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IT Management, Faculty of Engineering
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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: Sotarath Thammaboosadee

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MITiCON2015 Secretary

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
MITiCON2015 General Chair



Dr. Sotarot Thammaboosadee
MITiCON2015 Secretary

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- Sarunya Lertputtarak, BUU
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- Werapon Chirachalit, KMUTT
- Wimol San-umm, TNI
- Yordying Thanatawee, BUU

Conference Secretary

- Sotarat Thammaboosadee, MU

Web Developer

- Nuttakorn Penchotiros

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 <u>Thongchai Surinwarangkoon</u>	PS-026 Personal Factors Affecting Visionary Leadership for Supply Chain Management in the Manufacture Industrial of Thailand: An Empirical Study <u>Kasem Bunnoiko, Walailak Atthirawong</u>
1:15 pm to 1:30 pm	IM-066 Requirement Prioritization for Software Release Planning Based on Customer Value with Analytic Hierachy Process <u>Alissara Chindapornsopit, Taweesak Samanchuen</u>	PS-025 "Facebook" a Dreamlike Stage: Big Data Features, Performance, and Neoliberal Economic Approaches <u>Sustarum Thammaboosadee, Rubkwan Thammaboosadee, Sotarathammaboosadee</u>
1:30 pm to 1:45 pm	IM-056 A Truck Tires Usage Worthiness Prediction Model <u>Nakarin Prateepattanatumrong, Sotarathammaboosadee</u>	EM-054 Constructing a Risk Behavior Guideline for Adolescent Students using Decision Tree <u>Surin Aunsan, Sotarathammaboosadee</u>
1:45 pm to 2:00 pm	IM-075 The Hierarchical Technology Valuation Model for Big Data Technology Applied in Recruitment <u>Thiti Noydee, Sotarathammaboosadee</u>	EM-057 Analyzing the Characteristics of Maths and English Tablet-based Games for Primary School Children <u>Hsu Nang, Antony Harfield, Ratchada Viriyapong</u>
2:00 pm to 2:15 pm	IM-086 Of Online Community: Clustering Group of Compatible Mentor and Mentee <u>Pratya Nuankaew, Punnarumol Temdee</u>	EM-027 A Study of Relationships of Attitudes and Behaviors towards to Usage of Google Translate of IT Students <u>Onwara Thanongsaksakul, Sotarathammaboosadee, Rubkwan Thammaboosadee</u>
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 <i>Panyaphat Aekitsawatwikul, Adisorn Leelasantitham, Supaporn Kiattisin, Smitti Darakorn Na Ayuthaya</i>	EM-049 Application of BIM into Civil Engineering Management Class <i>Thloedtida Thipparat, Narong Chaisongkroh, Nonthachart Kulprapa, Thongpoon Thaseepetch</i>
2:45 pm to 3:00 pm	IM-055 CRM Strategies discovered by Clustering Technique and Business Intelligence; case study in Chemical Industry <i>Thanakal Yotsomsak, Sotarar Thammaboosadee</i>	EM-050 Application of QFD to Design a Course in Building Information Modeling (BIM) <i>Thloedtida Thipparat, Narong Chaisongkroh, Nonthachart Kulprapa, Sunantha Srisopha</i>
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 <i>Chiang-Yu, Cheng, Yu-Tsu Lin, Chih-Wei, Cheng</i>	EM-016 The Preparation of Vietnamese Students at Burapha University for Asean Economic Community (AEC) Skilled Labour Market <i>Chinh Bui Xuan, Saranya Lertbuddharak, Sirinya Chokchaiworarat</i>
