Mahidol University
IT Management, Faculty of Engineering
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IEEE
THAILAND SECTION

MITiCON

The 2nd Management Innovation Technology International Conference

"Technology and Innovation Management for Societal and Global Challenges"

November 16-18, 2015

Bangkok, Thailand

Proceedings

Editor: Sotarat Thammaboosadee

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The 2nd Management Innovation Technology International Conference (MITiCON2015)

16-18 November 2015, Bangkok, Thailand

Conference Proceedings

Published by

www.miticon.org

Information Technology Management, Faculty of Engineering, Mahidol University

25/25 Putthamonthon sai 4 Rd., Salaya, Putthamonthon, Nakhonpathom, Thailand

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Welcome Message from the General Chair and Secretary

On behalf of the Organizing Committee, it is our greatest honor to welcome you to the 2nd Management and Innovation Technology International Conference (MITiCON2015), hosted at the Grand Mercure Fortune Bangkok Hotel, Thailand, 16–18th November 2015. MITiCON2015 is supported and sponsored by the Information Technology Management Program, Faculty of Engineering, Mahidol University, co-sponsored by the Graduated Studies of Commerce, Burapha University and supported by several industrial firms. The MITiCON2015 features a world-class conference that brings together researchers and practitioners in the field of management, innovation technology and information technology for the society and global challenges according to the conference theme: "Technology and Innovation Management for Societal and Global Challenges". MITiCON2015 provides an opportunity for academic and industry professionals to present and discuss the latest issues and research progress in the area of technology and innovation management such as IT and innovation management, knowledge management, technology assessment, strategic management, data management, IT corporate management, IT governance, Enterprise Architecture, business management, financial management, economics, policies management, educational management, and their social impacts. Additionally, other related engineering and science topics are also welcome.

This year we received 125 high-quality papers from more than 10 countries. Many papers demonstrated notable systems with empirical analyses. Many of them proposed interesting and outstanding researches in the related fields of innovation management. Each paper was reviewed by two reviewers. Based on these rigorous reviews, MITiCON2015 consequently accepted 73 papers in 7 research tracks for inclusion in the conference program. Therefore MITiCON2015 represents an acceptance rate around to 58%. All accepted

papers will be included in the Proceeding of Management and Innovation Technology International Conference.

The highlights of the conference include:

• Three Keynote speeches by researchers and executive from academic and industry:

- Dr. Smitti Darakorn Na Ayutthaya (Mahidol University), who gives a talk in "Innovation in the Digital Economy for National Policy of Thailand".

- Asst. Prof. Dr. Banpot Wiroonratch (Graduated Studies of Commerce, Burapha University), he provides an academic tutorial in Ph.D. research conduction.

- Ben Gerber (DBS Bank, Singapore), who gives a talk in "Understanding Privacy"

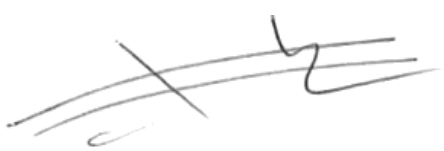
• 10 parallel sessions of international paper oral presentations throughout a two-day period

• 2 parallel sessions of local paper oral presentations on the last day of the conference; and

A series of social functions have been planned, which include a welcome reception, lunches, conference banquet at Grand Mercure Fortune Bangkok Hotel.

Apart from attending the technical program, you are encouraged to experience the magic of the Nightlife City, Bangkok, especially to the Ratchada area which the conference venue is located.

Last but not least, we would like to express our sincere gratitude to everyone involved in making the conference a success. Many thanks go to advisory board members, the organizing committees, the keynote speakers, the program committee and reviewers, the session chairs, the conference participants, and of course, to all the contributing authors who will be sharing the innovation and novelty of their high quality research. We wish our best wishes for an awesome staying in Thailand!



Asst. Prof. Dr. Supaporn Kiattisin
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Keynote Speech

Innovation in the Digital Economy for National Policy of Thailand

Dr. Smitti Darakorn Na Ayutthaya

On behalf of the Royal Thailand Government has pledged to promote the digital economy for transformation. The Ministry of Information and Communication Technology is joining hands with the Federation of Thai Industries in translating the Government's policy on the digital economy into action. Thai economy in 2015 would grow by about 4 percent. The digital economy in the industrial sector, SME operators would be urged to adopt e-business as a new channel for their business operations. "Digital economy" refers to an economy that is based on digital technologies, which are rapidly transforming both business practices and societies. The Thai government is giving a boost to the digital economy in order to enhance the competitiveness of the Thai industrial sector and prepare Thailand for the ASEAN Economic Community. In response to this policy, entrepreneurs and operators of the digital business will be created and developed, so that they will become a driving force for the country's productivity.

Keynote Speech

The Conduct of Dissertation:

The questions must be answered is

how the discovered models can be really used

Asst. Prof. Dr. Banpot Wiroonratch

Mostly research methodology for social sciences are carried out in three steps. 1. What is the original idea? 2. What is the problem found? 3. What the new idea is. Whenever you can answer these questions you can complete you research. Addition, the used sample size and statistic should be suitable as well.

Keynote Speech

Understanding Privacy

Ben Gerber

Data is driving opportunity and increasing quality of life across the world. To realize these opportunities, organizations must demonstrate they are trustworthy and value privacy as a social good by handling data responsibly.

