

PROGRAMME BOOK

# IC-AMME & LSCM 2021

**2<sup>nd</sup>** International Conference on  
Automotive, Manufacturing, and  
Mechanical Engineering

**4<sup>th</sup>** International Conference on  
Logistics and Supply Chain  
Management

## Conference Topic

Enhancing Sustainability  
and Value-Added  
Creation in Smart  
Industries

**2nd Oct 2021**

## Organized By



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# **IC-AMME & LSCM 2021**

The 2<sup>nd</sup> International Conference on  
Automotive, Manufacturing, and Mechanical Engineering

and

The 4<sup>th</sup> International Conference on  
Logistics and Supply Chain Management

## **Organized By**

Petra Christian University - Surabaya - Indonesia

## **Supported By**

Institut Supply Chain dan Logistik Indonesia (ISLI)

Sophia University - Tokyo - Japan

Universidade Lusófona de Humanidades e Tecnologias - Lisboa - Portugal

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## Message from The Organizers

I am pleased to welcome you to this joint online conference of the 2<sup>nd</sup> International Conference on Automotive, Manufacturing, and Mechanical Engineering (IC-AMME) and the 4<sup>th</sup> International Conference on Logistics and Supply Chain Management (LSCM). This conference was supposed to be conducted in 2020, but it was delayed because of the COVID-19 pandemic. Afterwards, we decide to consider this pandemic an opportunity to have our conference online because we must adapt to the new normal. The committee receives around 70 submissions and accepts 59 full papers from Brazil, France, Japan, Malaysia, Nigeria, Norway, Portugal, Taiwan, Thailand, the USA, and Indonesia.

We are honoured to have two excellent keynote speakers, Prof. Takashi Suzuki, PhD from Sophia University and Prof. Benny Tjahjono, PhD from Coventry University, that will share their lots of experience and discuss future trends in sustainable energy and circular economy.

On this occasion, I want to express my great appreciation to all reviewers that have done a great job reviewing all the submissions. Special thanks to our partners: the Indonesian Supply Chain and Logistics Institute (ISLI), Sophia University, Lusofóna University, and UCSI University for supporting this conference. I want to appreciate the hard work and dedication of all committee members.

Finally, I hope you will enjoy this one day conference. I look forward to seeing you at the next conferences.

Assoc. Prof. Dr. Didik Wahjudi

Conference Chair

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## Organizers:

- Mechanical Engineering Department, Petra Christian University, Indonesia
- Industrial Engineering Department, Petra Christian University, Indonesia

## Conference Schedule

\* Jakarta Time (UTC/GMT +7 hours)

**Saturday, October 2, 2021**

07.30 - 08.00	Registration
08.00 - 08.15	Opening Ceremony
08.15 - 09.00	<b>Keynote Speaker:</b> Prof. Takashi Suzuki (Sophia University, Japan) <b>"Energy for Sustainable Future"</b>
09.00 - 09.15	Group photo & Session preparation
09.15 - 11.55	SESSION 1 (See the detailed concurrent session schedule)
11.55 - 13.00	Lunch break
13.00 - 13.45	<b>Keynote Speaker:</b> Prof. Benny Tjahjono (Coventry University, UK) <b>"Demystifying the Circular Economy Business Models in Operations and Supply Chain Management"</b>
13.50 - .....	SESSION 2 (See the detailed concurrent session schedule)

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## **Design and Assembly of Honda C70 Electric Motorcycle**

Ian Hardianto Siahaan, Bryan Kurniawan, Amelia Sugondo

**Abstract:** Electric motors are one of the more environmentally friendly transportation alternatives, which can be a problem solution to reduce pollution. Besides that, electric motors have become a necessity in the future. Nowadays, Indonesia is also starting to prepare for the era of electric vehicles. Opportunities to accelerate automotive electrification come from motorcycles. Motorcycles are not as complicated as developing electric cars. In this paper, Honda C70 is a choice target for driving force because it has a slim body, a lightweight is not too large construction, and is still fashionable. Meanwhile, we modify the motor into an electric motor for its frame or chassis to be often encountered with the dormant condition, separated by the only remaining engine and chassis to its course. Therefore, this motorcycle is suitable for modification from a combustion engine-driven engine into an electric motor. In this paper, some steps are being taken to its manufacture. The first one, calculating the required electric motor power requirements. The second, design and assembly of the Honda C70 motorcycle frame with BLDC dynamo. The third is the Honda C70 motorcycle performance in the city and outside the city, and the last one, the Honda C70 painting as the final process. The electric motor's design can cover 49 km with an average speed of 30-40 km/hour while out of town with roads up and down mountains. Whereas, this electric motor can cover 50.23 km with an average speed of 30-40 km/hour from a fully charged battery condition in urban areas. So that's roughly 97.5 percent of the distance traveled within the city. This electric motor is more suitable in urban areas because there are many places to charge the battery, and it is more efficient to use if in the city. The process of assessing the battery in this electric motor design takes 4 hours 30 minutes from the battery condition 0% (0 Volt) to 100% (81.5 Volt). In addition, the cost required to be very economical compared to motor fuel.

**Keywords:** electric motors, battery, dynamo

## **Effect of Calcination Time on Microstructure, Functional Groups, Dislocation Density, and Micro-strain of Materials $\text{LiNi}_{0.7}\text{Fe}_{0.2}\text{Co}_{0.1}\text{O}_2$ Battery Cathode**

Budiarto, Edward Baringin Sihite, Rio Parluhutan

**Abstract:** Research on the effect of calcination time on microstructure, functional groups, dislocation density, and micro-strain of the cathode material  $\text{LiNi}_{0.7}\text{Fe}_{0.2}\text{Co}_{0.1}\text{O}_2$  [LNFC], as one of the cathode materials for lithium batteries, has been carried out. Lithium battery cathode material is one of the determining factors for energy storage capacity, which is used as a power source in electronic equipment, laptops, and electric vehicles. The aim of the study was to create and analyze the effect of variations in calcination time of 10, 20, and 75 hours and a constant temperature of 700 °C on the microstructure, functional groups, dislocation density, and micro-strain in the cathode material of the LNFC battery with the single-stage co-precipitation method. The results of microstructure observations with SEM showed that the micron size was uneven and homogeneous. The elemental composition of Ni, Fe, and Co analyzed by EDXS showed that the metal content of Ni, Fe, and Co decreased with increasing calcination time. Based on the results of spectral observations using FTIR, the band was found to be around 549  $\text{cm}^{-1}$ , for Li-O stretching vibrations, indicating the formation of  $\text{LiO}_6$  octahedra. Also the characteristic vibrations of metal oxides Co-O, Ni-O, and Fe-O respectively at wave numbers: 528-586, 580, and 680  $\text{cm}^{-1}$ . The test results with X-ray diffractometer showed that with increasing calcination time, the value of dislocation density increased from 1.42 lines/ $\text{mm}^2$  to 9.9 lines/ $\text{mm}^2$ . The mean micro-strain increased from 13.56 % to 31.56%, including in the Miller hkl index (104), (110), (101), (003), and (105).

**Keywords:** NFC battery cathode, crystallite size, micro strain, microstructure.

## **Consumers' Personality Influence on Slimming Tea Perception and Purchase Willingness**

Chia-Sheng Yeh, Jung-Kuei Ker, Wan-Chia Wang

**Abstract:** A current issue within this new era would be income increasing, getting weight, and changing behaviors of eating and drinking. Accordingly, there are increasing varieties of slimming tea beverage which related to images of healthy, oil-free, fat burning, etc. This study attempts to investigate the influence of consumers' personality upon the perception of collectivism and individualism; the result reveals that consumers who have higher level of collectivism perceived higher recognition than those of individualism. Therefore, the degree of recognition influences the purchasing behavior and willingness. In addition, the results reported Slimming Tea drink acquired the recognition and purchasing from consumers of collectivism which generated same response of the influence with national personalities ( $p < .05$ ). There is significant influence reported on the prediction of national personalities upon Slimming Tea drink's perception and purchasing ( $p < .001$ ), and overall explanation ability referred to 13.4% and 9.7% individually. Finally, on the prediction ability of purchasing information toward the recognition of diet drink, herding behavior ( $\beta .301$ ) higher than purchasing intention ( $\beta .211$ ).

**Keywords:** Slimming Tea, Purchasing Willingness, consumers' Personality, diet, dietetic beverage

## **Effect of Mass on Drying Kinetics of Andaliman (*Zanthoxylum Acanthopodium DC.*) by Swirl Fluidized Bed Drying: Mathematic Model**

Melvin Emil Simanjuntak, Melvin Bismark H. Sitorus, Udur, Januari Hutabarat, Teng Sutrisno, Painsi Sri Widyawati.

