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The Occupational Health Safety Model in logistics businesses in the Epidemic Crisis
รูปแบบความปลอดภัยด้านอาชีวอนามัยของสุขภาพในการขนส่งสินค้าของธุรกิจโลจิสติกส์ในภาวะวิกฤตโรคระบาด

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Abstract

This research aimed to develop an occupational health safety model of logistics businesses in the epidemic crisis using a multi-period integrative research method. The qualitative research method was conducted first by synthesizing the data of the shipping business standards, i.e., Q-Mark, GDP, GSP, Q-Cold Chain, and ISO22301. Then the in-depth interviews were employed with the executives of the companies who received the mentioned standards in order to synthesize specific variables related to occupational health safety. After that the quantitative method was conducted using the obtained variables to create a questionnaire as a tool to collect data about the occupational health operations of 414 Q-Mark certified transport logistics operators in Thailand. Then the factor analysis was used to confirm the variables. Finally, both the qualitative and quantitative results were employed to develop an occupational health safety model followed by a group discussion to reaffirm the pattern. The results showed that the occupational health safety model of logistics business in the epidemic crisis consisted of 5 areas, which were the management system within the organization, the driver management for cargo delivery, the management of freight vehicles, the management of the routes used for goods transportation, and the response to health safety crises. It was found that the response to health safety crises was of the highest importance, followed by the management system within the organization.

Keyword: Logistics Business, Freight, Occupational Health, Security Model, Epidemic Crisis

บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อพัฒนารูปแบบความปลอดภัยด้านอาชีวอนามัยของสุขภาพในการขนส่งสินค้าของธุรกิจโลจิสติกส์ในภาวะวิกฤติโรคระบาด โดยใช้วิธีการวิจัยเชิงผสมผสานแบบหลายช่วง นำด้วยการวิจัยเชิงคุณภาพ เริ่มต้นด้วยการสังเคราะห์ข้อมูลจากมาตรฐานที่เกี่ยวข้องกับธุรกิจขนส่งสินค้า ได้แก่ Q-Mark, GDP, GSP, Q-Cold Chain, ISO22301 และสัมภาษณ์เชิงลึกผู้บริหารของบริษัทที่ได้รับมาตรฐานดังกล่าว เพื่อสังเคราะห์ตัวแปรเฉพาะที่เกี่ยวข้องกับความปลอดภัยด้านอาชีวอนามัยของสุขภาพ จากนั้นจึงใช้วิธีเชิงปริมาณ โดยนำตัวแปรที่สังเคราะห์ได้มาสร้างแบบสอบถามเพื่อสำรวจการดำเนินงานด้านอาชีวอนามัยของสุขภาพของผู้ประกอบการธุรกิจโลจิสติกส์ด้านขนส่งที่ได้รับการรับรองมาตรฐาน Q-Mark ในประเทศไทย จำนวน 414 ราย และทำการวิเคราะห์องค์ประกอบของปัจจัยเพื่อยืนยันตัวแปร สุดท้ายจึงนำผลการวิจัยทั้งเชิงคุณภาพและเชิงปริมาณมาพัฒนารูปแบบความปลอดภัยด้านอาชีวอนามัยของสุขภาพและจัดสนทนาเชิงกลุ่มเพื่อยืนยันรูปแบบอีกครั้งหนึ่ง ผลการวิจัยพบว่า รูปแบบความปลอดภัยด้านอาชีวอนามัยของสุขภาพในการขนส่งสินค้าของธุรกิจโลจิสติกส์ในภาวะวิกฤตโรคระบาด ประกอบด้วย 5 ด้าน ได้แก่ ด้านระบบการจัดการภายในองค์กร ด้านการจัดการพนักงานขับรถขนส่งสินค้า ด้านการจัดการรถขนส่งสินค้า ด้านการจัดการเส้นทางที่ใช้ในการขนส่งสินค้า และด้านการโต้ตอบภาวะวิกฤติความปลอดภัยด้านสุขภาพ ซึ่งผลการวิเคราะห์องค์ประกอบ พบว่าองค์ประกอบด้านการโต้ตอบภาวะวิกฤติความปลอดภัยด้านสุขภาพมีความสำคัญสูงสุด รองลงมาคือ ด้านระบบการจัดการภายในองค์กร