What is privacy? Where do privacy expectations originate from? What does your organization need to do to respect privacy, and meet or exceed the expectations of customers, constituents and regulators? This session will provide the audience with an understanding of international privacy concepts, legal and regulatory requirements and best practices.

Conference Agenda

The 2nd Management and Innovation Technology International Conference (MITiCON2015)

16 - 18 November 2015, Bangkok, Thailand

Grand Mercure Bangkok Fortune Hotel

November 16, 2015		
4:30 pm to 6:30 pm	**Registration and Reception Lobby, Fl.1**	
November 17, 2015		
8:30 am to 10:00 am	**Registration and Reception Room: Grand Mercure 4, Fl.3**	
9:30 am to 10:00 am	**Opening Ceremonies Room:Grand Mercure 4, Fl.3**	
10:00 am to 10:45 am	**Keynote Speech-I Presenter:Dr. Smitti Darakorn Na Ayutthaya Topic:Digital Economy Room:Grand Mercure 4, Fl.3**	
10:45 am to 11:00 am	*Coffee Break*	
11:00 am to 11:30 am	**Keynote Speech-II Presenter:Asst. Prof. Dr. Banpot Wiroonratch Topic:The Conduct of Dissertation (presented in Thai) Room:Grand Mercure 4, Fl.3**	
11:30 am to 1:00 pm	**Lunch Location: One Rachada, Fl. G**	
1:00 pm to 5:30 pm	**PRESENTATION**	
1:00 pm to 2:15 pm	**Track-IM1 Information Technology and Innovation Management Session Chair: *Asst. Prof. Dr. Adisorn Leelasantitham* Room: Grand Mercure 3, Fl.3**	**Track-EM&PS Educational Management & Policies Management and Social Aspects Session Chair: *Dr. Sarunya Lertputtarak* Room: Grand Mercure 4, Fl.3**
1:00 pm to 1:15 pm	**IM-044** IT Management for SCM and Logistics in Agricultural Product Industry *Thongchai Surinwarangkoon*	**PS-026** Personal Factors Affecting Visionary Leadership for Supply Chain Management in the Manufacture Industrial of Thailand: An Empirical Study *Kasem Bunnoiko, Walailak Atthirawong*
1:15 pm to 1:30 pm	**IM-066** Requirement Prioritization for Software Release Planning Based on Customer Value with Analytic Hierachy Process *Alissara Chindapornsopit, Taweesak Samanchuen*	**PS-025** "Facebook" a Dreamlike Stage: Big Data Features, Performance, and Neoliberal Economic Approaches *Sustarum Thammaboosadee, Rubkwan Thammaboosadee, Sotarat Thammaboosadee*
1:30 pm to 1:45 pm	**IM-056** A Truck Tires Usage Worthiness Prediction Model *Nakarin Prateeppattanatumrong, Sotarat Thammaboosadee*	**EM-054** Constructing a Risk Behavior Guideline for Adolescent Students using Decision Tree *Surin Aunsan, Sotarat Thammaboosadee*
1:45 pm to 2:00 pm	**IM-075** The Hierarchical Technology Valuation Model for Big Data Technology Applied in Recruitment *Thiti Noydee, Sotarat Thammaboosadee*	**EM-057** Analyzing the Characteristics of Maths and English Tablet-based Games for Primary School Children *Hsu Nang, Antony Harfield, Ratchada Viriyapong*
2:00 pm to 2:15 pm	**IM-086** Of Online Community: Clustering Group of Compatible Mentor and Mentee *Pratya Nuankaew, Punnarumol Temdee*	**EM-027** A Study of Relationships of Attitudes and Behaviors towards to Usage of Google Translate of IT Students *Onwara Thanongsaksakul, Sotarat Thammaboosadee, Rubkwan Thammaboosadee*
2:15 pm to 2:30 pm	*Coffee Break*	
2:30 pm to 4:00 pm	**Track-IM2 Information Technology and Innovation Management Session Chair: *Emeritus Prof. Lance Fung* Room: Grand Mercure 3, Fl.3**	**Track-EM Educational Management Session Chair: *Dr. Jean Paolo G. Lacap* Room: Grand Mercure 4, Fl.3**

