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PROCEEDING 2nd

INTERNATIONAL SEMINAR ON APPLIED TECHNOLOGY, SCIENCE AND ARTS - APTECS 2010 THEME EMPOWERING CREATIVITY THROUGH SCIENCE AND TECHNOLOGY TO ENHANCE NATIONS COMPETITIVENESS GRAHA **SEPULUH NOPEMBER,** 21-22 **December** 2010 **Organized by : Institute of Research and Public Services (LPPM) INSTITUT TEKNOLOGI SEPULUH NOPEMBER 2010** **9**

2nd INTERNATIONAL SEMINAR ON APPLIED TECHNOLOGY, SCIENCE, AND ARTS (APTECS 2010) HONORARY COMMITTEE PROF. PRIYO SUPROBO PROF. I NYOMAN SUTANTRA GENERAL CHAIRMAN DR. BAMBANG SAMPURNO TECHNICAL PROGRAM COMMITTEE PROF. IMAM ROBANDI, PROF. PAULUS INDIYONO, PROF. GAMANTYO HENDRANTORO, PROF. DJAUHAR MANFAAT, PROF. NOOR ENDAH MOCHTAR, PROF. TRIWULAN, PROF. HAPPY RATNA S., PROF. R. Y. PERRY BURHAN, PROF. MAURIDHI HERY P., PROF. SUPRAPTO, PROF. DJATMIKO ICHSANI, PROF. I NYOMAN PUJAWAN, PROF. ALI ALTWAY, PROF. TRIYOGI, PROF.GEDE WIBAWA, PROF. HIYAMA TAKASHI (KUMAMOTO UN.), MARK G STEWART (UNIVERSITY OF NEW CASTLE), PROF. WAHYUDI PRIYONO (UI), PROF. RIZAL TAMIN (ITB), PROF. JAMASRI (UGM), DR. AGUS W., DR. K. BAHARUDIN (UTM), DR. ESSY ARIJOENI (UI), DR. TRI PADMI (ITB) ORGANIZING COMMITTEE DR. AULIA SITI AISJAH, PROF. DANAWATI DR. RIA ASIH SUMITRO, DR. I MADE YULISTYA NEGARA DR. WAHYUDI, DR. ISPURWONO, SITI KAMILIA AZIZ, MT., AUNUR ROHIM, DEA., DIAH P. WULANDARI, MT., ANDJRAH HAMZAH, MSI., HENDRA CORDOVA, MT., DR. RER. NAT FREDY KURNIAWAN, SUYANTO,MT. SECRETARIAT DIVISION DR. KARTIKA NUSWANTARA, DEWI AMALIA, ST., IR. HERI SUDARSONO, INDAH PURWATI, SUCIPTO OPENING SPEECH OF THE RECTOR OF ITS Assalamu'alaikum Wr.Wb. Good Morning Ladies and Gentlemen, Let me, first, praise the Almighty God for the blessings and mercies that have made all we have today possible. Distinguished guests, esteemed presenters and participants, I would like to extend the warmest welcome to all of you attending the 2nd Internasional

Seminar on Applied Technology, Science and Arts (APTECS). **4**

I would like to express my profound gratitude to Prof. KISHIDA Satoru for his willingness to join this seminar and to deliver his outstanding lecture on the Prospect of High-Tech Superconducting Oxides and their Surface Analysis Superconductivity, Surface Analysis, and Oxide as the Creative Industry for the Future. This speech would be very contributing to all attending this seminar. Acknowledgement must also be given to all the attending plenary sessions, the Ministry of Marine Affairs and Fisheries Republic of Indonesia, Dr. Ir. H Fadel Muhammad Al-Haddar; the Chief Executive Officer, Mr. Dahlan Iskan; and Prof. Wayan Dibya who are willing to spend some of their time that I know they are quite compact in schedule. Thank you for featuring very inspiring experience and insightful notions that would be very contributing to all attending this seminar to build high comprehensive and up to date prior knowledge. Allow me to express my heartfelt gratitude to many sponsors for their generous financial support. APTECS is an annual seminar hosted by the Institut Teknologi Sepuluh Nopember (ITS) as the forum of academic sharing focusing on various issues in science, technology and arts. As one of the reputable institutions in Indonesia, it is undeniable that active contributions of ITS would be one of the important considerations to deal with the Asean China Free Trade

Agreement (ACFTA) that has been launched since the 1st January 2010. At the same time ceasing International competitions would become one of the agenda that must be done by enhancing as well as empowering the national competitiveness in all aspects including engineering, economy, social, and many others. In fact, regarless of the subsequently and surely diminished natural resources, people today need to be able to find brilliant ways to determine success in economy for the future of this beloved country, Indonesia. Dear Audience, the main point of my speech is that this country would take the global challenge only if we are able to develop dynamic cultures and traditions as a nation. And, ITS, in the Golden year anniversary, would become the leading institution to enliven the competition through the development of science, technology, and not to mention cultures and arts. Now, dear audience, the seminar is all yours. I hope everyone will find the seminar inspiring and enriching, through presentations and discussions on

empowering creativity through science and technology to enhance nation **competitiveness.**

