand forecasting has increased.	4.01	0.62
The rate of returns/damaged goods has decreased.	3.99	0.67
The factory can respond to customer needs and complaints quickly and appropriately.	3.87	0.77

Example 4.3. Inferential Data Analysis on the Impact of Personal Factors on Operational Performance and Responding to Customer Needs.

Table 3
Analysis of Variance (ANOVA) for Operational Performance and Customer Responsiveness-General Information.

Independent Variable	Dependent Variable	df	SS	MS	t / F	P
Gender	Operational Performance	1	12.5	12.5	4.2	0.042*
Gender	Responding to Customer Needs	1	10.8	10.8	3.7	0.050*
Length of service	Operational Performance	3	15.0	7.5	3.0	0.050*
Length of service	Responding to Customer Needs	2	13.2	6.6	2.6	0.072
Age	Operational Performance	3	22.0	7.33	3.3	0.028*
Age	Responding to Customer Needs	3	19.7	6.57	2.9	0.041*
Income	Operational Performance	3	25.1	8.37	3.8	0.015*
Income	Responding to Customer Needs	3	21.3	7.10	3.2	0.030*

Note: *p < 0.05.

From Table 3, the results of the F-test/t-test at a 0.05 level of significance show that employees in Rayong province who differ in personal factors such as gender, age, length of service, and income have different levels of operational performance and regarding customer needs. Conversely, employees who differ in the personal factors of length of service do not have different levels of responding to Customer Needs.

Example 4.4. Inferential Data Analysis Regarding the Effect of Logistics and Supply Chain Management on Operational Performance.

Table 4
Multiple Regression Coefficients of Logistics and Supply Chain Management Affecting Operational Performance.

Variable	B	Beta Coefficient (β)	Rank	t	p
Constant	0.72	–	–	4.76**	0.00
1. Transportation Route Planning	0.11	0.15	5	2.82**	0.00
2. Inventory Management	0.27	0.31	2	4.77**	0.00
3. Technology and Information Utilization	0.14	0.17	4	2.70**	0.00
4. Supply Chain Coordination	0.22	0.22	3	4.50**	0.00
5. Logistics Cost Management	0.07	0.08	6	1.53	0.12
6. Sustainability and Environment	0.05	0.07	7	1.33	0.81
7. Personnel Development	0.29	0.33	1	5.10**	0.00
8. Supply Chain Risk Management	0.01	0.01	8	0.34	0.72

Note: *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$, + $p \leq 0.10$.

From Table 4, the logistics and supply chain management affecting employee operational performance is represented by the equation: Operational Performance = 0.72 + 0.29 (Personnel Development) + 0.27 (Inventory Management) + 0.22 (Supply Chain Coordination) + 0.14 (Technology and Information Utilization) + 0.11 (Transportation Route Planning) When considering each aspect of logistics and supply chain management that affects employee operational performance, the standard scores can be ranked from highest to lowest as follows: personnel development ($\beta = 0.33$) is ranked 1st, inventory management ($\beta = 0.31$) is ranked 2nd, supply chain coordination ($\beta = 0.22$) is ranked 3rd, technology and information use ($\beta = 0.17$) is ranked 4th, and transportation route planning ($\beta = 0.15$) is ranked 5th, respectively.

Example 4.5. Inferential Data Analysis of the Four Multiple Regression Coefficients of Logistics and Supply Chain Management Affecting Responding to Customer Needs.

Table 5
Multiple Regression Analysis Coefficients of Logistics and Supply Chain Management Affecting Responding to Customer Needs.

Variable	B	Beta Coefficient (β)	Rank	t	p
constant	0.01	–	–	0.067	0.94
1. Transportation Route Planning	0.08	0.08	5	1.74*	0.08
2. Inventory Management	0.11	0.10	4	1.76*	0.07
3. Technology and Information Utilization	0.48	0.45	1	7.78**	0.00
4. Supply Chain Coordination	0.01	0.01	6	0.31	0.75
5. Logistics Cost Management	0.02	0.01	6	0.35	0.72
6. Sustainability and Environment	0.10	0.11	3	2.33**	0.02
7. Personnel Development	0.23	0.21	2	3.54**	0.00
8. Supply Chain Risk Management	0.09	0.08	5	1.61*	0.10

Note: $^{***}p \leq 0.001$, $^{**}p \leq 0.01$, $^{*}p \leq 0.10$.

