PROCEEDINGS OF THE ISICO 2013













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PREFACE

Dear Participants of ISICO 2013,

Welcome to Information Systems International Conference (ISICO) 2013. Thank you for coming and your participation in this conference. Information Systems International Conference (ISICO) 2013 is the second International Conference on Information Systems organized by Department of Information Systems, Institut Teknologi Sepuluh Nopember (ITS), Institut Teknologi Sepuluh Nopember (ITS) Surabaya, Sekolah Tinggi Manajemen Informatika dan Teknik Komputer (STIKOM) BALI and Overseas Indonesian Students Association Alliance (OISAA). This conference is supported by National Taiwan University of Science and Technology (NTUST), Pusan National University (PNU), Asosiasi Perguruan Tinggi Informatika dan Komputer (APTIKOM) and Indonesian Scholars Journal (IS Journal). ISICO 2013 aims at facilitating a meeting to discuss the curriculum of Information Systems following IT trends, a means to update IT trends especially in database and technology, and a way to discuss the alignment among IT, people and business. Other aims of this conference are as follows:

1. to update, evaluate, and expand knowledge about Information Systems (IS) curriculum, and to accommodate a room for discussion regarding curriculum of Information Systems in Indonesia
2. to update IS trends and research
3. to expand networks and share information about collaboration opportunities in research, project, or education programs among the participants
4. to be part of the initiation of the Association for Information Systems (AIS) chapter of Indonesia (I-AIS) that will be the international network node of academics and practitioners in the Information Systems discipline in Indonesia
5. to establish long-term strategic partnerships and to develop knowledge transfer between academic institution and industry and those who are involved in the ISICO 2013

This conference invites participants from all over the world to join by submitting their work represented in research full papers on the subject related to Information Systems. We also welcome participants from academics and praticitioners to join our fruitful conference program. Several experts in the field of information systems are also invited to be the ISICO 2013's committee members. Enjoy the conference, thank you for coming and your contribution in this conference and we also would like to thank to all organizers, supported organizations and sponsors of ISICO 2013.

Yours very truly,
Conference Chair of ISICO 2013

Tony Dwi Susanto

CONTENTS

COMMITTEE ..... **v**

PREFACE ..... **vii**

Management, Economics and Business Track **1**

Building Successful Environmental Information Systems (EIS) *1*
Wahyudi Agustiono

Analysis and Design Application for Quantifying IT Business Value *7*
Stanley Karouw, Hans Wowor

Does Enterprise Architecture Give Value to e-Government in Developed Countries? *13*
M. Ali Hanafiah, Robert Goodwin

Usability Testing on Flight Searching Website Using Heuristic Evaluation *19*
Rianto, Ridi Ferdiana

Web Tags Formatting with Multilevel Numbering *25*
Andrea Stevens Karnyoto, Marius Limpo

Innovation Diffusion and Adoption of Wilmar's Geographic Information Systems (GIS) in Wilmar's Intra-Organization *31*
Kristina Gloria Simanjuntak, Danang Junaedi

E-Learning User Interface Acceptance Based on Analysis of User's Style, Usability and User Benefits *37*
Ramadiani, Rodziah binti Atan

The Development of KPI for Measuring ICT Support Service Quality *43*
Rozi Nor Haizan, N., Rose Alinda, A., Azizah, A.R.

Web Site Usability Evaluation: An Exploratory Study on the Web Site of Directorate General of Higher Education *49*
Imam Azhari, Agus Harjoko

Applying ITIL Based Software Inside University's ICT Centre toward Continual Service Improvement *55*
Tawar

Cognitive Task Analysis: A Contextual Inquiry Study on Basic Computer and Information Literacy Skills among Physicians *61*
Fozia Anwar, Suziah Sulaiman, P.D.D.Dominic

Measuring Quality of Asian Airline Websites Using Analytical Hierarchy Process: A Future Customer Satisfaction Approach *67*
Humera Khan, P.D.D.Dominic

Practitioners' Validation on Effectiveness of Mobile School Model *73*
Ahmad Sobri Hashim, Wan Fatimah Wan Ahmad, Azizah Jaafar, Shahrina Md Nordin

Factor Analysis: An Applied Approach towards the Adoption of Cloud Computing to Enhance the Healthcare Services in Malaysia *79*
P.D.D.Dominic, Kalai Anand Ratnam

A Model of Feedback Relationships between Software Maintenance and Information Systems Staff Management: A Case of an E-government System *85*
Gunadi, Geoffrey A. Sandy, and G. Michael McGrath

Evaluating the QOS for E-Commerce Architecture Using Proposed WQM Algorithm *92*
Riktesh Srivastava

Private Healthcare in Malaysia: Investigation on Technology Profiles and Technology Acceptance Factors *98*
Aliza Sarlan, Rohiza Ahmad, Wan Fatimah Wan Ahmad, P.D.D. Dominic