2:30 pm to 2:45 pm	**IM-062** Analysis of Global Mobile Device in Thailand *Panyaphat Aekitsawatwikul, Adisorn Leelasantitham, Supaporn Kiattisin, Smitti Darakorn Na Ayuthaya*	**EM-049** Application of BIM into Civil Engineering Management Class *Thoedtida Thipparat, Narong Chaisongkroh, Nonthachart Kulprapa, Thongpoon Thaseepetch*
2:45 pm to 3:00 pm	**IM-055** CRM Strategies discovered by Clustering Technique and Business Intelligence; case study in Chemical Industry *Thanakal Yotsomsak, Sotarat Thammaboosadee*	**EM-050** Application of QFD to Design a Course in Building Information Modeling (BIM) *Thoedtida Thipparat, Narong Chaisongkroh, Nonthachart Kulprapa, Sunantha Srisopha*
3:00 pm to 3:15 pm	**IM-005** Information Format-Shopping Orientation Fit in Mobile Commerce App: A Contradiction between Functional and Psychological Consequences *Chiang-Yu, Cheng, Yu-Tsu Lin, Chih-Wei, Cheng*	**EM-016** The Preparation of Vietnamese Students at Burapha University for Asean Economic Community (AEC) Skilled Labour Market *Chinh Bui Xuan, Saranya Lertbuddharak, Sirinya Chokchaiworarat*
3:15 pm to 3:30 pm	**IM-009** A Web-and-Android-Based Crime Data Retrieval System: A Case Study: Investigation Sub-Division Chiangrai Police Station *Thammavich Wongsamerchue, Wimol San-Um*	**EM-002** A Framework for Empowering Teachers to Author Interactive Content for Tablet Classroom Activities *Siwawes Wongcharoen, Jaratsri Rungrattanaubol, Antony Harfield*
3:30 pm to 3:45 pm	**IM-053** Semantic Ontology for Fine Arts Knowledge Management *Wassana Ouppala, Sotarat Thammaboosadee*	**EM-087** Classification of Basic Computer Skills for Skill Based Online Learning *Sataworn Chaichumpa, Santichai Wicha, Punnarumol Temdee*
3:45 pm to 4:00 pm	**IM-046** The Model Development of Incremental Innovation Affecting Organization Performance of Thailand Furniture Industry *Kitipong Tangkit, Vinai Panjakajornsak*	**EM-052** Univeristy Students' Year Level, Gender, and Entrepreneurial Attitude Orientation: The Case of Management and Entrepreneurship Students of a Philippine Higher Education Institution *Jean Paolo G. Lacap*
4:00 pm to 5:30 pm	**Track-EG** **Engineering, Science, and Technology Management** **Session Chair: *Prof. Dr. B. K. Pal*** **Room: Grand Mercure 3, Fl.3**	**Track-IT1** **Computer Engineering, Computer Science, Information Technology,and Software Engineering** **Session Chair: *Dr. Taweesak Samanchuen*** **Room: Grand Mercure 4, Fl.3**
4:00 pm to 4:15 pm	**EG-068** Occupational Health Hazards Vis-à-vis Industrial Safetyand Environmental Degradation – Case Studies *Dr. B. K. Pal, Sunil Kumar Bisoyi, Deepak Majhi, Susil Kumar Bisoyi*	**IT-061** Efficient Compact Join Algorithm for Acyclic Conjunctive SPARQL *Jaesung Lee, Dongguk Kim, Kyungsun Kim, Hanmin Jung*
4:15 pm to 4:30 pm	**EG-071** Optimal routing model for multi modal transportation *Thanawat Bamrungthai, Supaporn Kiattisin, Smitti Darakorn Na Ayuthaya*	**IT-070** A Development of Efficient Routing Algorithm Applied in Transportation Networks *Tun Tun Naing, Sunantha Sodsee*
4:30 pm to 4:45 pm	**EG-063** The Development of Distributed Sensors Network for Measurement of Thermal Comfort in Academic Classroom *Wipawadee Wongsuwan, Wimol San-Um*	**IT-065** A Verification of Instantaneous Acoustic Emission Signals Based on ASTM E976-94 Standard through Short-Time Fourier Transform Method *Jirayu Samkunta, Wimol San-Um*
4:45 pm to 5:00 pm	**EG-001** A Structural Equation Model Development of Environmental Performance and Economic Performance of The Electrical and Electronics Industry in Thailand *Surin Wichchuwong, Vinai Panjakajornsak, Amnuay Saengnoree*	**IT-064** An Image Encryption Scheme and Its Android Application using Robust Chaotic Map with Absolute Value Nonlinearity *Sivapong Nilwong, Wimol San-Um*
5:00 pm to 5:15 pm	**EG-038** Application of AHP and VIKOR for Chemical Product Selection *Thoedtida Thipparat, Narong Chaisongkroh*	**IT-039** Emotion Recognition using EEG data with a Multiple Classification Framework *Anuchin Chatchinarat, Chun Che Fung, Kok Wai Wong*
5:15 pm to 5:30 pm	**EG-051** 4D Application for Energy Building Project *Thoedtida Thipparat, Narong Chaisongkroh*	**IT-032** Improving Classification Performance with Complementary Fuzzy-Based Neural Networks *Ratchakoon Pruengkarn, Chun Che Fung, Kok Wai Wong, Worapat Paireekreng*
5:30 pm to 5:45 pm	**EG-090** Design of Thermoelectric-Based Cooling System used for Portable Application *Teerapon Thongpasri, Surapong Pongyupinpanich*	
6:30 pm to 8:30 pm	**Evening Reception** **Location: Rim Suan, Fl.12**	

November 18, 2015	
8:30 am to 9:00 am	**Registration and Reception** **Room: Grand Mercure 4, Fl.3**
9:15 am to 11:45 am	**MORNING PRESENTATION**

