

**Tarumanagara International Conference
on the Applications of Technology and Engineering 2019**

CERTIFICATE

OF ACHIEVEMENT

this certificate is presented to

LINA GOZALI, ST., MM., Ph.D

*for the contribution as **Presenter***

Paper Title: Calculation of Labor Amount with Theory of Constraints and Line Balancing Method
in PT. XYZ Fish Crackers Factory

November 21st - 22nd, 2019 | Universitas Tarumanagara, Jakarta

Chairman



TICATE

Dr. Hugeng, S.T., M.T.

Rector



UNIVERSITAS TARUMANAGARA
REKTOR

Prof. Dr. Agustinus Purna Irawan

PROGRAM AT A GLANCE

Tarumanagara International Conference on the Applications of Technology and Engineering
 Jakarta, 21-22 November 2019

Day 1 (Thursday, 21 November 2019)

| TIME | ACTIVITY |
|---------------|---|
| 08.30 – 09.00 | Registration & Coffee Morning |
| 09.00 – 09.15 | Opening Ceremony <ul style="list-style-type: none"> • Singing “National Anthem” & “ Mars Tarumanagara” • Traditional Dance • Report from Chairman: Dr. Hugeng (SMIEEE) |
| 09.15 – 09.30 | Welcome Speech: Rector of Universitas Tarumanagara Prof. Dr. Agustinus Purna Irawan (ASEAN Engineer) |
| | Untar Video Profile |
| 09.30 – 11.45 | Keynote Speaker: <ol style="list-style-type: none"> 1. Dr. Ing. Joewono Prasetijo (Universiti Tun Hussein Onn Malaysia, Malaysia) 2. Prof. Dr. Tjokorda Gde Tirta Nindhia (Udayana University, Indonesia) Invited Speakers: <ol style="list-style-type: none"> 1. Prof. Dr. Srikantappa. A.S. (Cauvry Institute of Technology India, India) 2. Prof. Dr. Mohd Zulkifli Abdullah (Universiti Sains Malaysia, Malaysia) 3. Prof. Yasuyuki Nemoto, Ph.D. (Ashikaga University) |
| 11.45 - 12.00 | Souvenir Presentation & Photo Session |
| 12.00 - 13.00 | Lunch Break |
| 13.00 – 15.00 | Paper Presentation Session I |
| 15.00 – 15.15 | Coffee & Tea break |
| 15.15 – 17.15 | Paper Presentation Session II |

Day 2 (Friday, 22 November 2019)

| TIME | Activity |
|---------------|--------------------------------|
| 08.30 – 08.30 | Registration & Coffee Morning |
| 08.30 – 11.30 | Paper Presentation Session III |
| 11.30 – 13.00 | Lunch Break |
| 13.00 – 16.00 | Paper Presentation Session IV |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 1
Time : 13.00 – 15.00
Track : Mechanical Engineering & Technology

| NO | SCHEDULE | PAPER TITLE | AUTHOR | INSTITUTION |
|----|-------------|---|--|---------------------------------------|
| 1 | 13.00-13.15 | Smart Brake Monitoring System with Brake Failure Indication for Automobile Vehicles | Srikantappa. A. S | Cauvery Institute of Technology |
| 2 | 13.15-13.30 | Tensile Behaviour of Kevlar Fibre & Coir Fibre Reinforced with Epoxy | Srikantappa. A. S | Cauvery Institute of Technology |
| 3 | 13.30-13.45 | Flexural & Impact Characteristics of Kevlar Fibre & Coir Fibre Reinforced with Epoxy Hybrid Composites | Srikantappa. A. S | Cauvery Institute of Technology |
| 4 | 13.45-14.00 | A Study on Tool Characteristics for better Performance in machining OHNS Steel using TiAlN Coated Tungsten Carbide tool inserts | Srikantappa. A. S, Shivakumara. C. M, Adaveesha. B | Cauvery Institute of Technology |
| 5 | 14.00-14.15 | Comparative study between MSC Marc/Mentat student version and Simufact Welding for three-passed butt joint | Richard A.M. Napitupulu, Chilinton Hutabarat, Charles S.P Manurung, Yupiter HP Manurung, Marcel Graf | Nommensen HKBP University Medan |
| 6 | 14.15-14.30 | Simufact Welding for three-passed butt joint | Prince Marbun, Richard A.M. Napitupulu, Charles SP Manurung, Sutan Simanjuntak, Yung-Chou Kao | Nommensen HKBP University Medan |
| 7 | 14.30-14.45 | Influence Of Fillers On Tribological Behaviour Of Glass-Coir Reinforced Epoxy Composites – An Ann Approach | Vijay B R and Dr. Srikantappa A S | Cauvery Institute of Technology |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 2
Time : 13.00 – 14.45
Track : Mechanical Engineering & Information Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|--|----------------------------------|
| 1 | 13.00-13.15 | Aluminum Frame Product Development Using Quality Function Deployment and Value Engineering at PT KSN | Surya Perdana, Ridwan Usman and Zeny Fatimah Hunusalela | Universitas Indraprasta PGRI |
| 2 | 13.15-13.30 | Modeling of Prediction Bandwidth Density with Backpropagation Neural Network (BPNN) Methods | Cynthia Hayat, Iwan Aang Soenandi, Samuel Limong, Johan Kurnia | Universitas Kristen Krida Wacana |
| 3 | 13.30-13.45 | Experimental Analysis of Semi-Open Impeller Pump as Turbine | Dede Lia Zariatn, Risdianto, Amat Chaeroni and Ismail Ismail | Universitas Pancasila |
| 4 | 13.45-14.00 | Redox Flow Batteries as Energy Storage Devices | Septiani Silitonga, Richard A.M Napitupulu, Charles SP Manurung, Sibuk Ginting, Parulian Siagian, Yong-Song Chen | Nommensen HKBP University |
| 5 | 14.00-14.15 | An Experimental Study on the Response of Composite Plate Due to Granade Explosion | Gunaryo, Heriana, Andi Kuswoyo, Djarot Widagdo and Bambang K. Hadi | Institut Teknologi Bandung |
| 6 | 14.15-14.30 | Statistical Analysis of CFRP Mechanical Properties using B-Basis Based on Weibull and ANOVA Distribution Analysis | Yurviany, Djarot Widagdo, Muhammad Kusni and Bambang K. Hadi | Kementrian Pertahanan |

