

The Acceptance of Transportation Business on The Use of Digital Services Supporting CRM Functions Serving E-commerce in Thailand

Patnipa Adissarangoon^a, Sakuna Anuvareepong^{b,*}

^a*School of Computer and Engineering Management, Assumption University, Bangkok, Thailand*

^b*Martine de Tours School of Management and Economics, Assumption University, Bangkok, Thailand*

Received 8 February 2017; Accepted 16 April 2017

Abstract

This paper aims to assess the significance on the use of digital services supporting CRM functions of the transportation service providers for serving E-commerce in Thailand. For our proposed model, the corresponding digital services are given as: call center, payment system, internet technology, Web 2.0 technology, mobile/smart phone, telecommunication technology, and identification technology; while the CRM functions for transportation business include customer care, convenience, and safety and security. In order to assess the model, the CRM functions have been analyzed by Chi-Square test among the types of e-commerce. The results show that the usages of interactive voice, response, chat, FAQ, customer self-service site, social media in customer care, website, SMS, call for making appointment, tracking system, bar code, QR code, and OTP security are highly significant on E-commerce types of E-Department store, E-Supermarket, E-Discount store, E-Special store, E-Tailer (Off-price), and E-Marketplace (Used product), with $p < 0.001$.

© 2017 Published by ITMSOC Working Group.

Keywords: Customer Relationship Management (CRM), E-Commerce, Logistics, Frequently Asked Questions (FAQ), Short Message Service (SMS), Quick Response Code (QR Code), One Time Password (OTP).

1. Introduction

REGARDING to a new economic model that has been seeking by many countries in both Asia and other continents, Thailand has launched the National Economic and Social Development Plan from Thailand 1.0 to Thailand 4.0. Thailand 4.0 is a part of economic model designed for the value-based economy transformation by using IT (Information Technology) as an engine for driving economic growth [1]. Additionally, these have been rapid changes of technology and emerging of digital service. In order to comply the government plan and cope the advance technology of digital services, this research is designed to explore the

significance of the usage of digital services to support CRM (Customer Relationship Management) functions for the transportation business based on E-commerce (Electronic commerce) in Thailand. In this paper, the CRM functions with their corresponding digital services have been divided into customer care, convenience, and security. There are twenty-three digital services included in all groups of CRM function. To assess a model on the acceptance of the transportation service providers regarding the digital services usage to support CRM functions, there are six types of E-commerce have been used as monitoring variables. They are E-department store, E-supermarket, E-discount store, E-special store, E-Tailer (off price), and E-Marketplace (used product) [2]. Later, the results taken from this study could be useful to explore how the innovative channels are available on the transportation business design by using digital services for serving each type of E-commerce business in Thailand.

*Corresponding author.

Email address: sakunanvr@au.edu (Sakuna Anuvareepong)

Table 1. Digital Services (DS).

Digital Service (DS)
DS 1 Call Center System;
DS 1.1 Interactive Voice Response (IVR)
DS 1.2 Live operation
DS 2 Internet Technology;
DS 2.1 Website
DS 2.2 E-commerce
DS 2.3 E-mail
DS 3 Web 2.0 feature;
DS 3.1 Social media;
DS 3.1.1 Facebook
DS 3.1.2 Twitter
DS 3.1.3 Line
DS 3.1.4 Blogs
DS 3.1.5 YouTube
DS3.1.6 Discussion (e.g.www.Pantip.com)
DS 4 Mobile/Smart Phone;
DS 4.1 Mobile App
DS 4.2 Mobile –commerce (M-commerce)
DS 4.3 Chatting
DS 4.4 Short message sending (SMS)
DS 5 Telecom Technology;
DS 5.1 Notification system
DS 5.2 Location status
DS 5.3 GPS
DS 5.4 Real time tracking location of the product delivery process
DS 6 Identification Technology;
DS 6.1 Barcode
DS 6.2 QR code
DS 6.3 One Time Password (OTP)

Table 2. CRM Functions (CF) [3].

CRM Function	Description
CF 1 Customer Care	Company provides the after sale service for the customer when they have a problem in using the product or service.
CF2 Convenience	Company provides the website for customer to search for the information, product catalog, or product characteristic. After customers are making the purchase, company provider will send the SMS notification. Customer can make an appointment with the sender before delivery product to the customer at home/ office/ BTS station. Mobile application is available for customer to make a purchase on their smart phone.
CF 3 Safety & Security	Company provides tracking system in real time, barcode, QR code and OTP during the delivery process. Customer feels trust and comfortable that product won't be lost.