Information Technology Governance Using COBIT 4.1 Framework for Supporting Service of Information Technology (Case Study: PT. Pupuk Sriwidjaja Palembang) *104*
Stenly Heryudo, Angelina Prima Kurniati, Erda Guslinar Perdana

User Testing of a System Prototype for Adaptive English Learning using Perturbation Learner Model.... *110*
Nguyen Viet Dung, Suziah Sulaiman, Mohd Fadzil Hassan

An IT Infrastructure Library (ITIL) Maturity Strategy for Private Cloud Sourcing Models: A Literature Review and Research Methodology Formation *116*
Alma Miller, Enrique Campos-Nanez, Pavel Fomin, James Wasek

An Impact Analysis of Social Media Strategy for a Customer Engagement of an Indonesian Pop Band (ADA Band) *122*
Rabekha Delia Angiani, Alva Erwin, Mohammad A. Amin Soetomo, Maulahikmah Galinium

Analyzing Surabaya City Government E-Procurement Success Using Information Systems Success Model *128*
Mudjahidin, Rizka Marsa P, Bambang Setiawan, Hatma Suyotrisongko

The Customization of the ISACA's Framework as an Audit Model for Large Scale (Enterprise) Web Applications *134*
Gede Karya, Veronica S. Moertini

Comparative Study of E-Government Enterprise Architecture by Secondary Attributes of 3 Asian Countries *140*
Khakim Ghozali, Yudho Giri Sucahyo

Internet Center (Warnet) Diffusion in Rural Villages to Sustain Economic Development or Part of Global Big Data Trend? *147*
Rudi Rusdiah

Analyzing the Influence of Information System's Quality, User Satisfaction and Net Benefit of E-Learning Users *155*
Aris Kusumawati, Apol Pribadi, Hanim Maria Astuti

Creating the Document of Software Development Quality Assurance of School Social Network (SSN) based on IEEE 730-2002 Standard *161*
Achmad Holil Noor Ali, Ika Nurkhasanah, Hanim Maria Astuti

Factors affecting the acceptance of Enterprise Resource Planning software: a case study in a manufacturing company *167*
Tony Dwi Susanto, Benediktus Kukuh Ganang Indarto, Anisah Herdiyanti

Education and Curriculum Track 175

Designing an Exciting Self-Regulated, Indigenized and Rhizomatic Courseware Environment *177*
Maria Victoria Pineda

Exploratory Investigation of Potential Signature Pedagogies in the Information Systems Discipline *184*
Yenni Merlin Djajalaksana, James A. Eison, Robert F. Dedrick

Study and Development of Learning Object Repository (LOR) Service in Rural Area Using the Perspective of Product Service System *190*
Andrew Fernando Pakpahan

Factors that Associate with the Selection of Instructional Strategies in Information Systems Discipline . *196*
Yenni Merlin Djajalaksana, Robert F. Dedrick, James A. Eison

E-Learning based on WBLP versus E-Learning Based On WBIS *202*
Florentina Yuni Arini, Sunarmi

Curriculum Structure of the Undergraduate Programs of Information Systems in Indonesia in the Year of 2013 ..... *207*
Arif Wibisono, Amna Shifia Nisafani

How to Integrate XBRL into Accounting Curriculum at Banjarmasin State Polytechnic *213*
Noor Romy Rahwani

Dashboard Information System for Student's Character Assessment *219*
Dony Saputra, Dedi Royadi, Zainul Hakim

Let's Keep on Reading: User-Centered Design of an Online Book Loan System for University Students in Bandung *225*
Maria Elnymesia Birgita, Johanna Renny Octavia Hariandja

Implementing Quiz Creator to Improve the Quality of Education *231*
Heny Pratiwi, Ekawati Yulsilviana

Minecraft: A Game as an Education and Scientific Learning Tool *237*
Glenn Ekaputra, Charles Lim, Kho I. Eng

A Proposed Model for Animation of Malay Folktales for Children *243*
Norshahila Ibrahim, Wan Fatimah Wan Ahmad, A'fza Shafie

Evaluating Educational Mobile Games for School Children *249*
Sarmad Soomro, Wan Fatimah Wan Ahmad, Suziah Sulaiman

E-Learning Activity based on EMM and ADKAR Change Management for Elementary Schools *255*
Sari Dewi Budiwati, Armein Z. Langi

Artificial Intelligence and Enterprise Systems Track 261

Design of an Intelligent Warehouse Management System *263*
Reza Pulungan, Simon Pulung Nugroho, Nova El Maidah, Tri Bowo Atmojo, Putut Dewanto Hardo, Panggih Pawenang

Comparison of Intelligent Water Drops and Backtrack Algorithm in Solving Travelling Salesman Problem *269*
Indra Maryati, Gunawan