PARALLEL SESSION SCHEDULE

Thursday, 21 November , 2019

Room : Conference Room 3
 Time : 13.00 – 14.45
 Track : Mechanical Engineering & Electrical Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|--|--|--|
| 1 | 13.00-13.15 | Design of an autonomous electric vehicle for assistance in the movement of people with visual disabilities using vision algorithms and artificial intelligence | Juan José Encinas Cantaro and Mario Chauca Saavedra | Ricardo Palma University |
| 2 | 13.15-13.30 | Characterization of Predictive Control Based on Model (MPC) in Multivariable Process of Milling in a Mineral Concentrator Plant | Juan Tisza, Mario Chauca | Universidad Nacional de Ingenierí |
| 3 | 13.30-13.45 | Development of Testing Equipment of Hydrokinetic Turbine Model to Support Implementation of the Laboratory Work | Jorfri Boike Sinaga, Novi Tanti and M.Dyan Susiala | Universitas Lampung |
| 4 | 13.45-14.00 | The Study Experimental of The Solar Collector Performance of Adsorption Refrigerator in Medan City | Syahrul Abda, Jaya Arjuna, Tulus B. Sitorus | Universitas Sumatera Utara |
| 5 | 14.00-14.15 | Automatic Statistics Measurement Antenna Performance Towards Virtual Ground Station | Arif Hidayat, Hidayat Gunawan ¹ , Ali Syahputra Nasution, Andrianingsih, Diki Wahyudi | Pusat Teknologi dan Data Penginderaan Jauh |
| 6 | 14.15-14.30 | The use of MNCP-5 particle transport program for calculation of flux radiation exposure in object surface | Tumpal Pandiangan, Ika Bali and Alexander R.J. Silalahi | Matana University |
| 7 | 14.30-14.45 | Design of Multiband MIMO Antenna for 5G Millimeter-wave Application | Rusmono, Efri Sandi and Teresa Marani | Universitas Negeri Jakarta |
| 8. | 15.00 – 15.15 | Optimization of PJU LED luminaires based on lamp housings, drivers and optics | Endah Setyaningsih, Yohanes Calvinus | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 4
Time : 13.00 – 15.00
Track : Civil & Environmental Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|---|--|--------------------------------------|
| 1 | 13.00-13.15 | Vehicle Road Accident Prediction Model along Federal Road FT050 Kluang-A/Hitam-B/Pahat Route Using Excess Zero Data | Joewono Prasetijo | Universiti Tun Hussein Onn Malaysia, |
| 2 | 13.15-13.30 | The compressive strength behavior of mahogany wood connections with bolt-ring connectors | Wiryanto Dewobroto, Ika Bali, Lodia Semaya Amnifu | Universitas Pelita Harapan, |
| 3 | 13.30-13.45 | Correlation of Undrained Shear Strength and Liquidity Index of Fine-Grained Soils in West Java, Indonesia | Gilberta Miranda Hutabarat and Budijanto Widjaja | Parahyangan Catholic University |
| 4 | 13.45-14.00 | Analysis of online-taxi service quality and passenger satisfaction | Tarita Aprilani Sitinjak, Ludfi Djakfar and Achmad Wicaksono | Palangka Raya University |
| 5 | 14.00-14.15 | The effect of addition of polypropylene fibers on crushed glass concrete mixed | Albert Aun Umbu Nday, Theresia Avila Bria and Deasi D. A. A. Daud | Politek Kupang |
| 6 | 14.15-14.30 | Utilization of roof garden installation to reduce rainwater runoff in urban residential | Endah Lestari | STT PLN |
| 7 | 14.30-14.45 | Natural Flocculant VS Chemical Flocculant Where Is Better To Used In Wastewater Treatment | Badrus Zaman*, Nurandani Hardyanti ¹ , M. Arief Budihardjo, Budi Prasetyo S., Aldiansyah Ramadhandi, Arum Tri Listiyawati | Universitas Diponegoro |
| 8 | 14.45-15.00 | Assessing the Potential of Delivery Consolidation to Campus Center | Alfiora Santoni, Nahry Nahry and Sarini Abdullah | Universitas Indonesia |
| 9 | 14.45 – 15.00 | Comparation Between Suspended or Seabed Pipeline Installation for Inter Island Fresh Water System. | Try Suyono, Agustinus Purna Irawan and Wati Asriningsih | Universitas Khairun |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 5
Time : 13.00 – 15.00
Track : Industrial Engineering, Mechanical Engineering & Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|--|--|-------------------------------------|
| 1 | 13.00-13.15 | Implementation of Lean Warehousing to Improve Warehouse Performance of Plastic Packaging Company | Yudha Prasetyawan, Alfia Khairani Simanjuntak, Lulu Auliya Andrian and Nauval Rifqy | Institut Teknologi Sepuluh Nopember |
| 2 | 13.15-13.30 | Simple automation for pineapple processing combining with karakuri design | Yudha Prasetyawan, Atiya Arifiyana Agustin and Dewanti Anggrahini | Institut Teknologi Sepuluh Nopember |
| 3 | 13.30-13.45 | Lean Manufacturing Implementation on Extrude Process with Value Stream Mapping: Study Case in Tyre Manufacture | Teguh Sri Ngadono, Muh Rokhim and Zulfa Fitri Ikatrinasari | Mercu Buana University |
| 4 | 13.45-14.00 | Kinematics analyses for robot motion | Wandro Siregar, Parulian Siagian, Lin Rong-Shine, Richard AM.Napitupulu, MidukTampubolon,Sutan LMH Simanjuntak | Nommensen HKBP University Medan |
| 5 | 14.00-14.15 | Slicing Methodology of A CAD File for 3D Printing | Prince Marbun, Richard A.M. Napitupulu, Charles SP Manurung, Sutan Simanjuntak1, Yung-Chou Kao | Nommensen HKBP University Medan |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 6
Time : 13.00 – 15.00
Track : Mechanical Engineering & Industrial Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|--------------|---|---|---------------------------|
| 1 | 13.00-13.15 | Experimental analysis on combustion characteristics of single layer porous media for various burner sizes | M.Z. Abdullah | Universiti Sains Malaysia |
| 2 | 13.15-13.30 | Viscosity of Mono vs Hybrid Nanofluids: Measurement and Comparison | Khairil Fadzli and Mz Abdullah | Universiti Putra Malaysia |
| 3 | 13.30-13.45 | Lead-free solder SAC 305 Volume Reduction and Cold Slump after Stencil Printing Process | Mz Abdullah | Universiti Sains Malaysia |
| 4 | 13.45-14.00 | The Role of Technology Savviness in Muslim Online Shopping (MOS) | Jhanghiz Syahrivar Frangky Selamat ² , Hetty Karunia Tunjungsari, Chairy | President University |
| 5 | 14.00-14.15 | Measurement of risk project maturity using organizational project management maturity model (OPM3): Study case of construction project in Bandung | Fanjar Wijaksono, Devi Pratami and Achmad Fuad Bay | Telkom University |
| 6 | 14.15-14.30 | Designing Procurement Process Monitoring Dashboard for Supporting Food Security Supply Chain Risk Management System in Indonesian Bureau of Logistics | Detha Aulia Alfazah, Ari Yanuar Ridwan, Femi Yulianti and Putu Giri Artha Kusuma | Telkom University |
| 7 | 14.30– 14.45 | The Use of Quality Metric To Control Quality Of Telecommunication Project (Case Study: Regional Metro Junction) | Naufal Muhammad Zaki, Imam Haryono and Devi Pratami | Telkom University |
| 8 | 14.45-15.00 | Personal Performance Measurement of Project Manager using Project Manager Competency Development Framework (PMCDF®) (Case Study PT.XYZ) | Sarah Wahyuni, Devi Pratami and Achmad Fuad Bay | Telkom University |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 7
Time : 13.00–15.00
Track : Industrial Engineering, Mechanical Engineering , Civil Engineering & Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|--|---|-------------------------------------|
| 1 | 13.00-13.15 | Project Acceleration of Outside Plant-Fiber Optic (OSP-FO) Project in PT. XYZ Using Time Cost Trade Off (TCTO) Method by Adding Overtime Hours | Syifa Nur Hasyati, Ika Arum Puspita and Wawan Tripiawan | Telkom University |
| 2 | 13.15-13.30 | On Preparation of Advance Ceramic for Single-edge V-Notch Beam Fracture Toughness Test of ISO/FDIS 23146:2008(E) Standards | Tjokorda Gde Tirta Nindhia | Udayana University |
| 3 | 13.30-13.45 | Comparison of fracture toughness testing by the single edge v-notch beam and the surface crack in flexure method on silicon nitride | Tjokorda Gde Tirta Nindhia | Udayana University |
| 4 | 13.45-14.00 | Implementation of Statistical Quality Control to Reduce Defects in Mabell Nugget Products (Case Study at PT. Petra Sejahtera Abadi) | Rini Alfatiyah, Sofian Bastuti, Dadang Kurnia | Universitas Pamulang |
| 5 | 14.00-14.15 | Determined Consumers Online Purchase Intention Factors by Considering Risk and E-Trust | Aulia Fasha | Universitas Singaperbangsa Karawang |
| 6 | 14.15-14.30 | Analysis improvement process of making joint care air filter mitsubishi (CJM) with overall equipment effectiveness and six big loses PT. Nichirindo Pratama Duta | Syahreen Nurmutia, Adi Chandra, Muhammad Shobur | Pamulang University |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 8
Time : 13.00 – 15.00
Track : Civil Engineering & Environmental Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|---|--|--------------------------|
| 1 | 13.00-13.15 | The Effect of High-Density Polyethylene (HDPE) and Low-Density Polyethylene (LDPE) on Characteristics of Asphalt Concrete with Dry and Wet Mixing Process | Eduardi Prahara and Fennysia Aswita | Bina Nusantara |
| 2 | 13.15-13.30 | Passenger Satisfaction Assessment On The Performance Of The Flight Of Balikpapan-Yogyakarta Route Flights (Case Study: International Airport Sultan Aji Muhammad Sulaiman Balikpapan Sepinggan) | Yanti, M.Eriko.T, Pius, Leksmono Suryo Putranto | Universitas Tarumanagara |
| 3 | 14.00 – 14.15 | Reducing Project Duration of An Apartment Project by Waskita Karya using Crashing Method | Kirana Rukmayuninda Ririh and Nur Yulianti Hidayah | Universitas Pancasila |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 1
Time : 15.15 –17.45
Track : Industrial Engineering, Civil & Environmental Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|---|----------------------------|
| 1 | 15.15-15.30 | Strategies in increasing willingness to lend toward peer to peer lending companies operated in Indonesia | Niko Iskandar and Erlinda Muslim | Universitas Indonesia |
| 2 | 15.30-15.45 | Designing a performance measurement system for the human resources division using the human resource scorecard method: case study at PT KBN | Andi Yolanda and Erlinda Muslim | Universitas Indonesia |
| 3 | 15.45-16.00 | Detection of Cholesterol Levels by Analyzing Iris Patterns using Back Propagation Neural Network | Liani Budi Rachman and Basari Basari | University of Indonesia |
| 4 | 16.00-16.15 | Innovation of quality improvement to reduce weld defect through six sigma methods in the fabrication process of power plant component | Ayu Puspa Wirani, Dana Santoso Saroso and Humiras Hardi Purba | Mercu Buana University |
| 5 | 16.15-16.30 | Reducing of Defects in the Drug Tablets Production Process with DMAIC to Improve Quality – Study Case of Pharmaceutical Industry | Adha Winatie, Dana Santoso Saroso and Humiras Hardi Purba | Mercu Buana University |
| 6 | 16.30-16.45 | Determination Of Priority Criteria Which Influences CPO Factory Productivity | Nurhayati Sembiring and Imam Ramzani | Universitas Sumatera Utara |
| 7 | 16.45-17.00 | Analysing Company's Performance by Using Sustainable Supply Chain Management (SSCM) | Nurhayati Sembiring | Universitas Sumatera Utara |
| 8 | 17.00-17.15 | Determination Of Priority Criteria Which Influences CPO Factory Productivity | Nurhayati Sembiring, M. Imam Ramzani | Universitas Sumatera Utara |
| 9 | 17.15-17.30 | The strategy improvement of the engine maintenance | Nurhayati Sembiring and Diva Varian Koto Deli | Universitas Sumatera Utara |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 2
Time : 15.15 –17.00
Track : Informatic Engineering and Technologies

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|--|---|-----------------------------------|
| 1 | 15.15-15.30 | Medical Diagnosis System in Healthcare Industry: A Fuzzy Approach | Nina Sevani, Andrih Setiawan, Fajar Saputra, Richardo Kusuma Sali and Oki Sunardi | Krida Wacana Christian University |
| 2 | 15.30-15.45 | Comparative Study Between the Integration of ITIL and ISO / IEC 27001 with the Integration of COBIT and ISO / IEC 27001 | Nur Kholis Gunawan, Raden Budiarto Hadiprakoso and Herman Kabetta | Sekolah Tinggi Sandi Negara |
| 3 | 15.45-16.00 | A review of attacks, objects, and mitigations on web services | Rafif Masrur Rauf, Tubagus Eiffel Rivaldo, and Amiruddin Amiruddin | Sekolah Tinggi Sandi Negara |
| 4 | 16.00-16.15 | A brief review of attacks and mitigations on smartphone infrastructure | Rico Setyawan, Allicia A. Rahayu, Nur Annisa K. F., Amiruddin Amiruddin | Sekolah Tinggi Sandi Negara |
| 5 | 16.15-17.00 | Designing the QuickCash Payment System prototype by using cash withdrawal services through minimarket as an alternative solution for secure money transfer from bank customers to non-bank customers | Prasetyo Adi Wibowo Putro and Gagas Paras Mulati | Sekolah Tinggi Sandi Negara |