Table 3. CRM Functions (CF).

Hypotheses	Description
Ha1	The digital services has significant relationship with CRM function serving E-Department store
Ha2	The digital services has significant relationship with CRM function serving E-Supermarket
Ha3	The digital service has significant relationship with CRM function serving E-Discount store
Ha4	The digital services has significant relationship with CRM function serving E-Special store
Ha5	The digital service has significant relationship with CRM function serving E-Tailer (Off-Price)
Ha6	The digital service has significant relationship with CRM function serving E-Marketplace (Used product)

Table 4. Item-Total Statistics.

Digital Services serving CRM functions	Cronbach's alpha
IVR system	.915
Telephone (Live Operation)	.915
E-mail	.920
Chat	.914
Webboard	.918
FAQ webpage	.917
Customer self-service site	.915
Social media;	.919
Facebook	.918
Twitter	.916
Line	.922
Blogs	.913
YouTube	.918
Discussion	.915
Company website	.918
Mobile App	.915
SMS	.916
Call for make appointment	.917
Tracking system	.919
Barcode and QR code	.918
OTP	.917

Table 5. The Chi-Square Method of The Customer Care.

CRM Function	Digital Service	Type of E-commerce	p-value
Customer Care	FAQ webpage	E-Marketplace (Used product)	p<0.001
	IVR System	E-Special Store	p<0.001
	Telephone	E-Special Store	p<0.001
	Customer Self-service Site	E-Special Store	p<0.001

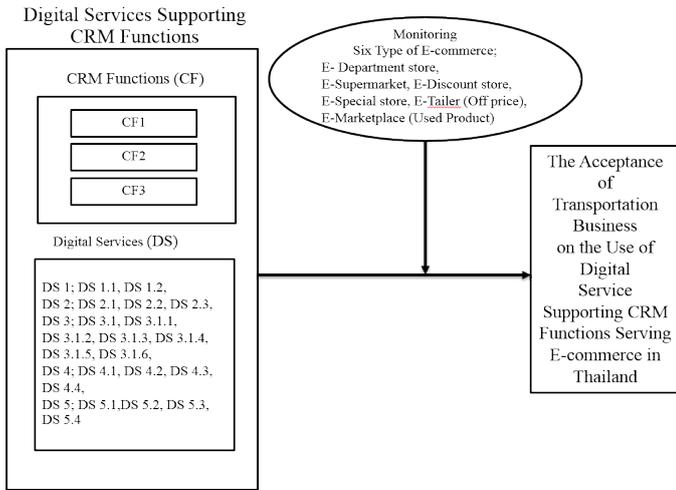


Fig. 1. The model of the acceptance of transportation business on the use of digital service supporting CRM function serving e-commerce in Thailand.

Table 6. The Chi-Square Method of The Convenience.

CRM Function	Digital Service	Type of E-commerce	p-value
Convenience	Call for make an appointment with customer before product delivering	E-Department Store	p<0.05
	SMS	E-Special store	p<0.001
	YouTube	E-Special store	p<0.05

2. Literature Review

2.1. Digital Services

The digital world has played the popular role in many companies around the world that help supporting company strategy and have ability to reach directly to the individual customer. Digital service brought advance technology (e.g. internet or wireless network via computer, smart phone, or tablet) to support the transportation business in order to reduce the risk in the relationship between seller and customer, increase an awareness of customer relationship management (CRM). Customer can get the right product at the right place and the right time that customer

Table 7. The Chi-Square Method of The Safety and Security.

CRM Function	Digital Service	Type of E-commerce	p-value
Safety and Security	Barcode & QR code	E-Special store	p<0.001
	Tracking system	E-Special store	p<0.01
	One time password (OTP)	E-Special store	p<0.01

can check the real time status or tracking location of the product delivered. Therefore, there are many devices and applications help supporting the operation of transportation business. They are as the following.

2.1.1. Call Center System

Call center can separate into two characteristics which are interactive voice response (IVR) and live operation (LO). IVR is voice command systems for supporting the simple problem with the frequency answer question (FAQ) that system can quickly response to the customer requirement. LO is dealing with the telephone calling to the company in real time between call center and customer [2].