From Table 5, the logistics and supply chain management affecting employee responding to customer needs is represented by the equation: responding to customer needs = 0.01 + 0.48 (Technology and Information Utilization) + 0.23 (Personnel Development) + 0.11 (Inventory Management) + 0.10 (Sustainability and Environment) + 0.09 (Supply Chain Risk Management) + 0.08 (Transportation Route Planning).

When considering each aspect of logistics and supply chain management that affects the responding to customer needs, the standard scores can be ranked from highest to lowest as follows: Technology and Information Utilization ($\beta = 0.45$) is ranked 1st, Personnel Development ($\beta = 0.21$) is ranked 2nd, sustainability and environment ($\beta = 0.10$) is ranked 3rd, inventory management ($\beta = 0.10$) is ranked 4th, transportation route planning and supply chain risk management ($\beta = 0.08$) is ranked 5th, and supply chain coordination and logistics cost management ($\beta = 0.01$) is ranked 6th, respectively.

5. Extensions

1. Continuous Personnel Development

1.1 Training and Skill Enhancement: Regularly provide training and development in logistics, information technology, and customer service skills to employees to boost their work potential and responding to customer needs.

1.2 Cross-Functional Training: Encourage personnel to engage in cross-functional training to increase operational flexibility and enable them to solve on-the-spot problems effectively.

2. In-Depth Utilization of Information Technology

2.1 Investment in Data Analytics: Invest in Big Data and Business Intelligence systems to collect, analyze, and predict customer needs with greater accuracy.

2.2 Digital Platform Development: Develop digital platforms that can connect internal departments and external partners to ensure faster coordination and data management within the supply chain, thereby reducing errors.

3. Efficient Inventory Management

3.1 Adopting Optimization Systems: Implement Inventory Optimization and Just-in-Time (JIT) methodologies to reduce costs, minimize losses, and increase delivery accuracy.

3.2 Real-time Tracking: Utilize Real-time Tracking inventory systems so employees can instantly check product status and respond to customer needs immediately.

4. Cost and Risk Management Strategies

4.1 Systematic Management: Although the research indicates that cost and risk have a lower impact (at the operational level), they should be managed systematically through actions like Risk Assessment and Cost Control to mitigate long-term impacts.

4.2 Backup Supplier Network: Establish a network of backup suppliers to prevent supply chain disruption risks.

5. Integration of Sustainability and Corporate Social Responsibility (CSR)

5.1 Environmentally Conscious Logistics: Design logistics management with environmental considerations, such as reducing carbon emissions from transportation and using eco-friendly packaging.

5.2 Enhancing Corporate Image: Build a strong Corporate Social Responsibility (CSR) image to increase customer satisfaction and trust in the long term.

6. Procurement Process Improvement

6.1 Implementing E-Procurement: Adopt an e-Procurement approach to reduce documentation procedures and increase transparency.

6.2 Real-time Data: Utilize real-time data systems for price comparison and vendor evaluation to make procurement more efficient and responsive (Procurement Tactics, 2024).

6. Conclusion and discussion

6.1. Analysis of Factors Affecting Employee Performance and Responding to Customer Needs

The analysis indicates that personal factors such as gender, age, tenure, and employee income are correlated with work performance and responsiveness to customer needs. This aligns with previous research, which suggests that differences in gender and age can create variations in job performance and engagement with customer needs. Tenure may directly affect performance, but does not necessarily reflect responsiveness to customer needs, as this factor is often related to work experience.

6.2. Impact of Internal Management and Development

Human resource development and inventory management play a crucial role in employee operating efficiency. This reflects that investment in human capital and internal organizational management processes clearly enhances work capability. Technology utilization, coordination, and transportation route planning also boost efficiency. However, cost management, sustainability, or risk management may have a more strategic impact rather than an operational one. This aligns with research by Jarutheerasan et al. [5], which found that inventory management, transportation route planning, and supply chain coordination affect on-time delivery capability and responding to customer needs. This supports the present study's finding that inventory management and supply chain coordination are key variables influencing operational efficiency.