คำสำคัญ : ธุรกิจโลจิสติกส์, การขนส่งสินค้า, อาชีวอนามัย, รูปแบบความปลอดภัย, ภาวะวิกฤตโรคระบาด

Introduction

The world is confronting the public health crisis, which is the spread of the novel coronavirus, or it is known as "COVID-19". The spread of the novel coronavirus (COVID 19) has a wide impact worldwide, such as disruption in the tourism industry and the related industries — flight cancellation, hotel booking cancellation, and other activities, including the slowdown in industrial production that is under the global value chain. These issues continuously affect and the world economy recesses to the global economic crisis. A domestic logistics business operation was affected after the government and each province has enhanced the measures of pandemic suppression and prevention both in terms of product transportation planning and economic impacts due to the order to temporarily close of some business types such as shopping centers, boxing stadiums, and entertainment places. From the interview with transport logistics operators: KYS Limited Partnership, Yingphaisan Logistics Limited Partnership, Hatyai Pongsiri Forwarding Co., Ltd., Nimseeseng Logistics Co., Ltd., and BS Limited Partnership, about problems and impacts of the occupational health safety of logistics businesses in the epidemic crisis, so it led to synthesize practice guidelines for goods transportation services as follows: 1) Organizational Policies, companies should issue protection policies and set policies which have clear responsible person; 2) Work Practices, companies should have work practices in order to handle with the epidemic crisis; 3) Employees, companies should communicate, hold a meeting to explain to employees since the beginning of the crisis, companies should not let them confront with the crisis and cumulative stress from work and educate them to have knowledge and understanding about health safety in the epidemic crisis; 4) Vehicle, companies should have a car cleaning plan and make a sanitizing history in the epidemic crisis; 5) Customers and external persons, companies should build more customer relationships in order to build their

trust and satisfaction in work and companies should protect health safety. The most important problem is the impacts from the risk of goods transportation services of health products. The public health crisis situation caused the researchers to study the occupational health safety model of logistics businesses in the epidemic crisis because Thailand lacks the occupational health safety model and standard in goods transportation services. The benefits from the results of policy research could be correctly and appropriately used for planning management of the occupational health safety of logistics businesses in the epidemic crisis in order to build health safety of organizations' employees, build trust and reliability of customers to use logistic services in the epidemic crisis. Academic benefits, the results from this research could be used to develop and build new knowledge of management of the occupational health safety of logistics businesses, to make the management be in accordance with the policies of the Department of Land Transport that would like to enhance goods transport operators and increase competitive potential in logistics businesses.

Conceptual Framework

The researchers have developed the occupational health safety model in logistics businesses, which has met a Service Quality Standard for Truck Operation (Q Mark), Cold Chain Quality Standard for Truck Operation (Q Cold Chain), Guide to Good Storage Practice (GSP), Good Distribution Practice (GDP), and the international standard for Business Continuity Management (ISO22301). The model consists of the following:

The independent variable is goods transportation services or Q-Mark, consisting of 5 areas: organization, delivery operations, employees, verticals, and customers and external persons.

The intervening variable is quality standards of transport: GDP, GSP, Q Cold Chain, and ISO22301.

The dependent variable is the occupational health safety model in logistics businesses. There are 5 areas: the management system within the organization, the driver management for cargo delivery, the management of freight vehicles, the management of the routes used for goods transportation, and the response to health safety crises.