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 <i>Thammavich Wongsamerchue, Wimal San-Um</i>	EM-002 A Framework for Empowering Teachers to Author Interactive Content for Tablet Classroom Activities <i>Siwawes Wongcharoen, Jaratsri Rungtrattanaubol, Antony Harfield</i>
3:30 pm to 3:45 pm	IM-053 Semantic Ontology for Fine Arts Knowledge Management <i>Wassana Ouppala, Sotarar Thammaboosadee</i>	EM-087 Classification of Basic Computer Skills for Skill Based Online Learning <i>Satavorn Chaichumpa, Santichai Wicha, Punnamul Temdee</i>
3:45 pm to 4:00 pm	IM-046 The Model Development of Incremental Innovation Affecting Organization Performance of Thailand Furniture Industry <i>Kitipong Tangkit, Vinai Panjakajomsak</i>	EM-052 University Students' Year Level, Gender, and Entrepreneurial Attitude Orientation: The Case of Management and Entrepreneurship Students of a Philippine Higher Education Institution <i>Jean Paolo G. Lacap</i>
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 Safety and Environmental Degradation – Case Studies <i>Dr. B. K. Pal, Sunil Kumar Bisoyi, Deepak Majhi, Susil Kumar Bisoyi</i>	IT-061 Efficient Compact Join Algorithm for Acyclic Conjunctive SPARQL <i>Jaesung Lee, Dongguk Kim, Kyungsun Kim, Hanmin Jung</i>
4:15 pm to 4:30 pm	EG-071 Optimal routing model for multi modal transportation <i>Thanawat Bamrungthal, Supaporn Kiattisin, Smitti Darakorn Na Ayuthaya</i>	IT-070 A Development of Efficient Routing Algorithm Applied in Transportation Networks <i>Tun Tun Naing, Sunantha Sodsee</i>
4:30 pm to 4:45 pm	EG-063 The Development of Distributed Sensors Network for Measurement of Thermal Comfort in Academic Classroom <i>Wipawadee Wongsuwan, Wimal San-Um</i>	IT-065 A Verification of Instantaneous Acoustic Emission Signals Based on ASTM E976-94 Standard through Short-Time Fourier Transform Method <i>Jirayu Samkunta, Wimal San-Um</i>
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 <i>Surin Wichchuwong, Vinai Panjakajomsak, Amnuay Saengnoee</i>	IT-064 An Image Encryption Scheme and Its Android Application using Robust Chaotic Map with Absolute Value Nonlinearity <i>Sirapong Nilwong, Wimal San-Um</i>
5:00 pm to 5:15 pm	EG-038 Application of AHP and VIKOR for Chemical Product Selection <i>Thloedtida Thipparat, Narong Chaisongkroh</i>	IT-039 Emotion Recognition using EEG data with a Multiple Classification Framework <i>Anuchin Chatchinarat, Chun Che Fung, Kok Wai Wong</i>
5:15 pm to 5:30 pm	EG-051 4D Application for Energy Building Project <i>Thloedtida Thipparat, Narong Chaisongkroh</i>	IT-032 Improving Classification Performance with Complementary Fuzzy-Based Neural Networks <i>Ratchakoon Pruengkarn, Chun Che Fung, Kok Wai Wong, Worapat Paireekreng</i>
5:30 pm to 5:45 pm	EG-090 Design of Thermoelectric-Based Cooling System used for Portable Application <i>Teerapon Thongpasri, Surapong Pongyupinpanich</i>	
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 <i>Mathuros Panmuang, Chonnikarn Rormorn, Khuanwara Potiwara</i>	BM-010 The Use of Social Media for Corporate Disclosure by Companies Listed in the GCC <i>Ehab K. A. Mohamed, Mohamed A. K. Basuony</i>