9:15 am to 10:30 am	**Track-EA&IT** **Enterprise Architecture, IT Corporate Management, and IT Governance** **Session Chair: *Prush Sa-Nga-Ngam*** **Room: Grand Mercure 3, Fl.3**	**Track-BM1** **Business, Marketing, Strategic, and Financial Management** **Session Chair: *Asst. Prof. Dr.Yordying Thanatawee*** **Room: Grand Mercure 4, Fl.3**
9:15 am to 9:30 am	**EA-030** The Factors Affecting to Acceptable Behaviors of Enterprise Resource Planning *Mathuros Panmuang, Chonnikarn Rormorn, Khuanwara Potiwara*	**BM-010** The Use of Social Media for Corporate Disclosure by Companies Listed in the GCC *Ehab K. A. Mohamed, Mohamed A. K. Basuony*
9:30 am to 9:45 am	**EA-074** Economic Analysis of the Information System Investment Using Cost and Benefit Analysis (CBA) Method *Leo Willyanto Santoso, Yulia, Imelia Widjanadi*	**BM-014** A Study of the Core Competencies Affecting the Performance of Security Investment Consultant at Security Companies in the Stock Exchange of Thailand *Phatre Friestad*
9:45 am to 10:00 am	**EA-076** IT Investment Evaluation Using Multi Objective Multi Criteria: Case Study on an Expedition Company *Yulia, Leo Willyanto Santoso, Danny Tantra*	**BM-034** Employee or Employer? Entrepreneurial Perspectives of Tourism Management Students of a Higher Education Institution in Angeles City, Philippines *Darriel B. Mendoza, Jean Paolo G. Lacap*
10:00 am to 10:15 am	**IT-077** Towards an Internet-of-Things aware Process Modeling Method - An Example for a House Suveillance System Process Model *Roland Petrasch, Roman Hentschke*	**BM-060** A Structural Equation Model Development of Service Quality, Brand Image, and Switching Deterrents Affecting Customer Loyalty for Mobile Service Providers in Thailand *Patcharanan Klankaew, Amnuay Saengnoree, Vinai Panjakajornsak*
10:15 am to 10:30 am	**IT-033** Management of Internet Bandwidth Using Machine Learning Technique *Hari Suparwito, Hong Xie, Chun Che Fung, Shri Rai*	**BM-045** The Role of Regulatory Focus on Promotional Mental Accounts *Pei-Ru, Li, Po-Shun, Chen, Chia-Jung Chang*
10:30 am to 10:45 am	*Coffee Break*	
10:45 am to 12:00 am	**Track-IT2** **Computer Engineering, Computer Science, Information Technology,and Software Engineering** **Session Chair: *Dr. Sotarat Thammaboosadee*** **Room: Grand Mercure 3, Fl.3**	**Track-BM2** **Business, Marketing, Strategic, and Financial Management** **Session Chair: *Dr. Supasit Lertbuasin*** **Room: Grand Mercure 4, Fl.3**
10:45 am to 11:00 am	**IT-073** Implementing Historical Aspects of Majapahit Empire in A Turn Based Strategy Game *Liliana, Gregorius Satia Budhi, Silvia Rostianingsih, Erandaru*	**BM-007** A Structural Equation Model Development of Service Quality Customer Satisfaction and Relationship Quality That Affect Customer Loyalty of Sea Freight Forwarders in Thailand *Teewin Narunart, Vinai Panjakajornsak*
11:00 am to 11:15 am	**IT-079** Comparison Between Shape-based And Area-based Features Extraction for Java Character Recognition *Rudy Adipranata, Gregorius Satia Budhi, Liliana, Bondan Sebastian*	**BM-040** A Causal Model of Innovation Capability, Market Orientation and Absorptive Capacity Affecting Competitive Advantage of Thailand Rubber Industry *Prapapan Mantam, Vinai Panjakajornsak*
11:15 am to 11:30 am	**IT-078** The Use of Probabilistic Neural Network and ID3 Algorithm for Java Character Recognition *Gregorius Satia Budhi, Rudy Adipranata, Bondan Sebastian, Liliana*	**BM-015** The Preparedness to Apply Total Quality Mangement in Production: a Case Study of a Company Making Metallic Coated Steel in Rayong Province *Jarun Suantai, Surat Supitchayangkul, Sarayuth Chokchaiworarat*
11:30 am to 11:45 am	**IT-083** Nudity Detection Using Combination of Color-Based and Morphological Methods *Sangjun Rattanee, Werapon Chiracharit*	**BM-017** Activity Types and Agro-tourism Route at Khun Dan Prakarn Chon Dam, Nakorn Nayok Province *Nitt Visesphan, Sarunya Lertputtarak, Wilailuk Khamloy*
11:45 am to 12:00 pm	**IT-069** Applying Item Category Rating in Recommendation Systems *Thanaphon Phukseng, Nawaporn Wisitpongphan, Sunantha Sodsee*	**BM-035** Value Analysis of Cyber Security Based on Attack Types *Mehrnaz Akbari Roumani, Chun Che Fung, Shri Rai, Hong Xie*
12:00 pm to 1:00 pm	**Lunch** **Location: One Rachada, Fl. G**	
1:00 pm to 1:30 pm	**Keynote Speech-III** **Presenter: Ben Gerber** **Topic: Understanding Privacy** **Room:Grand Mercure 4, Fl.3**	
1:45 pm to 4:15 pm	**LOCAL PRESENTATION (Thai Tracks)**	
1:45 pm to 4:15 pm	**Track-TT1** **Thai Track I** **Session Chair: *Manutsiri Chansutthirangkool*** **Room: Grand Mercure 3, Fl.3**	**Track-TT2** **Thai Track II** **Session Chair: *Dr. Taweesak Samanchuen*** **Room: Grand Mercure 4, Fl.3**
1:45 pm to 2:00 pm	**TT-012** การสรรหาเงินฝากเชิงกลยุทธ์ธนาคารออมสินในเขตอำเภอวิหารแดงจังหวัดสระบุรี *พรพรรณ รักษาค, ภูวรินทร์ นิลรังษี, ธีทัต ตรีศิริโชติ*	**TT-028** ผลกระทบจากอิทธิพลส่งผ่านของนวัตกรรมผลิตภัณฑ์ระหว่างสารสนเทศในการจัดการความรู้และการบรรลุเป้าหมายองค์กร *นจรี ภาคาสัตย์, ศักดิ์ชาย จันทร์เรือง*