PARALLEL SESSION SCHEDULE

Thursday, 21 November , 2019

Room : Conference Room 3
 Time : 15.15 –16.45
 Track : Informatic Engineering and Technologies

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|--|------------------------------|
| 1 | 15.15-15.30 | Smart Chicken Farming: Monitoring System for Temperature, Ammonia Levels, Feed in Chicken Farms | Raden Budiarto | STSN |
| 2 | 15.30-15.45 | BCube and DCell Topology Data Center Infrastructures Performance | Edi Surya Negara, Keni Keni and Ria Andryani | Universitas Bina Darma |
| 3 | 15.45-16.00 | Analysis of Supply Chain Risk Mitigation Strategies in the Bogor Compressor Company with the House of Risk Method | Surya Perdana, Ridwan Usman, Nur Arifiya | Universitas Indraprasta PGRI |
| 4 | 16.00-16.15 | Networks Status Notification using Telegram Messenger | Erika Ramadhani and Akhmad Syarifurrahman | Universitas Islam Indonesia |
| 5 | 16.15-16.30 | Implementation of Incognito and SHA-3 Methods as Alternative to PIN Selection in Web Login | Gesi Deta and Yogha Restu Pramadi | STSN |
| 6 | 16.30-16.45 | Software-Defined Wireless Sensor Networks: A Systematic Review, Architecture and Challenges | Tony Tony and Lely Hiryanto | Curtin University |

PARALLEL SESSION SCHEDULE
Thursday, 21 November, 2019

Room : Conference Room 4
Time : 15.15 –17.00
Track : Medical & Health Technology, Industrial Engineering, Information Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|--|--|----------------------------------|
| 1 | 15.15-15.30 | Cardiac Arrhythmia classification using deep learning | Alexander R. J. Silalahi and Tumpal Pandiangan | Matana University |
| 2 | 15.30-15.45 | Designing and Building Secure Electronic Medical Record Application by Applying AES-256 and RSA Digital Signature | Galih Wening and Hermawan Setiawan | Sekolah Tinggi Sandi Negara |
| 3 | 15.45-16.00 | The Effectiveness of Massage Therapy and Music Therapy in Reducing Fear in Dental Spa | Siti Istingsih and Basuki Wibawa | Universitas Mataram a |
| 4 | 16.00-16.15 | Modeling On Group Decision Support System to Determine Accreditation of Early Childhood Education Institutions | Muhammad Syaukani | STMIK Banjarmasin |
| 5 | 16.15-16.30 | Design of expert system for tool selection in digital forensics investigation | Erika Ramadhani, Elyza Gustris Wahyuni and Hanif Rizal Pratama | Universitas Islam Indonesia |
| 6 | 16.30 - 16.45 | Early Assesment Dyslexia | Wiryasaputra | Universitas Kristen Krida Wacana |
| 7 | 16.45 – 17.00 | Analysis Improvement Production Process of Making Joint Care Air Filter Mitsubishi (CJM) With Overall Equipment Effectiveness and Six Big Losses PT. Nichirindo Pratama Duta | Syahreen Nurmutia, Adi Chandra, Muhammad Shobur | Pamulang University |

PARALLEL SESSION SCHEDULE
Thursday, 21 November, 2019

Room : Conference Room 5
Time : 15.15 –16.30
Track : Medical & Health Technology, Civil & Environmental Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|--|---|-------------------------------|
| 1 | 15.15-15.30 | Dynamic Modeling to Predict The Availability of Premium Rice in Karawang Regency | Ekaterina Setyawati | Institut Pertanian Bogor |
| 2 | 15.30-15.45 | Distribution of Story Shear and Reinforcement in Dual System | Daud Rahmat Wiyono, Roi Milyardi and Cindrawaty Lesmana | Universitas Kristen Maranatha |
| 3 | 15.45-16.00 | Curve Number Method to Determine the Runoff Height in the Upper Cimanuk Watershed | Dwi Ariyani | Universitas Pancasila |
| 4 | 16.00-16.15 | Benefits of the Opex Pro Application in Online Project Monitoring and Evaluation at PT. XYZ | Manlian A. Ronald Simanjuntak, Mustafa Nahdi | Universitas Pelita Harapan |
| 5 | 16.15-16.30 | The Identification of Risk Factors of Quality that Affecting Contractors' Performance at XYZ Company | Edward Rizky Tatimu and Manlian Ronald A. Simanjuntak | Universitas Pelita Harapan |

PARALLEL SESSION SCHEDULE
Thursday, 21 November , 2019

Room : Conference Room 6
Time : 15.15 –16.30
Track : Civil & Environmental Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|--|----------------------------|
| 1 | 15.15-15.30 | The Study of Quality Control Management that Influence the Implementation of Technical Standards for Class C Hospital Buildings in Tangerang Districts | Milla Andina Fajriah and Manlian Ronald A. Simanjuntak | Universitas Pelita Harapan |
| 2 | 15.30-15.45 | The study of the identification of using the supply chain to increasing financing efficiency of management project for building construction x in Jakarta | Mukhamad Risa Diki Pratama and Manlian Ronald A Simanjuntak | Universitas Pelita Harapan |
| 3 | 15.45-16.00 | Cost Risk Analysis Method for Construction Project in Kuala Tanjung | Eko Handoyo Cahyo Pranoto and Manlian Ronald A. Simanjuntak | Universitas Pelita Harapan |
| 4 | 16.00-16.15 | Cost Performance Study on EPC Projects in Banten Province (Case Study: Substation and Transmission lines 150 kV EPC Project) | Arif Deni Rahmat and Manlian Ronald A. Simanjuntak | Universitas Pelita Harapan |
| 5 | 16.15-16.30 | Project Cost Risk Identification and Construction Performance Indicators of High-rise Building in DKI Jakarta (Case Study: PT. X) | Manlian Ronald A. Simanjuntak and Intan Virgina Suryaningrum | Universitas Pelita Harapan |

PARALLEL SESSION SCHEDULE
Thursday, 21 November, 2019

Room : Conference Room 7
Time : 15.15 –17.00
Track : Civil & Environmental Technology and Industrial Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|--|--|-------------------------------------|
| 1 | 15.15-15.30 | Risk Identification in Procurement of Glass facade in High-Rise Office Buildings in Jakarta | Reinaldi Tanumihardja and Manlian Ronald A. Simanjuntak | Universitas Pelita Harapan |
| 2 | 15.30-15.45 | Identification of Design And Build Risks in School Building Construction Projects in Central Jakarta | Andreas Suharyanto and Manlian Ronald A. Simanjuntak | Universitas Pelita Harapan |
| 3 | 15.45-16.00 | Study Phase of Operational Management Process X Building | Janerizka Bari Putri and Manlian Ronal A Simanjuntak | Universitas Pelita Harapan |
| 4 | 16.00-16.15 | Risk Identification in Procurement of Precast Facade Procurement on High Rise Buildings in Jakarta | Ardian Sulistianto and Manlian Ronald A. Simanjuntak | Universitas Pelita Harapan |
| 5 | 16.15-16.30 | Traffic Management and Engineering Analysis of the Manahan Flyover Area by using Traffic Micro-Simulation VISSIM | Budi Yulianto | Universitas Sebelas Maret |
| 6 | 16.30-16.45 | Control of Quality Concrete Base on Curing Methods | Anisah, Prihantono | State University of Jakarta |
| 7 | 16.45-17.00 | Increasing Production Efficiency using Karakuri Principle (A Case Study in Small and Medium Enterprise) | Dewanti Anggrahini, Yudha Prasetyawan and Sri Indriyani Diartiwi | Institut Teknologi Sepuluh Nopember |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 1
Time : 08.30 – 11.30
Track : Civil & Environmental Technology and Industrial Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|--|----------------------------|
| 1 | 08.30-08.45 | Calibration and Validation Indonesian Highway Capacity Manual 1997 Model | Budi Yulianto, Setiono Yulianto, Rizki Putri, Stevani Prastica and Felix Hartono | Universitas Sebelas Maret |
| 2 | 08.45-09.00 | Evaluation and Decrease of The Likelihood of Risks in Mass Floor Excavations According to Your Texture in Peru | Jhannel Lourdes Arteaga Ramos, Giancarlo Enrique Andia Alvarez and Mario Bernabe Chauca Saavedra | Ricardo Palma University |
| 3 | 09.00-09.15 | Feasibility of Well Water as a Source of Clean Water in the Coastal Coastal Settlement Area | Idawarni Asmal | Universitas Hasanuddin |
| 4 | 09.15-09.30 | Graph Model of Reporting Engine Performance Results in The Business | Bambang Prasetya Adhi, Widodo Widodo and Dendy Nanda Prasetya | Universitas Negeri Jakarta |
| 5 | 09.30-09.45 | New theory in strategic management of Industry 4.0 and Society 5.0 within Industrial and System Engineering and Business Engineering | Khristian Edi Nugroho Soebandrija | Bina Nusantara University |
| 6 | 09.45-10.00 | Lean Six Sigma and Business Engineering Perspective of Electrical Energy Optimization | Khristian Edi Nugroho Soebandrija, Dendhy Indra Wijaya and Fauzi Khair | Bina Nusantara University |
| 7 | 10.15-10.30 | Industry 4.0 and Society 5.0 through Lens of Condition Based Maintenance (CBM) and Machine Learning of Artificial Intelligence (MLAI) | Khristian Edi Nugroho Soebandrija, Fauzi Khair and Dendhy Indra Wijaya | Bina Nusantara University |
| 8 | 10.30-10.45 | Risk Analysis The Construction Use Of Soft Toll Road System Metodologi (Ssm) Case Study: Trans Toll Road Sec Sumatra 1 Bakauheni - Kalianda | Enriko Tosulpa | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 1
Time : 08.30 – 11.30
Track : Civil & Environmental Engineering , Industrial Engineering