9:30 am to 9:45 am	EA-074 Economic Analysis of the Information System Investment Using Cost and Benefit Analysis (CBA) Method <i>Leo Willyanto Santoso, Yulia, Imelia Widjanadi</i>	BM-014 A Study of the Core Competencies Affecting the Performance of Security Investment Consultant at Security Companies in the Stock Exchange of Thailand <i>Phatre Friestad</i>
9:45 am to 10:00 am	EA-076 IT Investment Evaluation Using Multi Objective Multi Criteria: Case Study on an Expedition Company <i>Yulia, Leo Willyanto Santoso, Danny Tantra</i>	BM-034 Employee or Employer? Entrepreneurial Perspectives of Tourism Management Students of a Higher Education Institution in Angeles City, Philippines <i>Darriel B. Mendoza, Jean Paolo G. Lacap</i>
10:00 am to 10:15 am	IT-077 Towards an Internet-of-Things aware Process Modeling Method - An Example for a House Surveillance System Process Model <i>Roland Petrasch, Roman Hentschke</i>	BM-060 A Structural Equation Model Development of Service Quality, Brand Image, and Switching Deterrents Affecting Customer Loyalty for Mobile Service Providers in Thailand <i>Patcharanan Klankaew, Amnuay Saengnong, Vinai Panjakajornsak</i>
10:15 am to 10:30 am	IT-033 Management of Internet Bandwidth Using Machine Learning Technique <i>Hari Suparwito, Hong Xie, Chun Che Fung, Shri Rai</i>	BM-045 The Role of Regulatory Focus on Promotional Mental Accounts <i>Pei-Ru, Li, Po-Shun, Chen, Chia-Jung Chang</i>
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 <i>Liliana, Gregorius Satia Budhi, Silvia Rostianingsih, Erandaru</i>	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 <i>Teewin Narunart, Vinai Panjakajornsak</i>
11:00 am to 11:15 am	IT-079 Comparison Between Shape-based And Area-based Features Extraction for Java Character Recognition <i>Rudy Adipranata, Gregorius Satia Budhi, Liliana, Bondan Sebastian</i>	BM-040 A Causal Model of Innovation Capability, Market Orientation and Absorptive Capacity Affecting Competitive Advantage of Thailand Rubber Industry <i>Prapapan Mantam, Vinai Panjakajornsak</i>
11:15 am to 11:30 am	IT-078 The Use of Probabilistic Neural Network and ID3 Algorithm for Java Character Recognition <i>Gregorius Satia Budhi, Rudy Adipranata, Bondan Sebastian, Liliana</i>	BM-015 The Preparedness to Apply Total Quality Management in Production: a Case Study of a Company Making Metallic Coated Steel in Rayong Province <i>Jarun Suanai, Surat Supitchayangkul, Sarayuth Chokchaiworarat</i>
11:30 am to 11:45 am	IT-083 Nudity Detection Using Combination of Color-Based and Morphological Methods <i>Sanglun Rattane, Werapon Chiracharit</i>	BM-017 Activity Types and Agro-tourism Route at Khun Dan Prakarn Chon Dam, Nakorn Nayok Province <i>Nitt Visessaphan, Sarunya Lertputtarak, Wilailuk Khamloy</i>
11:45 am to 12:00 pm	IT-069 Applying Item Category Rating in Recommendation Systems <i>Thanaphon Phukseng, Nawaporn Wisitpongphan, Sunantha Sodsee</i>	BM-035 Value Analysis of Cyber Security Based on Attack Types <i>Mehmaz Akbari Roumani, Chun Che Fung, Shri Rai, Hong Xie</i>
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 Chansuthirangkool 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 การสรรหาเงินฝากเชิงกลยุทธ์ธนาคารออมสินในเขตอำเภอวังนาคำจังหวัดสระบุรี <i>พรพรรณ วัฒน, ภาวรินทร์ นิลวงศ์, ชัยศักดิ์ ศรีไชยดี</i>	TT-028 ผลกระทบจากอิทธิพลส่งผ่านของนวัตกรรมผลิตภัณฑ์ระหว่างสารสนเทศในการจัดการความรู้และการบรรลุเป้าหมายองค์กร <i>นุจรี ภาคาสิทธิ์, ศักดิ์สยาม จันทร์เรือง</i>