**Abstract:** Andaliman (*Zanthoxylum acanthopodium DC.*) Or Batak pepper is often used as a seasoning ingredient in traditional cooking. Andaliman is difficult to consume in far areas because it rots quickly and is easily overgrown by fungus. The andaliman needs to be dried to prevent the growth of microbe. The maximum moisture content for dry herbs for the last longer is about 10%. In this study, andaliman was dried by the swirl fluidized bed method at a quite low temperature of 50 °C. The low temperature was chosen because andaliman contains various volatile compounds that easily evaporate at high temperatures and reduce its specific aroma. The sample masses for each experiment were 200, 250, and 300 gr. Andaliman grains have an average diameter of 3.1 mm. The moisture content was measured every 10 minutes by sampling. The results showed that the most suitable drying kinetics equation was the Rational model with the general form of the equation  $MR = \frac{a+bx}{1+cx+dx^2}$ . The R<sup>2</sup> values for the sample masses of 200, 250 and 300 gr were 0.99959, 0.99878 and 0.99832 respectively, and the average effective diffusion values were  $3.06 \times 10^{-9}$ ,  $2.57 \times 10^{-9}$  and  $1.97 \times 10^{-9}$  m<sup>2</sup>/s.

**Keyword:** Andaliman, drying kinetic, mathematic model, swirl fluidized bed, effective diffusion

## **Key Performance Indicators in Humanitarian Logistics: a Systematic Literature Review 2010-2020**

Anderson Nunes da Silva, Marcele Elisa Fontana, Raphaela Vidal, Pedro Carmona Marques

**Abstract:** This article analyzes the operational performance measurement in humanitarian logistics (HL). To this end, a systematic literature review (SLR) was performed aiming to present general information about the context of performance measurement in HL, based on relevant studies on the subject. Thus, 55 articles published from 2010 to 2020 were examined to answer three research questions (RQ1, RQ2 and RQ3). The results underline an increasing trend of the number of publications related to the performance measurement in HL, probably led by the growing pressure for humanitarian organizations (HO) to deliver increasingly efficient and effective operations. The gaps and, consequently, the research opportunities, identified by the analysis of the articles, can guide the planning and implementation of the performance measurement of HL in different situations, bringing benefits to both users and suppliers in this chain.

**Keywords:** Humanitarian supply chain, measurement, performance measure.

## **Optimization of the Dimple Depth and Arc Length of Dimple Distance in the Intake Port for Improved Engine Performance**

Teng Sutrisno, Willyanto Anggono, Richard Fernando Yong, Melvin Emil Simanjuntak, Herman Sasongko, Heru Mirmanto.

**Abstract:** One of the instant ways to improve engine performance is to tune in the intake port. One of the tunings in the intake port is porting polish and addition dimple. This impact can increase engine performance due to an increase in intensity turbulence of flow. The occurrence of a mixture (air and fuel) in the combustion chamber was more homogeneous, and a more turbulent flow caused the small friction loss. This research is how to design the intake port to increase the turbulence intensity of flow with variations of dimple depth and arc length of dimple distance. The aim is to determine the increase in engine performance on the optimization of dimple diameter and arc length between dimples. Results of Computational Fluid Dynamics show that the dimple depth of 1.5 mm with an arc length of dimple distance of  $7^\circ$  is produced turbulence intensity  $>10\%$ . When the design is applied to the Honda CRF 180, the power increase is 12.25%, and there is an increase in torque of 1.46% from the standard intake port.

**Keywords:** dimple, intake port, engine performance, elbow.

## **Cost Integrated Value Stream (CI-VS) to Optimize Production Cost of High-Frequency Welding (HFW) Steel Pipe**

Moses Laksono Singgih, Yasmin Nabilah Ginting, Siens Harianto

**Abstract:** Optimizing the production process by integrating costs is essential to consider. The waste can affect a production system's effectiveness and efficiency during the ongoing production process and impact production costs. The purpose of this paper is to optimize production costs in the entire value stream by integrating production costs along the value stream, so it is called the cost integrated value stream (CI-VS). By mapping the total cost losses due to waste that occur along the value stream, this research finds that the CI-VS approach increases production efficiency while maintaining product quality.

**Keywords:** Cost Integrated Value Stream (CI-VS), Efficiency, Production System, Wastes.



## **Conceptual Framework of Auto Suggesting Warehouse Management System for FIFO/FEFO Implementation towards Lean Warehousing**

Dwi Nurma Heitasari<sup>1</sup>, Tri Warcono Adi<sup>2</sup>, Daniel Ivan Subianto<sup>3</sup>

**Abstract:** Nowadays in 4.0 industry era, warehouses hold an important role in the supply chain competition. Warehouses ensure that the goods are safely kept throughout the supply chain journey. The current era has created new obstacles in the warehouse sector which will require new strategies in order to face them. Two of the most popular strategies are First-In First-Out (FIFO) and First-Expired First-Out (FEFO) stock keeping method. These strategies need to be done efficiently with the shortest time possible, which is the principle of lean warehouse, which may be a problem to various companies. One of the solutions to this problem is by using the Warehouse Management System (WMS). The WMS would have to consider the problems that are happening or may happen in the future. It should also support in the decision making by providing information and suggestions. The suggestions should be able to tell where to put away or pick an item in the warehouse efficiently while also keeping FIFO/FEFO in mind. Thus, this paper will discuss how that may happen while analysing the important aspects that should be considered and identify how WMS may solve these problems and create added value to the logistics operation.

**Keywords:** Warehouse, Management, Lean, Operation

## **Prediction of Bullish and Bearish Candlestick Signals Movement on Forex using Random Forest and Multilayer Perceptron**

Zebe Da, Siana Halim

**Abstract:** This paper discusses the bullish and bearish candlestick signals using random forest (RF) and multilayer perceptron (MF). We have two scenarios to apply. First, we used the stochastics measurements as the features of the RF and MLP. Second, we added the candlestick features into the models. In the first scenario, the accuracy rate for the random forest is 61.68%, while the MLP gets an accuracy of 64.15%. Adding the candlestick features increases the accuracy of the prediction both for the RF and the MLP. In the second scenario, the random forest improved up to 82.08%, and MLP gained 72.88% accuracy.

**Keywords:** Candle stick, random forest, multilayer perceptron, bullish, bearish, forex.

## **PUGH Method to Generate Alternatives More Comparable for Accident Risk Control**

Moses Laksono Singgih, Kristin Mei Nora Aruan, Siens Harianto.

**Abstract:** This paper aims to determine risk reduction using the Pugh method and Benefit-Cost Analysis (BCA) methods. The Pugh method uses a matrix to compare several alternative candidates to choose an alternative that meets a set of criteria, then Benefit-Cost Analysis (BCA) compares the alternative improvements generated quantitatively.. The researcher uses the Pugh method to measure the qualitative level of optimization of alternative concepts by combining alternatives into hybrid alternatives in work accidents in the steel pipe industry, namely the Steel Pipe Company (SPC). By identifying work accidents, the researchers then identified the causes and proposed risk reduction alternatives using Pugh's method to compare several alternatives and determine the minimum cost criteria to improve health, safety, security, and environmental (HSSE). Reducing the risk of work accidents can undoubtedly benefit the company, so it is necessary to use the Benefit-Cost Analysis (BCA) method to determine how much profit the company receives after being compared with the losses suffered due to work accidents.

**Keywords:** Benefit-Cost Analysis, Pugh's Method, Work Accident

## **Analysis of Combustion Characteristics of Ammonia/Oxygen Mixture Using a Constant Volume Combustor with Subchamber**

Bin Guo, Makoto Horie, Keita Aihara, Takuma Ohashi, Abiyasu Zhang, Mitsuhisa Ichiyanagi, Takashi Suzuki.

**Abstract:** Nowadays, the greenhouse effect issue is becoming more serious. Thus, the renewable energy is playing an increasingly important role. Among all alternative fuels, ammonia has been attracting attention as a carbon-free energy carrier for hydrogen, because of its large energy density per volume and easy storage and transportation. On the other hand, ammonia has a low combustion speed, which is an important issue for the use of ammonia as a vehicle fuel. To increase the mean flame speed of ammonia, in this research, authors adopted the concept of using the burned gas ejected from the sub-chamber to compress the mixture in the main chamber to promote its HCCI combustion. Thus, authors used the constant volume combustor with subchamber to realize the above combustion concept and to study the combustion characteristics of ammonia and oxygen mixture. As the result, the maximum combustion pressure (2.5 MPa) can be obtained when the equivalent ratio is 0.4, and the combustion speed is the fastest when the equivalent ratio is 0.6, and the mean flame speed is about 57.5m/s.

**Keywords:** spark ignition engine, fuel/alternative fuel, ammonia, constant volume combustor

## **The Role of IT Implementation, Information Sharing, and Supply Chain Collaboration in Improving Supply Chain Performance**

Hotlan Siagian, Glenn Ryan Purwanto, Oviliani Yenty Yuliana

**Abstract:** Governments in various countries, including in Indonesia, restrict crowd activities to control the spread of the COVID-19 virus. Restrictions on the number of workers or work from home resulted in many companies experiencing the need to monitor and control demand and supply. The impact of the COVID-19 pandemic, not a few service companies, retail, and industry closed, resulted in the economy slowing down. This research examines the influence of IT implementation, information sharing, and supply chain collaboration on supply chain performance. Sample collection uses non-probability techniques with convenience sampling methods. Sample this research is seventy manufacturing companies in Surabaya. Sample data is analyzed using the software Partial Least Square (PLS). This study shows that the relationship between supply chain collaborations creates a competitive advantage by sharing information. The joint decision can be easier with the presence of the right, accurate, and quality information. In contrast, the adoption of increased supply chain collaboration with information technology can improve the performance of companies.