| | | | | |
|----|---------------|---|--|-------------------------------|
| 9 | 10.45-11.00 | Development of unskilled labour into skilled labour at the jetty project of PLTU Tanjung Jati B Units 5 and 6 | Jegoteluko | Universitas Tarumanagara |
| 10 | 11.00-11.15 | Designing marketing strategies based on factors affecting purchase intention of hotel voucher through Online Travel Agent's website | Cindy Yunitasari and Erlinda Muslim | Universitas Indonesia |
| 11 | 11.15-11.30 | Millennials employee retention strategies planning based on job satisfaction in Indonesia banking industry | Siti Rohmah As'Ad and Erlinda Muslim | Universitas Indonesia |
| 12 | 11.30 – 11.45 | Correlation between Plasticity Index and Methylene Blue Value to Determining Soil Classification | Andrias Suhendra Nugraha, Paulus P. Rahardjo, Bigman M. Hutapea, and Imam A. Sadisun | Universitas Kristen Maranatha |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 2
Time : 08.30 – 11.30
Track : Civil & Environmental Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|---|--------------------------|
| 1 | 08.30-08.45 | Performance evaluation, violations and driver's perception of the Yellow Box Junction in the city of Surabaya (Case study of the junction of Jl. Ir. Sukarno - Jl. Dharmahasada and the junction of Jl. Kutai - Jl. Adityawarman) | Leksmono Suryo Putranto, Rpx Rooswan Happono | Universitas Tarumanagara |
| 2 | 08.45-09.00 | Preliminary cost in industrial building at Sumatra, Kalimantan, and Papua | Christian Satrija S and Onnyxiforus Gondokusumo | Universitas Tarumanagara |
| 3 | 09.00-09.15 | The Use of Quality Metric to Control Quality of Telecommunication Project (Case Study: Regional Metro Junction) | Naufal Muhammad Zaki, Imam Haryono and Devi Pratami | Universitas Tarumanagara |
| 4 | 09.15-09.30 | Factors affecting residential choice in Greater Jakarta | L S Putranto, P Louis | Universitas Tarumanagara |
| 5 | 09.30-09.45 | Discovering Authenticity as an Architect Through Psychological Analysis. Case study: The Church of the Light, Tadao Ando | M Clara, R Trisno, P R Kasimun, F Lianto | Universitas Tarumanagara |
| 6 | 09.45-10.00 | Mechanical properties of powder concrete with a geopolymer bond | W Kushartomo, Sofianto | Universitas Tarumanagara |
| 7 | 10.15-10.30 | Whitmore Section and Block Shear Failure Analysis on a Bolted Gusset Plate using Finite Element Method | Yoses Riadi and Leo S Tediando | Universitas Tarumanagara |
| 8 | 10.30-10.45 | Concrete Structure Condition Rating in Buildings with NonDestructive Testing | Henny Wiyanto, Joshua Chang, Yohanes Dennis | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 2
Time : 08.30 – 11.30
Track : Civil & Environmental Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|---|--|-------------------------------|
| 9 | 10.45 – 11.00 | Application of life cycle cost in the construction of soil retaining wall replacing soldier pile with diaphragm wall (case studi of Pejaten Apartment Projects) | Lidya Monalisa and Chaidir Anwar Makarim | Universitas Tarumanagara |
| 10 | 11.00 – 11.15 | Climate Responsive Architecture in Jakarta's Apartments | Christine Tjie, Fermanto Lianto and Naniek Widayati Priyomarsono | Universitas Tarumanagara |
| 11 | 11.15-11.30 | Natural Lighting Analysis in Plaza Senayan, Jakarta, Indonesia | Silvia Gunawan, Naniek Widayati Priyomarsono, Rudy Trisno | Universitas Tarumanagara |
| 12 | 11.30 – 11.45 | Correlation between Plasticity Index and Methylene Blue Value to Determining Soil Classification | Andrias Suhendra Nugraha, Paulus P. Rahardjo, Bigman M. Hutapea, and Imam A. Sadisun | Universitas Kristen Maranatha |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 3
Time : 08.30 – 11.30
Track : Civil & Environmental Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|--------------|--|---|--------------------------|
| 1 | 08.30-08.45 | Structural design of airport runway Case study: Jos Orno Imsula MOA Airport | Kelly V Khoemarga, Anissa Noor Tajudin | Universitas Tarumanagara |
| 2 | 08.45-09.00 | Emergency Shelter Design For Disaster Preparation | Abdel Mounaim, Naniek Widayati Priyomarsono, Rudy Trisno | Universitas Tarumanagara |
| 3 | 09.00-09.15 | Encapsulated Lime Peel Essential Oil (Citrus hystrix) Into Chitosan Nanoparticle: New Entity to Enhanced Effectivity Against Propionibacterium Acne in Vitro | Linda Julianti Wijayadi , Taty Rusliati Rusli6 | Universitas Tarumanagara |
| 4 | 09.15-09.30 | Determine The Value of Mark Up at Bid Price Hotel Buildings | Melisa Dwijayanti and Johny Johan | Universitas Tarumanagara |
| 5 | 09.30-09.45 | Decision making analysis for water distribution improvement projects | Dedi Alfa Julian Purba | Universitas Tarumanagara |
| 6 | 09.45-10.00 | Decision making application for housing development investment | Harun Immanuel | Universitas Tarumanagara |
| 7 | 10.15-10.30 | Study of Factors Affecting Productivity of Portable Concrete Pump for Slab and Beam Construction Project X | Arianti Sutandi | Universitas Tarumanagara |
| 8 | 10.30-10.45 | Designing Procurement Process Monitoring Dashboard for Supporting Food Security Supply Chain Risk Management System in Indonesian Bureau of Logistics | Detha Aulia Alfazah, Ari Yanuar Ridwan, Femi Yulianti and Putu Giri Artha Kusuma | Telkom University |
| 9. | 10.45– 11.00 | Kapuas river sediment fall velocity analysis with withdrawal tube. | Wati Asriningsih Pranoto | Universitas Tarumanagara |
| 10 | 11.00-11.15 | Designing a marketing strategy for food products sold online | Septiana Pratama Nugraheni and Erlinda Muslim | Universitas Indonesia |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 4
Time : 08.30 – 11.30
Track : Civil & Environmental Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|---|--|-----------------------------|
| 1 | 08.30-08.45 | Ground Water Potencial Analisis In Saolat And Waijoi Area East Halmahera | Wati Asriningsih Pranoto and Tri Suyono | Universitas Tarumanagara |
| 2 | 08.45-09.00 | Analysis of the Potential of Crust Formation and Corrosiveness in the Way Rilau PDAM Lampung Distribution Network Using the Langelier Saturation Index Method | Anwar | Universitas Tarumanagara |
| 3 | 09.00-09.15 | Market Analysis Consumer Profile And Product Test Apartments Near Campus Project Plan Puncak Kertajaya Apartment Surabaya | Syahrial Firdausi | Universitas Tarumanagara |
| 4 | 09.15-09.30 | Characteristics Analysis of Slum Area in the Region of Rw 16 Kapuk, West Jakarta | Jemima Devina Halim | Universitas Tarumanagara |
| 5 | 09.30-09.45 | Analysis of value engineering application at the design stage of a deep excavation system | Benjamin Benjamin and Johny Johan | Universitas Tarumanagara |
| 6 | 09.45-10.00 | Maintenance Building Strategies in a private University in Jakarta | Febry Triwijayanty and Wahyu Indra Sakti | Universitas Tarumanagara |
| 7 | 10.15-10.30 | Measurement of Risk Project Maturity Model (OPM3): Study case of construction project in Bandung | Fanjar Wijaksono, Devi Pratami and Achmad Fuad Bay | Telkom University |
| 8 | 10.30-10.45 | Climate Responsive Architecture in Jakarta's Apartments | C Tjie1, F Lianto, and Naniek Widayati Priyomarsono | Universitas Tarumanagara |
| 9 | 10.45 – 11.00 | Analysis of Affecting Factors Housing Prices in Indonesian Cities | Ibrahim Ibrahim and Nurahma Tresani | Universitas Tarumanagara |
| 10 | 11.00-11.15 | North Coast Jakarta Land Reclamation as a Solution of Land Requirements | Agustina Tjoi | Universitas Tarumanagara |
| 11 | 11.15-11.30 | The Impact of Online Travel Agents (OTA) towards Hotel Real Estate Market : Jakarta, Indonesia | Charles Tahir, Nurahma Tresani and Nasirrudin Mahmud | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 5
Time : 08.30 – 11.30
Track : Civil & Environmental, Electrical, & Industrial Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|--|--|--------------------------|
| 1 | 08.30-08.45 | Flexible Pavement Mechanistic Response to the 2017 Indonesian Road Pavement Manual with Cement-Treated Base (CTB) | Anissa Noor Tajudin | Universitas Tarumanagara |
| 2 | 08.45-09.00 | Utilization of rainwater harvesting installation to fulfil water needs in educational buildings | Endah Lestari | Universitas Tarumanagara |
| 3 | 09.00-09.15 | Determine The Value of Mark Up at Bid Price Hotel Buildings | Dwijayanti | Universitas Tarumanagara |
| 4 | 09.15-09.30 | Expanded Coverage Remote Control | Hadian Satria Utama, Tryas Honorris and Indra Surjati | Universitas Tarumanagara |
| 5 | 09.30-09.45 | Analysis the measurement quality system of clearance tappet using measurement system analysis on motorcycle manufacturing company | Carla Olyvia Doaly, Iphov Kumala Sriwana, Lithrone Laricha Salomon and Farrell Farrell | Universitas Tarumanagara |
| 6 | 09.45-10.00 | Interior Design Of Postgraduate Library Based On Cyber Technology By Applying Javanese Cultural Ornaments And Eco-Friendly Materials | Hartini Laswandi, Basuki Wibawa, Robinson Situmorang and Stephanie Efendy | Universitas Tarumanagara |
| 7 | 10.15-10.30 | Risk Assessment Of Working Posture And Implementation Of New Workstation To Increase Productivity | I Wayan Sukania | Universitas Tarumanagara |
| 8 | 10.30-10.45 | Application Of Six Sigma Method As A Quality Control Tool Tool With DMAIC Concept In PT. XYZ. | Ahmad Ahmad, Lina Gozali, Lamto Widodo and Cristin Natalina | Universitas Tarumanagara |
| 9 | 10.45 – 11.00 | Performance Anakysis Of Employees At PT. Sungai Berkat Serani Sukses Using Human Resource Scorecard Method | Ahmad Ahmad, Lithrone Laricha Salomon and Dean Alexander | Universitas Tarumanagara |
| 10 | 11.00 – 11.15 | The Key Factors Influencing Consumers' Level of Satisfaction of Subsidized Housing in Puri Harmoni 8, Parung Panjang | Hendri Viandra Reza, Lana Winayanti, Liong Ju Tjung | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 6
Time : 08.30 – 11.45
Track : Industrial Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|--|--------------------------|
| 1 | 08.30-08.45 | Calculation of Labor Amount with Theory of Constraints and Line Balancing Method in PT. XYZ Fish Crackers Factory | Lina Gozali, Frans Jusuf Daywin and Alvin Jestinus | Universitas Tarumanagara |
| 2 | 08.45-09.00 | Research Gap of Facility Planning and Layouts Studies | Bintang Bagaskara | Universitas Tarumanagara |
| 3 | 09.00-09.15 | Comparison Study about Production Scheduling System from Some Paper Case Studies | Vania Eliyanti, Lina Gozali, Lamto Widodo and Frans Jusuf Daywin | Universitas Tarumanagara |
| 4 | 09.15-09.30 | Comparison Study about Inventory Control System from Some Papers in Indonesia Case Study | Shelinsca Hoswari, Lina Gozali, Iveline Anne Marie and I Wayan Sukania | Universitas Tarumanagara |
| 5 | 09.30-09.45 | Comparison Study of the Application of Line Balancing and the Theory of Constraint | Jessica Sagitta, Lina Gozali and Frans Daywin | Universitas Tarumanagara |
| 6 | 09.45-10.00 | Comparison Study about Warehouse Layout from Some Paper Case Studies | Natalia Sudiarta, Lina Gozali, Iveline Anne Marie and I Wayan Sukania | Universitas Tarumanagara |
| 7 | 10.15-10.30 | Designing Press Tool For Carton Finishing Process To Improve Productivity And Efficiency | Lamto Widodo, Adianto Adianto, Siti Rohana Nasution and Priadi Wijaya | Universitas Tarumanagara |
| 8 | 10.30-10.45 | Consumer Preference Analysis Of Snack With Conjoint Analysis Method Approach (Case Study : Telur Gabus). | Lithrone Laricha Salomon, Wilson Kosasih and Carla Doaly | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 6
Time : 08.30 – 11.45
Track : Industrial Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|---|---|--------------------------|
| 9 | 10.45 – 11.00 | Application of quality control of carton box in quality control department at PT Purinusa Ekapersada | Clara Puspita Ningrum, Lina Gozali and Lamto Widodo | Universitas Tarumanagara |
| 10 | 11.00 – 11.15 | Redesign Layout Planning of Raw Material Area and Production Area Using Systematic Layout Planning (SLP) Methods (Case Study of CV Oto Boga Jaya) | Bintang Bagaskara Korda, Lina Gozali and Lamto Widodo | Universitas Tarumanagara |
| 11 | 11.15 – 11.30 | Understanding of Customer Services Based on Value Chain Strategy and Practical Instructions for Hospital Financial Management at Miriam Pratama Clinic, Kudus, Central Java | Roni Setyawan | Universitas Tarumanagara |
| 12 | 11.30 – 11.45 | Aggregate and Disaggregate Production Planning, Material Requirement, and Capacity Requirement in PT. XYZ | Fransiska Lefta, Lina Gozali and Iveline Anne Marie | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Friday, 22 November , 2019