2:00 pm to 2:15 pm	TT-047 การพัฒนาชุดจำลองเครือข่ายคอมพิวเตอร์บนพื้นฐานของ Dummynet: การกำเนิด Jitter <u>จรัสพงษ์ กาญจนลักษณ์, เทอดพงษ์ แดงสี, ดุจดัย ไตรยธรรม, พงษ์พัสิฐ ภูมิพิชัย</u>	TT-080 การประเมินประสิทธิภาพการดำเนินงานด้านขายแดนไทยด้วยวิธีการวิเคราะห์การวางกรอบข้อมูล <u>ดำรงพล ขนัวรรณ, จิรพรรณ เลี้ยงโรคาพาธ, อติศร สีสานศิริธรรม, สุภาภรณ์ เกียรติสิน, สมิทธิ ดารากร ณ อยุธยา</u>
2:15 pm to 2:30 pm	TT-019 การพัฒนาสื่อประชาสัมพันธ์หลักเกณฑ์การจัดเก็บภาษีห้างหุ้นส่วนสามัญและคณะบุคคลที่มีโชติบัญญัติบุคคล <u>เยาวลักษณ์ วรรณศิริวิทย์, นพดล เดชประเสริฐ</u>	TT-085 การตรวจหาภาพพินโดยการแปลงลักษณะเด่นแบบไม่แปรผันตามขนาด <u>สมเดช ศ่างาเมือง, วิรพล จิรจิต</u>
2:30 pm to 2:45 pm	TT-020 การพัฒนาคุณสมบัติของข้อมูลสถิติเศรษฐกิจภาคต่างประเทศของธนาคารแห่งประเทศไทย <u>รวี อาณานุกร, สุขชนนี เมธิโยธิน</u>	TT-021 แนวทางการพัฒนาการจัดเก็บภาษีอากรและลดจำนวนผู้เสียภาษีที่เป็นกลุ่มเสี่ยงของสำนักงานสรรพากรพื้นที่นนทบุรี 2 <u>เรียม เขียนทอง, นพดล เดชประเสริฐ</u>
2:45 pm to 3:00 pm	Coffee Break	
3:00 pm to 3:15 pm	TT-081 การเปรียบเทียบคุณลักษณะและประสิทธิภาพเครื่องแม่ข่ายเสมือนแบบก่อนเมฆของศูนย์ข้อมูลกลาง Uninet ระหว่าง ยุคสปีดสตรีมและไมโครซอฟท์ซิสเต็มเซิร์ฟเวอร์ 2012 <u>ศุภร จันทกร, สุภาภรณ์ เกียรติสิน, อติศร สีสานศิริธรรม, สมิทธิ ดารากร ณ</u>	TT-089 การวิเคราะห์สมรรถนะการทำงานของโรงไฟฟ้าพลังงานร่วม: กรณีศึกษา <u>อัญญิศา จิตคามิย, สมเดช เนติสิดตานนท์</u>
3:15 pm to 3:30 pm	TT-004 การเปรียบเทียบประสิทธิภาพการทำงานของ Extract, Transform and Loading (ETL) โดยใช้ต้นไม้มัดดัดและและตรรกศาสตร์คลุมเครือ <u>ณัฏฐพล นาคบัวแก้ว, สุภาภรณ์ เกียรติสิน, อติศร สีสานศิริธรรม, โชติศักดิ์ ธรรมบุษดี, สมิทธิ ดารากร ณ อยุธยา</u>	TT-018 มาตรฐานการบริการคนไร้ที่พึ่งนนทบุรี ในสถานแรกรับคนไร้ที่พึ่งนนทบุรี <u>ณัฏฐินี วรรณกุลนันท์, นพดล เดชประเสริฐ</u>
3:30 pm to 3:45 pm	TT-023 การบริหารจัดการที่ส่งผลกระทบต่อความร่วมมือในการพัฒนาสถานทำงานอยู่ ป่าทำงานของพนักงานและข้าราชการ สำนักนโยบายและยุทธศาสตร์ สำนักงานปลัดกระทรวงสาธารณสุข <u>สโรชินี สหสาคร, สุขชนนี เมธิโยธิน</u>	TT-022 แนวทางการปฏิบัติงานในการเข้าถึงมวลชนของหน่วยทหารระดับกองร้อยในพื้นที่หน่วยเฉพาะกิจยะลา ระหว่างปี 2552 - 2557 <u>วาทินี สุวรรณรักษ์, สุขชนนี เมธิโยธิน</u>
3:45 pm to 4:00 pm	TT-091 การลดสัญญาณรบกวนข้ามช่องใน VLSI Design โดยใช้ทฤษฎีเกมกระโดด <u>อติศักดิ์ จันทังพล, นุสรา ฮวดโพธิพันธ์, อภิชาติ ศิริประเสริฐสิน</u>	TT-092 การจำลองโครงสร้าง VLSI Chip เพื่อลดเส้นทางการเชื่อมต่อโดยใช้ทฤษฎีเกมกระโดด <u>วิไลพร แก้วกระโทก, สิทธิพงศ์ ขวโนทัย, พรกฤษ อ่อนเกิด, อภิชาติ ศิริประเสริฐสิน</u>
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 <u>Mahasak Pijittum, Suporn Kiattisin, Smitti Darakorn Na Ayuthaya</u>	TT-093 การออกแบบจัดวางผังโรงงานเพื่อลดขั้นตอนการเดินทางโดยใช้เทคนิคซัพเพิลพรอกลิปปิง <u>อนัญญา ศรีวงษ์, สิริทิพย์ วันจันทร์, ประกาย นาคี, อภิชาติ ศิริประเสริฐสิน</u>