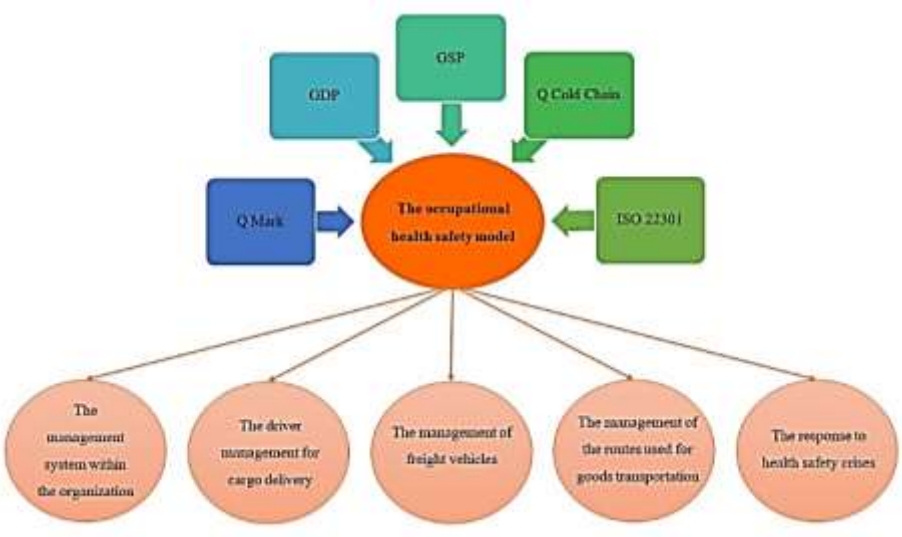

Figure 2 Conceptual Framework

Source: : Phupatt, Chayapol, 2020

Study Objectives

The objective was to develop the occupational health safety model in logistics businesses during the epidemic crisis.

Literature Review

After reviewed literature related to the occupational health safety model of logistics businesses during the epidemic crisis, it showed that quality standards for goods transportation such as Service Quality Standard for Truck Operation (Q Mark), Quality Standard for Transportation of Agricultural Products and Foods by Temperature-Controlled Truck (Q Cold Chain), Quality Standards for Transportation of Drugs and Medical Supplies, Guide to Good Storage Practice or GSP, Quality Standards for Transportation of Drugs and Medical Supplies, Good Distribution Practice or GDP, Industrial Product Standard, Business Continuity Management System (ISO 22301). They have the basic concept in order to enhance the quality of goods transportation service by trucks to impress service consignees. Meanwhile, transportation operators need to adapt to changes in trade and services. Therefore, they need to develop themselves to have capability as equal as international standards. In the scope of the mentioned standards, the researchers synthesized transport standards and the occupational health safety in each standard as in Table 1.

Table 1 shows transport standards and the occupational health safety.

Transport Standards	Occupational Health Safety				
	Internal Management	Transportation Staff Management	Freight Vehicles Management	Transportation Routes Management	Crisis Response
Q Mark (Department of Land Transport: 2020)	Selection of partners who is safe in health.	Determination of the qualifications of transportation staff.	Determination of the cleanliness standards and sterilization for health standards.	Having the plan and risk assessment of the routes that found the epidemic.	Determination of work procedure and communication channel with customers in case of occurring epidemic crisis.
Q Cold Chain (Department of Land Transport: 2020)	Measurement and reporting of the health operation result.	Development of skills and health knowledge.	Inspection of the condition and protective equipment in terms of occupational health safety that relates to the epidemic.	Checking and monitoring staff's behavior after delivering goods in risk areas.	Training or simulation to respond to the epidemic crisis.

Table 1 (Continue)

Transport Standards	Occupational Health Safety				
	Internal Management	Transportation Staff Management	Freight Vehicles Management	Transportation Routes Management	Crisis Response
GSP (World Health Organization, 2020)	Health monitoring in goods receiving.	Readiness checking before working.	-	-	-
GDP (World Health Organization, 2020)	Health monitoring in delivery.	-	-	-	-
ISO 22301 (MASCI, 2020)	Intention and engagement in the safety of administrators' health.	-	-	-	-
Transport Logistics Operators	The company needs to have prevention policy.	Companies should announce or order to inform employees that there is a pandemic or an emerging disease. Companies should not let their employees confront crises and cumulative stress from work. In addition, companies should have employee training in order to educate them to have knowledge and understanding about occupational health safety in the crisis.	The company needs to have a cleanliness plan and sanitization plan.	The company needs to have obvious work procedures in order to handle with the epidemic crisis.	The company needs to build a relationship with customers in order to create confidence and satisfaction to customers or external persons.

Table 2 Research related to the goods transportation of logistics businesses.