**Keywords:** IT implementation, supply chain management, supply chain performance, information sharing, supply chain collaboration.

## **Optimization of Fuel Distribution with the Addition of Gas Stations to Anticipate the Increase Demand in Lombok Island**

Lana Lamansyah, Oksil Venriza, Andian Ari Istiningrum, Ferry Noegroho.

**Abstract:** Optimization is a step taken to determine the best solution to a problem, where the best determination is based on several criteria and considerations. Distribution of BBM/BBK is an activity of distributing BBM/BBK from supply points to recipients (depots, industries, gas stations, etc.) carried out by several modes of transportation. One of the steps to optimize the distribution of fuel/BBK and anticipate the increase in demand is by adding gas stations. The steps taken are forecasting future fuel/BBK consumption, looking for the ability to serve consumers from gas stations by looking at stock stability and calculating the utility capacity of gas stations, looking for factors that affect demand by using the regression method where the variable used is fuel consumption for the dependent variable and the number of residents, vehicles, and tourists as independent variables, plotting the distribution and determining the location of the gas station development plan by considering these factors and other factors such as road class, distance between gas stations, and disaster-prone areas) so as to obtain 6 alternative locations for the gas station development plan. With the analysis using the AHP method, there are two locations with very suitable categories, namely the location in Rembitan Village, Pujut District with a weight value of 0.21 and in Pengawisan, West Sekotong with a final score of 0.22.

**Keywords:** Fuel Distribution, Demand, Forecasting, Gas Stations, and Optimization.

## **Strengthening Business Sourcing Strategy Under Disruptions: Lesson Learn from Humanitarian Organizations**

Paulina Kus Ariningsih

**Abstract:** Learning from humanitarian organizations dealing with operations under disruptions is presumed to be evitable for commercial organization procurement practices to strengthen their supply sustainability and resiliency. This study is a preliminary attempt to develop the precise sourcing strategies under disruption from assessing four most recent humanitarian organizations' annual reports with qualitative content analysis of systematic coding method. The qualitative content analysis indicates that a long-term innovation partnership, supplier development, supply diversification, and more significant volume contract are the critical success factors to maintain sustainability and resiliency for long and short-term supply under disruption without losing productivity. A sourcing strategy matrix under disruptions is proposed as an initial framework for commercial procurement under disruptions. Further research proposals are also presented in the end part of this study.

**Keywords:** Sourcing Strategy, Disruption, Procurement, Humanitarian Organization

## **Rural banks and their lending distribution towards MSMEs during COVID-19 pandemic**

Gerald Vidisa Jourdano, Ridhotama Shanti D. Ottemoesoe

**Abstract:** This study examines the impact of credit risk in influencing lending by Rural Banks (BPR) to micro, small and medium enterprises (MSMEs) during the pandemic. As micro-lenders, BPRs are expected to support MSMEs especially during the economic retardation. Inherited with opacity such as lack of credit history and financial statement transparency, the probability of credit default may increase during the pandemic, hence BPRs might be difficult to either implement their mandate through lending distribution or to face a higher number of NPL. The research is conducted by distributing questionnaires to 204 MSMEs borrowers who ask for loans from rural banks in 2020. Using logistic regression, this study finds that the chances of micro-enterprises to obtain credit are significantly higher than medium-sized firms and firms with shorter credit outstandings are more likely to obtain loan facilities.

**Keywords:** MSMEs; rural banks; BPR, credit application; Indonesia; pandemic.



## **The Contruction Capacity Planning Onshore Storage Tank for Product X Using Arena Simulation at PT XYZ**

Hendro Setiawan, Andian Ari Istiningrum, Oksil Venriza

**Abstract:** The problems faced by the world at this time are due to the growth of the human population which is not matched by the availability of energy, causing a deficit in energy production. The solution to the problem is the use of product X which is one of the alternative energies derived from oil and gas processing. Therefore, special attention is needed for product X found in Indonesia. PT XYZ is a company that has duties and functions in managing product X to meet energy needs in Indonesia. As time goes by, there is an increase in the population in Indonesia, which is followed by the need for product X which has increased. The increasing demand for product X was also followed by problems that occurred at PT XYZ both external and internal. Problems In external problems, there are fluctuations in the demand for product X, the arrival of supply for product X & local regulations regarding the use of product X, while for the company's internal problems, namely losses, time of each process, operational problem, stock resistance and even wanting to expand PT XYZ's business. So PT XYZ wants to plan the storage tank capacity of product X to meet the increase and fluctuation of product X in 2023. At the stage of planning the ideal capacity to meet the demand for product X by considering the arrival time of product X, losses, stock resistance and problems that occur that can interfere with operational activities. Therefore, from the planning the arena simulation method was used to determine the ideal capacity of the storage tank construction for product X. So from the analysis based on calculations using the Arena simulation method, the ideal capacity was 50,000 m<sup>3</sup> with 5 storage tanks.

**Keywords:** Product X, Capacity, Arena Simulation, Storge Tank, ideal, Resistance Stok

## **Fuel Properties and Diesel Engine Performances of Biodiesel Blends Derived from *Salacca zalacca* Seed Oil**

Willyanto Anggono, Gabriel J. Gotama, Kevin Jonathan, Fandi D. Suprianto, Sutrisno

**Abstract:** Biodiesel has been proposed as an alternative renewable fuel to reduce the dependency on fossil fuels. Since the quality of the biodiesel blends depends on the feedstock and the biodiesel-to-diesel ratio, an extensive study on a specific biodiesel feedstock should be conducted. Despite the abundance of *Salacca zalacca* plants in Southeast Asia, there is a lack of studies regarding their potential as biodiesel feedstock. Therefore, this study investigated the fuel properties and the diesel engine performances of biodiesel derived from *Salacca zalacca* seed oil. The biodiesel blends investigated have a biodiesel-to-diesel ratio of 10:90 (B10) and 20:80 (B20). The fuel property studies found that the flash point, distillation temperature at 90% recovery, and the sulphur content of B10 and B20 need improvement to adhere to the biodiesel standards. The results from the engine performance studies for engine speeds of 1800 to 3000 RPM suggest that the performances of B10 are comparable to that of conventional diesel fuel. However, B10 falls short on its brake specific fuel consumption and thermal efficiency at low engine speed. Future works will focus on improving the fuel properties and engine performances of B10 to allow biodiesel derived from *Salacca zalacca* seed oil as a fossil fuel substitute.

**Keywords:** biodiesel, engine performance, fuel property, methyl ester, *Salacca zalacca*, transesterification

## **Optimizing Inventory Policy in a Plywood Retail Company using Continuous Review Method and Multi Criteria Classification**

Alissa Saphira Putri, Ari Yanuar Ridwan, Prafajar Suksessanno Muttaqin

**Abstract:** PT. BWI is a company based in Jakarta. PT. BWI sells building material products, namely plywood. The problem that occurs in the company is the occurrence of overstock every month. The cause of overstock is that the company does not have an inventory control policy on the products it sells. Companies only use intuition when determining when to order products from suppliers and the quantity of products ordered. In addition, there is no product classification in determining which products must be strictly controlled and prioritized. Therefore, this research aims to determine inventory classification and determine the proposed inventory control policy for PT. BWI plywood products, where the product has normal distribution. Based on the results of multi-criteria inventory classification, there are 5 products in class A, 6 products in class B, and 9 products in class C. After calculating the inventory policy using continuous review, the total proposed inventory cost can decrease by 85% of the total actual inventory cost.

**Keywords:** Inventory, Plywood, Overstock, Multi Criteria Inventory Classification, Continuous Review

## **Design and Analysis of a Double Lead Screw Household Trash Compactor Using a Static Simulation**

T. Kevin Ronald Santoso, Amelia Sugondo.

**Abstract:** Waste is a serious problem, especially household waste. Therefore, an idea was developed to overcome the existing household waste problem in the form of a trash compactor. This research proposes on designing the trash compactor using a double lead screw mechanism. The trash compactor uses an electric motor for its driving force and a set of gearbox for speed reduction. The trash compactor was designed, modelled, and simulated by using Autodesk Inventor Professional 2022. The simulation is based on a static simulation. The results show that the design of lead screw, frame, and ram size has overcome the 20000N of trash compactor capacity are according to the material strength and displacement for each components with safety factor more than 1.4. The trash compactor has a total capacity of 245.76 liter.

**Keywords:** Household waste, lead screw, static simulation, Von Mises stress, displacement, safety factor

## **Designing Raw Material Procurement Risk Mitigation System in Halal Supply Chain in The Food Industry Based on SNI 99001:2016 Using House of Risk (HOR) Method**

Muti Hanifah, Ari Yanuar Ridwan, Mohammad Deni Akbar

**Abstract:** The development of the industrial world continues to experience significant progress, one of the growing industries is the halal food industry. To develop halal food, it is necessary to be supported by Halal Supply Chain Management (HSCM). The implementation of HSCM activities has several risks that can hinder the process. In this research, the SCOR model is used to measure and improve supply chain performance and the House of Risk method is used to identify risks that arise in the supply chain flow so that appropriate strategies can be designed to overcome these risks in order to reduce and overcome various risks. This research aims to determine risk and risk mitigation with the HSCM approach so that companies can analyze risk and mitigate risk in paying attention to product haleness by designing a monitoring system. The results showed that there were twelve risk events and seven selected risk agents which were then included in the preparation of mitigation strategies. There are four preventive actions that may be taken as mitigation strategies. The other results in this research is a monitoring system in order to facilitate risk monitoring.