Supply Chain Management Implementation for Food Security besides Rice (Cassava) Using ERP Software *275*
Erma Suryani, Retno Aulia Vinarti, Kukuh Pratama, Radityo Prasetianto Wibowo

The Adequate LTE Downlink Scheduling Scheme for Video Streaming Services *282*
Ulil S. Zulpratita

Fuzzy AHP Based Decision Support System for SKTM Recipient Selection *288*
Cut Fiarni, Arief Gunawan, Asti Lestari

Dashboard Marketing System for Student's Enrollment. Case Study : UNIS Tangerang *294*
Dony Saputra, Oleh Soleh, Meta Amalya Dewi

Development of Drowsiness Detection System with Analyzing Attetion and Meditation Wave Using Support Vector Machine Method *300*
Indoriko Shin, Bambang Setiawan, Febriliyan Samopa , Hatma Suryotrisongko, Faizal Johan Atletiko, Radityo P. Wibowo

Development of Drowsiness Detector System for Late Night Shift Worker Using Support Vector Machine Method with Neurosky Mindwave Mobile *307*
Izzat Aulia Akbar, Febriliyan Samopa, Bambang Setiawan, Hatma Suryotrisongko, Faizal Johan Atletiko, Radityo P Wibowo

Feature-Based Sentiment Analysis in Online Review with Semi-Supervised Support Vector Machines (S^3VMs) *314*
Jessie Setiady, Warih Maharani, Rita Rismala

Academic Mining to Assist the Guardian Mechanism Using Naive Bayes Classifier *320*
Veronikha Effendy, Thee Houw Liong

Path Analysis Method for Identification Enabler of Enterprise Governance in Implementation of Vocational Higher Education Governance *325*
Heru Nugroho, Kridanto Surendro

Design Analysis of the Footsteps Identification through the Recognition of Home Occupant Walking Habits *331*
Eko Polosoro, Jazi Eko istiyanto, Agfianto Eko Putra

Batik Image Classification Rule Extraction using Fuzzy Decision Tree *337*
Anita Ahmad Kasim, Retantyo Wardoyo

Analysis of Automated Scheduling System Case Study Oral Final Study Examination in Swiss German University *342*
James Purnama, Julius Polar, Maulahikmah Galinium

Dynamic Simulation Model to Reduce Electricity Distribution Losses in Medium and Low Voltage Networks *348*
Erma Suryani, Umi Salama, Rully Agus Hendrawan, Achmad Jauhari

Knowledge Sharing on Post-Harvest Product from Industrial Tree for Business *355*
Dian Anubhakti, Basuki Hari Prasetyo, Nazir Harjanto

A Model of Posted-Price Opaque Booking System Implemented for Indonesian-Market Online Travel Agent. Case Study: Klikhotel.com *361*
Niko Ibrahim, Verliyantina

Twitter Sentiment Analysis and Insight for Indonesian Mobile Operators *367*
Hansen Wijaya, Alva Erwin, Amin Soetomo, Maulahikmah Galinium

Can "Quality of Sleep" Be Evaluated from Hypnogram? - Estimation of Factor Score of Oguri-Shirakawa - Azumi Sleep Inventory by Artificial Neural Network- *373*
Tomohiko Igasaki, Yosuke Taniyama, Yudai Matsuda, Nobuki Murayama

Comparing Clasification Algorithm Of Data Mining to Predict the Graduation Students on Time *379*
Imam Tahyudin, Ema Utami, Armadyah Amborowati

Automatic Demographic Classification of Indonesian Twitter Users *385*
Hashfi Rasis, Alva Erwin, James Purnama, Maulahikmah Galinium

The Application of Extended Weighted Tree Similarity Algorithm in Online Commodity Exchange of Agro Forward Auction Market in Central Java Province *390*
Johan J.C. Tambotoh, Wiwin Sulistyo, Jasson Prestiliano

Solving University Timetabling Problem Using Harmony Search: a Case Study in STMIK Mikroskil *397*
Harrison, Hardy, Ng Poi Wong

Analyzing Rice Demand and Supply Behavior for Food Availability: a System Dynamics Model. Case Study: Sub-Regional Surabaya, Gresik and Sidoarjo) *403*
Erma Suryani, Diajeng Permata I.J., Rully Agus Hendrawan, Lily Puspa Dewi

Recognition of Handwriting Based on Signature and Digit of Character Using Multiple of Artificial Neural Networks in Personality Identification *410*
Esmeralda C Djamal, Sheldy Nur Ramdlan, Jeri Saputra

Virtual Reality: An Alternative Tools for Knowledge Acquisition Process *416*
Siti Rohajawati, Dana Indra Sensuse, Astrid Sugiana

The Comparison of CBA Algorithm and CBS Algorithm for Meteorological Data Classification *423*
Mohammad Iqbal, Imam Mukhlash, Hanim Maria Astuti