2:00 pm to 2:15 pm	**TT-047** การพัฒนาชุดจำลองเครือข่ายคอมพิวเตอร์บนพื้นฐานของ Dummynet: การกำเนิด Jitter *จรัสพงศ์ กาญจนลักษณ์, เทอดพงษ์ แดงสี, ดุลย์ ไตรยสรรค์, พงษ์พิสิฐ วุฒิดิษฐโชติ*	**TT-080** การประเมินประสิทธิภาพการดำเนินงานด่านชายแดนไทยด้วยวิธีการวิเคราะห์การวางกรอบข้อมูล *ดำรงพล ชนะวรรณ, จิรพรรณ เลี่ยงโรคาพาธ, อดิศร ลีลาสันติธรรม, สุภาภรณ์ เกียรติสิน, สมิทธิ ดาราภร ณ อยุธยา*
2:15 pm to 2:30 pm	**TT-019** การพัฒนาสื่อประชาสัมพันธ์หลักเกณฑ์การจัดเก็บภาษีห้างหุ้นส่วนสามัญและคณะบุคคลที่มิใช่นิติบุคคล *เยาวลักษณ์ วรกานต์ทวีกิจ, นพดล เดชประเสริฐ*	**TT-085** การตรวจหาภาพปีนโดยการแปลงลักษณะเด่นแบบไม่แปรผันตามขนาด *สุเมธ คำง่าเมือง,วีรพล จิรจริต*
2:30 pm to 2:45 pm	**TT-020** การพัฒนาคุณสมบัติของข้อมูลสถิติเศรษฐกิจภาคต่างประเทศของธนาคารแห่งประเทศไทย *รวี อาณาบาล, สุชนนี เมธิโยธิน*	**TT-021** แนวทางการพัฒนาการจัดเก็บภาษีอากรและลดจำนวนผู้เสียภาษีที่เป็นกลุ่มเสี่ยงของสำนักงานสรรพากรพื้นที่นนทบุรี 2 *เรียม เขียนทอง, นพดล เดชประเสริฐ*
2:45 pm to 3:00 pm	*Coffee Break*	
3:00 pm to 3:15 pm	**TT-081** การเปรียบเทียบคุณลักษณะและประสิทธิภาพเครื่องแม่ข่ายเสมือนแบบก้อนเมฆของศูนย์ข้อมูลกลาง Uninet ระหว่าง ยูคาลิปตัสคราวด์และไมโครซอฟท์ซิสเต็มเซ็นเตอร์ 2012 *ศรัด จันทร์ไกร, สุภาภรณ์ เกียรติสิน, อดิศร ลีลาสันติธรรม, สมิทธิ ดาราภร ณ*	**TT-089** การวิเคราะห์สมรรถนะการทำงานของโรงไฟฟ้าพลังงานร่วม: กรณีศึกษา *อัญชิตา จิตตามัย, สุเมธ เนติสัตตานนท์*
3:15 pm to 3:30 pm	**TT-004** การเปรียบเทียบประสิทธิภาพการทำงานของ Extract, Transform and Loading (ETL) โดยใช้ต้นไม้การตัดสินใจและตรรกศาสตร์คลุมเครือ *ณัฐพล นาคบัวแก้ว, สุภาภรณ์ เกียรติสิน, อดิศร ลีลาสันติธรรม, โชษาศรัดต ธรรมบุษดี สมิทธิ ดาราภร ณ อยุธยา*	**TT-018** มาตรฐานการบริการคนไร้ที่พึ่งนนทบุรี ในสถานแรกรับคนไร้ที่พึ่งนนทบุรี *ณัฐสิมี วรัตน์กลบันทร์, นพดล เดชประเสริฐ*
3:30 pm to 3:45 pm	**TT-023** การบริหารจัดการที่ส่งผลต่อการมีส่วนร่วมในการพัฒนาสถานทำงานน่าอยู่ น่าทำงานของพนักงานและข้าราชการ สำนักนโยบายและยุทธศาสตร์ สำนักงานปลัดกระทรวงสาธารณสุข *สโรชิน สหสาคร, สุชนนี เมธิโยธิน*	**TT-022** แนวทางการปฏิบัติงานในการเข้าถึงมวลชนของหน่วยทหารระดับกองร้อยในพื้นที่หน่วยเฉพาะกิจยะลา ระหว่างปี 2552 - 2557 *วาทินี สุวรรณรักษ์, สุชนนี เมธิโยธิน*
3:45 pm to 4:00 pm	**TT-091** การลดสัญญาณรบกวนข้ามช่องใน VLSI Design โดยใช้ทฤษฎีกบกระโดด *อดิศักดิ์ จีบคำพล, นุสรา ฮวดโพธิ์พันธ์, อภิชาต ดีรประเสริฐสิน*	**TT-092** การจัดวางโครงสร้าง VLSI Chip เพื่อลดเส้นทางการเชื่อมต่อโดยใช้ทฤษฎีกบกระโดด *วิไลพร แหว่กระโทก, สิทธิพงศ์ ชวนโพธิ์, พรภัสสร อ่อนเกิด, อภิชาต ดีรประเสริฐสิน*
4:00 pm to 4:15 pm	**TT-094** Designing the Governance and Measurement Model for Thailand Mobile Connect Service by Utilising the TM Forum eTOM and ISO 38500 Framework *Mahasak Pijittum , Supaporn Kiattisin, Smitti Darakorn Na Ayuthaya*	**TT-093** การออกแบบจัดวางผังโรงงานเพื่อลดขั้นตอนการเดินทางโดยใช้เทคนิคซัฟเฟิลฟรอกลิปปิง *อนัญญา ศรีวงษ์, สิรินทิพย์ วันจันทึก, ประกาย นาคี, อภิชาต ดีรประเสริฐสิน*