Researcher	Subject	Result
Lambert, Stock & Ellran (1998)	Meaning of goods transportation of logistics businesses	The operation planning process and effective control in order to perform movement of raw material storage during production, finished goods, and related information from a source of supply to consumption point smoothly. This is in order to respond to customers' demands with efficient cost in transportation.
Kedkanok Chuemahawan (2017)	Development of quality standard criteria of Thai logistics business, international freight forwarder type.	The result suggests new standard criteria which consist of 9 areas: 1) Vision and strategic business management planning; 2) Process Management; 3) Human Capital Management and Development; 4) Customers and Marketing; 5) Cooperation with Partners in the Supply Chain; 6) Innovation and technology; 7) Safety and stability; 8) Result Assessment; 9) Operation Result.
Siripon Lerdyingyod (2014)	The roles of the government and private sectors toward the development of the logistics system of SME truck transport operators in Thailand.	In order to develop the logistics management system of SME truck transport operators in Thailand, they should cooperate from planning an integration plan, central organization establishment, human resource management, monitoring control, using modern technological systems, issuing a law that supports road transport business, creating a partnership network or business cooperation between the government and private sectors; financial institution; educational institution; research and development institutes; international consumers and businesses sector. It causes the Thai economic system to drive and compete at the global level strongly and stably.
Phuwana Auksawakornnilangkul (2019)	Adaptation of Thai logistics service providers in the digital era.	The trend of crucial changes, which affects providing service of Thai logistics service providers in the digital era, is divided into 3 dimensions: 1) the transformation dimension of technology in Thailand; 2) the transformation dimension of business operations in Thailand; 3) the transformation dimension of trading policy in Thailand.

From reviewing the literature relating to logistics businesses concept, it was found that there is no research about the occupational health safety model of logistics businesses in the epidemic crisis. Most studies emphasize the concept of service quality or the relationship between parameters to organizational efficiency. Empirical evidence—both research and academic work—showed that the integration of the occupational

health safety model in logistics businesses impacts on safety standards of health for freight management. The integration is also important to safety standards of health for freight management. From the above information, the researchers realized the importance of studying the concept of integrating the occupational health safety model in logistics businesses in the epidemic crisis to make the country have the capability to compete and benefits for the transport logistics operators and other organizations. They can use as a prototype to manage the occupational health safety model in the epidemic crisis. It also builds safety to employees' health in the organization and received-service people.

Methodology

This research used a multi-period integrative research method. It was started with qualitative research by synthesizing data from standards related to goods transportation business: Q-Mark, GDP, GSP, Q-Cold Chain, and ISO22301, and in-depth interviews with the executives of companies received the mentioned standards. The in-depth interviews were conducted using a semi-structured questionnaire to find the research gap and synthesize specific variables related to occupational health safety. Then the researchers used quantitative research, taking the synthesized variables to create a questionnaire by using a statistical tool: the rating scale of Likert. There are 5 points: the point of 1 to 5 for each question with a high-level opinion or low-level opinion. The 1-point is strongly disagree and the 5-point is strongly agree. The reliability of the questionnaire was assessed by Cronbach's method: using Cronbach's alpha coefficient. The reliability result is 0.964. Researchers used a semi-structured questionnaire to interview operators about practice guidelines of safety officers for executive-level work to survey the occupational health safety operations of 414 Thai operators who received the Q-Mart standard (Department of Land Transport, 2020). The questionnaire was returned from 324 operators, or it was accounted for 78.26%. After that, the researchers analyzed the composition of factors in order to confirm the variables. The analysis results found that a KMO value is 0.951; a preliminary correlation between variables is above 0.3; Bartlett's test of Sphericity has statistical significance; therefore, the 25-variable used to study are correlation. Finally, the researchers used the results of both qualitative research and quantitative research to develop the occupational health safety model and hold a group discussion in order to confirm the created model.

Result

The result of transport logistics operators' interview indicated that the impact of the public health crisis or COVID19, which has made the companies needed to plan and prepare readiness in management: goods transportation routes, coordination with the government sector, and the safety of health in the transportation of employees and customers, which accords with the result of quantitative research. The result indicated that the thing that the transport logistics operators, who received the Service Quality Standard for Truck Operation (Q-Mark), prioritized the most was occupational health safety in logistics businesses in the epidemic crisis. The overview of giving priority is at high-level criteria.