Room : Conference Room 1
Time : 13.00 – 15.15
Track : Industrial Engineering, Mechanical and Civil Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|--|--|--------------------------|
| 1 | 13.00-13.15 | The Influence Of IOT (Internet Of Things) Against Industrial Development In Tanah Abang Market | Yorent Natanael | Universitas Tarumanagara |
| 2 | 13.15-13.30 | Potential of processed timber for preserving the Chinese traditional buildings | James Rilatupa, Rudy Trisno and Fermanto Lianto | Universitas Tarumanagara |
| 3 | 13.30-13.45 | Comparison Study Among Production Planning Research in Some Papers and Industries in Indonesia | Fransiska Lefta, Lina Gozali and Iveline Anne Marie | Universitas Tarumanagara |
| 4 | 13.45-14.00 | Flexural properties of bamboo strip composites on lamina configuration | Sofyan Djamil | Universitas Tarumanagara |
| 5 | 14.00-14.15 | Cipali Toll Road Safety Audit | Ni Luh Shinta Eka Setyarini Setyarini, Lekmono Suryo Putranto Putranto and Najid Najid | Universitas Tarumanagara |
| 6 | 14.15-14.30 | Project Manager Classification for Design and Build Construction of State Buildings | Jujuk Kusumawati, Khrisna M, and Najid | Universitas Tarumanagara |
| 7 | 14.30-14.45 | Evaluation of Side Friction in IHCM For Highway 4 Lanes 2 Ways Divide | Najid | Universitas Tarumanagara |
| 8 | 14.45-15.00 | Personal Performance Measurement of Project Manager Using Project Manager Competency Development Framework (PMCDF) (Case Study PT.XYZ) | Sarah Wahyuni, Devi Pratami and Achmad Fuad Bay | Telkom University |
| 9 | 15.00 – 15.15 | Mapping and Measuring IT Governance Performance in Higher Education | Bagus Mulyawan, Raymon Kosala, Benny Ranti, Suhono Haryo Supangat | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE

Friday, 22 November, 2019

Room : Conference Room 2
 Time : 13.00–15.30
 Track : Informatic Engineering and Technology

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|-----|---------------|---|--|--------------------------|
| 1 | 13.00-13.15 | Comments Scraping Application For Review Youtube Content | Viny Christanti M | Universitas Tarumanagara |
| 2 | 13.15-13.30 | Tourism Destination Grouping Systems With Partitioning Clustering Method from Geotagged Photo using Android | Maya Retnosari, Wasino Wasino and Desi Arisandi | Universitas Tarumanagara |
| 3 | 13.30-13.45 | Prediction Analysis Of Criminal Data Using Mechine Learning | Meiliana Meiliana, Dedi Trisnawarman, Muhammad Choirul Imam and Ziad Rusdi | Universitas Tarumanagara |
| 4 | 13.45-14.00 | Sentiment Analysis Ford Opinion Classification Of Smart Farming In Indonesia | James Nata Salim, Dedi Trisnawarman, Ziad Rusdi and Muhammad Choirul Imam | Universitas Tarumanagara |
| 5 | 14.00-14.15 | Decision Support System Model Determines The Type Of Road Construction In Indonesia | Henderi Henderi, Endang Kusnadi and Dedi Trisnawarman | Universitas Tarumanagara |
| 6 | 14.15-14.30 | Business Intelligence Framework for Performance Measurement in Higher Education Study Programs | Dedi Trisnawarman and Muhammad Choirul Imam | Universitas Tarumanagara |
| 7 | 14.30-14.45 | Start to End: Recommended Travel Routes Based on Tourist Preference | Vivien H. Wangi, Jap Tji Beng and Wasino | Universitas Tarumanagara |
| 8 | 14.45-15.00 | Vowel Recognition Based on Face Images Using Fisher Linear Discriminant Analysis | Lina and Desi Arisandi | Universitas Tarumanagara |
| 9 | 15.00 – 15.15 | Segmentation of White Blood Cell Areas from Colour Degraded Microscope Slide Images | Lina, Ery Dewayani and Arlends Chris | Universitas Tarumanagara |
| 10. | 15.15 – 15.30 | Grouping of Tourism Objects Using Geotagged Photo with Hierarchical Clustering Method in Bantul and Sleman | Fenny Lusiana, Jap Tji Beng and Wasino | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 3
Time : 13.00–15.00
Track : Industrial Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|---------------|--|--|--------------------------|
| 1 | 13.00-13.15 | Comparison Study of Facility Planning and Layouts Studies | Bintang Bagaskara Korda, Lina Gozali, Lamto Widodo and Frans Jusuf Daywin | Universitas Tarumanagara |
| 2 | 13.15-13.30 | Establishment of An Application for Quality Detection of Photographs Based on Sharpness and Light Intensity | Hugeng Hugeng, Ardis Jevon Tjahyadi | Universitas Tarumanagara |
| 3 | 13.30-13.45 | Public Housing Savings (TAPERA) and The Application In DKI Jakarta | Henriko Ganesha Putra | Universitas Tarumanagara |
| 4 | 13.45-14.00 | Community Service Report : Designing The Ergonomic Roasting Machine For Coffe Seed With Additional Engine at Seduh Kopi Coffe Shop | Frans Yusuf Daywin, Lina Gozali, Lamto Widodo, Carla Olyvia Doaly and Wildan Hendri Ross | Universitas Tarumanagara |
| 5 | 14.00-14.15 | Factors affecting potential customers in choosing an apartment | Suryanto and Nurahma Tresani | Universitas Tarumanagara |
| 6 | 14.15-14.30 | Driving Factors and Occupant Satisfaction Riving Factors and Occupant Satisfaction Choosing Residential Apartment Near Campus University of Indonesia Locations Taman Melati Apartments Margonda | Syahrial Firdausi, Nurahma Tresani and Suryono Herlambang | Universitas Tarumanagara |
| 7 | 14.30-14.45 | Comparison study between nearest neighbor and farthest insert algorithms for solving VRP model using heuristic method approach | Wilson Kosasih, Ahmad, Lithrone Laricha Salomon and Febricky | Universitas Tarumanagara |
| 8. | 14.45 – 15.00 | Facial Skin Disease Recognition Using Backpropagation Neural Network (Bpnn) | Chairisni Lubis and Krisna Susanti | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 4
Time : 13.00–15.00
Track : Industrial Engineering & Mechanical Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|---|-----------------------------|
| 1 | 13.00-13.15 | Concept design for adjustable motorcycle handlebar | Aldo Salim Sandy Yehezkiel, Bready Fernando, Tasya Monica, Joshua Ricardo, Agustinus Purna Irawan | Universitas Tarumanagara |
| 2 | 13.15-13.30 | Development of Wood Carving Furniture Technology in Jepara | Eddy Supriyatna Marizar | Universitas Tarumanagara |
| 3 | 13.30-13.45 | Study of Vertical Residential Development in the Poris Plawad Mass Transportation Development Area (TOD) in Tangerang City | Megawati | Universitas Tarumanagara |
| 4 | 13.45-14.00 | The Characterizing of Ageing Temperature of Lead-Free Solder Sn-0,7Cu x Zn on Mechanical, Physical Properties, and Microstructure | Erwin Siahaan, Abrar Riza | Universitas Tarumanagara |
| 5 | 14.00-14.15 | The effect of maximum cross-section Reduction and Rolling Temperature on Formability and Mechanical Properties of Al-Cu. | Erwin Siahaan | Universitas Tarumanagara |
| 6 | 14.15-14.30 | The influence of Silver content in Lead-Free Solder Sn-0,7Cu xAg (SAC) on Physical and Mechanical Properties. | Erwin Siahaan | Universitas Tarumanagara |
| 7 | 14.30-14.45 | The Characterizing on Corrosion Rate and Mechanical Properties of Low Carbon Steel in Potassium Chromate Solution. | Erwin Siahaan | Universitas Tarumanagara |
| 8 | 14.45-15.00 | Concept design of solar cell satellite dish | Steven Teja Nicholas Travis Adrianto, Louis Martin JM3, Nicholas Kurniawan, Agustinus Purna Irawan | Universitas Tarumanagara |

PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

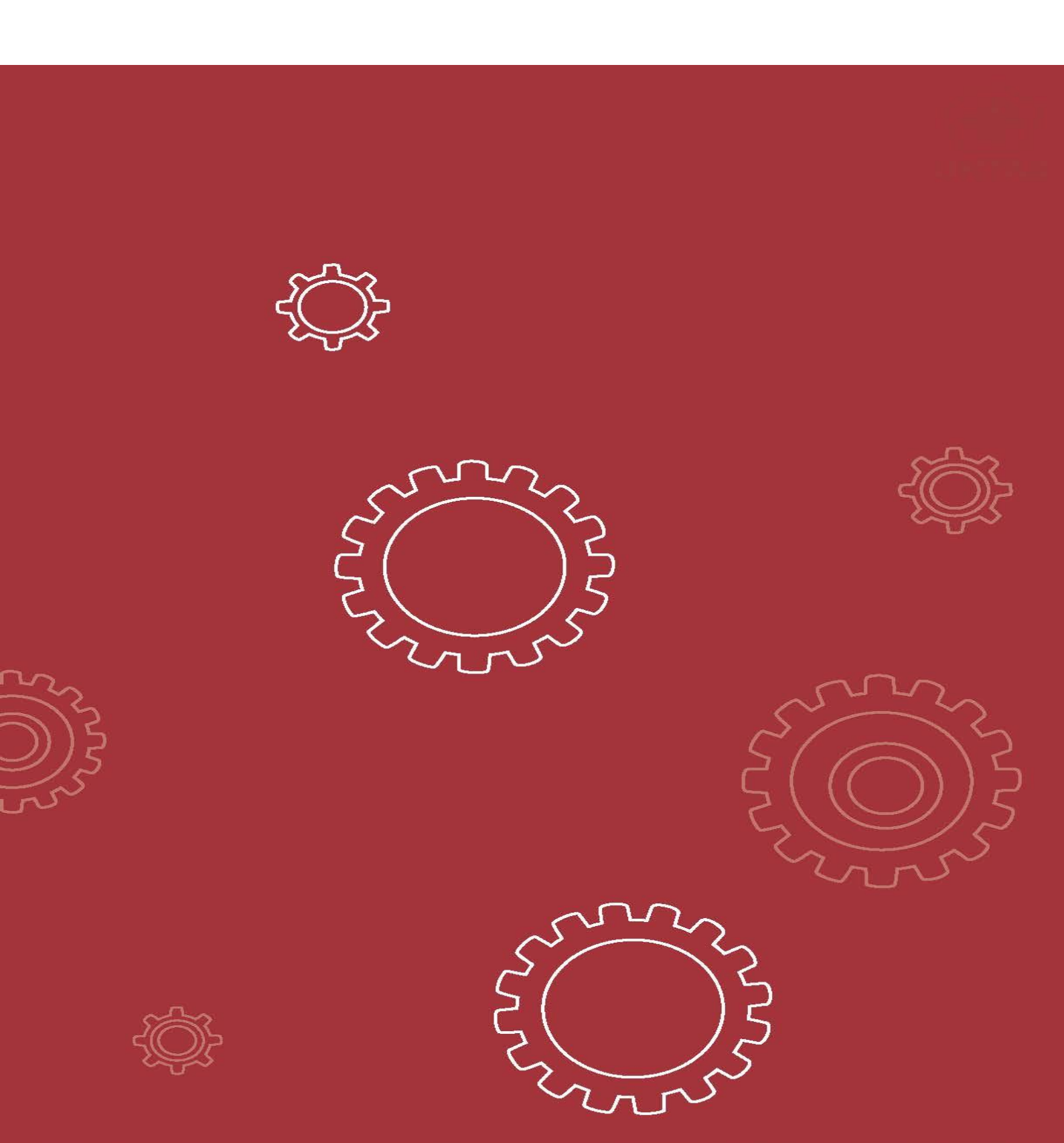
Room : Conference Room 5
Time : 13.00–15.30
Track : Industrial Engineering & Mechanical Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|---|--------------------------|
| 1 | 13.00-13.15 | Concept design of high interface powerbank | Verry Gunawan, Nicholaus Christiardy , Agustinus Purna Irawan | Universitas Tarumanagara |
| 2 | 13.15-13.30 | Potential of Process Timber for Preserving the Chinese Traditional Buildings | J. Rilatupa and F Lanto | Universitas Tarumanagara |
| 3 | 13.30-13.45 | Reynolds Number Effects on Swirling Flows Intensity and Reattachment Length over a Backward Facing Step Geometry Using STD k-e Turbulance Model | Steven Darmawan | Universitas Tarumanagara |
| 4 | 13.45-14.00 | The Effects of Brand Loyalty and Brand Image on Repurchase Intention of Premium Priced High-Tech Product in Indonesia | Hetty Karunia Tunjungsari | Universitas Tarumanagara |
| 5 | 14.00-14.15 | Investment Analysis of Boarding House in Tanah Abang District | Arnold Pramudita | Universitas Tarumanagara |
| 6 | 14.15-14.30 | Tool Wear Analysis of Coated Carbide Tools on Cutting Force in Machining Process of AISI 4140 Steel | Sobron Lubis | Universitas Tarumanagara |
| 7 | 14.30-14.45 | The role of technology in reshaping the payment method among Indonesians | Keni Keni, Hendry Tjoe and Nicholas Wilson | Universitas Tarumanagara |


PARALLEL SESSION SCHEDULE
Friday, 22 November, 2019

Room : Conference Room 6
Time : 13.00–15.30
Track : Industrial Engineering

| NO | SCHEDULE | PAPER TITLE | AUTHORS | INSTITUTION |
|----|-------------|---|---|--------------------------|
| 1 | 13.00-13.15 | Resistance of Residents In The Klender Public Housing Revitalization Program | Maya Sari, Nurahma Tresani and Wita Simatupang | Universitas Tarumanagara |
| 2 | 13.15-13.30 | Does Go-Jek affected Smart City Operational in Jakarta | Jevon Atmabrata and Nurahma Tresani | Universitas Tarumanagara |
| 3 | 13.30-13.45 | Podcast Technology as a Favorable Media-on-Demand for Indonesian Young Generation | Diah Ayu Candraningrum, Joni Welman Simatupang and Fransisca Iriani Roesmala Dewi | Universitas Tarumanagara |
| 4 | 13.45-14.00 | Travel App - showing nearest tourism site using Haversine formula and directions with Google Maps | Grace Tarani Sridevi Lee, Desi Arisandi and Wasino Wasino | Universitas Tarumanagara |
| 5 | 14.00-14.15 | Website Application for Visualizing Reports of Intangible Cultural Heritage Integrated with Google Maps : Case Study in Balai Pelestarian Nilai Budaya Jawa Barat | Andre Laverius, Wasino Wasino and Ery Dewayani | Universitas Tarumanagara |
| 6 | 14.15-14.30 | Curve Number Method to Determine the Runoff Height in the Upper Cimanuk Watershed | Dwi Ariyani | Universitas Pancasila |
| 7 | 14.30-14.45 | Dry Land Irrigation In Kandar, Tanimbar Islands Regency | Ony Frengky Rumihin | Universitas Tarumanagara |
| 8 | 14.45-15.00 | Development of Transit Oriented Development (TOD) Areas in Improving Public Transport Services and Traffic Engineering in DKI Jakarta Province | Baidowi | Universitas Tarumanagara |
| 9 | 15.00-15.15 | Dynamics Of Land Value Change | Juntrisnawati Loi, Nurahma Tresani and Nasiruddin Mahmud | Universitas Tarumanagara |