IT Investment Evaluation Using Multi Objective Multi Criteria: Case Study on an Expedition Company

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***Abstract*—Information Technology (IT) is an essential part of a company. IT can enhance the company's strategic position by helping them to take the next step in productivity and profitability. However, in many cases, there are failures in IT investment. IT investment only increases costs and does not provide any benefit for the company. IT investment must be aligned with the company's strategy. Business needs for IT also has to be prioritized. Projects should be initiated and scheduled based on priorities and availability of IT resources. This paper describes a model based on Multi Objective Multi Criteria (MOMC) to help determining priorities in IT investment. The MOMC approach can reflect both tangible and intangible benefits, associate the investment to company strategies, and suggest important features on application portfolio selection. In addition, a case study of an expedition company is presented in which the model has been applied. This company determined the priority in selecting IT applications to be invested using MOMC model.**

Keywords— Information technology investment, MOMC, application portfolio

I. INTRODUCTION

One way to maximize IT investment is by considering how an IT project is initiated today. First, the need for the project is identified by a business unit or department. Then these business needs for IT supports are prioritized. Projects are initiated and scheduled based on priorities and availability of IT resources. This approach is focused on allocating IT resources, the resources which are insufficient to meet IT's backlog of project work.

During the previous research (Fig. 1), a process of a strategic planning information system has been conducted for an expedition company. The process consisted of Porter Value System Analysis, SWOT Analysis, TOWS Analysis, which generated a strategy for this company. This research conducted a selection both for the most needed application as well as most aligned to the strategy of the company using multi objective multi criteria (MOMC) methods. This method consisted of Balanced Scorecard (BSC) from four different viewpoints, Critical Success Factors (CSF), and Analytical Hierarchy Process (AHP).

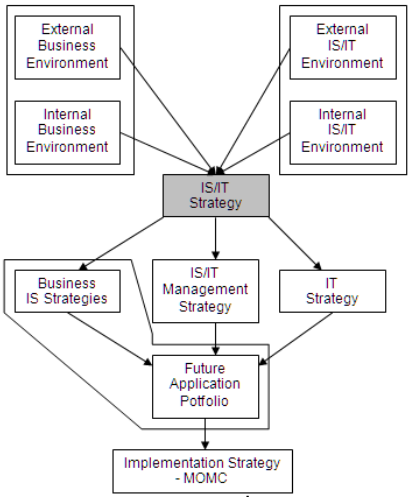

Fig. 1. IS/IT Strategic Model [10]

II. THEORY

A. *Multi Objective Multi Criteria (MOMC)*

Corresponding with its name, this method finds the most optimal solution for a problem having multiple objectives [3]. This is the best decision making method by considering various objectives, costs and benefits in a company. Besides, this method allows a selection process for optimization to be conducted [7]. This MOMC method covers several research methodologies such as Balance Scorecard (BSC), Critical Success Factors (CSF), Delphi Method and Analytical Hierarchy Process (AHP).

MOMC is a pretty much used variant of Cost Benefit Analysis [5][2]. This method is developed due to the reality that a company is holding a number of stakeholders having different views on the costs and benefits of many information technology aspects or elements [8] Every information technology project definitely has objectives to be met. It often has more than one objective as each stakeholder, as a decision maker, has different viewpoints towards that objective. Therefore each party has the right to give weight to the objective, for instance viewed from the priority side or the significant impact of the investment. Then the value that has been synchronized with the costs and benefits is multiplied by each weight to obtain the end result.

B. Balanced Scored Card (BSC)

This is a method which changes the concept and working steps of a company to be objective and measurable. If the company is going to do some improvement in something intangible, the result of the intangible measurement has to be integrated into the management system of the company [4]. In this case, the ones categorized as intangible are the concept and working steps of a company. To be integrated into the management system of the company, the concept and working steps have to be analyzed using BSC method. The analysis using BSC method involves 4 perspectives:

- Financial Perspective
- Customer Perspective
- Learning and Growth Perspective
- Internal Business Perspective

By analyzing the 4 perspectives, the Company Strategic Planning will be generated [7].

C. Critical Success Factor (CSF)

This method is a series of requirements, if owned by a company, will ensure the success of the company. CSF of the company can be obtained by comparing the company strategy with the result of the Balanced Scorecard analysis from various viewpoints. Then the CSF of the company for each view point will be obtained [7].

D. Analytical Hierarchy Process (AHP)

This method helps decision makers to select the best solution out of a number of choices and selection criteria [1]. In assigning weights, some errors might happen, due to the lack of consideration or some contradiction in assigning weights. Using AHP method, the weight assignment to the criteria, can be conducted with various consideration and calculation that can minimize errors [7]. AHP is one of the current main mathematical models, used to give supports in decision making theory [9]. The first stage in using AHP is to determine clear criteria for the selection [6].