Economic Analysis of the Information System Investment Using Cost and Benefit Analysis (CBA) Method

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Abstract— Nowadays, the development of technology is very fast. It makes people tend to follow the development of the technology. There are some elements to be fulfilled in order to apply the technology. Those are funds, mental ability of the organization, and other needs to make it smoothly work. However, it is important to calculate the benefits compare to the technology expenses. To help the organization in solving that problem, it needs a method as a tool to calculate the benefits and the investment.

Based on that problem, there must be an analysis on the investment. That analysis can be done by calculating the ROI. Then, the result can be a consideration whether the investment worth to be applied or not. To do that calculation, there are some early steps to be done, such as doing the survey to the money spend for the investment, doing the survey to the cash flow, and the quantification.

Because of the complexity calculation process, a calculating tool which can help the organization easily get the result of ROI was developed. The web based application is developed using php language and Mysql as its database. It will make the user easily access the application everywhere and every time.

Keywords— IT Investment Analysis, ROI, payback period.

I. INTRODUCTION

In the era of globalization, technology is growing rapidly. Almost all activities that occur in everyday life can not be separated with existing information technology. The activities of business process technology has exploited not only in industry but also in other fields such as banking, health, education, and others. Therefore, an agency or company has now believes that information technology can help to develop and advance operations at the agency or the company. The agency is willing to provide a budget specifically for technology investments to gain added value to the institution or company.

In terms of investment costs for Administrative Information Systems (AIS) would be required and the cost is not small when viewed in terms of benefit not all is felt immediately, there is also a need of time in a certain period. However, many agencies or companies that uses IT investment only to compete with competitors without knowing the value of the balance of spending and benefits. Many agencies or companies who feel

confused to calculate the value of the benefits of IT investments that will be or are being implemented. Therefore, the analysis conducted research on the application of IT investments, whether the costs incurred are in accordance with the benefits that will be received later.

Cost is one of the key IT investments, the most important thing is how much benefit is obtained, how great Return on Investment (ROI), and how long it takes to achieve ROI [1]. IT investment consists of two benefits are counted (tangible) and are not counted (intangible) which will be used as a variable ROI calculation [2], [3]. From the results of these calculations can be seen the value of profits earned.