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Calculation of Labor Amount with Theory of Constraints and Line Balancing Method in PT. XYZ Fish Crackers Factory

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Calculation of Labor Amount with Theory of Constraints and Line Balancing Method in PT. XYZ Fish Crackers Factory

Lina Gozali, Frans Jusuf Daywin, Alvin Jestinus

Industrial Engineering Department, Faculty of Engineering, Tarumanagara University

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Abstract. *The right amount of labor on work station is important to avoid uneven workload, that might reduce efficiency on production line, and cause bottleneck. Therefore, this research focus at searching the optimal amount of labor using line balancing and bottleneck that occurs on XYZ Fish Crackers Factory. Theory of constraints method is used to identify bottleneck, and line balancing method that will be used is Kilbridge-Wester, Moodie Young, Helgeson-Birnie, and J-Wagon. Fish cracker drying is the process that encounter bottleneck. The beginning line efficiency is 50.09%, with Kilbridge-Wester, Helgeson Birnie, and J- Wagon method, the line efficiency is 89.22%, and with Moodie Young method, the line efficieny is 89.45%. Therefore, Moodie Young method is the best method to apply, because it has the best result, with 89.45% line efficiency, 10.55% balance delay, 13.96% smoothness index, 20.3 minutes of idle time, 5 work station, and amount of labor needed is 10 person.*

1. Introduction

Calculation of the right amount of labor at work station need to be done to avoid the imbalance of operating time at the work station. Labor imbalance in the production line may decrease efficiency of work stations. The impact due to imbalance in the time distribution of work stations, may cause bottlenecks, and high idle time at work stations.

Therefore, to produce balanced production line, increase the efficiency of work station, and avoid bottleneck process, theory of constraints and line balancing method can be used to analyze the problems.

XYZ Fish Crackers Factory is a small industry engaged in fish crackers manufacturing, usually known as white crackers. Problems that occur in XYZ Fish Crackers Factory such as bottleneck at work station, uneven workloads, and cracker production time is quite time consuming because there is drying process. Therefore, calculation of the right amount of labor and equal distribution of workloads need to be done to increase efficiency in the production line to meet the increasing consumer demand.

This research emerges from the problem of bottleneck that occurs, and uneven workload. This study aims to identify bottleneck work elements in the production process, balancing workloads at production line. Theory of constraints and line balancing methods is used to handle these problems, so the workload is evenly distributed, minimize the bottleneck process, and found the right amount of labor needed in the production process.

2. Literature Review

2.1 Stopwatch Time Study

Stopwatch time method measure the standard time to finish working process in every station for each product.

2.2 Line Balancing

Line balancing according to Gasperz [1], balancing assignment of task elements from an assembly line to work stations to minimize the number of work stations and minimize total idle time at all



stations for a certain level of output. In balancing this task, product units must be specified for each task and sequential relationship must be considered.

The purpose of line balancing to obtain smooth production flow in order to obtain high utilization of facilities, labor, and equipment through balancing work time between work stations. Each task element in a product activity is grouped in such way to several work stations so a good working time balance is obtained. There are terms in line balancing:

- a. Precedence Diagram: graphical description sequence of operating work, and dependence on other work operations that aim to facilitate the control and planning of activities related to it.
- b. Assemble Product: Product that passes through sequence of work stations where each work station provides certain process until the final product is finished.
- c. Work Element: Part of the entire assembly process. Operation Time (T_i): Standard time to complete an operation.
- d. Work Station (WS): Place on the production line where the production process is carried out.
- e. Cycle Time (CT): Time needed to make one unit of product.
- f. Station Time (ST): Total time from work element carried out on the same work station. Idle Time (I): Difference between cycle time (CT) and station time (ST).
- g. Balance Delay (BD): Often called balancing loss, a measure of line inefficiency that results from actual idle time due to imperfect allocations between work stations.
- h. Line Efficiency (LE): Ratio of total time at the work station divided by cycle time multiplied by number of work stations.
- i. Smoothness Index (SI): An index that shows the relative smoothness of balancing certain assembly line.

2.3 Line Balancing Method

2.3.1. Kilbridge-Wester Method

This method is trying to impose operations that have a large initial responsibility first. Steps in Kilbridge-Wester method are [2]:

- a. Determine precedence diagram according to actual situation.
Divide work element into regions from left to right.
- b. In each region, sort work element starting from largest operating time to smallest
- c. operating time.
- d. Charge work element from the left most area first, and between regions, charge work element with the largest operating time first.
- e. After the work station charged, determine whether the time utilization is acceptable. If not, check all work process that meet relationship related with the operations that have been charged. Decide whether exchange of work element will increase the utilization of work station time.

2.3.2. Moodie Young Method

Moodie-Young method has two stage of analysis [3]:

- a. The first phase is the grouping of work stations. The work element is placed on a work station with rule if there are two work element that can be choose, the work element that has a larger time is placed first. Precedence diagram is made with matrix P (Prior Work Elements), and matrix F (Following Work Elements) for all work element.
- b. The second phase identify largest work station time and smallest work station time. Then specify GOAL. $GOAL = (ST_{max} - ST_{min}) / 2$. Identify work element at work station with maximum time that has smaller time than GOAL. The maximum work element is moved to the minimum work station time. Then move other work element

and repeat until there are no more work element to move.

2.3.3. Helgeson-Birnie Method

This method is usually better known as position weight method. Steps in Helgeson-Birnie method are [4]:

- a. Determine precedence diagram according to actual situation.
- b. Determine position weight for each work element related to operating time from longest working time from the start of operation to the rest of the operation.
- c. Rank each work element based on position weight. Work element that has the highest weight is placed in the first rank.
- d. Group work elements to work stations provided that they do not exceed the specified cycle time.

2.3.4. J-Wagon Method

This method prioritize highest number of work elements, that work element will be prioritized to the work station. The steps in the J-Wagon method are [4]:

- a. Determine the weight for each element of work.
- b. Sort the weights from the largest to the smallest.
- c. Assign work elements to work station, with condition total work station time should not exceed the cycle time and prior work element have been done.
- d. If work station time exceed the cycle time, last operation in the work station must be assigned to the next work station.
- e. Repeat steps c and d until all work element have been grouped into the work station.

2.4 Theory of Constraints

Theory of Constraints was introduced by E.M. Goldratt, a management philosophy based on continuous improvement principles through focus on constraint system. In the view of Theory of Constraint, the organization's main goal to obtain profits can be achieved by increasing output while reducing operating and inventory costs [5].

2.5 Theory of Constraints Stages

Continuous improvement by using Theory of Constraints has five stages, as follows [6]:

- a. Identify the Constraint
- b. This stage trying to identify the weakest part or relationship from the system that limits or decreases system performance.
- c. Exploit the Constraint
- d. This stage is trying to identify various possible ways to manage and eliminate constraints.
- e. Subordinate Everything Else to the Constraint
- f. After handling constraints effectively, it is very important to equalize the rate of each non-constraint element with rate of the element that was previously a constraint so constraint utilization is efficient.
- g. Elevate the System's Constraint
- h. This stage is needed to increase the constraint capacity to turn it into a non-constraint.
- i. If a Constraint is Broken, Repeat the Cycle
- j. If the constraints chosen for system development have been solved, it is necessary to re-identify other constraints.

2.6 Bottleneck

Bottleneck is source that has the same or smaller capacity than needed. Bottleneck is process that limits throughput. In Theory of Constraint method, bottlenecks can be minimized from the system where the constraint is located. Bottleneck is closely related to capacity-constraint resource (CCR), process capacity in production that is close to the standard. The CCR and bottleneck identification table can be seen in Table 1.

Table 1. CCR-Bottleneck Identification [7]

| Category | Bottleneck | Non-Bottleneck |
|----------|---|--|
| CCR | Inhibits actual flow, both in number and time. Must be considered in product flow planning. | Inhibits the flow of actual time, but not quantity. Must be considered in product flow planning. |
| Non-CCR | May inhibit actual flow, both in number and time. Does not require consideration in product flow planning. | Does not inhibit actual flow, both in number and time. Does not require consideration in product flow planning. |

3. Research Methodology

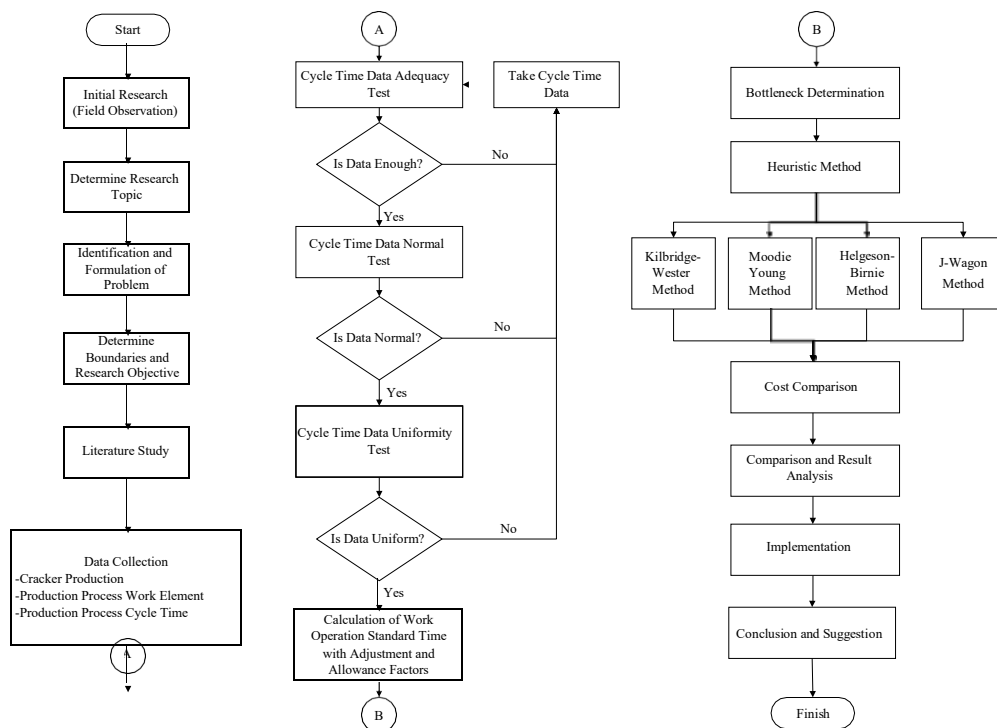


Figure 1. Research Methodology

Research methodology is stage that must be determined before carrying out research so that the research takes place in a directed and systematic manner. The stages in the research methodology in the form of a flow diagram can be seen in Figure 1.