Visualization of Intelligent System using Decision Tree and Fuzzy Clustering for Heart Disease Early Detection *429*
Wiwik Anggraeni, Achmad Pramono, Retno Aulia Vinarti

The Influence of Parameter Choice on the Performance of SVM RBF Classifiers for Argumentative Zoning *437*
Renny Pradina Kusumawardani, Bambang Riyanto Trilaksono, Masayu Leylia Khodra

Software Engineering and Design Track 445

Simulation System for Document Image Restoration Using Mean Shift Filtering and Multi Directional Wavelet Transform *447*
Ridha Sefina Samosir

Production and Machine Scheduling System Integrated with Materials Requirement Planning *453*
Meliana Christianti J., Yogha Satya Utama

Digital Color Image Encryption Using RC4 Stream Cipher and Chaotic Logistic Map *459*
Ni G. A. P. Harry Saptarini, Yosua Alberth Sir

Document Authentication Using Print-Scan Image Watermarking Based on DCT (Discrete Cosine Transform) Algorithm *465*
Nazori Agani, M. Iman Wahyudi, Riyanto

Embedding and Extracting Technique for Implementing Image Watermarking Based on DCT (Discrete Cosine Transform) *471*
Irfan, Nazori Agani

Issues of the Morphological Analysis in Comparison with the Compound Noun Extraction Analysis for a Patent Document *477*
Kyoko Yanagihori, Kazuhiko Tsuda

Semantic Analysis of Structured High-definition MPEG-2 Soccer Video Using Bayesian Network *483*
Jiang Feihu, Hiroyoshi Morita, Akiko Manada

Developing Web Services for Data Integration and Distribution Presence System for Lecturer, Assistant, and Students using Agile Unified Process *491*
Fandy Setyo Utomo, Berlilana, Rujianto Eko Saputro

The Development of Visit Ancol Dreamland with Augmented Reality (VADAR) Mobile Application *497*
Hery Herawan, Lulu Chaerani Munggaran

Detection of a Person Awakening or Falling Out of Bed Using a Range Sensor *503*
Geer Cheng, Sawako Kida, Hideo Furuhashi

Implementation of Digital Signage for Digital Communication Media *509*
Awan Setiawan, Iwan Abadi, Sheilfiyanti Abdul Rahman

Metadata for Creating and Displaying Dashboard in XML Schema *514*
Rosni Lumbantoruan

Designing Portal Amazing North Sulawesi Using Pusilkom Agile Unified Process Methodology *520*
Stanley Karouw, Hans Wowor, Gene Kapantow

Development System With The Attendance of Content Based Image Retrieval (CBIR) *526*
Pandapotan Siagian, Erick Fernando, Sindak Hutauruk

*Geographic Information System For Mapping Place Of Health Care Using Algorithm A** *532*
Pandapotan Siagian, Erick Fernando, Sindak Hutauruk

An Holistic Evaluation of Federated SPARQL Query Engine *538*
Nur Aini Rakhmawati

Analysis of MySql Server and MySql Cluster on the Cloud Computing *545*
Zefriansyah, Fathir Wafda, Teddy Juana, Yuwaldi Away

Colorectal Cancer Classification using PCA and Fisherface Feature Extraction Data from Pathology Microscopic Image *551*
Fajri Rakhmat Umbara, Adiyasa Nurfalah, The Houw Liong

Dashboard for Monitoring Network Operations *557*
Eka Stephani Sinambela

Review on Data Mining Methods for Tuberculosis Diagnosis *563*
Rusdah, Edi Winarko

GPU-Based Parallel Programming for Digital Document Image Classification *569*
Refi Sencia Dity, James Purnama, Reggio N. Hartono, Maulahikmah Galinium

An Interface Model for Information Visualization of Multiple Electronic Health Records *575*
Muhammad Sheraz Arshad Malik , Suziah Sulaiman

A Preliminary Study on The Impact of Knowledge Collection Behavior and Creative Intention on Programmer's Creativity *581*
Aamir Amin, Shuib Basri, Mohd Fadzil B Hassan, Mobashar Rehman

Campus of Del Polytechnic of Informatics in Geographic Information System Representation *586*
Humasak T.A. Simanjuntak

A Parallel Architecture for Multiple-Face Detection Technique Using AdaBoost Algorithm and Haar Cascade *592*
Hadi Santoso, Reza Pulungan

A Web-Based Tool Support for Automating Software Effort Estimation *598*
Zhamri Che Ani, Shuib Basri

Integrating IQ Engines Smartcamera and Google API for Android to Find Books through Google Books *605*
Stefanus, James Purnama, Maulahikmah Galinium

Integrated Application Agent-Based Services *611*
Susmini Indriani Lestariningati