In this research conducted a case study on distributor X where the distributor is a distributor of HPL layer material that is commonly used for furniture that served the purchase in the area of Java. Due to the vast sales target and reach thousands of pages each month that can be sold to make Distributor X felt sorrow for the recapitulation of the monthly report, report the stock of goods, financial recaps, and so on. So it will take time and lower costs. Therefore Distributor X decides to use information systems that can help and support the operations of its business processes. It has just been developed in recent months and its use had not been used optimally. However, Distributor X must compare the economic value and the benefits derived from the results of this investment applied AIS. The problems in this research are: What benefits are obtained in the presence of applied information systems?, How to calculate the amount of benefits obtained and when the Return on Investment (ROI)?, Do Distributor X has done the right thing by investing funds to Information System in the operational activities of its business processes? And is the applied information system is already quite feasible to be developed and implemented at the Distributor X?

The purpose of this paper is to analyse investments, measuring the economic value of the investment cost, knowing the benefits, as well as determine whether the costs in proportion to the benefits derived from the AIS in the operational field distributor has been done by the Distributor X.

II. COST AND BENEFIT ANALYSIS

Cost Benefit Analysis (CBA) is a technique used to obtain a quantitative value of cost and benefits of an IT project. The first thing to do is to determine the costs and benefits will be calculated, how the weighting of costs, benefits and any barriers that would arise. The calculations are discussed in this method is Net Present Value Method (NPV), Payback Period Method, Return on Investment (ROI), and Internal Rate of Return (IRR).

Calculation of the ROI can be done by using three types of worksheets [4], namely:

- Development Cost Worksheet, a list of all components in the first year or the cost required to start and build a project, as shown in Fig 1.
- Ongoing Expenses Worksheet, which lists all components or costs required to maintain the project from the first year until the final year of the project, as shown in Fig 2.
- Economic Impact Worksheet, a calculation sheet costs and economic benefits that have been quantified (Value Linking, Value Acceleration, Value Restructuring and Innovation Valuation) which show the calculation of annual cash flow to generate ROI, as shown in Fig 3.

Year 1	
A.	Development effort
1.	Incremental systems dan programming (e.g., estimated days times \$xxx/day)
2.	Incremental staff support (e.g., data administration at \$xxx/day)
B.	New Hardware
1.	Terminals, printers, communications
2.	Other
C.	New (purchased) software, if any
1.	Packaged applications software
2.	Other
D.	User training
E.	Other
TOTAL	

Fig. 1. Development worksheet.

Year 1-x	
A.	Application software maintenance
	Development effort days
	Ratio of Maintenance to development (based on experience, e.g., 10 to 1)
	Resulting annual maintenance days
	Daily maintenance rate
	TOTAL application software maintenance
B.	Incremental data storage required : _____ MB x _____
	(e.g., estimated MB at \$xxx.xx)
C.	Incremental communications (lines, messages, etc)
D.	New software leases or hardware leases
E.	Supplies
F.	Other
TOTAL ONGOING EXPENSES	

Fig. 2. Ongoing expenses worksheet.

A. Net Investment Required (From Development Cost Worksheets)					
B. Yearly cash flows : based on five 12-month periods following implementation of the proposed System. Cash flow can be negative					
	YEARS				
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Net economic benefit:	0	0	0	0	0
Operation Cost Reduction	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
= Pre-tax income	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
(-) On-going expense					
From worksheet	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
=Net cash flow	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX
C. Simple ROI, calculated as B / # YRS / A					XXX%
D. Scoring, Economic impact					
Score	Simple Return of Investment				
0	Zero or less				
1	1% to 299%				
2	300% to 499%				
3	500% to 699%				
4	700% to 899%				
5	Over				

Fig. 3. Economic impact worksheet.