The highest average is the management of the routes used for goods transportation; the secondary is the response to health safety crises, the management system within the organization, the driver management for cargo delivery, and the management of freight vehicles. The researchers have synthesized the compositions of the occupational health safety model in logistics businesses into 5 areas. There are 1) the management system within the organization; 2) the driver management for cargo delivery; 3) the management of freight vehicles; 4) the management of the routes used for goods transportation; 5) the response to health safety crises. As in Figure 3—the measurement model for latent factor in terms of the occupational health safety model in logistics businesses in the epidemic crisis.

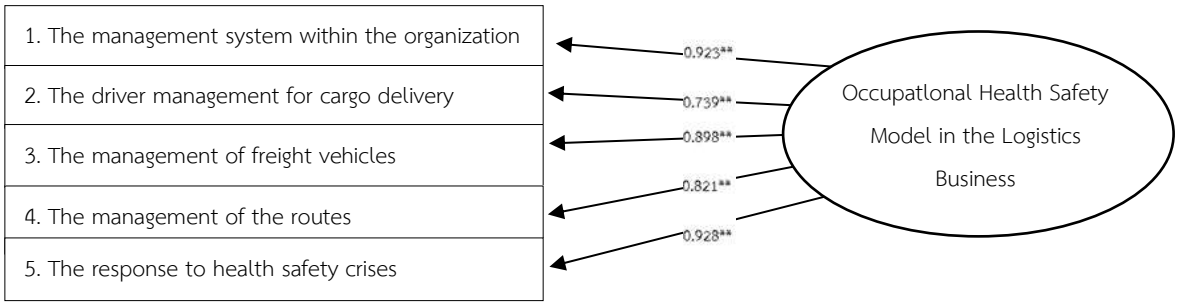

Figure 3 shows the measurement model for latent factors in terms of the occupational health safety model in logistics businesses in the epidemic crisis.

Table 3 shows the analysis result of concordance between research model and empirical data.

Criteria for Analysis		Resulting	Result of
Index Value	Used Criteria	Value	Consideration
P-value	> 0.05	0.122	Pass the criteria (Hair et al.,2010)
Root Mean Square Error of Approximation (RMSEA)	≤ 0.05	0.050	Pass the criteria (Hair et al.,2010)
Goodness-of-Fit (GFI)	≥ 0.90	0.991	Pass the criteria (Hair et al.,2010)
Adjusted Goodness-of-Fit (AGFI)	≥ 0.90	0.966	Pass the criteria (Hair et al.,2010)

Figure 3 shows the measurement model for latent factors in terms of the occupational health safety model of logistics businesses in the epidemic crisis (after adjusting the model). The model accords with the empirical data considering from Chi-square value, which has a difference that does not have a statistical significance 0.05 (p-value = 0.122). After considering the Goodness-of-Fit from RMSEA = 0.050, GFI = 0.991, and AGFI = 0.966: therefore, it makes the model consistent with the empirical data in good criteria. After considering every observed variable's factor loading, they are at an acceptance level: they have positive values between 0.739-0.928. Hence, it is concluded that every observed variable, especially the variable of response to crisis condition, is the best variable that described the characteristics of the latent factor of the occupational health

safety model in logistics businesses in the epidemic crisis. The secondary is the management system within the organization, including the management of freight vehicles, respectively. From the result of quantitative research, the researchers have developed the occupational health safety model in logistics businesses in the epidemic crisis and took it to analyze qualitative data by group discussion with personnel in logistics businesses in Thailand. The result indicated that the personnel in logistics businesses agreed with the topic of the 5-area of occupational health safety model in logistics businesses, which is important to the health safety in the epidemic crisis, customers, employees, and external persons.

Conclusion and Discussion

From the interview with transport logistics operators who received Q-Mark certification about the problem and impact of the occupational health safety of logistics businesses in the epidemic crisis, the result indicated that the most crucial problem is the impact of health risks. It made the researchers synthesized and analyzed the qualitative and quantitative data. The result showed that the occupational health safety model in logistics businesses in the epidemic crisis could be divided into 5 areas, as in Table 3.