Finally, I wish to see you again in the coming 3rd APTECS seminar, December 2011. I wish great happiness, good health, and much success to each of you. Thank you. Surabaya, 21 Desember 2010 Rector of ITS Prof. Priyo Suprobo OPENING SPEECH OF THE CHIEF OF INSTITUTE OF RESEARCH AND PUBLIC SERVICES First of all, let us praise God whose blessings have enabled us to band together here in the 2nd International APTECS seminar that, this year, is hosted particularly to commemorate the golden year anniversary of the Institut Teknologi Sepuluh Nopember. It is a pleasure for LPPM to welcome you all the professional researchers either from abroad or all over Indonesia. This is the forum where we can meet colleagues from various specialty areas to develop knowledge, technology, and arts that would, of course, contribute to the lives of the mankind In the attempt to foster the development of science and technology, basic and applied researches, and industrial researches as well are all the major activities need to be conducted to enhance industrial productivity and competitiveness and to advance our nations unchallenged supremacy; therefore, unless there were any publications and disseminations of research findings and discoveries, researches with high sophisticated findings and contributions would have completely no meaning. In this global era, without ability to cope with advanced technology and to develop the creativity and innovation, industries would not be able to take part into rigorous competitions. For this reason, then APTECS raises the topic of “Empowering Creativity through Science and Technology to Enhance Nations Competitiveness”. APTECS is forwarded to be one of the forums for researchers to disseminate and further discuss the results of researches; furthermore, this forum is promoted to enrich creative and innovative ideas that would be worth considering for further researches. Intensive communication as well as discussions in APTECS would continue the process of advancing science, technology, and arts as well. Moreover, further attempt of this form is to promote the implementation of the research finding to give positive contributions for our beloved country. All researches and their findings are aimed to keep up and further develop our noble cultural values, arts, and human civilization so that, as a member of world societies, our nation would be much dignified among other nations on earth. By hosting this seminar LPPM-ITS is not only to gain the advancement of the science and technology throughout all the findings offered in this forum but at the same time, to encourage and to enhance the arts and cultural values of this country that would fruitfully signify our existence as a nation. This academic forum meets annually at the end of the year, and next year we would welcome you to see us again in the 3rd APTECS International Seminar that would offer more laborious topics. On behalf of LPPM-ITSI would like to express my deepest gratitude to all presenters and participants, and I wish a productive and inspiring seminar.

Surabaya, 21 Desember 2010 Prof. Ir. I Nyoman Sutantra MSc.PhD The Chief of LPPM-ITS OPENING SPEECH OF THE COMMITTEE CHAIRMAN Rector of ITS, Dr. Ir. H. Fadel Muhammad, Minister of the Ministry of Marine Affairs and Fisheries Ministry Prof. KISHIDA Satoru from Tottory University Japan Prof. Wayan Dibya fron Indonesian Arts Institute, Denpasar Bali Mr. Dahlan Iskan, the Chief Executive Officer of PLN Distinguished Presenters, all participants, and Colleagues Assalamualaikum, Wr. Wb. I am both honored and delighted to welcome you here in this remarkable conference hosted by Institut Teknologi Sepuluh Nopember (ITS) Surabaya in corporation with the Research Institute and Public Services (LPPM) ITS. The conference today takes the topic of “Empowering Creativity through Science and Technology to Enhance Nations Competitiveness”. On behalf of the committee, I would like to thank Prof. Priyo Suprobo, the Rector of ITS, whose full support has enabled all of this possible; Prof. I Nyoman Sutantra, M.Sc, PhD., the head of LPPM who has kept encouraging us in accomplishing all good preparation to welcome you here today until tomorrow; and the support of the board of committee of the golden year anniversary, whose financially support this event. Also, all the sponsors who keep rendering and make today’s conference be more easily carried out. Ladies and Gentlemen, The interest of the international scientific community is clear, sharing enormous inspiring notions, research findings and innovations. This Conference has attracted 150 domestic and overseas presenters, it means that within two days we will hear 150 oral presentations. The subjects range from descriptions of recent technology, science both natural and social, and arts. So, it is marvelous, isn’t it? Only in two days 150 brilliant ideas would have been disseminated and enriched our inventory of knowledge; furthermore, these 150 fresh and prolific ideas will enable this beloved country ready to face the challenge of ACFTA. Ladies and Gentlemen, In the middle of us, here we have four notable speakers who would overcome our desire for inputing the latest knowledge delivered in their presentations in the plenary sessions. Therefore, I would like to express my sincere gratitute and warm welcome to Prof. KISHIDA Satoru who comes far away from Tuttori University, Japan; I also feel grateful for the coming of important figures: our Minister, Dr. Ir. H Fadel Muhammad Al-Haddar; Prof. Wayan Dibya from Denpasar-Bali, and Mr. Dahlan Iskan who has been so popular among us, people of Surabaya. Ladies and gentlemen, Today’s conference is born due to a hard work of all committee and staffs who have spent their time working day by day arranging every detail of the event, so allow me to congratulate their very keen and perfect job that makes me standing up here welcoming all the distinguished guests. Last but not least, I would like to ask you all an apology for all incovenience that you might find prior, during, or after the conference; we are all just an ordinary man that won’t be able to avoid making mistakes. Thank you and have extraordinarily inspiring seminar. Wassalamu’alaikum Wr.Wb, General Chairman of 2nd APTECS 2010 Dr. Bambang Sampurno ACKNOWLEDGEMENTS Special gratitude is extended to all of the followings: RECTOR OF INSTITUT TEKNOLOGI SEPULUH NOPEMBER INSTITUTE OF RESEARCH AND PUBLIC SERVICES – ITS THE JOURNAL OF IPTEK ITS MINISTRY OF MARINE AFFAIR AND FISHERIES TOTTORI UNIVERSITY, JAPAN PERUSAHAN LISTRIK NEGARA (PLN) PT. TELEKOMUNIKASI INDONESIA, TBK PT. TRUBA JAYA ENGINEERING PT. NAHARADIA PRAKASA HOUSE OF BEAUTY CLINIQUE ELEKTRO BUDOYO – ITS SMKN IX SURABAYA for never ending supports that have made the 2nd APTECS 2010 held successfully SCHEDULE INTERNATIONAL SEMINAR ON APPLIED TECHNOLOGY, SCIENCE, AND ARTS 2nd APTECS 2010 Monday, 20 December 2010 Time Activities 19.00 - 22.00 Welcome dinner for overseas participants, officially attended by the mayor, Ir. Tri Rismaharini, MT Day I: Tuesday 21 December 2010 Time Activities 06.45 - 07.30 Registration 07.30 - 07.40 Indonesian Traditional Musical Instruments- Elektro Budoyo : Ayak Talu 07.40 - 07.50 Traditional Dancing : Jejer Gandrung Banyuwangi - SMKN 9 Surabaya 07.50 - 08.00 Welcome to 2nd APTECS : Dr. Bambang Sampurno 08.00 - 08.05 Ladrang APTECS : Elektro Budoyo 08.05 - 08.15 Colossal Dancing Remo : Elektro Budoyo 08.15 - 08.25 Speech from The Chief of Research and Public Services - ITS : Prof. I.N Sutantra 08.25 - 08.30 Opening Term - Rector ITS : Prof. Priyo Suprobo Theme I :