**Keywords:** Halal Supply Chain Management, Risk, Mitigation, SCOR, House of Risk, Monitoring System.

## **The Effect of Printing Orientation on The Fused Deposition Modeling Process of The Robot Gripper Object-Moving Force**

Yopi Yusuf Tanoto, Juliana Anggono, Yohanes, Cedric Rahardjo, Ninuk Jonoadji

**Abstract:** HIPS (High Impact Polystyrene) is one of the materials used in 3D printing. Research studies and applications of this material have not been made extensively, especially in works which require flexural strengths. The purpose of this study is to determine the correct orientation to produce grippers with the highest flexural strength which can serve as an alternative material for aluminum grippers. This research indicates that orientation 2 produces the highest flexural strength at 4.16 kN with lattice fill pattern, a 75% fill density, and a layer thickness of 0.125 mm. Orientation 2 is defined as the specimen's thickness parallel to the surface's width.

**Keywords:** 3D Printing, Flexural Strength, Robot Gripper, HIPS.

## **Broiler Chicken Slaughter Age Optimization Model Design by Considering the Total Chicken Breeding Cost**

Antyesti V. Apsari, Muhammad Akbar, Mohammad M. Isnaini.

**Abstract:** This paper presents a development of a mathematical model used to optimize broiler harvest time by considering the estimated profit obtained. The model development is carried out by utilizing Feed Conversion Ratio (FCR) data which describes the level of efficiency of animal feed conversion. By paying attention to this pattern, calculations can be made to predict the weight growth of chickens during the breeding period. Calculations are also carried out to estimate the amount of profit obtained by considering the cost of food. Adjustments are made by making several modifications to the reference model, namely by adding the FCR bonus component to the objective function and eliminating the Day Old Chick (DOC) purchase cost component. Modifications were also made to the decision variables, constraints, parameters, and indices used in the overall model. The proposed model shows the estimated profit over the next few days, which might give the poultry owner additional insight to bargain with the buyer's proposal regarding the profitable harvest time. With the cost component in the model, the calculation results will depend on the price parameter.

**Keywords:** broiler, DOC, FCR, slaughter age, chicken weight.

## **Procurement Performance Measurement Based on ISO 9001 Quality Management System in Engineer to Order Manufacturing Companies using SCOR and Fuzzy AHP Method**

Bunga Harnum Sandita, Ari Yanuar Ridwan, Erlangga Bayu Setyawan.

**Abstract:** The manufacturing industry will continue to grow from year to year along with increasing productivity. As in 2020, the manufacturing industry continues to show its development. With this potential, the government is increasingly focused on encouraging the performance of the manufacturing industry as one of the driving forces of the national economy. PT. XYZ is a company engaged in the manufacturing industry sector by managing raw materials into finished goods using technology and work skills and has been running for almost 20 years. To continue to improve its performance, the company follows the ISO 9001:2008 certification to attract consumer trust. Although PT. XYZ is already ISO 9001:2008 certified, the company still does not have a performance rule that can ensure that all supply chain activities within the company have been carried out properly. Based on the following problems above, the company needs a supply chain performance measurement system in the material procurement process by making KPI or Key Performance Indicators based on ISO 9001 using SCOR and Fuzzy AHP methods. Asset management and agility are the most important criteria for PT. XYZ

**Keywords:** Supply Chain Management, Performance Measurement System, ISO 9001, SCOR, Fuzzy AHP



### **Mini-SPERO: Personal Servicing Robot During Self-Isolation**

Indar Sugiarto, Iwan Halim Sahputra, Hariyo PS Pratomo, Hilton Tnunay.

**Abstract.** During the Covid-19 pandemic, it is important to have systems that support patient recovery, for example, a robot that can help in delivering various medical supplies to patients. This paper describes the process of designing a low-cost robot that can be used for helping patients during their self-isolation. The robot is composed of two main parts: a manipulator and a mobile base. The manipulator's joints were made using a 3D printer articulated by several DC servos, whereas the mobile base was constructed using three DC motors equipped with omni-wheels. Both parts were controlled using a single Raspberry Pi that provides all means for data acquisition, control, and communication. The manipulator was also designed with the ability to avoid fall over by adding a controllable beam that works as a balancer. On the other hand, the mobile base was also equipped with a proximity sensor that can be used to measure the distance of objects surrounding the robot. The manipulator can be controlled by using a PID or a Fuzzy controller. From the experiment, we observed that the Fuzzy controller has a slower response compared to the PID one with a difference between 0.23 and 1.07 seconds. For the mobile base, we used only an inverse kinematics proportional controller with odometry calculation that results in the smooth robot movement with error at about 9.5% on the x-axis and 8.1% on the y-axis.

**Abstract.** Covid-19 pandemic, robot, mobile manipulator, fuzzy controller, load balancer.

## **A Preliminary Study of Remanufacturing on FDM Machine**

K Wangsawijaya, Y Yusuf Tanoto, D Wahjudi, G Shu San, J Herlianto

**Abstract:** The development of 3D printer machines is fast and extensive. Now 3D printer machines can be owned easily and at an affordable price. Because of this rapid development, many companies are making 3D printers. Therefore, to reduce e-wastes and other wastes, it is better to *upgrade* the 3D printer with new parts than to throw away the old one and buy a new one. Like the BFB 3D Touch which is no longer *produced*, it is a pity to throw it away. Therefore, this BFB 3D Touch is remanufactured and *upgraded* to be like the 3D printer that is currently circulating in general.

The results obtained are remanufacturing steps for the BFB 3D Touch 3D printer machine, entrance diagnosis, complete disassembly, cleaning, inspection and sorting, recondition or replenishment by new parts, reassembly and testing. In the implementation, it was found that many electronic parts did not have spare parts because this 3D printer is discontinued. Therefore, the electronic components are replaced and upgraded. For example, motherboard, hot end, and LCD. Previously the maximum resolution was 0.125 mm, now it can reach 0.06 mm. Previously 3 mm filament measuring is used, now 1.75mm is used.

**Keywords:** 3D printer, remanufacture, BFB 3D Touch

## **Water Droplet Absorption into Cellulose-based Fabric: A Molecular Viewpoint**

Iwan H. Sahputra, Indar Sugiarto, Hariyo P. S. Pratomo, Andreas Liudi Mulyo.

**Abstract.** In this paper, we present the mechanisms of water droplet absorption into the cellulose-based fabric from a molecular viewpoint. A  $5 \times 5 \times 5$ -unit-cells of cellulose I $\beta$  model and a water molecule model have been developed to represent fabric and water droplet. The climbing-image nudged elastic band method was used to find the minimum energy path and the energy barrier of a water molecule when absorbed into three different cellulose surfaces, i.e. [100], [010], and [001] surfaces. The [010] has the lowest calculated energy barrier compared to the other surfaces, thus it is the easiest surface to be penetrated by water molecules. The other surfaces have larger energy barrier values due to the temporary binding of an oxygen atom of the water molecule on cellulose molecules when the water molecule penetrates the surface. For all surfaces, there is not any chemical reaction taking place when the water molecule is adsorbed on the surface or when it is absorbed in the subsurface. Thus, the absorption processes observed in this study is physical absorption.

**Keywords:**

## **The Mechanism and Scheme of Product Allocation in Multi-Channel Distribution**

Nadia Laksita Devy, Nur Aini Masruroh

**Abstract:** The growth of internet and technology information increases the use of online sales. Manufacturers sell their products with traditional channels by retailers, but nowadays, they provide a drop-shipping channel for online sales, which brings many benefits for manufacturers and retailers. Drop-shipping has the advantage of increasing market share and reaching customer engagement. Manufacturers use this great opportunity to sell their products directly to customers. Therefore, the supply chain provides allocation distribution by traditional channels, drop-shipping, and direct sales. One of the products that fit sales through online channels, especially drop-shipping is fashion. The manufacturers' limited capacity and inability to fulfill orders are common in a supply chain when there are low demand and high demand seasons. Therefore, the manufacturers face asymmetric allocation causing failure to meet the total order quantity. This research adopts retailers' traditional channel allocation schemes: turn and earn allocation for high season and sequential allocation for low season. Retailers compete in a high season to maximize the allocation of their traditional channel. The retailers' traditional channel allocation in the high season depends on the retailers' order quantity performance in the low season. Therefore, retailers' competition has benefits to increase the number of sales in the low season. Manufacturers break the retailers into two types, the primary retailer with a better relationship with the manufacturer and the ordinary retailer. The manufacturer and the primary retailer optimize the number of the providing of the drop-shipping capacity product. In this research, the manufacturer has to make an allocation scheme and mechanism to maximize its profit. The mathematical model is developed to maximize the manufacturer's profit which considers the primary retailer profit. The research successfully found the optimum value of proportion capacity for drop-shipping, the optimal order quantity of retailers in the low season period, and the best value of factor allocation for the traditional channel. Based on this case, we use multi objectives approach to maximize the supply chain profit. The result of this mathematical model is better than the existing system. A numerical study is also conducted to discuss the sensitivity to different demand levels.