6.3. Technology and Responding to Customer Needs

The use of technology and information systems has the highest impact on the ability to respond to customer needs. This highlights the importance of effective customer data tracking and management. Personnel development still plays a secondary role, as employees with appropriate skills and knowledge can provide better customer service. Management that considers sustainability and the environment also affects customer satisfaction, reflecting the trend of customers being interested in organizations that are socially and environmentally responsible. This is consistent with the research of Chawchaikhong et al [6], which found that the use of information technology is a key variable that provides insights into order and customer needs, leading to improved customer response that meets expectations. Our research also confirms that the use of information technology has the highest standardized coefficient ($\beta = 0.45$) in responding to customer needs.

6.4. Linking to Prior Research

Consistent with the research of Chaipisit et al. [7], which found that logistics cost management and supply chain stability affect customer satisfaction and operational performance, our research found that cost and risk management had less impact. However, inventory management, personnel development, and technology had a clear effect on both dependent variables. Furthermore, Sirijirutsaya [4] found that personnel skill development and systematic logistics process management directly influence work performance and customer satisfaction. The findings of this study reflect the same trend: personnel development and the use of information technology are crucial factors that enhance efficiency and responding to customer needs.

6.5. Strategic vs Operational Factors

Conversely, logistics cost management or supply chain risk management had low or no statistical significance, which may be because these factors operate at the managerial level rather than the operational level. Logistics cost

management is a process at the managerial level rather than the operational level. Employees at the operational level often lack the authority for cost decisions, such as negotiating with suppliers, analyzing cost structures, or making budget decisions. Therefore, the observed impact on work performance and responding to customer needs is minimal. Risk management is often the responsibility of senior management, such as the purchasing department, logistics planning department, or supply chain managers, focusing on strategic analysis and preventive planning, not the routine tasks of operational-level employees. Thus, it does not clearly affect day-to-day work performance or direct responding to customer needs.

6.6. Conceptual Framework Connection

These study results can be linked to the Supply Chain Responsiveness (SCR) and Performance Management frameworks, reflecting the systemic relationship of internal organizational management to effectively enhance performance and responding to customer needs. The SCR framework emphasizes the ability to respond quickly to market changes, where information technology plays the most crucial role ($\beta = 0.45$) in increasing flexibility and data accuracy. Inventory management and supply chain coordination help reduce lead time and increase operational agility, while personnel development strengthens the organization's adaptability. The Performance Management framework focuses on measuring and managing efficiency across three dimensions: operations, responding to customer needs, and technological sustainability. Integrating these two frameworks allows organizations to develop "Responsive Performance" that blends efficiency and the ability to adapt sustainably over the long term.

Declaration of competing interest

The authors declare that they have no affiliations with or involvement in any organization or entity with any financial interest in the subject matter or materials discussed in this manuscript.

Author Contributions

Natthapon Waewpanyasil: Investigation, writing-original draft, and software.
Chonlatis Darawong: Conceptualization and writing-review.
Ramida Wongvedvanij: Supervision, conceptualization and writing-review.

Acknowledgements

This work was supported by Graduate College of Management, Sripatum University.