The prospect of High - Superconducting Oxides and Their Surface Analysis Superconductivity, Surface Analysis, and Oxide and The Creative for The Future: by Prof. KISHIDA Satoru – Tottori University, Japan Theme II : Central Roles of The Electricity to Enhance the Quality of Nation Competitiveness: by Mr. Dahlan Iskan – PLN Moderator: Prof. Imam Robandi 11.30 - 12.30 Break for Lunch and Pray A B C D E F G 12.30 - 12.47 Eng-21 Art-1 Eng-65 Eng-87 Sci-1 Eng-51 Eng-105 12.47 - 13.04 Eng-22 Art-2 Eng-66 Eng-88 Sci-2 Eng-52 Eng-106 13.04 - 13.21 Eng-23 Art-3 Eng-67 Eng-89 Sci-3 Eng-53 Eng-107 13.21 - 13.38 Eng-24 Art-4 Eng-68 Eng-90 Sci-4 Eng-54 Eng-108 13.38 - 13.55 Eng-25 Art-5 Eng-69 Eng-91 Sci-5 Eng-55 Eng-109 13.55 - 14.12 Eng-26 Art-6 Eng-70 Eng-92 Eng-117 Eng-56 Eng-110 14.12 - 14.31 Eng-27 Gen-1 Eng-71 Eng-93 Eng-118 Eng-57 Eng-111 14.31 - 14.48 Eng-28 Gen-2 Eng-72 Eng-94 Eng-119 Eng-58 Eng-112 14.48 - 15.05 Eng-29 Gen-3 Eng-73 Eng-95 Eng-120 Eng-59 Eng-113 15.05 - 15.30 Break 15.30 - 15.47 Eng-30 Gen-6 Eng-74 Eng-96 Gen-9 Eng-60 Eng-114 15.47 - 16.04 Eng-31 Gen-7 Eng-75 Eng-97 Gen-4 Eng-61 Eng-115 16.04 - 16.21 Eng-32 Gen-8 Eng-76 Eng-98 Gen-5 Eng-62 Eng-116 viii NOTE : A : Room Argopuro 1 B : Room Argopuro 2 C : Room Kawi D : Room Lawu Day II: Wednesday, 22 December 2010 E : Room Semeru 1 F : Room Semeru 2 G : Room Utama Time Activities 06.45 - 08.00 Registration 08.00 - 08.10 Indonesian Traditional Musical Instrument- Elektro Budoyo : Ojo dipleroki & Kelinciku Ucul 08.10 - 08.20 Traditional Dancing Pendet - TPKH ITS 08.20 - 08.30 Indonesian Traditional Musical Instrument - Elektro Budoyo : Ketawang 08.30 - 10.30 Keynote Speaker III and IV Panel : Theme III: Resilience of National Arts and Culture to Enhance Nation Competitiveness: By Prof. Wayan Dibia – Indonesian Arts Institute, Bali Theme IV : Empowering Marine Resources to Enhance Nation Competitiveness: Dr. Ir. H Fadel Muhammad Al-Haddar – Ministry of Marine Affairs and Fisheries Moderator: Prof. I Ketut Aria Pria Utama A B C D E F G 10.30 - 10.47