Intensive/High Care Unit System for Long-Term Monitoring of Heart Rate Variability *618*
Faizal Mahananto, Shugo Kurose, Tomohiko Igasaki, Nobuki Murayama, Jun'ichi Maehara

Developing Android-Based Personal Emergency Notification System with Global Positioning System as an Alternative Handling for Public Safety *624*
Widiasa Wijaya, Bambang Setiawan, Hatma Suryotrisongko, Febriliyan Samopa, Nisfu Asrul Sani

Assessment of Color Levels in Leaf Color Chart Using Smartphone Camera with Relative Calibration *631*
Yuita Arum Sari, R V Hari Ginardi, Riyanarto Sarno

Metrics and Attributes for Assessing the Stability of Handheld Application Usage *637*
Amalina Farhi Ahmad Fadzlah

Privacy and Security in Cloud Environment: A Survey of Recent Development *643*
Amal Alsubaih, Alaaeldin Hafez, Khaled Alghathbar

Developing Independent Data Mart and Analysis Tools as Standalone Application *650*
Rully Agus Hendrawan

Information, Network and Computer Track 625

Secure and Private Content Distribution in the DRM Environment *659*
Antonius Cahya Prihandoko, Hossein Ghodosi, Bruce Litow

Diffusion Analysis of F-function on KASUMI Algorithm *665*
Rizki Yugitama, Bety Hayat Susanti, Magfirawaty

Utilizing Instant Messaging for Real-Time Notification and Information Retrieval of Snort Intrusion Detection System *671*
Hargyo Tri Nugroho, Bagas Adi Wicaksono

Online Privacy Awareness using Social Media: A Case Study of Malaysian Youth *676*
Kamarul F. Hashim, Ammar Rashid, Shafiz Affendi Mohd Yusof

Malware Attacks Intelligence in Higher Education Networks *681*
Charles Lim, Louis Lukito

Holistic Approach for Memory Analysis in Windows System..... *687*
K. A. Z. Ariffin, A.K Mahmood, J. Jaafar, S. Shamsuddin

Implementation Analysis of Simplified AES (S-AES) Algorithm on Matyas-Meyer-Oseas (MMO), Davies-Meyer (DM), and Miyaguchi-Preneel (MP) Schemes using Yuval's Birthday Attack *694*
Elena Sabarina, Bety Hayat Susanti, Agus Winarno

Analysis of the Use of Whirlpool's S-box, S1 and S2 SEED's S-box in AES Algorithm with SAC Test..... *700*
Novita Angraini, Bety Hayat Susanti, Magfirawaty

Improving TCP Fairness Flows in Wireless Ad Hoc Networks *706*
Hatim Mohamad Tahir, Abas Md Said, Alex W.M. Tan

General Topics in Information Systems Track..... 711

Twitter Used by Indonesian President: An Sentiment Analysis of Timeline..... *713*
Paulina Aliandu

Failure to Launch: Scope Creep and Other Causes of Failure *718*
Samiaji Sarosa

A Theoretical Knowledge Transfer Model in Disaster Management in Malaysia..... *724*
Kamarul F Hashim, Mazida Ahmad

Optimum Sizing of Photovoltaic-Wind Power Hybrid System For Small Information System Center in Perlis, Malaysia *730*
M. Irwanto, Y.M. Irwan, N. Gomesh, S. P. Hadi

Social Evolution in Human Relations Behavior of Utilizing Facebook..... *735*
Syahida Mohd Nazri, Zulkifli Abd. Latiff

Appendix: Poster Abstracts A-1

Ekispedia Series, the Innovative Islamic Economics Learning Media Software-Based Mobile Phones.....*A-3*
Robi Awaluddin, Nisa Rahmah Suci, Tia Meida Sopian

The Implementation of Information Security Management System (ISMS) ISO 27001:2005 on Perbanas University.....*A-5*
IGN Mantra

Production and Machine Scheduling System Integrated with Materials Requirement Planning

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ABSTRACT

Production and machine scheduling is important for any corporation in order to meet the customers demand. Literatures show that integration between customer orders and materials availability is important combination. This paper presents the prototype for a production and machine scheduling system to improve and maximize the integration with materials requirement planning. In this paper, a software development life cycle was applied as the research methodology. The authors used unified modeling language for the analysis and design of the application. After requirements identification phase, the application prototype was built and presented to the application users. The results of this research are an application prototype that helps to record production data and could be accessed to know the production process integrated with materials requirement planning.

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1. INTRODUCTION

Production and machine scheduling is important for companies. There are times when the availability of the raw materials and the demand level of the final products do not match. The company has to fulfill customer orders because the number of customer orders improves the production process to meet the needs of customers. With a continuous production process, the company will face difficulties to monitor the production and raw materials inventory simultaneously. Ineffective machine scheduling in the company creates opportunity loss. To improve and maximize the production process, a company needs an application to plan an effective machine scheduling that integrated with materials requirement planning in the production process. This paper will answer the following research questions: (1) How to develop the production process and machine scheduling system for PT. X? (2) How to manage the production process and materials requirement planning with integrated application?