2.1.2. Internet Technology

Electronic mail (e-mail) is also easily provided for solving problems for customer immediately, which customers can send messages, pictures, sound, and video clips. E-commerce is the business transaction of online shopping that uses the Internet (company website) and wireless (company application) for supporting buyers and sellers. There are six major types of e-commerce. Firstly, Business-to-Customer (B2C) e-commerce is the online business where manufacturer provides e-commerce website and sells their products/services for individual customers. Secondly, Business-to-Business (B2B) e-commerce is the online business that provides for selling products/services to other businesses. Thirdly, Customer-to-Customer (C2C) e-commerce is the relationship between consumers selling the products to other consumers via online channel which e-commerce has played role as the middleman. Fourthly, mobile e-commerce (M-commerce) is use of smart phone and tablet device to make purchase of products/services. Fifthly, social e-commerce is using the social media for communication which serving B2C, B2B, and C2C. And sixthly, local e-commerce is selling the product/service that depends on the location of consumer. In Thailand, many special stores, department stores, supermarkets, convenience stores, and discount stores began to add more distribution channels of their products to serve their customers by using E-commerce technology and they also utilize mobile commerce (M-commerce) technology in order to serve their customers [4]. However, in Thailand, there are six major types of E-commerce which require the transportation service for the product delivery to their customers. They are E-Department store, E-Supermarket, E-Discout store, E-Special store, E-Tailer (off-price), and E-Marketplace (Used product) [5].

2.1.3. Web 2.0 Feature

Web 2.0 technologies are the tools, and technologies support interactive information sharing, data interoperability and user centered design by using social media (Facebook, Twitter, LINE app, YouTube), Blogs, and discussion [2]. Social media have been classified into three characteristics which include the ability of

presenting, sharing attitudes, and thinking among the community or within the groups. It is the richest media used by many companies concerning for building their brand communities which could be used as the communication channel for their customers [6].

2.1.4. Mobile/Smartphones

Mobile phone/smart phone have been developed and provided multiple function which customer can download and installed an application of the company on their smart phone or the devices. Many companies are trying to create and develop the strategy application for supporting the convenience to the customer [7]. Mobile e-commerce (M-commerce) is the wireless technology device to connect with the internet (e.g., smartphone, tablet) that help supporting the transaction in selling/buying the product/service [8]. Short message service (SMS) is like a speaking language communication between sender and receiver that available on mobile phone in text message style [9]. For this research SMS has been provided for the delivering process, which company will send SMS to inform customer before delivery the products, while, chat is the system that providing an online real time text and audio for company communicate with the customers [10].

2.1.5. Telecom Technology

Real time tracking and location status are schedule plan of time arrival, and help improve in the transit service [11]. Real time trip information system help sharing the real situation know the estimate arrival time, calculate the transportation fare, and arrival time. While GPS system is the satellite signals that can use via smart phone which GPS worked for locating the areas in real time and can share information quickly with an efficiently to get the correct direction, which can help driver find the best route and save time [12].

2.1.6. Identification Technology

Barcode are machine reader and appear in several features, barcode are often used as the quick response (QR) code which easy to use via smart phone [12]. One-Time-Password is a password allows using only one time for access to critical application and data. OTP is the password that is only valid for one transaction which differences from the traditional password. OTP are consisted with three dimensions which including time-synchronization OTP, previous password-based OTP, and the challenge-based OTP [13]. Table 1 shows all six categories of digital services. To be concise and clearly illustrate in this paper, DS will be used as the abbreviation of digital services. Whereas, DS1 to DS6 represents each category of digital service, including sub item in each category as ordering number, from DS 1.1 to DS 6.3, respectively.

2.2. Customer Relationship Management (CRM)

CRM has been applied into two perspectives which include with the strategic and operational perspective. The strategic per-

spective is the heart of CRM idea that builds and develops the customer value in order to gain customer loyalty and long term relationship with the customers. At this time, CRM have played a role of technology innovation (e.g. Facebook pages, Line application on smartphone, and business owner of e-commerce application) that provides the convenient channel for individual customer to communicate directly with the companies or e-commerce sellers [14]. Also, the operational perspective works as a front-office for handling with sales, marketing, and customer service [15, 16].