Eng-1 Eng- 9 **Eng-** 17 **Eng-** 46 **Eng-** 39 **Eng-** 78 **Eng-** **3**

33 10.47 - 11.04

Eng-2 Eng- 10 **Eng-** 18 **Eng-** 47 **Eng-** 40 **Eng-** 79 **Eng-** **3**

34 11.04 - 11.21

Eng-3 Eng- 11 **Eng-** 19 **Eng-** 48 **Eng-** 41 **Eng-** 80 **Eng-** **3**

50 11.21 - 11.38

Eng-4 Eng- 12 **Eng-** 20 **Eng-** 49 **Eng-** 63 **Eng-** 81 **Eng-** **3**

100 11.38 - 11.55

Eng-5 Eng- 13 **Eng-** 42 **Eng-** 35 **Eng-** 64 **Eng-** 82 **Eng-** **3**

101 11.55 - 12.12

Eng-6 Eng- 14 **Eng-** 43 **Eng-** 36 **Eng-** 85 **Eng-** 83 **Eng-** **3**

102 12.12 - 12.39

Eng-7 Eng- 15 **Eng-** 44 **Eng-** 37 **Eng-** 86 **Eng-** 84 **Eng-** **3**

103 12.39-12.58

Eng-8 Eng- 16 **Eng-** 45 **Eng-** 38 **Eng-** 77 **Eng-** 99 **Eng-** **3**

104 12.58 - 13.45 Break for Lunch and pray 13.45- 14.00 Closing Ceremony and Awarding Certificate 14.00 - 14.30 Preparation for City Tour (Cancelled) 14.30 - 17.30 City Tour (Cancelled) 17.00 - ... See you on 3rd APTECS NOTE : A : Room Argopuro 1 B : Room Argopuro 2 C : Room Kawi D : Room Lawu E : Room Semeru 1 F : Room Semeru 2 G : Room Utama ix Moderator Day I A Room : Argopuro 1 A: Prof. Ir. Noor Endah Mochtar, M.Sc., Ph.D. B Room : Argopuro II B: Prof. Ir. Happy Ratna Sumartinah, M.Sc., Ph.D. C Room : Kawi C: Prof. Dr. Ir. Mauridhi Hery Purnomo, M.Eng. D Room : Lawu D: Prof. Ir. Gamantyo Hendrantono, M.Eng., Ph.D. E Room : Semeru 1 E: Prof. Dr. R. Y. Perry Burhan, M.Sc. F Room : Semeru 2 F: Prof. Dr. Ir. Suprapto, M.Sc. G Room : Utama G: Dr. Maria Anityasari,ST.,ME. Moderator Day II A Room : Argopuro 1 A: Dr. rer.nat Fredy Kurniawan, MSi B Room : Argopuro II BDr. Ir. A. A. Masroeri, M.Eng. C Room : Kawi C: Prof. Ir. Sutardi, M.Eng., Ph.D. D Room : Lawu D: Prof. Ir. Djauhar Manfaat, M.Sc., Ph.D. E Room : Semeru 1 E: Prof. Dr. Ir. Adi Soeprijanto, M.T. F Room : Semeru 2 F: Prof. Dr. Ir. Dra. Danawati Hari Prajitno, SE,M.Pd. G Room : Utama G: Dr. Ir. Ria Asih Soemitro, M.Eng., DEA. Rules of Paper Presentation

1. The allotted time for presentation and question-answer session is 15 **minutes for each presenter 2. To keep prompt presentation, bell would ring three times to remind the presenter's available time for presentation.** **8**

It rings every eight minutes of the allotted time, ten minutes, and the last 15 minutes.

3. It is mandatory that the presenter promptly uses **the time allotted. 4. The timekeeper would also strictly watch the time allotted to each presenter.** **8**

x List of Abstracts: Effect of Ethanol-Indonesian Reguler Unleaded Gasoline Blends and Ignition Timing on Engine Performnace of Fuel Injected SI Engine ATOK SETIYAWAN, BAMBANG SUGIARTO, AND YULIANTO S. NUGROHO A Stair Climbing Wheelchair Based on Customer Needs I MADE LONDEN