4. Result and Discussion

The initial stage is to collect cycle time data to calculate standard time. Processed cycle time will be added with adjustment factor and allowance factor.

4.1. Calculation of Standard Time

Implementation of Theory of Constraint in minimizing bottlenecks in the production process requires processing time data for each element of the production stage. Calculation of standard time through can be seen in Table 2.

Table 2. Standard Time of Fish Crackers Production Process

| Process | Ws (min) | Adjustment Factor | Wn (min) | Allowance Factor | Wb (min) |
|-------------------|----------|-------------------|----------|------------------|----------|
| Making Dough | 7.2 | 0.07 | 7.7 | 0.098 | 8.5 |
| Mixing Dough | 25.2 | 0.03 | 26.0 | 0.135 | 29.5 |
| Milling Dough | 8.6 | 0.04 | 8.9 | 0.07 | 9.6 |
| Making Crackers | 23.8 | 0.1 | 26.2 | 0.11 | 29.1 |
| Steaming Crackers | 16.8 | 0.02 | 17.1 | 0.1 | 18.8 |
| Drying Crackers | 32.8 | 0.04 | 34.1 | 0.12 | 38.2 |
| Oven | 24.8 | 0.03 | 25.5 | 0.11 | 28.4 |
| Frying | 3.2 | 0.03 | 3.3 | 0.09 | 3.6 |
| Packaging | 5.7 | 0.02 | 5.8 | 0.113 | 6.5 |

4.2. Bottleneck Identification

Bottleneck identification is obtained from calculating production targets with available production capacity. If the capacity is insufficient, the operation that is bottleneck can interrupt overall production. The bottleneck calculation can be seen in Table 3.

Table 3. Bottleneck Calculation

| Process | Standard Time (min) | Capacity Needed (min) 16 cycle | Capacity (min/day) | Workload Percentage (%) |
|-------------------|---------------------|--------------------------------|--------------------|-------------------------|
| Making Dough | 8.5 | 135.3 | 480 | 28 |
| Mixing Dough | 29.5 | 471.4 | 480 | 98 |
| Milling Dough | 9.6 | 153.1 | 480 | 31.90 |
| Making Crackers | 29.1 | 465.0 | 480 | 96.87 |
| Steaming Crackers | 18.8 | 301.6 | 480 | 63 |
| Drying Crackers | 38.2 | 611.3 | 540 | 113.20 |
| Oven | 28.4 | 453.7 | 480 | 94.51 |
| Frying | 3.6 | 57.5 | 480 | 11.98 |
| Packaging | 6.5 | 103.5 | 480 | 22 |

4.1 Minimized Bottleneck

Based on the results of the identification of bottlenecks, the classification of process elements including resource and bottleneck capacity constraints can be seen in Table 4. Process elements including bottlenecks will be minimized by choosing the best alternative.

Table 4. Bottleneck-CCR Classification

| | <i>Bottleneck</i> | <i>Non-Bottleneck</i> |
|---|-------------------|--|
| <i>Capacity Constraint Resource (CCR)</i> | Drying Crackers | Milling Dough, Making Crackers, Oven |
| <i>Non-Capacity Constraint Resource</i> | | Making Dough, Steaming Crackers, Frying, Packaging |

4.2 Precedence Diagram

The flow of fish cracker production process can be seen in Figure 2.

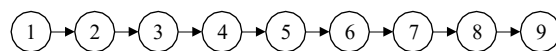


Figure 2. Production Process Flow

Remarks in Figure 2:

1. Making Dough (2 Labors)
2. Mixing Dough (2 Labors)
3. Milling Dough (1 Labors)
4. Making Crackers (2 Labors)
5. Steaming
6. Crackers (1 Labor)
7. Drying Crackers (2 Labors)
8. Oven (1 Labor)
9. Frying (2 Labors)
10. Packaging (1 Labor)

Comparison of line efficiency, balance delay, smoothness index, idle time, and the number of work stations needed using line balancing methods can be seen in Table 5.

Table 5. Comparison of Analysis Results with Line Balancing Methods

| | <i>Initial Line</i> | <i>Kilbridge Wester</i> | <i>Moodie Young</i> | <i>Helgeson-Birnie</i> | <i>J-Wagon</i> |
|-------------------------|---------------------|-------------------------|---------------------|------------------------|----------------|
| Line Balancing | 50.09% | 89.22% | 89.45% | 89.22% | 89.22% |
| <i>Balance Delay</i> | 49.91% | 10.78% | 10.55% | 10.78% | 10.78% |
| <i>Smoothness Index</i> | 67.33% | 19.81% | 13.96% | 19.81% | 19.81% |
| Idle Time (minutes) | 171.6 | 21.3 | 20.3 | 21.3 | 21.3 |
| Work Stations | 9 | 5 | 5 | 5 | 5 |

Description of work station results based on the results of analysis with the Moodie Young method can be seen in Figure 3.

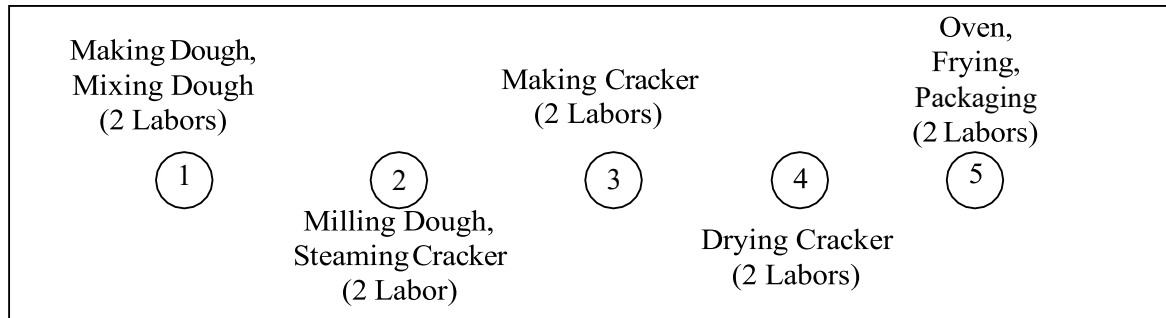


Figure 3. Work Station with Moodie Young Method

4.3 Cost Comparison

By using a comparison of line balance methods, the result is reduction in number of labors needed in the production process[9] . The amount of labors needed reduced from 14 labors to 10 labors. The result of reduction in operational costs can be seen in Table 6.

Table 6. Reduction of Operational Cost

| Cost Type | Amount of Labor | Salary/Month (Rp) |
|-------------------|-----------------|-------------------|
| Labor | 4 | 2.100.000 |
| Total Cost | | 8.400.000 |

The cost reduction that can be done by reducing the number of labors from 14 labors to 10 labors is Rp. 8.400.000 per month.

4.4 Initial Line and Implementation Comparison

After implementation has been done, processing time for each work station that is suggested will be calculated, and comparison between initial line condition and after implementation can be done. Comparison between initial line condition and after implementation can be seen in Table 7.

Table 7. Initial Line and Implementation Comparison

| Process | Idle Time (min) | | |
|-------------------|-----------------|------------|----------------|
| | Initial Line | Simulation | Implementation |
| Making Dough | 29.7 | 0.9 | 6.1 |
| Mixing Dough | 8.7 | | |
| Milling Dough | 28.6 | 9.1 | 13.4 |
| Steaming Crackers | 19.4 | | |
| Making Crackers | 9.1 | 6.2 | 6.5 |
| Drying Crackers | 0.0 | 3.4 | 4 |
| Oven | 9.8 | 0 | 3.2 |
| Frying | 34.6 | | |
| Packaging | 31.7 | | |

5. Conclusion

Based on result of analysis using theory of constraint method, the bottleneck occurs on process of drying crackers. This process is bottleneck because the workload is 113.20%, exceeding the available capacity, and inhibiting the flow of production. With the line balancing method, the best improvement result is using the Moodie Young method, with line efficiency of 89.45%, from the initial efficiency of 50.09%.

Moodie Young method have the minimum balance delay, smoothness index, and idle time

with value of 10.55%, 13.96%, and 20.3 minutes. Number of work station recommended by Moodie Young method is 5 work station. Amount of labor needed is reduced from 14 workers to 10 workers, with reduction cost of Rp. 8.400.000 per month.

Advice given to XYZ Fish Crackers Factory, for excess labor, should be moved to help work stations that have heavier jobs, ensuring that employees work consistently so that idle time and production process cycle times are reduced so that line efficiency is optimal.

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