Table 1 shows all three categories of CRM functions with their corresponding functions as describing. Also, CF1, CF2, and CF3 are the abbreviation of each category of CRM function defined as: customer care, convenience, and safety and security, respectively.

3. Research Methodology and Results

3.1. Research Model Design

This paper is an exploratory research using quantitative analysis for discovering the significance on the use of digital services supporting CRM functions of the transportation service providers serving E-commerce in Thailand. Also, the primary data are acquired from the survey since survey method is the most flexible way of obtaining data on underlying reasons. Additionally, the survey is conducted at “TILOG LOGISTIX 2016” organized by the Department of International Trade Promotion, Ministry of Commerce, and Reed Tradex at Bangkok International Trade and Exhibition Centre (BITEC) in Bangkok [17], Thailand during September 21-23, 2016 since the exhibition is the most comprehensive events related to the logistics service providers and solutions. For the research instrument, questionnaires are used to interview the respondents who are transportation business providers [18]. The secondary data have been reviewed from previous literatures, websites, documents, journals and articles.

For the sample size determination, [19] develops a representative sample from Eq. (1), where n_o is the sample size; Z^2 is abscissa of the normal curve that cuts of an area at the tails (95% level of confidence); e is the desired precision level; p is the estimated proportion of an attribute that exists in the population (assumed $p = 0.5$ for maximum variability); and q is $1 - p$ [20].

$$\begin{aligned} n_o &= Z^2 pq / e^2 \\ &= [(1.96)^2 (0.5)(0.5)] / (0.5)^2 \approx 385, \end{aligned} \quad (1)$$

$$\begin{aligned} n &= n_o / [1 + (n_o - 1) / N] \\ &= 385 / [1 + (385 - 1) / 122] = 92.826 \approx 93. \end{aligned} \quad (2)$$

For the determination of sample size in the finite population, a sample of size of 93 is needed as shown in Eq. (2), where n is the sample size; and N is population size [18]. Also, the total population of the transportation business providers in the exhibition is 122.

Nevertheless, 122 questionnaires have been distributed at the mentioned exhibition, and 100 questionnaires are usable, and the

questionnaire using 5-point Likert scales is used that the respondents could indicate the degree of agreement or disagreement with each statement regarding each construct [3].

For statistical data analysis, IBM SPSS Statistics software version 19.0 has been used. Also, reliability test for the internal consistency using Cronbach alpha test is also required to ensure the data to be reliable at least the recommended value of 0.8 [21]. Additionally, crosstabs with Pearson Chi-square test at 95% confidence level are used to explore the significant relationship between frequencies and percentages data of the dependent and independent variables in the crosstabs table.

3.2. Proposed Model

In this research paper, the construct contains in the proposed model comprise digital services that have been using in CRM functions of the transportation business. These functions are categorized into three groups; customer care, convenience, and safety and security. The innovation channels have been using to serve six types of e-commerce in Thailand. Hence, the model has been proposed to assess the significant of digital services that are used to support the three categories of CRM functions in the transportation business, specifically for each type of E-commerce. Later, to do the validity testing of the above proposed model, following hypotheses are required.

Ho: The digital service has no significant relationship with CRM function serving all types of E-commerce.

Ha: The digital service has significant relationship with CRM function serving all types of E-commerce.

3.3. Data Analysis

First of all, reliability used to be assessed for the internal consistency. As shown on Table 4, Cronbach alpha test is 0.921, which is above the recommended value of 0.8 [21]. To do further data analysis Table 3 shows *Ha* to be more hypothesized with the innovative CRM function serving each types of E-commerce.

Tables 5, 6, and 7 show the results of the chi-square method for all constructs in CRM functions. Thus, Table 5 shows that the significant digital services for the E-Special Store of customer care include customer self-service site. Whilst, FAQ webpage is the significant digital service for E-Marketplace (Used product) of the customer care function.

Later, in Table 6, SMS and YouTube are the significant digital services for the E-Special store supporting convenience function. Also, calling for making an appointment with customer before product delivering is the significant digital service for E-Department store supporting convenience function.

Besides, Table 7 shows that the digital service supporting safety and security functions for E-Special store are Barcode and QR code, tracking system, and OTP (One Time Password). Lastly, considering from Tables 5, 6, and 7, E-specialty store has played

an important role in using IVR system, telephone, customer self-service site, SMS, YouTube, barcode, QR code, tracking system, and OTP which support e-CRM functions of transportation service providers.