BATAN, SUNARDI TJANDRA, ALFIAN HUDAN NUZULA, AND GHOFFAR F.S. Simulation of Close Loop Distributorless Digital Ignition Multipurpose with Matlab Sofware SYAMSUL HADI, BAMBANG SAMPURNO, AND LIZA RUSDIYANA Fuzzy Control System of CVT with Two Actuator Fork Screw to Increase Vehicle Acceleration BAMBANG SAMPURNO AND WIDJOKONGKO HANANTO A Study on the Use of Kinetic Energy Recovery System Technology for Motorcycle to Enhance Acceleration DIAH WULANDARI, BAMBANG SAMPURNO, AND I NYOMAN SUTANTRA A Comparative Study on Shielded Metal Arc Welding in Sea Water, Fresh Water and Air ATRIA PRADITYANA Phase Transformation of CuZn Alloys Produced by Mechanical Alloying with Milling Time and Zn Volume Fraction Variation WIDYASTUTI, RAHMATILLAH ISRA', AND NURUL TAUFIQURRAHMAN Initiation and Propagation of Crack in Nylon-6 Disk Under Impact SUTIKNO Models of Queuing Simulation for Slag Transportation MUHAMMAD RUSMAN AND SUTIKNO Output Power Measurement of the Developed Knee Flexion Angular Driven by Human Energy Harvester HARUS LG AND UMARUDIN Electromagnetic Vibration Energy Harvester for Harvesting Vibration Energy of the KRI KKP-811's Engine HARUS LG AND RAHMAT SUSANTO The Effect of Welding Parameters on the Configuration of Arc and Its Prediction by Artificial Neural Network ABDULLAH SHAHAB, I. B. RU ADHI ATMA WIGUNA, AND MUHAMMAD FADLY ABBAS Designing a Portable Semi Automatic Dryer Machine for Rattan Art Home Industry AGUNG PRIJO BUDIJONO Eng -1 Eng-2 Eng-3 Eng-4 Eng-5 Eng-6 Eng-7 Eng-8 Eng-9 Eng-10 Eng-11 Eng-12 Eng-13 1 1 2 2 3 3 4 4 5 5 6 6 7 xi Planning and Developing Hot Press Machine Using Pneumatic System Relay Based Control SAMPURNO On the Vibration Profile of a V-Belt Transmission System in the Presence of a Lump BAMBANG DARYANTO W. , AND HERY ARTADY The Influence of the Coil Length and the Number of Wire Turns on the Voltage Generated by a Vibration Energy Harvesting Mechanism WIWIEK HENDROWATI, BAMBANG DARYANTO W., AND HARUS L. GUNTUR Empowering a Collective Techno-Force: Transforming an Engineer's Force into a Collective Techno-Force by Strengthening Techno- Team Work (An Interplay of Constructionism Perspective and Social Dimension of Organization) ADI SURYANI Analysis on Modeling of DC Motor and Its Driving System Using with Matlab for Wheeled Mobile Robot MIRZA GHULAM INDRALAKSANA, AND HENDRO NURHADI Concept of Rejuvenation Pure Asbuton Bitumen in Accordance with the Specifications of Petroleum Asphalt used is a Pavement Material FILIA RAKHMAH AND INDRASURYA B. MOCHTAR Hydrometeorological Data Collection and Processing NOORDIAH HELDA Experimental Study on Internal RH of BFS Mortars at Early Age JANUARTI JAYA EKAPUTRI The Implementation of Probabilistic Scheduling (Case Study : Development Project of FSAINTEK UNAIR Building) FARIDA RAHMAWATI Dry Joint Connection on Precast Column FATHMAH MAHMUD Modal Parameter Extraction of a Seismically-Excited Multi-Story Building from Its Measured Response AGUNG BUDIPRIYANTO Vulnerability Index Estimation for Building and Ground Using Microtremor TRIWULAN, WIDYA UTAMA, DWA DESA WARNANA, AND SUNGKONO

8 8 9 9 10 10 11 11 12 12 13 xii Prediction of Strength of 28-day-age-concrete with Fly Ash Based on Early Age Concrete Data Using Maturity Method IFTA MINKA, PUJO AJI, AND TRIWULAN Prediction of Strength of 28 day-age-concrete Based on Early Age Concrete Data Using Maturity Method TEGAR JUANG PAMBUDI, TRIWULAN, AND PUJO AJI Finite Element Modeling of Concrete-Steel Bond of Reinforced Concrete Structure DATA IRANATA Compressive Strength and Microstructure Properties of Polymeric Concrete Incorporating Pulverized Fuel Ash (PFA) and Microwave Incinerated Rice Husk Ash (MIRHA) M.F. NURUDDIN AND M.S. DARMAWAN Application of Probabilistic Scheduling Method on UNAIR

FSAINTEK Building Project FARIDA RAHMAWATI AND WINDIARTO ABISETYO Fabrication of Simple House Walls by Using Recycled Plastic Materials MUNARUS SULUCH AND HARUN ALRASYID Load Distribution and Deflection Prediction of Pile Groups for Lateral Load DEWI AMALIA, SUWIGNYO, AND ANANTA SIGIT SIDHARTA PDT Model for NSVM CHRISTIONO UTOMO Micro Earthquake Monitoring to Detect the Distribution of Fluid Injection in Kamojang Geothermal Field ANIK HILYAH Shear Strength Predictions of Steel Reinforced Concrete Beam- Column Joints Using Superposition and Strut-and-Tie Methods BUDI SUSWANTO AND HIDAYAT SOEGIHARDJO The Impacts of Gypsum Board to the Post-fire Steel Profile HIDAYAT SOEGIHARDJO AND TEGUH ESA WIBAWA Experimental Investigation of Hydraulic Jump on Conventional and Stepped Spillway EDIJATNO, NADJADJI ANWAR, AND VERY DERMAWAN Eng