III. DISCUSSION AND ANALYSIS

This information system project development certainly require no small cost, and certainly after the implementation will be followed by other costs such as the development cost and maintenance costs, or so-called ongoing expenses.

The Calculation of the development cost can be calculated using the development cost worksheet, whereas for the calculation of the ongoing expenses using the ongoing expenses worksheet which can then be converted economic impact into an impact economics worksheet.

The investment costs are incurred as a capital to an SI project can be implemented in an organization. The investment costs include among other things the cost of the provision of hardware and software used in order to invest SI can run well. The total investment cost incurred for the implementation of AIS on Distributor X until in 2014 was Rp. 96,391,495,

Investment costs required for AIS is not only the initial cost but also takes the running costs are calculated for the next 5 years, commencing from 2014 to 2018. The running costs will be calculated cover maintenance costs for applications that are used as feature updates, electricity costs and expenses internet.

The cost to update the feature each year is 10% of the price of developing, the amount is Rp. 2.500.000, -. These costs are derived from 10% multiplied by Rp. 25.000.000, - (total investment applications) = Rp. 2.500.000, -. This price applies to the addition of one feature in each year as well as the handling of error handling.

Implementation of AIS in Distributor X uses a main server, two PCs and two laptops for branch A, while for branch B using 3 PCs and one laptop.

Distributor X uses the Internet to connect to the server. Internet costs incurred every month is Rp. 380.000, for each branch. So that in one month, it spends Rp. 1.14 million, -. So in one year is Rp. 13.68 million, - For the first year counted from May to December.

TABLE I ONGOING EXPENSES

Expense	1 st Year	2 nd Year	3 rd Year
A	2.500.000	2.500.000	2.500.000
B	14.363.106	26.441.355	29.614.317
C	9.120.000	13.680.000	13.680.000

Expense	4 th Year	5 th Year	Total
A	2.500.000	2.500.000	12.500.000
B	33.168.035	37.148.199	140.735.012
C	13.680.000	13.680.000	63.840.000

Notes:

A = Maintenance fee

B = Electricity costs

C = Internet charges

It will discuss the programs created with the aim of helping the calculation of ROI, NPV, PP, IRR and IE Score. Web-based programs that are created using a MySQL database and PHP programming language.

Before developing a program, Entity Relationship Diagram (ERD) was created. It aims to be aware of the tables in the database and the relationships between tables. Entity Relationship Diagrams in the physical model can be seen in Fig 4.

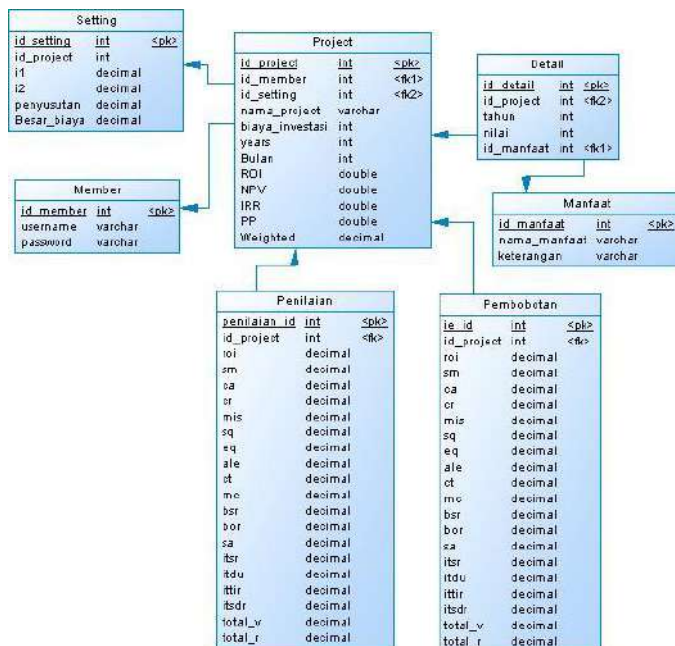


Fig. 4. Entity relationship diagram.