III. ANALYSIS USING BSC & CSF

The strategy resulted from the previous analysis was analyzed again using the BSC method. Each strategy was grouped into four BSC viewpoints, such as Financial Perspective, Internal Business Perspective, Innovation Perspective, and Customer Perspective.

TABLE I BSC – FINANCIAL PERSPECTIVE

▪ Reduction of losses due to cost compensation on the damaged and lost property of the customers ▪ Minimizing the operational cost by improving the use of carriages sharing system at the company ▪ Improving the company competitiveness by surpassing the cost as minimal as possible

TABLE 2 BSC – INTERNAL BUSINESS PERSPECTIVE

▪ Improving the speed of delivery process closer to the delivery process using airfreight. ▪ Addition of the numbers of railway carriages, car and truck of the company. ▪ Improving the organization structure of the company ▪ Developing a wider marketing scale of the company ▪ Improving the communication and information exchange systems among divisions in the company ▪ Improving the company competitiveness by providing more services compared to those of other companies ▪ Improving the security, management, and inventory systems of the property at the company warehouse

TABLE 3 BSC - INNOVATION PERSPECTIVE

▪ Applying the checking system of the shipment content and the calculation of the shipment value to be able to determine the treatment for the shipment to minimize the company loss ▪ Improving the efficiency process in the business activities of the company using the support of technology ▪ Developing the form of the business into a new one. as a delivery boarding out service provider for other companies that have no carriages ▪ Developing the delivery form of the company not only using railway but using airfreight as the fast delivery service of the company ▪ Applying the route management system based on priorities, target address, numbers and sizes of the shipment. ▪ Appling the forecasting system towards the everyday number of customers who would like their property to be shipped.

TABLE 4 BSC - CUSTOMER PERSPECTIVE

▪ Applying CRM using the support of technology

After grouping the strategy into four BSC perspectives had been conducted, CSF analysis of the company of each strategy was conducted. With regard to the company strategy and company CSF, an IS analysis could be developed. This analysis was needed to support the company strategy. The following Table 5 is an example of CSF analysis on the financial perspective.

TABLE 5 CSF

Financial			
Objective	Measure(s)	Action (CSF)	IS Need
▪ Reduction of losses due to cost compensation on the damaged and lost property of the customers	▪ Number of damaged property ▪ Number of lost	▪ Systematic, orderly and secure shipment management	▪ An inventory control using RFID to simplify the shipment inventory and security process. ▪ Position management for placing the shipment

			at the warehouse and railway carriages supported by Mixed Reality System (MREAL) in the form of Warehouse Planning ▪ A Warehouse security system using CCTV

IV. APPLICATION PORTFOLIO

IS and IT resulted from the CSF analysis were categorized into 4 parts at the application portfolio such as strategic, key operational, high potential, and support. The categorization depended on their contribution towards the success of the company business. The Application Portfolio resulted can be viewed at Table 6.

V. MULTI OBJECTIVE MULTI CRITERIA

The next process was using Delphi method to determine the criteria and sub-criteria. This method generated some criteria and sub-criteria as shown on Figure 2. The criteria and sub-criteria were further analysed using AHP to determine the priority of the company IT implementation process.

AHP analysis was conducted using Expert Choice Program. The analysis process was started by determining the goal. In this case the goal of the AHP was to determine the Implementation Project Portfolio Priority. The next step was to determine the alternatives. In this case the entire IT application portfolio was used as the alternatives. This process was followed by the weighting process. Figure 2 is the result of the weighting process of the criteria and sub-criteria.

The results of the weighting process shown in Figure 2, showed that the most important criteria for the company was Minimizing risks which had a point of 0.4. The least important criteria was improving the financial advantage which had a point of 0.107.

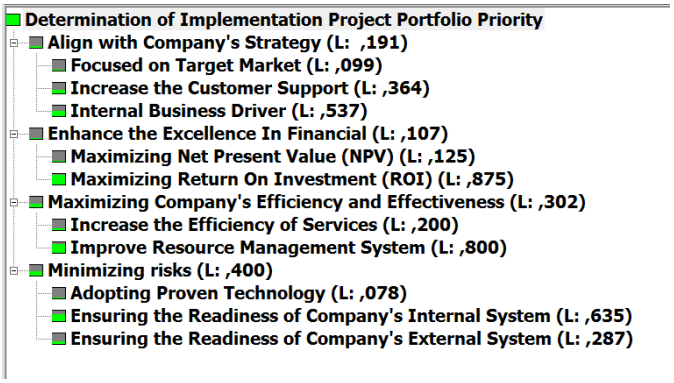

Fig 2. Determining IT Priority

The results of the IT implementation priority determination at the company can be viewed at Figure 3.