14 14 15 15 16 16 17 17 18 18 19 xiii Creativeness of Sustainable Development Aspects on Spatial Arrangement Strategies and the Reformation of Public Transportation Systems within the Agglomeration Areas of Mebidangro to Anticipate the Operational of Medan Baru Internasional Airport at Kualanamu FILIYANTI TETA ATETA BANGUN Optimization Process of Extraction of Paclitaxel and 10-Deacetylbaccatin III from Taxus Wallichiana Zucc Using Supercritical CO2 NGUYEN QUANG DUY, PHAN DINH TUAN, AND LE THI KIM PHUNG Nonlinear pH Control (Adaptive Self-Tuning PID) Based on Reaction Invariant HENDRA CORDOVA AND ALI MASDUKI A Study on the Effects of Rice Husk Ash on Strontium Waste Cementation SUSETYO HARIO PUTERO AND KUSNANTO Neural Networks Based Predictive PID Controller for Nonlinear System BAMBANG L. WIDJIANTORO, HENI DWI PUTRI, AND BAMBANG PRIHANDOKO Temperature Sensor Model Based on Thermo-Optics Effect in Fractal Fiber Bragg Grating M. RAMDLAN KIROM M and

A

AULIA SITI AISJAH, A. A. MASROERI, AND DINAYATI RODLIYAH Cold Chain System (Future Research Prespective) GRASIANO WARAKANO LAILOSSA, KETUT BUDA ARTANA, AND A.A.B.DINARIYANA The Concept of Wireless Optical Communication System to Transmit the Fringe Pattern of a Sagnac Interferometer SAYUTI SYAMSUAR Designing Automatic Backwash in Sand Filter Tank at Ipa 1 PDAM

Neural Networks and PI Controller Using Particle Swarm Optimization (PSO) M. YUSUF WIBISONO, AS'ADI, FACHRUDDIN, AND IMAM ROBANDI Application of Imperialist Competitive Algorithm for Optimal Capacitive Energy Storage in Electric Power System GUMILANG WICAKSONO, M. AVID FASSAMSI, AND IMAM ROBANDI An Analog Prototype Model of STATCOM in Analysis and Design SOEDIBYO, IMAM ROBANDI, NI KETUT ARYANI, AND AS'ADI Application of Differential Evolution for Load Frequency Control Optimization on Two Area Power System FAKHRUDDIN A, MIFTAKHUR ROZIQ M.D., MUHAMMAD RIDHA FAUZI, TAMAJI, AND IMAM ROBANDI Optimal Performance of Wind-Diesel Hybrid Power System (WDHPS) on Isolated Area with Superconducting Magnetic Energy Storage (SMES) Using Particles Swarm Optimization (PSO) A. M. BENIE ZAKARIYA I, STEPHAN, FACHRUDIN, AND IMAM ROBANDI Optimal Coordination of Superconducting Magnetic Energy Storage (SMES) and Power System Stabilizer (PSS) on Power System Using Differential Evolution Algorithm MUH. MAHFUD ROSYIDI, A. M. BENIE ZAKARIYA, ALI MUSYAFA, AND IMAM ROBANDI Optimal Design of PID Power System Stabilizers (PSS) Using Imperialist Competitive Algorithm (ICA) SUGENG LAKSONO, MOCHAMAD AVID FASSAMS, AS'ADI, ALI, AND IMAM ROBANDI Eng

31 32 32 33 33 34 34 35 35 36 36 37 xvi Optimization Solutions of Economic Dispatch in Power System Using Bacterial Foraging Algorithm MUHAMMAD RIDHA FAUZI, ALI MUSYAFA, AND IMAM ROBANDI Tuning of Automatic Voltage Regulator (AVR) System and Power System Stabilizer (PSS) Using Imperialist Competitive Algorithm (ICA) MUHAMMAD TAUFIQ RAMADHAN, MUHAMAD OTONG, TAMAJI, AND IMAM ROBANDI Design of Power System Stabilizer (PSS) Using Imperialist Competitive Algorithm (ICA) in Multimachine Power System AS'ADI, ADI PRAMUKA, ERPHAN SAHIRI, AND IMAM ROBANDI State Feedback Controller Design of Power System Stabilizer (PSS) by Using Fuzzy Model TAMAJI AND IMAM ROBANDI Design of Optimal Dual Input Power System Stabilizers (DIPSS) and Capacitive Energy Storage (CES) Using Particle Swarm Optimization (PSO) FAIQ ULFI, TAMAJI, AND IMAM ROBANDI Optimal Tuning of PID Controller for Load Frequency Control (LFC) Using Ant Colony Optimization (ACO) M. FAISHAL A, MIFTAKHUR ROZIQ M.D, MUHAMMAD RIDHA FAUZI, TAMAJI, AND IMAM ROBANDI Tuning of Power System Stabilizer (PSS) on Single Machine Infinite Bus (SMIB) Using Particle Swarm Optimization (PSO) ZAINAL ABIDIN, MUHAMMAD OTONG, TAMAJI, AND IMAM ROBANDI Model and Simulation of Vehicle Lateral Stability Control FACHRUDIN, IMAM ROBANDI, AND I NYOMAN SUTANTRA Application of Modified Neural Network- based Economic Dispatch in Java-Bali Interconnection System AMIR AMRUDDIN, M. YUSUF WIBISONO, AS'ADI, AND IMAM ROBANDI Power Quality Improvement in AC/DC Three Phase Semiconverter with Third Harmonic Injection Using PI Controller PRIMA DEWI PERMATASARI, YAHYA CHUSNA ARIF, AS'ADI, AND IMAM ROBANDI Design of Imperialist Competitive Algorithm for Optimal Coordination Superconducting Magnetic Energy Storage (SMES) and Power System Stabilizer (PSS) MOCHAMAD AVID FASSAMSI, AS'ADI, FACHRUDIN, AND IMAM ROBANDI Effects of Fuel Reprocessing Flow Rate on Passive Compact Molten Salt Reactor (PCMSR) Fuel Composition at Sustainable Phase ANDANG WIDI HARTO