This research will analyze and designed a system that will help the recording of production data and can be accessed real-time. So, the company will know the productivity level for the next production process any time. Additionally, the system can help the machine scheduling that will be integrated and connected directly to the production and inventory system. To assist the owners of the company, the application will send the information to validate the production process carried out through short message services whether or not the owners are located at the office and factory.

2. RESEARCH METHOD

The production represents activities that transform inputs to outputs. There are several purposes of production is to add the value of goods or services, to change the shape of goods or services, to satisfy human needs, to expand employment opportunities, and to achieve maximum profits [1]. Production involves several components such as the raw materials as inputs, the manufacturing process depending on what industry this company is in, and the finished goods as the outputs.

Among many problems, the sale price of the company's products remains among the most difficult ones to handle. The selling price of the company's products can determine whether the company can survive the competition in the industry. Selling price that is too high can prevent public not to buy or reduce the number of products purchased which will limit its revenues and profits. In contrast, the selling price that is too low will prevent to achieve planned operating income. Therefore, setting the right price is very important for any companies. It is important, however to realize that production capacity does not simply reflect the actual production rates [2].

Scheduling is a process to manage the work sequence. This can be done with or without a computer system. The key to making an effective and efficient scheduling is the decision to determine who should be running the process and when or how long the process will be operated [3]. A good scheduling system should ultimately cater to the company's needs and available resources. Thus, a tailored scheduling system should be the best option when it is available.

There is a module that is called the Materials Requirement Planning (MRP) which manages the material level to be stored and to be ordered [4]. The MRP system may send daily planned orders to carry out a real-time production schedule. At the same, orders can be sent to suppliers in order to notify them for any purchase of raw materials. Briefly, MRP can be described as a computer modeling technique that allows a demand-driven production execution. It determines what to produce, when to produce and how much to produce at specific times [5].

Software Development Life Cycle (SDLC) models are tools to develop software in order to meet a business needs [6]. The SDLC was employed as the research methodology starting from a project initiated as a part of business process analysis, application design, application builds using programming language, testing, implementation and maintenance. The application was designed with Unified Modeling Language (UML). At the completion of the application were performed in order to achieve the intended quality.

3. RESULTS AND ANALYSIS

The following description illustrates the business process of PT.X. The production process starts from the owners plan to undertake the production of goods and identification of the raw materials needed for production. This information was deployed to the production department. The department of production receives a list of materials required and the availability of the raw materials required will check. If the raw materials are not sufficient to satisfy the customer orders, warehouse will notify the production department and notify the procurement staffs. The owner decided whether or not a procurement of raw materials or a rejection of the production should be made. If the raw materials are available, the warehouse will mark the raw materials to be used and prepare the raw materials. After all the raw materials available, the production department will process the raw materials accordingly. The results of the production process will be recorded and be given to the warehouse.

The machine scheduling process is part of the production process for determining which machine to be used in the production process, considering the duration of the production process. This process begins when raw materials are ready for production, continued by having the production machine staff to check the production plan. Afterward, the production staff will determine which machine to be used in accordance with the categories and types of production machines. Then, the department of production will set the hours that will not interfere with the other production schedule on the particular machine. Productions will be carried out in accordance with the schedule.

Based on these business processes, an application prototype has been developed. The following figures show examples of use case diagram (Figure 1) and class diagram (Figure 2) that are implemented in the application.