**Keywords:** allocation scheme, multi-channel, drop-shipping, competition.

## **I4.0 Readiness Index in Electric Power Distribution in Serving Modern Consumers**

Very Fernando<sup>1, a)</sup>, Hasbullah Hasbullah<sup>2, a, b)</sup>, Nanda Tommy Wirawan<sup>3</sup>

**Abstract.** Nowadays, the needs of modern human life are inseparable from the use of electrical energy. The development of eco-friendly technology continues to emerge rapidly to help facilitate daily life, such as electric vehicles (EV), electric stoves, and other modern equipment. A variety of modern equipment will have a technical impact on the distribution of electric power. Perusahaan Listrik Negara (PLN) is a state-owned company, as one of the electricity service providers, must serve consumers reliably and efficiently. The existence of modern loads on the consumers side must be addressed with modern electricity supply, such as the preparation of smart grid technology, communication technology between EV charging stations, disturbance management, and efficient asset management. All of that is a readiness index for PLN to serve modern consumers. PLN needs to prepare technology and knowledge in the transformation of industry 4.0. This research helps PLN to assess the readiness of industry 4.0, called INDIST 4.0 (Power distribution readiness Index I4.0). The results of this study contain 5 Pillars, 15 Fields as a reference. Assessment for all distribution work areas in Indonesia with a value of 1.9 out of 4, meaning PLN is a newcomer and learner.

**Keywords :**

## **Busbar Failure Analysis on 6300A Distribution Panel with Computer Aided Engineering (CAE)**

Perwita Kurniawan, Hafid Saputro, Dimas Romantyo, Praditya Sih Ardihantoro

**Abstract:** The distribution panel is a safety device used to cut off electricity when a short circuit occurs. Inside the distribution panel there is a busbar system. Busbar is a component of copper bars that are shaped according to the desired path. Busbar is supported by a busbar support which must be strong enough to withstand from mechanical impact caused by an electromagnetic forces. Electromagnetic force can cause attraction between busbars, when the busbar support cannot withstand the busbar on its position it can cause a short circuit. The distribution panel inside is designed with the busbar system and busbar support. After the design process is complete, the next step is analysis. The busbar section is analyzed using CAE software. Based on the results of the study, the electromagnetic force is 4416,73 N. This causes a deflection of the busbar 64,814 mm and a maximum stress of 620,104 N/mm<sup>2</sup>. The simulation data shows that there is a deflection on the busbar when a short circuit occurs, but the amount of deflection is still safe because it is still in accordance with the allowable safe limit.

**Keywords:** distribution panel , busbar , CAE , main bar , deflection

## **Determining Factors Affecting Customer's Loyalty to Internet Service Provider Among Employees in Indonesia During the Covid-19 Pandemic: A Structural Equation Modelling Approach**

Bryan Ong, Indriati N. Bisono

**Abstract:** Internet service provider has been a critical aspect during COVID-19 pandemic. The purpose of this study was to determine factors affecting customers' loyalty to internet service providers (ISP) among employees in Indonesia during the COVID-19 pandemic by utilizing a structural equation modelling (SEM) approach and interview. 342 respondents voluntarily answered an online questionnaire which consisted of 36 questions and 20 respondents willingly answered 10 open-ended questions in interview via telephone which cover several factors such as Internet Quality (IQ), Security & Privacy (SP), Router Quality (RQ), and Price (P). SEM showed that Price (P) was found to have the greatest impact on customer satisfaction. Followed by, Router Quality (RQ), Security and Privacy (SP), and Internet Quality (IQ). Other than that, several factors were found to not have direct effects on customer satisfaction. The increment deemed to have a significant effect on the customer's satisfaction according to the result from SEM.

**Keywords:** internet provider, COVID-19, structural equation modelling, customer loyalty

## **Reducing Shrinkage and Stockouts in a Food Retail Store: A Portuguese Case Study**

Pedro Alexandre Marques, André Mendes de Carvalho

**Abstract:** Lean thinking is transforming the traditional way of a retail business operates to new and more effective practices. In particular, the food retail business is facing previously unseen challenges which require daily operational excellence to meet them with success. Low productivity, high variability in task completion, lack of work planning should be faced with daily relentless improvement actions. Kaizen, the continuous improvement pillar of Lean, needs to be seen not only as a methodology but also as a philosophy, a vision that needs to be written on everyday actions and personified by each individual. This paper describes an improvement event in the fresh food markets, specifically in the cold meat section, meant to decrease the shrinkage rate as well as the number of out-of-stock (OOS) situations. The methodology adopted followed the seven-step problem-solving procedure provided by the A3 thinking tool. Keywords: Lean thinking; Out-of-stocks; Retail; Shrinkage rate; Structured problem-solving.



## **Adoption of Blockchain-Based Solutions for Online Grocery Consumer**

Rohana Sham, Pek Chuen Khee, Victree Lim Wei, Lam Chee Hung

**Abstract:** The rapid development of the Internet has enabled e-commerce in several businesses in the country. Online grocery delivery services ensure that customers get their groceries at their place in a hassle-free manner. However not all online payment method is safe and acceptable for the users especially those living in an urban area. The purpose of this paper is to determine the factors that affect the acceptance of Blockchain and online delivery networks for consumer groceries. The target respondents are residents of Klang Valley. A total of 384 responses was collected through questionnaires. The survey data was analyzed using SPSS software. The independent variables, namely, accuracy, online payment, and cybersecurity, positively impact the dependent variable with significant value.

**Keywords:** Online Grocery, Blockchain, Technology

## **The Influence of Private HEIs' Characteristics and Electronic Word of Mouth (EWOM) on Students' Decision-Making to Enrol at Private HEIs in Kuala Lumpur & Selangor.**

Aeshah Mohd Ali, Salvinderjit Kaur A/P Ranjit Singh, Ranjene A/P Dakshinamurthi, Nor Asiah Mahmood.

**Abstract Purpose:** The purpose of this study was to examine factors that influence the decision of students to enrol in a Private HEI in the Malaysian context. The basic objectives of this analysis are therefore presented as to determine the relationship between PHEI's Characteristic (academic programs, tuition fees, reputation, location, employment opportunities); external factor (EWOM) as independent variables towards students' decision-making as dependent variable to enrol at a Private HEI; and to determine the major factor that influence students' decision making to enrol at private HEI. The underpinning theory applied in this study was Theory Reason Action (TRA) EWOM, while Theory of Planned Behavior (TPB) applied for Private HEI's characteristic namely as academic programs, tuition fees, reputation, location, and employment opportunities. A quantitative method and stratified sampling technique applied in this study. Four hundred and fifty (450) questionnaires distributed on a recommended sample for undergraduate students from 6 selected Private HEIs with university status in Kuala Lumpur and Selangor. After deleted outlier only 409 cases were held for analysis in this study. The set of data collected was examined using IBM SPSS (version 23) that performed factor analysis, reliability analysis, and multiple regression analysis applied to test on the hypotheses. The findings of this study resulted in a significant influence of academic programs, tuition fees, reputation, location, employment opportunities, and EWOM towards students' decision-making to enrol in a Private HEI. Thus, hypothesis H1, H2, H3, H4, H5, and H6 are supported. Overall, tuition fees were the most significant factor ( $\beta = .254$ ;  $p = .000 < .05$ ), followed by EWOM ( $\beta = .187$ ;  $p = .000 < .05$ ), reputation ( $\beta = .186$ ;  $p = .000 < .05$ ), WOM ( $\beta = .146$ ;  $p = .000 < .05$ ), location ( $\beta = .123$ ;  $p = .000 < .05$ ), academic programs ( $\beta = .101$ ;  $p = .003 < .05$ ), and lastly, employment opportunities ( $\beta = .097$ ;  $p = .000 < .05$ ). Tuition fees were ranked first because it is important for students to know if their parents or guardians can afford the tuition fees and make informed decisions since tuition fees for the same program can vary considerably between institutions.

**Keywords:** Students' Decision-Making, HEI's Characteristic, EWOM.

## **Factors That Affect The Investors Intention To Adopt Robo-advisory Services In Malaysia**

Pius Andrew Khoo Chiun Chea, Ong Shin Fang, Liew Chee Yoong

**Abstract:** In this paper we present empirically test the factors which affect investors' intention to adopt robo-advisors in Malaysia. Multiple regression method is used. We found significant relationship between transparency, relative advantage, social influence, and perceived usefulness in the adoption of robo-advisory services in Malaysia. However, there is no significant relationship between effort expectancy and intention to adopt robo-advisory services in Malaysia. The results coincide with past research on the related topic which showed a positive relationship with social influence and relative advantage. These results could provide insights in the robo-advisory market to further understand what encourages Malaysian investors' intention to adopt this new technology so that this technology can be adjusted to improve the adoption rate among Malaysian investors.