meaningful information, and enables the delivery of this information to users so that it help them to achieve the goals and objectives of higher education institutions in general [2]. Globalization is also supported by the increasingly widespread use of smart technology (computers, telecommunications and electronic office equipment) in all arenas of life. This situation has forced the management company in Indonesia to re-engineer their management systems that have been used to produce products and services [5]. The results of researchs carried out by Choe Min showed a positive correlation between the performance of the information technology and the influence of factors such as the participation of users, the ability of information technology staff, and the size of the Organization [4]. Elements of information technology which are including hardware, software, communications and data availability, based on some empirical studies, information technology has benefits for the working integration both vertically and horizontally, to help companies gain competitive information [3], presents information in a useful form and to send information to other parties as well as other locations [6]. II. FUNDAMENTAL THEORY Maturity Model Information Technology The needs of application and maturity of information technology in higher education institutions require the integration of technology and information. This need will be seen in the top-level decisions that must be supported by information technology. General process of information technology can be seen in Fig. 1. The control of IT Processes which satisfy Business Requirements is enabled by Control Statements and considers Control Practices Figure 1. Information Technology Processes The use of information technology to support the organization or institution in response to the pressure of business / government and to achieve its goal has been regarded as a necessity by each organizations government and corporations. Increasing complexity, interconnectedness, and globalization makes developers of information technology requires huge costs and also cause a variety of risks. At the same time, information technology also offers tremendous opportunities as a business enabler and change the business pattern of higher education institutions. In Fig. 2. is a pattern of business in higher education institutions. Figure 2.Business Pattern of Higher Education Institutions III. METHODS Development of information technology is a process to plan and restructure the technological information that has been implemented and constructed according to the needs of information on an institution. The purpose of the development of information technology is to make use of and development of information technology as a profitable container investment and provide benefits to higher education institutions.Maturity Model allows an organization to measure itself from nothing to be optimized, so the organization can perform measurements on the maturity level there to know the progress of the internal control of the system [6]. Scale maturity model will help professional to explain to the management of higher education where the shortage of information technology management is and to determine targets to compare the organizational control practices against best practice examples. The

advantage of the **maturity model approach is that it'** s **easy for management to** **2**

put higher education institutions on a scale and pay attention to what is involved whether they would improve the performance [6]. Process maturity model can be seen in Fig. 3. Figure 3. Maturity Model Process The concept of maturity of information technology is used to determine the extent to which managers use computer-based information technology. The use of information technology will improve the efficiency of effectiveness, quality, and consumer response. Infrastructure differences can impede or accelerate the activities of the organization in responding to the environment. According to Chenhall and Morris says that the reliability of information is determined by a broad- scope information, which is information technology which represent the focus dimension, time horizon, and quantification, and timeliness of information, the accuracy of information to support the managers face the uncertainty that

occurs in the workplace [1] IV. EXPERIMENTAL RESULTS In the domain Acquisition & Implementation (AI) encompassing functional purpose in Higher Education in developing studies organization in achieving its outcome of the process of information technology. In addition, developing the policy to provide information technology and procurement procedures in accordance with procurement policies in Higher Education. In the assessment process of maturity level in higher education institutions which is based on domain information criterion Acquisition & Implementation (AI), are including, efficiency effectiveness, acquisition, implementation, compliance, availability, and management of information technology applications and information technology infrastructure. In Figure 5 is a process maturity level assessment in higher education institutions . Figure 5. Assessment Process Maturity Level of Higher Education In Fig. 6. This is an example of a table showing the maturity model which show the statement on the level of maturity. This can be seen in the table there are three statements, each of which has a weight value and weight to a level of maturity is the amount of weight that is worth three. On every question will be given four choices that determine the maturity value statement, namely: ? Not at all (Weight = 0), if none of the statement are not met ? A Little (Weight = 0,33), if the statement are met only slightly. ? To some degree (Weight = 0,66), if the statement are met but not perfect. ? Completely (Weight = 1), if the statement are suited with actual circumstances. Figure 6. Maturity Model Table The value of each statement in the maturity level will be added and divided by the level of maturity, so we can obtain compliance for every level of maturity. Fig. 7. is showing the calculation due on the maturity level of information technology Figure 7. Calculation of Maturity Model Table The value of compliance at each level will processed to get the IT process maturity. Each value of compliance will be multiplied by the contribution of each maturity level. The value of this contribution for each level of maturity varies in accordance with the provisions of COBIT, the higher the level of maturity, the higher its contribution. The calculation process for measuring the maturity level domain based Acquisition & Implementation (AI) can be seen in Fig. 8. In this case the maturity value to process that information technology maturity level is 2.828. It has been noted previously that the maturity value of an information technology process are beetwen 0-5, but not necessarily the whole process of institutions of higher education information technology has a perfect maturity value. Figure 8. Result of calculation of Maturity Level on the Domain AI Further testing conducted are using the Cronbach Alpha reliability test-(1). Questionnaire testing has satisfactory reliability if it have Alpha-Cronbach reliability coefficient greater than 0.6. The formula used to calculate the Alpha-Cronbach [7]. The results of the test reliability and validity of domain acquisition and implementation (AI) can be seen in Fig. 9. ri (k ? 1) ? k ?1 ? ?S St2i 2 ?? ? ? ? ? ? ? ? 2 S t2 ? ? X t2 ?? t ? n ? X n 2 S 2 JKi i ? n ? JKs n 2 …….. (1) ……..... (2) ……. (3) Information: k = amount of item ∑Si = sum of varian item St2 = total varian JKi = sum of squares of all score items JKs = sum of squares subject Figure 9. Result of Reliability and Validity Test on the Domain AI AI-1 Identify Automated Solutions : ?