4. Conclusion and Recommendation

This research paper has been studied on the use of digital services supporting these categories of CRM functions; customer care, convenience, and safety and security of the transportation business serving six types of E-commerce; department store, supermarket, discount store, special store, off price retailer, and second hand shop. The results show that the significant digital services for customer care include the IVR system of call center and SMS of mobile/smart phone for e-special store. Whereas, barcodes and QR codes are the significant digital services supporting safety and security. Besides, the findings from this research study are not only the benefits to the transportation business serving E-commerce in Thailand but also being a part from private sector in driving and transforming Thailand 4.0 policy and plan towards value-based economy to be implemented successfully. Additionally, further study could also be the extended model for the cross bordering transportation business serving E-commerce in AEC countries.

Acknowledgment

We would like to express my very great appreciation to Mr. Panant Krairojananan for his valuable and constructive suggestions during the planning and development of this research work. His willingness to give his time so generously has been very much appreciated.

References

1. Asian Institute of Technology (AIT). Thailand 4.0; 2016. Available from: <http://www.ait.ac.th/news-and-events/2016/news/1thailand-4.0-english-dr.-suvit.pdf>.
2. Laudon KC, Traver CG. E-Commerce 2015 (11th Edition). Pearson; 2014. Available from: <https://www.amazon.com/-Commerce-2015-11th-Kenneth-Laudon/dp/0133507165?SubscriptionId=0JYN1NVW651KCA56C102&tag=techkie-20&linkCode=xm2&camp=2025&creative=165953&creativeASIN=0133507165>.
3. Pichetjaras N. In-depth Interview of Vice President, Leading in CRM Commercial Project at Thai Military Bank; 2016. Sep 15, 2016.
4. Thomas JO, Rankin YA, Boyette N. Self Service Technologies: Eliminating Pain Points of Traditional Call Centers. In: Proceedings of the Symposium on Computer Human Interaction for the Management of Information Technology. CHiMiT '09. New York, NY, USA: ACM; 2009. p. 9:60–9:63. Available from: <http://doi.acm.org/10.1145/1641587.1641596>.
5. Kanjanakontong S. In-depth Interview with Director at 2 Fellows Company Limited; 2016. Sep 15, 2016.
6. Cvijikj IP, Michahelles F. Understanding Social Media Marketing: A Case Study on Topics, Categories and Sentiment on a Facebook Brand Page. In: Proceedings of the 15th International Academic MindTrek Conference:

- Envisioning Future Media Environments. MindTrek '11. New York, NY, USA: ACM; 2011. p. 175–182. Available from: <http://doi.acm.org/10.1145/2181037.2181066>.
7. Kaplan AM, Haenlein M. Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*. 2010 Jan;53(1):59–68. Available from: <https://doi.org/10.1016/j.bushor.2009.09.003>.
 8. Anckar B, Eriksson N. Mobility: The Basis for Value Creation in Mobile Commerce? In: *Proceedings of the International Conference on Advances in Infrastructure for e-Business, e-Education, e-Service, e-Medicine, and Mobile Technologies on the Internet*. L'Aquila, Italy; 2003. Available from: <https://doi.org/10.1145/1011616.1011617>.
 9. Ruppel M, Vecchione A. "It's research made easier!" SMS and chat reference perceptions. *Reference Services Review*. 2012 Aug;40(3):423–448. Available from: <https://doi.org/10.1108/00907321211254689>.
 10. Wikipedia. Web Chat; 2016. Available from: https://en.m.wikipedia.org/wiki/Web_chat.
 11. Biagioni J, Gerlich T, Merrifield T, Eriksson J. EasyTracker: Automatic Transit Tracking, Mapping, and Arrival Time Prediction Using Smartphones. In: *Proceedings of the 9th ACM Conference on Embedded Networked Sensor Systems*. SenSys '11. New York, NY, USA: ACM; 2011. p. 68–81. Available from: <http://doi.acm.org/10.1145/2070942.2070950>.
 12. Adissarangoon P, Anuvareepong S. CRM using Web 2.0 Technology for Thai logistics business. In: *The 2nd International Conference on Production and Supply Chain Management*; 2013. .
 13. Sun H, Sun K, Wang Y, Jing J. TrustOTP: Transforming Smartphones into Secure One-Time Password Tokens. In: *Proceedings of the 22nd ACM SIGSAC Conference on Computer and Communications Security*. CCS '15. New York, NY, USA: ACM; 2015. p. 976–988. Available from: <http://doi.acm.org/10.1145/2810103.2813692>.
 14. Gulati R, Garino J. Get the Right Mix of Bricks and Clicks. *Harvard Business Review*. 2000 May-Jun;78(3):107–114. Available from: <https://hbr.org/2000/05/get-the-right-mix-of-bricks-and-clicks>.
 15. Greenberg P. CRM at the Speed of Light, Fourth Edition: Social CRM 2.0 Strategies, Tools, and Techniques for Engaging Your Customers (Consumer Application & Hardware - OMG). McGraw-Hill Education; 2008. Available from: <https://www.amazon.com/CRM-Speed-Light-Fourth-Application-ebook/dp/B002Z8R01C?SubscriptionId=0JYN1NVW651KCA56C102&tag=techkie-20&linkCode=xm2&camp=2025&creative=165953&creativeASIN=B002Z8R01C>.
 16. Quinton S, Harridge-March S. Relationships in online communities: the potential for marketers. *Journal of Research in Interactive Marketing*. 2010 mar;4(1):59–73. Available from: <https://doi.org/10.1108/17505931011033560>.
 17. TILOG LOGISTIX 2016. TILOG LOGISTIX 2016, The most Comprehensive Exhibition on Logistics Service Providers and Intralogistics Technologies and Solutions for ASEAN +6. BITEC, Bangkok.; 2016. Available from: http://www.tilog-logistix.com/index_en.html.
 18. Malhotra NK, Birks DF. *Marketing Research: An Applied Orientation*. Pearson; 2011. Available from: <https://www.amazon.com/Marketing-Research-Orientation-Naresh-Malhotra-ebook/dp/B007HDP7KE?SubscriptionId=0JYN1NVW651KCA56C102&tag=techkie-20&linkCode=xm2&camp=2025&creative=165953&creativeASIN=B007HDP7KE>.
 19. Cochran WG. *Sampling Techniques*. John Wiley & Sons; 1977. Available from: <https://www.amazon.com/Sampling-Techniques-William-G-Cochran/dp/B002B144QK?SubscriptionId=0JYN1NVW651KCA56C102&tag=techkie-20&linkCode=xm2&camp=2025&creative=165953&creativeASIN=B002B144QK>.
 20. Israel GD. *Determining Sample Size*; 1992. a series of the Program Evaluation and Organizational Development, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Available from: <http://www.sut.ac.th/im/data/read6.pdf>.
 21. Nunnally JC, Bernstein IH. *Psychometric Theory*. McGraw-Hill; 1994. Available from: <https://www.amazon.com/Psychometric-Theory-Jum-C-Nunnally/dp/007047849X?SubscriptionId=0JYN1NVW651KCA56C102&tag=techkie-20&linkCode=xm2&camp=2025&creative=165953&creativeASIN=007047849X>.

22. Madej D. Bar Code Interfaces. In: *Proceedings of the 2014 Multimedia, Interaction, Design and Innovation International Conference on Multimedia, Interaction, Design and Innovation*. MIDI '14. New York, NY, USA: ACM; 2014. p. 2:1–2:5. Available from: <http://doi.acm.org/10.1145/2643572.2643575>.

Biographies



Patnipa Adissarangoon received BBA. degree in Marketing and M.Sc. degree in Computer and Engineering Management from Assumption University, Thailand, in 2005 and 2007, respectively.

She is currently pursuing the Ph.D. degree in Computer and Engineering Management from Assumption University, Thailand.

Her current research interests are in E-Commerce and Customer

Relationship Management (CRM).



Sakuna Anuvareepong received BBA. degree in Business Computer, M.Sc. degree in Computer Information Systems, and Ph.D. degree in Computer and Engineering Management from Assumption University, Thailand, in 1982, 1991, and 2004, respectively.

She is presently a lecturer of Martine de Tours School of Management and Economics, Assumption University, Thailand.

Her current research interests are in the areas of Innovative Business, E-Commerce, Modules in E-Business (ERP, SCM, CRM), IT for Strategic Tourism and Hospitality Management, and IT for Strategic Logistics and Transportation Management.