**Keywords:** Investors, Robo-advisors, Services, Investment, Technology, Intention

## **The Relationship of Hygiene Factors Toward Employee Job Satisfaction in Royal Malaysian Navy**

Nor Asiah Mahmood, Amir Imran Bin Samaon, Mutablib Bin Ismail

**Abstract:** The purpose of this study is to investigate the relationship of hygiene factors toward employee job satisfaction (JS) in the Royal Malaysian Navy (RMN) especially RMN personnel who serve onboard ships in Lumut Naval Base. The methodology used for this study is quantitative analysis with a simple descriptive approach and correlation analysis with SPSS version 23. A descriptive-analytical approach: simple random samplings of 220 employees were used for analysis. The findings indicated that company policy; salary and benefits; and interpersonal relationships have a significant correlation with JS. It was also found that job security and working conditions do not have a significant correction on JS. The implications of this study are concluded that there is a significant correlation of company Policy, Salary and Benefits and Interpersonal Relationships on JS and there is no significant correlation of Job Security and Working Conditions on JS. The study also would not only affect the organization but also the field itself by contributing to the literature pool of aforementioned research elements. Models and theoretical applications that can be used for future research could also offer a different perspective of understanding and comprehension as opposed to previous study and research, thus this is one of the Novelties in this study.

**Keywords:** Job Satisfaction, Policy, Salary and Benefits, Interpersonal Relationship, Job Security and Working Conditions.

## **Reducing Defectives Smartphone's Component: A Case Study at Smartphone Manufacturing in Batam**

Wiky Putra Jaya, Debora Anne Yang Aysia

**Abstract** Quality was necessary for every consumer; therefore, every company must fulfill the quality of the product by customer's wishes. The competition between companies also encourages companies to create higher quality products and make continuous improvements. Therefore, every company would maintain the quality of their products and did not want any defects to occur during the production process. One of the problems at a smartphone manufacturing in Batam was the high number of their defective smartphone's components. The percentage of defective components from August 2020 until November 2020 was about 17,59%. DMAIC (Define, Measure, Analyze, Improve, Control) stages and quality tools such as five whys analysis, check sheet, histogram, and Pareto chart were used to discover the root cause of the problems. Improvements suggested were improvement of work method in the rear camera installation process, improvement of work method in the MT 1 test 3 process and providing an EVA layer on several corners of the worker's desk. The implementation results showed that defectives rear cameras could be identified earlier, so preventive action could be done in the earlier stage of the production process. The other results of the quality improvement implementation were dented battery cover reduced by 0,26%, scratched battery cover reduced by 0,43%, and dented front shell reduced by 0,11%.

**Keywords:** quality improvement, defectives smartphone's component, quality tools, DMAIC

## **Increasing Thin-Walled Workpiece Stiffness to Improve Its Surface Roughness in the Face Milling Process**

Oegik Soegihardjo

**Abstract:** Surface roughness is one of the important characteristics of the workpiece made by machining process. In addition to the machining or cutting parameters, the stiffness of the workpiece in the machining affects its surface roughness. The surface roughness of the workpiece will get better as the stiffness of the workpiece increases. For workpieces that have a large length to thickness ratio, increasing the stiffness of the workpiece becomes an important issue to improve its surface roughness. The cutting test was carried out on the gearbox housing model (g-h model) which was represented as a thin-walled workpiece. Mild steel was chosen as material for the g-h model. Taking into account the shape of the thin-walled workpiece and the orientation of the face milling tool on the workpiece wall, granular stiffener is used to increase the stiffness of the workpiece. Although granular stiffener may not always be used as good stiffeners because of its several constraints, for face milling process of the g-h model the choice of this stiffener is appropriate. Preliminary measurements of the average vibration amplitude with experimental modal analysis on the tool spindle and g-h model in time domain using accelerometer to measure the vibration response, gave results of 10 ms<sup>-2</sup> and 400 ms<sup>-2</sup> vibration amplitude respectively. The magnitude of the average vibration amplitude of the g-h model of this initial measurements was the reason why its stiffness must be increased. The addition of a stiffener to the g-h model (workpiece) reduced the vibration amplitude of the workpiece from 2892 ms<sup>-2</sup> to 393.04 ms<sup>-2</sup>. In the cutting test with 1.2 mm depth of cut, the addition of stiffener on the g-h model improved the surface roughness from 1.8 m to 0.92 m.

**Keywords:** workpiece stiffness, cutting test, surface roughness, vibration amplitude.

## **Study and Analysis of an Industrial Compressor Facing Overheat Problem**

Ekadewi A. Handoyo, Fery Marianto, Joshua H. Tandio

**Abstract.** A compressor in a rice manufacturer, PT. X, got overheated especially on hot days. The overheat makes the compressor shut off and stops the production line. From the observation and data collected in PT. X, it was found that the overheat problem in the compressor was caused by (1) the dust on the surface of the aftercooler and the fluid cooler, and (2) the high temperature of the intake air to the compressor. The management comprehends the suggestion to clean the coolers' surface, close the door to the compressor room, and install an intake duct to bring in cooler air input to the compressor. Carrying out the suggestion, the overheat problem is overcome and there is saving in operational cost. The savings could be more than 4000 kWh/year for eight hours of work each day. By lowering the inlet air temperature as much as 4C° for the compressor, the CO<sub>2</sub> emission could be reduced around 4000 kg/year. A heat exchanger could replace the after cooler and the fluid cooler for recovering the waste heat of the compressor. The heat to be recovered from the compressor is approximately 40 kW. The waste heat recovery framework will produce 13 liter/min water at 70°C.

## **Rolling Forecast as an Alternative Tool for Short Term Production Planning : A Case Study of Bicycle Manufacturer**

Desi Winoto, I Gede Agus Widyadana

**Abstract:** The accuracy of production planning is crucial that must be achieved by manufacturing companies. Production planning is sensitive to sales patterns and the availability of raw materials. Production planning must be in line with raw material planning. The lead time of raw materials for three months causes production planning to be done earlier to ensure that the raw materials are available. In the waiting period for these raw materials, sales patterns may change so that the forecast and actual value deviations differ significantly. A dynamic mechanism of calculating the value of safety stock is carried out and carrying out the correction function of forecasting value by rolling forecast for overcoming it. Rolling forecasts allow forecasts of updated forecasting due to changes in sales patterns detected from actual sales value renewal. Using a rolling forecast as an alternative tool in forecast correction can reduce the amount of excess inventory up to fifty-seven percent.

**Keywords:** forecasting; rolling forecast; production planning; inventory control



## **Effect of Family Business Support, Academic Support, and Entrepreneurship Education on Student Entrepreneurial Intentions**

Elizabeth Suminar, Karina Agustin, Nyoman Sutapa

**Abstract.** The outbreak of the Covid-19 pandemic has significantly influenced the availability of job opportunities. Moreover, companies are downsizing their labor number to carry out their industrial sustainability. Therefore, there is an urgent situation for graduate students to create their entrepreneurship rather than expect formal employment. This study assesses three factors that will impact college students' spirit to build their entrepreneurship: family business support, entrepreneurship education, and academic support. Respondents were collected from 151 individuals of engineering graduate students. Research from literature studies related to the factors is considered in designing the questionnaire as the survey to the respondents. Analyzing the survey data with the Structural Equation Modeling technique in Smart PLS 3,0 resulted in information that the family business support and academic support had a significant influence on student's entrepreneurial intention. Thus, family business support becomes the most significant factor to encourages students to become entrepreneurs. In addition, the existence of financial and non-financial support from family can encourage students' motivation to create their entrepreneurship. On the other hand, entrepreneurship education does not significantly affect the students to develop an entrepreneurial interest.

## **Determinants of Auditors Fraud Detection Capability: Evidence from Malaysia**

Ayodele Ozavize Freida, Nur Diyana Bt Mustapha, Edosa Aronmwan, Radha AP K. Krishnan Nair, Joanna Yeo Shu Hua, Siti Norazura binti Abdul Bahari

**Abstract:** The study examines whether auditors' experience, auditor's incentive, and auditor's independence contribute to auditor's fraud detection capability. Data were collected from a sample of 200 auditors as respondents. Based on the OLS regression technique employed, the result shows that auditors' experience, incentives, and independence significantly influence auditors' fraud detection capability. The implication is that organizations in Malaysia can utilize audit incentives, auditor's experience, and auditor's independence as crucial instruments for designing fraud detection strategies to minimize fraud losses. This study contributes to existing research and advances the understanding of how auditor related factors that affect fraud detection capability can be harnessed as a strategy to tackle fraud threats in businesses.

**Keywords:** Auditor's experience; Auditors Incentive; Auditor's independence; Fraud detection capability

## **The Rate of Student's Academic Burnout During Covid-19 Pandemic**

Anthony Gunawan Tanputera, Herry Christian Palit, Debora Anne Yang Aysia

**Abstract:** This research aimed to determine the level of academic burnout on online learning for junior high school, high school, and college students in East Java. Online learning was one of the government's efforts to minimize the effect of the COVID-19 virus. The use of gadgets for too long could cause various emotional and physical disturbances for the user. Data was collected via a questionnaire asking about the effect of online learning on academic burnout for students in East Java. There were 334 respondents, consists of 102 junior high school students (31%), 104 high school students (31%), and 128 college students (38%). Academic burnout was measured using three dimensions, namely emotional exhaustion, cynicism, and reduced academic efficacy. This present study shows 67.66% of junior high school students, 71.12% of senior high school students, and 68.50% of collage students experienced academic burnout. Online learning increases academic burnout, where the rate of emotional exhaustion is high, however the rate of cynicism and reduced academic efficacy are moderate. Students who prefer offline learning compared to online learning have a higher rate of cynicism because they felt burdened with the assignments given, and the material taught in class was not clear. The analysis of academic burnout from these three dimensions is also concluded in this paper.