Table 4 The occupational health safety model in logistics businesses in the epidemic crisis

The occupational health safety model in logistics businesses in the epidemic crisis	**Details**
1. The response to health safety crises	1.1 Determine procedures and communication channels when occurring health safety crisis. 1.2 Practice response to health safety crises. 1.3 Prepare protective clothing, masks, gloves, instruments for measuring temperature, and other health safety equipment. Prepare transport vehicles in order to protect transportation staff and reduce their health safety paranoid.
2. The management system within the organization	2.1 Select a business partner who has a policy that is focused on health safety. 2.2 Measure, monitor, and report the result of health safety continuously. 2.3 Build intention and engagement in health safety policy continuously and seriously. 2.4 Have management structure of involved departments in order to be responsible for the safety of health in transport. Determine the safety for systematic and standard delivery of goods. 2.5 Have delivery procedures from receiving delivery orders to delivery products for each type of customers. Determine persons who are responsible for each procedure, taking into account the health safety standard in goods transportation. 2.6 Have the information about announcement and health safety standards of customers' companies. 2.7 Have self-evaluation or an external agency to assess health safety standards.

Table 4 (Continue)

3. The management of freight vehicles	3.1 Determine the standards of freight vehicles in terms of health safety. 3.2 Check the condition and cleanliness of vehicles in terms of health safety. 3.3 Provide health safety equipment in vehicles. 3.4 Always check the cleanliness of disinfectant within freight vehicles. 3.5 Determine and control the time and the area for cleaning. Disinfect in the company area, freight vehicles, and containers for holding products.
4. The management of the routes used for goods transportation	4.1 Assess health risks along the goods transportation routes. 4.2 Check driving behavior with a GPS system in terms of using risky routes.
5. The driver management for cargo delivery	5.1 Determine qualifications of transportation staff with emphasizing health safety. 5.2 Develop the health knowledge to employees during the crisis. 5.3 Provide health check-ups for employees during the crisis. 5.4 Indicate health screening details on the recruitment procedure for driver staff, transportation staff, and staff involved in transportation. 5.5 Train transportation staff in the topic of transportation in the crisis.

Benefits from the research could be correctly and appropriately used in planning for the occupational health safety model in logistics businesses in the epidemic crisis. The result and the created model are in accordance with opinions from the group discussion of the personnel in logistics businesses in Thailand. In addition, they are in accordance with the policy of the Department of Land Transport and Service Quality Standard for Truck Operation, which covers delivery operation by truck 5 areas: organization, delivery procedure, employees, vehicles, and customer and external persons, in order to enhance transport operators and enhance the competitive potential in the transport logistics business to be in accordance with the research of Hamedi, Haghani, and Yang, S. (2012). The results found that the route reliability is one of the main variables. The route options should be connected to departure time options in order to reach the destination with acceptable probability to increase possibility to providing things to immigrants under uncertainty without interruption. Challenging problems, route management, and effective and reliable time specification need to be developed for disasters and after disasters. For vehicles that were considered about reliability, routing, and determination of humane land transportation are the guidelines that provide quick goods transportation services. While they could reduce the risk of unwanted delays caused by uncertainty.

Suggestions

Applying research results: When there is an emerging disease, the details of the model in the research result could be used to assess the transport management that has the occupational health safety of logistics businesses in the epidemic crisis. Moreover, the compositions of the model's details could be applied to use.

Future research: from the result of the transport logistics business research, the result can be used to correctly and appropriately plan the management of occupational health safety in logistics businesses. The studied

transport management model that has the occupational health safety of logistics businesses in the epidemic crisis can be applied to plan the strategies: the management system within the organization, the driver management for cargo delivery, the management of freight vehicles, the management of the routes used for goods transportation, and the response to health safety crises. In addition, it can be used to enhance the competitive potential of the business in order to deal with the epidemic crisis. Moreover, it can be used to enhance the competitive potential in the transport logistics business to be in accordance with the Department of Land Transport policy, which is developed to enhance the goods transport operators with transport service standards.

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