TABLE 6 APPLICATION PORTFOLIO

STRATEGIC	HIGH POTENTIAL
▪ CCTV. ▪ The company official website as an online marketing media. ▪ RFID for inventory control. ▪ Forecasting software. ▪ CRM software ▪ X-Ray Machine for inspecting the shipment's content. ▪ Features on shipment route management based on the priority of the shipment delivery location, and the size of the shipment at the Company operational software ▪ GPS for location tracking towards delivery unit ▪ GPS for determining the best delivery route ▪ Shipment value column at the shipment table at the company operational software	▪ MREAL for warehouse planning. ▪ Features on online order, location delivery checking and the shipment status checking at the company official website
▪ Features on the data maintenance of shipment, customers, and suppliers as well as receipts, loading lists, travel documents and invoices writings at the Company operational software	▪ Features on the data maintenance of the partnering companies at the Company operational software ▪ Feature on data maintenance of customers at the Company operational software ▪ The facility of crypto payment for the online order feature at the company official website
KEY OPERATIONAL	SUPPORT

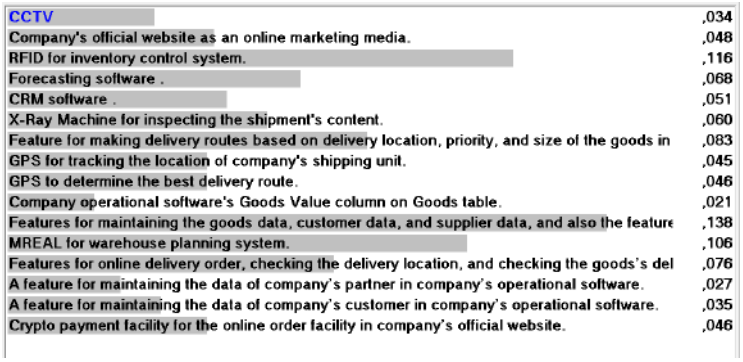

Fig 3. The results of IT Implementation Priority Determination

TABLE 7 THE IT IMPLEMENTATION WEIGHTING ORDER

IT	Criteria				Total weights
	Aligning with the Company Strategy	Increasing the Financial Excellence	Maximizing the Company Efficiency and Effectiveness	Minimizing Risks	
CCTV	0,043	0,040	0,028	0,034	0,034
The company official website as an online marketing media	0,043	0,073	0,059	0,036	0,048
RFID for inventory control	0,080	0,075	0,139	0,128	0,116
Forecasting Software	0,062	0,093	0,082	0,054	0,068
CRM Software	0,073	0,066	0,047	0,039	0,051
CX-Ray Machine for inspecting the shipment's content	0,027	0,021	0,023	0,111	0,060
features on shipment route management based on the priority of the shipment delivery location and the size of the shipment at the company operational software	0,094	0,117	0,091	0,062	0,083
GPS for location tracking towards delivery unit	0,044	0,029	0,037	0,057	0,045
GPS for determining the best delivery route	0,043	0,040	0,042	0,052	0,046
Shipment value column at the shipment table at the company operational software	0,026	0,022	0,020	0,018	0,021
Features on the data maintenance of shipment, customer, and supplier as well as receipts, loading lists, travel documents and invoices writings at the company operational software	0,122	0,141	0,155	0,133	0,138
MREAL for warehouse planning	0,069	0,075	0,105	0,130	0,106
Features on Online order, location delivery checking and the shipment status checking at the company official website	0,098	0,111	0,080	0,054	0,076
Feature on partnering companies data maintenance at the operational company software	0,034	0,029	0,028	0,022	0,027
Feature on customer data maintenance at the company operational software	0,060	0,037	0,033	0,024	0,035
the facility of crypto payment for the online order feature at the company official website	0,082	0,033	0,032	0,044	0,046

The results of the weighting process at Figure 3 and Table 7, showed that:

- The 1st order is "Features on the data maintenance of shipment, customers, and suppliers as well as receipts, loading lists, travel documents and invoices writings at the integrated company operational software which can be accessed online", as many as 0,138
- The 2nd order is "RFID for Inventory control", as many as 0,116
- The 3rd order is "MREAL for warehouse planning", as many as 0,106
- The 4th order is "features on shipment route management based on the priority of the shipment delivery location and the size of the shipment at the company operational software", as many as 0,083
- The 5th order is" Features on Online order, location delivery checking and the shipment status checking at the official company website". as many as 0,076
- The 6th order is "Software forecasting", as many as 0,068
- The 7th order is "X-Ray Machine for checking the shipment's content" ,as many as 0,060
- The 8th order is "CRM Software", as many as 0,051
- The 9th order is "The company official website as an online marketing media", as many as 0,048
- The 10th order is "GPS for determining the best delivery route and the facility of crypto payment for the online order feature at the company official website", as many as 0.046
- The 11th order is "The GPS for location tracking towards delivery unit", as many as 0,045
- The 12th order is "Feature on customer data maintenance at the company operational software", as many as 0,035
- The 13rd order is "CCTV", as many as 0,034
- The 14th is "Feature on partnering companies data maintenance at the operational company software", as many as 0,027
- The last order is the "Shipment value column at the shipment table at the company operational software", as many as 0.027

VI. CONCLUSION

- The Critical Success Factors owned by PT. X shows that PT. X is a company applying a modern system, structured, orderly and using the support of integrated modern technology. Thus the company is able to run the business process efficiently, orderly and secure
- Currently the company most needed IT application, which is also the key operational of the company, is the development of "Features on the data maintenance of shipment, customers, and suppliers as well as receipts, loading lists, travel documents and invoices writings at the integrated company operational software which can be accessed online".

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to

Leo Willyanto Santoso

"IT Investment Evaluation Using Multi Objective
Multi Criteria: Case – Study on an Expedition Company"

The 2nd Management Innovation Technology International Conference (MITiCON2015)

November 16-18, 2015 Bangkok Thailand

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