Define business functional and technical requirements ? Establish processes for integrity/currency of requirements ? Identify, document and analyse business process risk ? Conduct a feasibility study/impact assessment in respect of implementing proposed business requirements ? Assess IT operational benefits of proposed solutions ? Assess business benefits of proposed solutions ? Develop a requirements approval process ? Approve and sign off on solutions proposed **2**

AI-2

Acquire and Maintain Application Software : ? Translate business requirements into high level design specification ? Prepare detailed design and technical software application requirements ? Specify application controls within the design ? Customise and implement acquired automated functionality ? Develop formalised methodologies and processes to manage the application development process ? Create a software quality assurance plan for the project ? Track and manage application requirements ? Develop a plan for the maintenance of software applications **1**

AI-3

Acquire and Maintain Technology **Infrastructure : ? Define acquisition procedure/process ? Negotiate acquisition and acquire required infrastructure with (approved) vendors ? Define strategy and plan maintenance for infrastructure ? Configure infrastructure components** **1**

AI-4

Enable Operation and Use : ? Develop strategy to operationalise the solution ? Develop knowledge transfer methodology ? Develop end user procedure manuals ? Develop technical support documentation for operations and support staff ? Develop and deliver training ? Evaluate training results and enhance documentation as required **1**

AI-5

Procure IT Resources : ? Develop IT procurement policies and procedures aligned with procurement policies at the corporate level ? Establish/maintain a list of accredited suppliers ? Evaluate and select suppliers through a request for proposal (RFP) process ? Develop contracts that protect the organisation's **interests ? Procure in compliance with established procedures** **1**

AI-6 Manage Changes : ?

Develop and implement a process to consistently record, assess and prioritise change requests ? Assess impact and prioritise changes based on business needs ? Assure that any emergency and critical change follows the approved process ? Authorise changes ? Manage and disseminate relevant information regarding changes 2

AI-7 Install and Accredit Solutions and Changes : ?

Build and review implementation plans ? Define and review a test strategy (entry and exit criteria) and an operational test plan methodology ? Build and maintain a business and technical requirements repository and test cases for accredited systems ? Authorise changes **Perform system conversion and integration tests on test environment ? Deploy test environment and conduct final acceptance tests ? Recommend promotion to production based on agreed accreditation criteria** 2

Based on the recapitulation and the test results, we obtained results on the maturity level domain Acquisition & Implementation (AI) is located at around 2828 â 3459, the highest value lies in the AI-2 (Obtain and Maintain Application Software), and AI-7 (Install and Accreditation Solutions and changes). Results summary of mature domain Acquisition & Implementation (AI) can be seen in Fig. 10. AI-1 5 4 AI-7 3 AI-2 2 1 0 AI-6 AI-3 AI-5 AI-4 Figure 10. Result of Maturity Domain Aquire & Implement (AI) The overall result of the maturity of information technology of higher level education institution is presented in graphical form, and can be seen in Fig. 11. which indicates that the presence of information technology and good infrastructure contribute to higher education institutions, students and lecturers. Fig. 11 is a graph of the maturity level of information technology, higher education institutions. Tingkat Maturity 5.50 5.00 4.50 4.00 Infrastruktur y = 6.6251x3.+2135;.035.25x8 - 42.217 3.87 ; 3.60 4.42 ; 3.85 R = 0.9992 3.50 3.00 2.52 ; 2.74 2.50 2.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Teknologi Informasi Figure 11. Graphic of information technology maturity level higher education institutions V. CONCLUSIONS Conclusions that can be drawn from this study are as follows: ? From the measurement results using maturity model, it is known that the level of information technology in higher education institutions at the recurrent level with an average score of 2828. In general, to achieve a further level of maturity models it need to manage and regulate the process of information technology services, applications and internal information technology infrastructure. ? From the results of mapping the level maturity model, that the process of information technology and information technology management needs to make adjustments and modifications to information technology, so it can be applied widely to institutions of higher education. Based on the reliability and validity test, it is shown that maturity model can be accepted by the institution with a measurement with trust level (cronbachâs alpha) of 0921 and the level of validity of 0.75 (75%). VI. REFERENCES [1] Astuti, Sri. Duties as a Variable Moderating Against The Relationship Between The Usefulness of Information Technology and User Satisfaction at the End User Company. Thesis. Yogyakarta: Gadjah Mada University. 2001. [2] Bounds, Gregory. Management: A Total Quality Perpective, South Western College Publishing, Ohio. 1994. [3] McLeod, Raymond. Management Information Systems. 10th Edition, New Jersey : Prentice

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