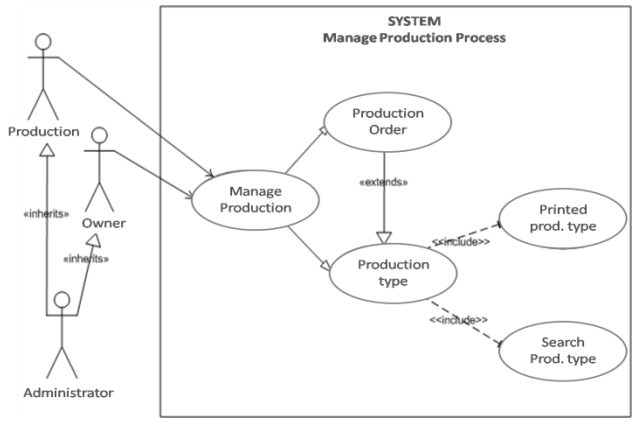

Figure 1. Use Case Diagram – Manage Production Process

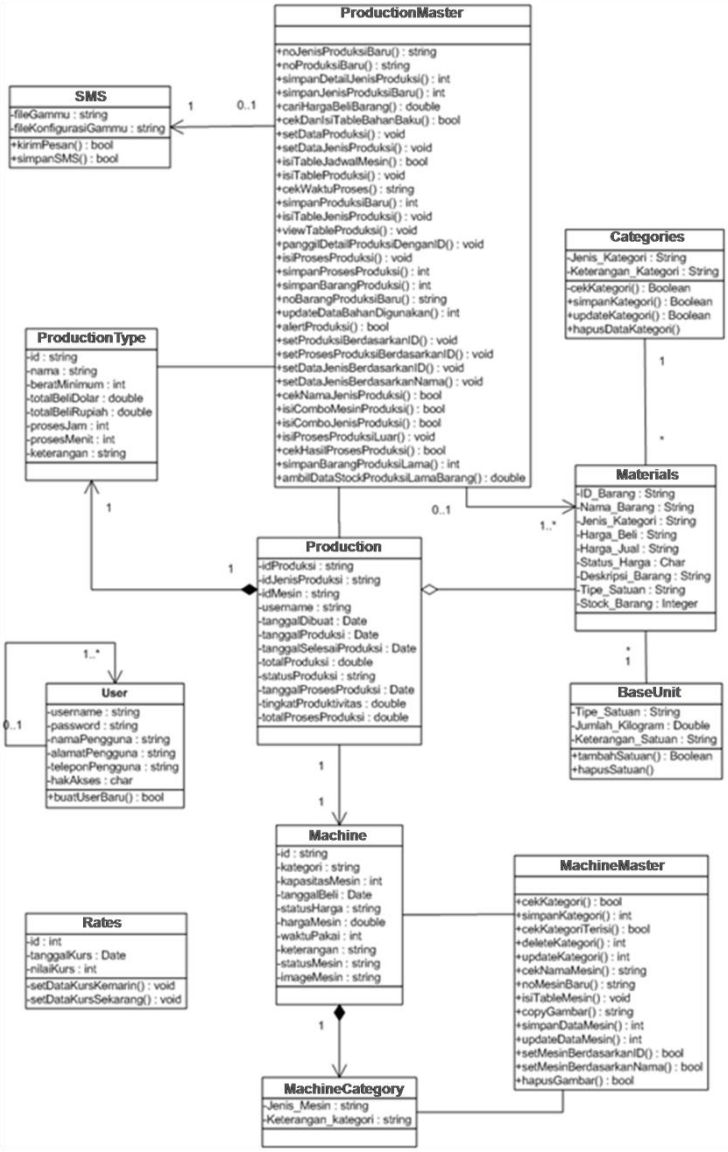

Figure 2. Class Diagram – Production and Machine Scheduling System

This section will explain the results of a system prototype developed in this research. Figure 3 shows machines information details to show that a particular machine is ready to be used for production.

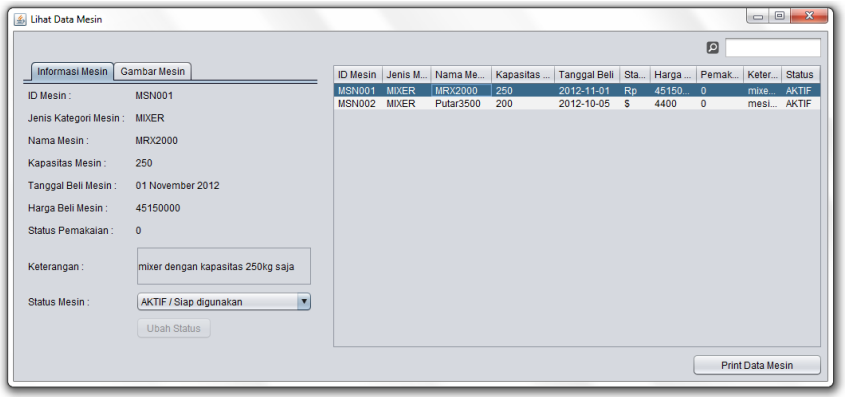

Figure 3. Machine Information Details

Figure 4 shows an input form to set up the production type and the bill of materials for the materials requirement planning prior to the execution of production.