**Keywords:** academic burnout, emotional exhaustion, cynicism, reduced academic efficacy

## **Impact of COVID-19 on Small and Medium Enterprises (SMEs) in Services, Manufacturing and Construction Industry**

Tan Yan Xi, Yang Jia Huei, Mohsen Jafarian

**Abstract:** This paper studied the impact of COVID-19 on SME. We study the impact of COVID-19 in terms of demand, supply, employment, long term financing and short term financing. Survival strategies for SME during COVID-19 are also incorporated in this study. To study the impact of COVID-19 on SMEs empirically, primary data will be collected using questionnaires and will be analysed by quantitative approach. The sample size of research is targeted to achieve 384 respondents. Methods used for data collection of this research are mainly adapted questionnaires which are sourced from the public documents of the US Bureau of Labour Statistics.

**Keywords:** COVID-19, SMEs, Services, Manufacturing, Construction, Malaysia

## **Impact Of Covid-19 On The Capital Structure Of Publicly Listed Firm: Evidence From Malaysia**

Mohsen Jafarian, Yap Zi Yi, Chong Carryn

**Abstract:** This paper examines the effects of COVID-19 on the capital structure of publicly listed firms in Malaysia. Using panel data regressions and total debt as proxy for capital structure, we study the relation between the leverage and asset tangibility, firm size, market to book value, liquidity, profitability, growth opportunity together with crisis dummies where it is built based on a sample of 478 firms listed on Bursa Malaysia within industrial products & services, consumer products & services, property, construction, energy, health care, plantation, technology, telecommunications & media, and transportation & logistics industries before and during COVID-19 pandemic for the period of 2016-2020.

**Keywords:** COVID-19; Capital Structure; Leverage; Asset Tangibility; Firm Size, Market to Book Value, Liquidity, Profitability, Growth Opportunity

## **Optimization of Injection Process Parameters for The Manufacture of Recycled PP Material Thread Cones**

Adi Nugroho, Adhi Setya Hutama, Winastwan Sista Hayu

**Abstract:** Product development and innovation are important things needed by an industry. Product development is a strategy carried out in offering new or modified products that are appropriate and needed by consumers. Innovation itself can be interpreted as the efforts made by product makers to improve, improve, and develop products produced. Cone from plastic products are also undergoing development and innovation, one of which is the manufacture of plastic cones made from recycled plastic. The use of recycled plastic is aimed at reducing plastic waste which is currently a problem in Indonesia. In the development process, cone products made from polypropylene plastic material (PP) are recycled with added calcium carbonate used as a product booster. The process of making thread cone products is done by injection molding process and is expected to have standardized product weight. Optimizing injection parameter can be done by combining parameters that have influence on product weight and simulating the parameter combination using moldflow software. The optimization process can be carried out using taguchi method, where this method helps in choosing the most optimal parameters combination without simulated all parameters combinations. The analysis carried out aims to find the optimal combination of parameters with the value of product weight from simulation results can approach the specified target value. Based on research on optimizing the injection molding process parameters in the manufacturing cone using taguchi method with nominal the better characteristic, the following parameters combinations were obtained: holding time for 4 seconds; injection time about 1,5 second; injection speed about 140 mm/s; and melt temperature about 250 °C and the resulting product weight of 11.13 grams that meets production standards.

**Keywords:** Product Development and Innovation ; Optimimization Taguchi ; PP Recycle ; Injection Molding Parameter

## **Optimizing Travel Distance for Picking Order Problem using Symbiotic Organism Search Algorithm Combined with Mutation Operators**

Tanti Octavia, Andreas Handojo, Adelyn Thungriallu

**Abstract:** This article aims to investigate the reliability of sos algorithm for solving the picking order problems considering the real environments of warehouse. We attempt to apply SOS algorithm combined with mutation operators. There are three mutation operators used, namely swap mutation operator, inversion mutation operator, and insertion operator. Simulation is carried out using a case study of warehouse's company that stores various kinds of daily products to fulfil the customer demand. The simulation is run considering the percentage decrease in the distance between initial solution and final solution and the computational time. Simulation is run for the number of iterations of 100, 500, and 1000 and the ecosystem size as 10,20, and 50. The results show the SOS algorithm can provide a large percentage of distance reduction for a small number of consumer demand in all iterations and ecosystem sizes, with a percentage decrease in distance of more 5%. As for the large number of customer demand (500 and 1000), the percentage decrease in the total distance is below or equal to 3.71% for all iterations.

**Keywords:** metaheuristic algorithms, mutation operators, ecosystem size, picking order

## **Inventory Models for Multi Items Stock-Dependent Demand and Stock-dependent Holding Rate with Capacity Constraint**

I Gede Agus Widyadana, Tanti Octavia, Andreas Handojo

### **Abstract:**

Inventory models for stock dependent demand have been developed continuously in recent years. In this paper, we develop inventory model for multi-items buy considering stock-dependent demand and stock-dependent holding rate for a rack that has a specific capacity. Two models are developed. The first model is an individual order quantity for each item and the second model is a joint replenishment model. The non-linear model with constraint is solved using evolutionary algorithm. A numerical example and sensitivity analysis are conducted to show how the models work and to get some management insights. The sensitivity analysis shows that there is no dominant model. However, the joint replenishment order outperforms individual order when the rack capacity is tight and there is high ordering cost.

**Keywords:** inventory; multi-items; stock-dependent demand; stock-dependent holding rate; joint replenishment



## **Evaluation of Covid-19 Vaccine Effectiveness in Handling the Covid-19 Pandemic in the City of Surabaya with A Dynamic System Simulation Approach Using Vensim PLE**

Aldo Setyawan Jaya, Siana Halim, Bernardo Nugroho Yahya

**Abstract.** The Covid-19 pandemic, a major global issue, has created a severe health emergency for the past year. In addition, it led to a crisis of governance and policies for handling Covid-19 worldwide, particularly in the city of Surabaya. Therefore, the Surabaya city government has implemented various policies to handle the Covid-19 pandemic. This study aims to provide predictions and evaluations regarding the effectiveness of implementing policies for handling the Covid-19 pandemic in the City of Surabaya, especially the Covid-19 vaccination policy. Furthermore, we simulated the effect of those policies on the rate of infected people using the dynamic system model using Vensim PLE. The simulation results show that the vaccination policy has an adequate level of 64.65%. Moreover, the implementation of vaccination, the enforcement of community activity restrictions (PPKM), convalescent plasma therapy, contact tracing and isolation, and also swab tests have been proven to reduce the rate of increase in Covid-19 cases effectively.

**Keywords.** Covid-19 pandemic in Surabaya City, dynamic system simulation, vaccine effectiveness, policy evaluation

## **Design Thinking: Visual Guidance for Quality Inspection Case Study on Cosmetic Packaging Company**

Florensia Agatha Jessica Djaja, I Nyoman Sutapa

**Abstract:** The article discusses human error in quality inspection process at a cosmetic packaging company. Human error occurs because the visual guide of quality requirements designed by the inspector does not match the expectations and needs of the selectors as users. To improve the design of the visual guide to effectively reduce inspection errors, a design thinking approach is used. A user-centred design approach, designed jointly between users and designers, through five design stages, namely the empathize, define, ideate, prototype and test stages. The results of improving the visual guide are able to reduce inspection errors.

**Keywords:** manual inspection, design selector-inspector collaboration, cosmetic product packaging, visual guide, design thinking.

## **Marketplace Based Application System to Improve Customer Satisfaction on Laundry Business**

Djoni Haryadi Setiabudi, Michael Santoso, Mariana Wibowo

**Abstract.** Laundry shop customers are presently confronted with several service options, qualities, and features. This is due to the inconsistent operational management of these organizations, in delivering maximum satisfaction. These problems often lead to the unsatisfactory level of customers, as they begin to search for better laundry alternatives, which consumes much time and effort. The studies on laundry business have also been widely carried out, as they are found to only focus on the ease of management due to delivery to one shop, which is equipped with features of comfortable services and payments. However, it has not been able to handle the demand of customers and various items, which needs to be sent to different laundry shops. Based on these studies, the laundry business concept should be developed to improve service qualities, with customers having the option to distribute their items to desired shops, through the placement of one order. According to the development of this system, a sequential simplification from multi to single orders was observed, as the marketplace concept was also used. Furthermore, the manager handled and simplified the multi-order process, which was carried out by distributing orders to several shops, arranging the pick-up and delivery procedures, as well as receiving and transferring payments to all laundry services. The result showed a comparison between the mobile-based laundry business and traditional systems, respectively. This new system was found to save time and costs, as it handled simple to complex laundry needs with a single click on the application, compared to the traditional laundry business that involved multi orders.

## **Sustainable Product Design and Development: A review**

Kriswanto Widiawan, Nutcharee Pakdeechoho

**Abstract.** Sustainable product design and development is a vast field of research. So far, no study has been conducted on the sub-field of research. Typically, each scholar conducts research based on his point of view and expertise. This paper aims to compile the categorization of sustainable product design and development in terms of topics, objectives, methods, and contributions. Based on a literature review of sustainable product design and development, several research sub-categories were found, namely process, life cycle assessment, eco-design, design strategies, multi-criteria decision making, performance measurement, customer's side, and miscellaneous that covers various study areas. This categorization provides insight and recommendations for future research.