This login form is used to access the main page of this website. Login Form can be seen in Fig 5. Users can only perform if username login and password in accordance with the existing data in the table member.

Login Page

Username:

Password:

Fig. 5. Login page.

Register Page

Username:

Password:

Fig. 6. Signup page.

years:

Insert detail

Nama Proyek:

Biaya Investasi:

Biaya Berjalan

Rp.

Rp.

Rp.

Rp.

Rp.

Cost Benefit

Rp.

Rp.

Rp.

Rp.

Rp.

Fig. 7. New project page.

This signup page is used to register as a new member so that it can log in to access this website. Sign up page can be seen in Fig. 6. The data entered will be stored in the table member.

Form add project serves to add to the project along with details of the project. In this form there are three parts: project inserts, inserts the weighting and insert assessment. On the form add project all existing field has to be filled. Data will be stored in two tables of the project and detail tables. The first field means the value for the first year and beyond. Field accordance with the number of input years. Form add project can be seen in Fig. 7.

Setting form serves to adjust the value of the interest rate, a large depreciation and the cost of the wish depreciated. Such data will be used to calculate ROI, NPV, IRR, and PP. Form settings can be seen in Fig. 8.

Form report serves to show detail project including value of ROI, NPV, IRR, PP. Form reports can be seen in Fig. 9.

The screenshot shows a web form titled 'Bunga IRR' and 'Penyusutan'. At the top, there is a 'project id' dropdown menu showing 'SIA Distributor X'. Below this, under 'Bunga IRR', there are two input fields: 'I1' with the value '7.5' and 'I2' with the value '9.0', both followed by a '%' symbol. Under 'Penyusutan', there is an input field for 'bunga' with the value '20.0' and a '%' symbol, and another input field for 'Biaya yang disusutkan' with the value '71.391.495'. A blue 'Submit' button is located at the bottom of the form.

Fig. 8. Setting page.

The screenshot shows a 'Report' page for 'SIA Distributor X'. It lists project details: Name project (SIA Distributor X), Model Investasi (Rp. 95.291.495,00), ROI (26.37%), NPV (Rp. 21.834.812,00), IRR (27.63%), and Payback (1.43 tahun). Below this is a table with columns for 'Evaluasi', 'Business Domain', 'Technology Domain', and 'Weighted Score'. The table contains numerical scores for various criteria like ROI, SM, CA, CR, MI, SD, EV, ALE, CT, MC, DSR, BOR, SA, TSR, TU, TR, and SOR. The 'Weighted Value' row at the bottom shows a total score of 82.86.

Fig. 9. Report page.

IV. CONCLUSIONS

From the analysis of investment, the following conclusion was reached:

- The value of obtained ROI for IT projects is -37.20%. By looking at the negative value of ROI, it can be considered not feasible to develop. On the other hand there are

several benefits that do not impact directly but affect the existing savings. Once added to these benefits, the values obtained ROI of 26.37%. This suggests that the benefit of an IT project is not only seen by any tangible benefits. With the ROI of 26.37%, the AIS projects classified in categories 1 and deserve to be developed.

- The obtained NPV for IT project is Rp. 21,834,842. From the results obtained and adapted to the requirements of the NPV calculation, it states that value $NPV > 0$ so that the IT project is feasible to be implemented.
- IRR AIS acquired for the project is estimated at 27.63%. Terms feasibility of the calculation of IRR is if $IRR > I$ (the interest rate). The interest rate used to use bank deposit interest rate is 7.5%. According to the results there can be said that the SIA meets the eligibility requirements IRR.
- Payback Period obtained for AIS is 1.43 year is 1 year and 5 months 7 days. From the results of the payback period in accordance with what the Distributor estimates X so that the investment is feasible to be implemented.

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