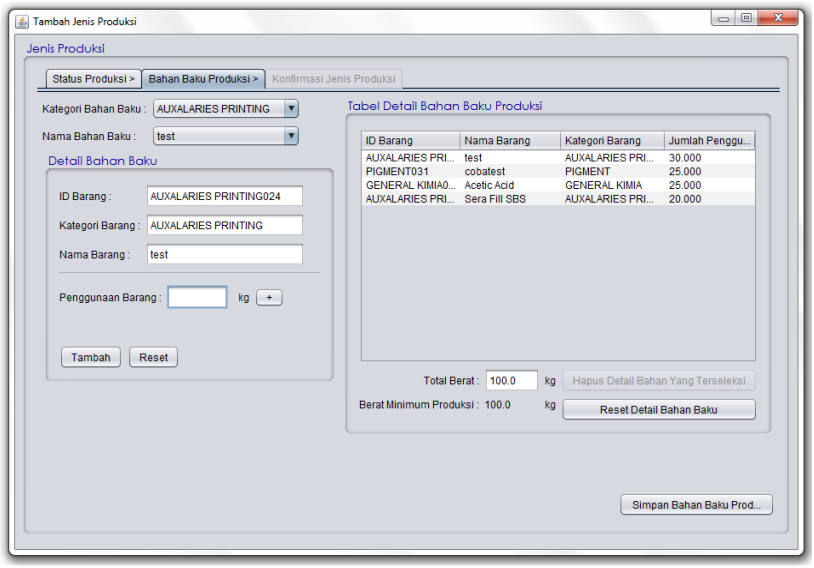

Figure 4. Materials Requirement Form

Figure 5 shows the production process information that consists of material selection, machine occupancy, order execution time set up, and production result confirmation after the production process is finished.

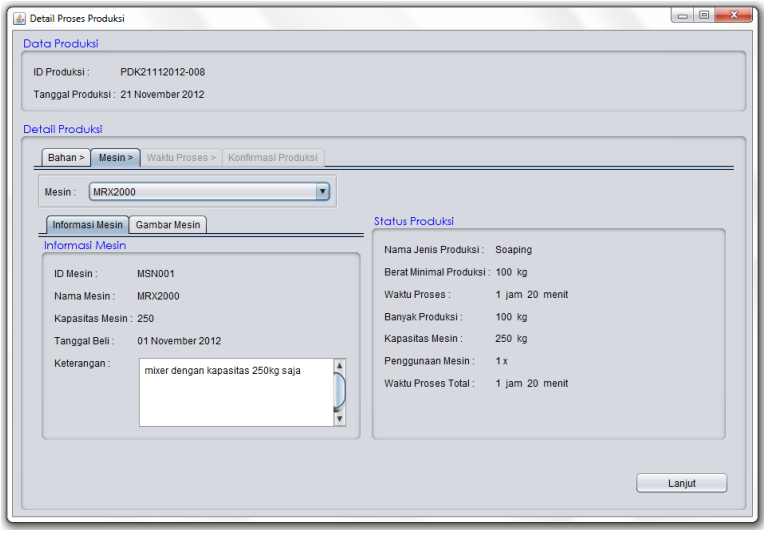

Figure 5. Orders Execution

Figure 6 shows the details of the production process that has been completed. The form consists of production id, production date, product name, expected production amounts, production result amounts, and the percentage of productivity.

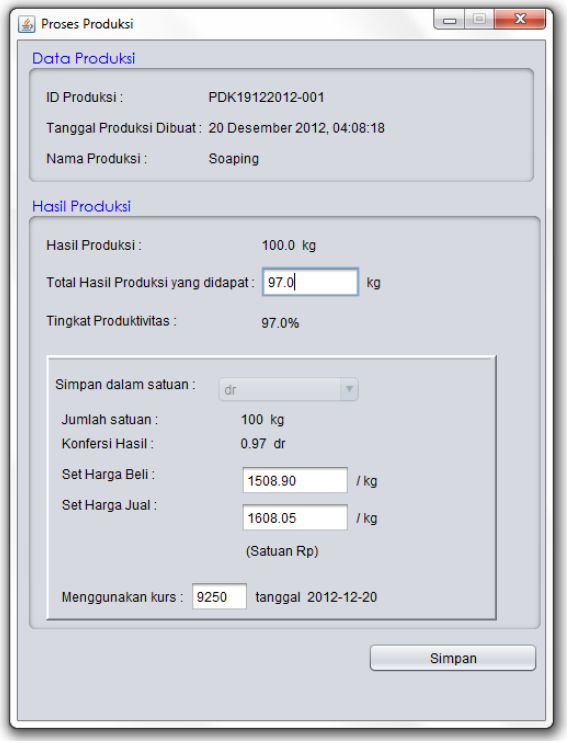

Figure 6. Production Process Details

4. CONCLUSION

The application prototype resulted from this research show an ability to assist the recording of production data in real-time. The production department, warehouse management and owners can review materials availability and view the final confirmations after the completion of the production process. Owners can also gain information on the productivity level (in percentage). In addition, this application can assist machine scheduling as aligned with the production system and raw material inventory level. The

application can send information to the owners in order to validate the production process that has been carried out by sending short message services. With this service, owners can find out all production activities regardless of their location.

Recommendation for further development of this application are as follows. This application can be further developed as a real-time logistic information system. Further research is necessary to add an accounting module in order to integrate the financial functions into the system. In such addition it is expected that all activities can be controlled and computerize. Thus, the maintenance can be done periodically in an efficient manner considering that there will be major increases in the amount of transactions in the future.

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