## **Sengon Wood Veneer Defects Reduction in PT. Anugrah Rimba Raya**

Frederick Yoel Tjandrawibowo, Felecia

**Abstract:** PT Anugerah Rimba Raya is a wood processing company that has been established in Lumajang since 2018. The company is committed to producing wood veneer made from logs with the best quality. The problem faced by the company is the occurrence of defects in the sengon wood veneer during the production process. Data from the grading division stated that during 2020 there were 41.21% defective sengon wood veneer from the total output of the Hot Press Dryer (HPD). The purpose of this research was to reduce the defects of sengon wood veneer. This research follows the DMAIC strategy and uses the 5 Why's Analysis to analyze the causes of sengon wood veneer defects. The results showed that there were five major types of defects, namely partially removed, knot holes, rough holes, skin, and joints. Efforts to reduce sengon veneer defects at the company are done by providing Standard Operating Procedures for the rotary, adding new setting work stations, cleaning HPD regularly, and reducing the use of short sticks. The control stage is carried out by closing the rotary panel, supervising, and making warnings sign. After the implementation and control, the proportion in May 2021 decreased to 26.5%.

**Keywords:** defect; sengon wood veneer; DMAIC; 5 Why's Analysis

## **The Role of Internal Audit of Integrated Management System ISO 9001:2015 and ISO 14001:2015 in Improving Employee Performance**

Jani Rahardjo

**Abstract:** Internal audit is an important function in a corporate organization that implements an Integrated Management System (IMS) ISO 9001:2015 and ISO 14001:2015 with findings and provides suggestions and recommendations to management and all employees. Internal audit is one of the mandatory requirements for implementing the ISO 9001 and ISO 14001 which is integrated into the IMS. This study involved 48 employees at Company 'X' to prove that the role of internal audit in IMS can improve employee performance. The result of SEM-PLS for the model Internal Audit as a mediating variable has an impact on employee performance preceded variable by planning, management commitment and IMS implementation

**Keywords:** Internal Audit, IMS, ISO 9001, ISO 14001, Employee Performance.

## **Employee Retention: Effect of Compensation, Work Stress, and Job Satisfaction. A Case Study in an Edible Bird's Nest Company**

Billy Indrawan Wongso, Karina Agustin, I Nyoman Sutapa

**Abstract.** This study was conducted to measure compensation factors and job stress on job satisfaction that may affect employee retention rates. A case study was conducted on a swiftlet company by conducting a questionnaire-based survey to collect data and information from employees. Compensation and job stress factors were determined as independent variables, employee retention variable as the dependent variable, and job satisfaction as the intervening variable in analyzing the survey data with the Structural Equation Modeling technique in Smart PLS 3.0. The study found that compensation positively and significantly affects job satisfaction and employee retention. Furthermore, the study results prove that job stress has a negative effect on job satisfaction and employee retention. Job satisfaction can also have a positive and significant impact on employee retention. However, let us look more deeply at the demographic aspect of the respondents in the group of employees. For employees who already have children, job stress variables do not significantly affect employee retention. In addition, job satisfaction variables do not significantly affect employee retention for workers in the age group below 25 years and the compensation variable does not significantly affect the unmarried employee.

**Keywords:** Employee Retention, Compensation, Work Stress, Job Satisfaction, Swiftlet Nest Company.

## **Hierarchy of End-of-use Options: Smartphones Reuse to Support Online Learning During COVID-19 Pandemic in Indonesia**

Shu-San Gan, Siana Halim.

**Abstract.** This paper studied the hierarchy of end-of-use options for smartphones to support online learning during COVID-19 pandemic in Indonesia. The EOU options were first studied by reviewing relevant literature about e-waste in Indonesia and then a hierarchy of EOU options was drawn up. Finally, integrating the result with the analysis from the literature review on the use of smartphones in online learning during the pandemic, we proposed a new hierarchy that could bridge the challenges in both aspects. As a result, it helps to reduce e-waste from used smartphones and at the same time helps underprivileged students to obtain smartphones for online learning.



## **The Effect of Top Management Commitment on Firm Performance Through the Green Purchasing and Supplier Relationship Management in 3-Star Hotel Industry**

Novia Chandra Tanuwijaya, Zeplin Jiwa Husada Tarigan, Hotlan Siagian

**Abstract.** The local government needs to facilitate the hotel through industry regulations, and one of the requirements is the obligation of each hotel to pay attention to environmentally friendly practices. This study investigates the effect of top management commitment on firm performance through green purchasing and supplier relationship management in the 3-star hotel. The survey for collecting data has been conducted on seventy-one 3-star hotel domiciled in the city of Surabaya. Sixty-one questionnaires, a response rate of 86%, were filled in duly and considered valid for further analysis. Data analysis used the partial least square technique by utilizing Smart PLS. The result of the analysis demonstrated that top management commitment affects supplier relationship management of 0.544. Top management commitment affects firm performance of 0.281. However, this study indicated that top management commitment does not affect green purchasing. Supplier relationship management has a significant effect on green purchasing of 0.391. Supplier relationship management also affects firm performance of 0.377. Finally, Green purchasing significantly improves firm performance of 0.226 This work provides a new insight for the manager on how to increase firm performance in the context of supply chain management.

**Keywords:** Top Management Commitment, Green Purchasing, Supplier Relationship, Firm Performance

## **The Properties of Snake Fruit and Kluwak Pits Reinforced PP: Exploring their Application for Automobile Part**

Juliana Anggono, Hero Victorio, Lukas Andre Chrisnanto

**Abstract.** There is a demand for automotive industry to use lightweighting materials to achieve better fuel efficiency and to address the increasing of the environmental concern. Biocomposites which incorporate natural fibers or fillers to reinforce the plastic are the promising material in the future to get the weight out. In this work, biocomposites of PP were produced using two different natural fillers, i.e. ground snake fruit (*salacca zalacca*) pit and outer shell pit of kluwak fruit (*pangium edule*) with particle size of  $< 100 \mu\text{m}$ . Both fillers were added to PP with a composition of 5 to 30 wt.% with 5 wt.% increment. Biocomposite samples were prepared using hotpressing at temperature  $190 \text{ }^\circ\text{C}$ . Area density was measured, and their flexural strength was tested in accordance with ASTM D790-17. SEM (Scanning Electron Microscopy) was used to perform a microstructural evaluation. Flexural strength increases with the increase of filler quantity. For biocomposites filled with particles of snake fruit pit, they show flexural strength in the range of 39.48 - 42.83 MPa with the maximum was obtained from sample with a composition of 15 wt. %. In the case of the composites filled with ground kluwak pits, they produced flexural strength of 37.36 - 43.56 MPa with the maximum was obtained from sample with a composition of 30 wt. %. The flexural strength displayed by both biocomposites was acceptable to the required strength as it was found in the existing material (woodboard) that was used by the automotive industry for package tray product of a Japanese car.

## **Proposed Improvement of Car Bumper Design to Facilitate Remanufacturing Process**

Didik Wahjudi, Shu-San Gan, Yopi Yusuf Tanoto, Reynardo Kevin, Jonathan Herlianto Wibowo

**Abstract.** Remanufacturing is one of the closed-loop supply chain strategies that returns an end-of-life product to a like-new or better product furnished with a warranty. The Remanufacturability of a product is much influenced by the product design. However, not many products or parts can be easily remanufactured because of the lack of supporting features that facilitate remanufacturing, such as automotive parts. Automotive parts are good candidates to be remanufactured as the number of cars is ever increasing. This study aims to provide recommendation to improve the design of car bumpers to be more remanufacturable based on life cycle thinking guidelines. The life cycle thinking guidelines can help make decisions when designing a car bumper because each stage of the life cycle has its own role and advantages, such as reducing environmental damage, minimizing assembly stages, optimizing product life, and facilitating remanufacturing. The life cycle thinking guidelines have been applied to improve the design of three car bumpers. With the proposed improvement in the car bumpers' design, it is expected that the bumper design will be more environmentally friendly and more remanufacturable.

**Keywords:** remanufacturing; remanufacturability; life cycle thinking; car bumper design

## **Two-Phase Scrubber Design as Test Separator for Gas Wells**

Joni Dewanto, Lisa Permatasari, Fandi D Suprianto.

**Abstract:** Natural gas production from the wellhead is a complex mixture of gas and liquids contained in the gas. The liquid that is also produced from natural gas production will be in the form of liquid droplets and needs to be separated from the gas. A two-phase scrubber is a two-phase separator used to recover liquids carried away from natural gas production. Gas from the wellhead will enter the scrubber with a certain pressure and temperature according to the operating pressure and operating temperature, and is held in the scrubber for some time (retention time). Due to the high working pressure, the scrubber tank is included in the pressure vessel category, and therefore the design process must be carried out correctly and follow the latest ASME BPVC standard (American Society of Mechanical Engineers standard of Boiler and Pressure Vessel Code) documentation. The design carried out is to determine the design, material, and dimensions of the main components of the two-phase scrubber tank. The results of the design are technical drawings and welding recommendations, as well as the finishing process of the two-phase scrubber.

**Keywords:** two-phase scrubber; pressure vessels; ASME BPVC 2017



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