References

[1] The Office of Industrial Economics, Industrial Economic Report 2024 and Outlook 2025, Ministry of Industry (2024).
[2] Institute for Supply Management, The hidden costs of inventory management (2024). Available from: https://www.ismworld.org/supply-management-news-and-reports/news-publications/inside-supply-management-magazine/blog/2024/2024-06/the-hidden-costs-of-inventory-management/.
[3] Genie.io, The impact of stockouts: Costs, risks, and how to prevent them (2023). Available from: https://www.genie.io/blog-articles/the-impact-of-stockouts-costs-risks-and-how-to-prevent-them.
[4] S. Sirijirusaya, W. Jarunsreesotkamjorn, Logistics Management Efficiency Affecting the Financial Performance of Industrial Factories in the Tak Special Economic Development Zone, Mae Sot District, Tak Province, Journal of Management Science and Accounting 3 (1) (2024) 87–101. Available from: https://so07.tci-thaijo.org/index.php/JMSA_FMS_URU/article/view/3951.
[5] P. Jarutirasarn, N. Tamkaew, A Study of Factors Affecting Logistics Operation Management of Businesses in Chonburi Province, SAU Journal of Social Sciences & Humanities 7 (1) (2023) 34–52. Available from: https://so05.tci-thaijo.org/index.php/saujournalssh/article/view/263796.
[6] T. Chaochaikhong, R. Prapasirilax, A. Ardam, Factors Influencing the Efficiency of Logistics and Supply Chain Management in Businesses in Nakhon Ratchasima Province, Journal of the Association of Researchers 30 (3) (2023) 1–13. Available from: https://so04.tci-thaijo.org/index.php/jar/article/view/278147.
[7] C. Tewsoiy, P. Phongthong, Supporting Logistics Factors Influencing the Delivery Logistics Service Providers Logistics Efficiency in Muang District, Suphanburi Province, Journal of Management Science Nakhon Ratchasima Rajabhat University 3 (1) (2024) 29–42. Available from: https://so08.tci-thaijo.org/index.php/jmsnrru/article/view/2529.
[8] N. Jeenaboonrueang, Causal Relationship between Logistics Technology, Individual Skills and Supply Chain Relationships Management, and Logistics Management Efficiency: A Case Study of Personnel and Logistics Operators in Chiang Rai Province, Industrial Technology Lampang Rajabhat University Journal 16 (1) (2023) 14–29. Available from: https://li01.tci-thaijo.org/index.php/Itech/article/view/257239.
[9] M. Christopher, Logistics & Supply Chain Management (5th ed.), Pearson Education, 2016.

[10] J.T. Mentzer, W. DeWitt, J.S. Keebler, S. Min, N.W. Nix, C.D. Smith, Z.G. Zacharia, Defining supply chain management, Journal of Business Logistics 22 (2) (2001) 1–25.
[11] O.E. Williamson, The economic institutions of capitalism: Firms, markets, relational contracting. Free Press, 1985.
[12] J. Barney, Firm resources and sustained competitive advantage, Journal of Management 17 (1) (1991) 99–120. Available from: https://doi.org/10.1177/014920639101700108.
[13] T.Y. Choi, Y. Hong, Unveiling the structure of supply networks: Case studies in Honda, Acura, and Daimler Chrysler, Journal of Operations Management 20 (5) (2002) 469–493. Available from: https://doi.org/10.1016/S0272-6963(02)00025-6.
[14] APICS, Supply Chain Operations Reference (SCOR) Model. APICS, 2017.
[15] B.B. Flynn, B. Huo, X. Zhao, The impact of supply chain integration on performance: A contingency and configuration approach, Journal of Operations Management 28 (1) (2010) 58–71. Available from: https://doi.org/10.1016/j.jom.2009.06.001.
[16] M.L. Fisher, What is the right supply chain for your product?, Harvard Business Review 75 (2) (1997) 105–116.
[17] B.M. Beamon, Measuring supply chain performance, International Journal of Operations & Production Management 19 (3) (1999) 275–292. Available from: https://doi.org/10.1108/01443579910249714.
[18] O.E. Williamson, The economics of organization: The transaction cost approach, American Journal of Sociology 87 (3) (1981) 548–577. Available from: https://doi.org/10.1086/227496.
[19] A. Gunasekaran, C. Patel, E. Tirtiroglu, Performance measures and metrics in a supply chain environment, International Journal of Operations & Production Management 24 (1) (2004) 71–87. Available from: https://doi.org/10.1108/01443570410510920.
[20] A. Parasuraman, V.A. Zeithaml, L.L. Berry, SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality, Journal of Retailing 64 (1) (1988) 12–40.
[21] T. Yamane, Statistics: An introductory analysis (2nd ed.), Harper & Row, 1973.
[22] R.J. Rovinelli, R.K. Hambleton, On the use of content specialists in the assessment of criterion-referenced test item validity, Dutch Journal of Educational Research 2 (2) (1977) 49–60.
[23] J.C. Nunnally, I.H. Bernstein, The Assessment of Reliability, Psychometric Theory 3 (1994) 248–292.