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Usability Evaluation of "Inventory Information System" Design of Disaster Management in Yogyakarta Province - Indonesia

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PROCEEDING

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MESSAGE FROM CONFERENCE CHAIR

I would like to welcome you to the 2020 1st International Conference on Engineering and Information Technology for Sustainable Industry, Tangerang, Indonesia. ICONETSI 2020 provides a scientific platform for both local and international researchers, engineers and technologists who work in all aspects of Engineering and Information Technology for Sustainable Industry to exchange their latest research results. In addition to the contributed papers, internationally well-known experts are also invited to deliver keynote and plenary speeches at ICONETSI 2020. We are honored to have the distinguished keynote speakers: Prof. Bambang PS Brodjonegoro, Ph.D of the Minister of Research and Technology – BRIN, INDONESIA; and also Prof. Dr. Engg. Koichi Murata of Nihon University, Japan; Prof. Dr. Eng. Agus Purwanto of Universitas Sebelas Maret, Indonesia; Assoc. Prof. Dr. Waseem Haider of Central Michigan University, USA; Dr. Anto Satriyo Nugroho of Agency for Assessment and Application of Technology – BPPT, Indonesia; Assoc. Prof. Yudi Fernando PhD M.LogM of Universiti Malaysia Pahang, Malaysia; and Dr. Charles Lim, BSc., MSc. of Swiss German University, Indonesia as our invited speakers.

The conference is organized as a set of tracks in Sustainable Energy and Environment, Production and Operation Management, Logistics and Supply Chain, Ergonomic and Human Factors, Automation, Mechatronics and Robotics, Cyber Security and AI, and Software Engineering.

In this first event of ICONETSI 2020, we have received 125 paper submissions from Germany, Japan, Taiwan, Singapore, Egypt and Indonesia. To ensure the high quality of papers in ICONETSI 2020, each submission is reviewed by no less than three reviewers through a blind review process. In addition, we also carefully check the similarity rating to avoid plagiarism, and the writing format according to the conference proceedings template for each submission. After a careful review process, the program committee accepted 76 high quality full papers for presentation in ICONETSI 2020.

The successful organization of ICONETSI 2020 has required strong support from Indonesia Honeynet Project, Industrial Engineering Higher Education Organizing Cooperation Agency (BKSTI), Pusat Unggulan Iptek (PUI) Baterai Lithium Universitas Sebelas Maret, and Indonesian Association for Pattern Recognition (INAPR).

Most of all, I thank you, the participants, for enriching this conference by your presence. I am thankful to the conference organizing committee members, the track chairs, the session chairs, and the numerous volunteers, without whose generous contributions, this conference would not have set a record number of presentations and number of participants, higher than our expectation, especially considering some difficulties that happened during the Covid-19 pandemic. We truly believe the participants will find the discussion fruitful, and will enjoy the opportunity of setting up future collaborations.

Warm Regards,
Assoc. Prof. Dr. Tanika D Sofianti
ICONETSI 2020 General Chair

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SUSTAINABLE ENERGY AND ENVIRONMENT

Usability Evaluation of "Inventory Information System" Design of Disaster Management in Yogyakarta Province - Indonesia

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ABSTRACT

"Inventory Management System" is a website-based information system for disaster relief goods inventory designed for the Sleman Regency Regional Disaster Management Agency. Usability interface measurement has not been done when designing the information system. The usability interface is a quality attribute that is used to evaluate the convenience of people in obtaining information on a product, system, or service. This study aims to measure the usability of the existing website design interface and compare the usability value with the improved website design interface. Heuristic evaluation and usability testing methods are used to determine the usability interface design, both before and after repair. The results show that there were 18 problems found by evaluators. After interface improvements, the level of efficiency, effectiveness, satisfaction on all tasks, and usability values based on web-use have increased.

CCS CONCEPTS

Human-centered computing ~ Human computer interaction (HCI)

Keywords

Usability; heuristic evaluation; efficiency; effectivity; satisfaction, WEBUSE.

ACM Reference format:

Naniek Utami Handayani, Wina Dara Kusuma, Zainal Fanani Rosyada, Yusuf Widharto, Ajeng Hanifah. 2020. Usability Evaluation of "Inventory Information System" Design of Disaster Management in Yogyakarta Province – Indonesia. In *Proceedings of International Conference on Engineering and Information Technology for Sustainable Industry (ICONETSI 2020), September 28-29, 2020,* Tangerang, Indonesia. ACM, New York, NY, USA, 6 pages.

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1. INTRODUCTION

"Inventory Management System" is an information system compiled by the Disaster Logistics research team at the Department of Industrial Engineering, University of Diponegoro, regarding logistical inventories Website-based natural disasters for BPBD Sleman, Yogyakarta Province, Indonesia. This information system is designed to provide information to the entire community regarding the availability of logistics in the main warehouse (BPBD Sleman) and all refugee camps so that the logistical needs in each refugee place will be met as needed (Lawrence, 2012; Kovacs and Spens, 2007).

A website must not only contain useful information but also provide information efficiently and quickly accessible (Djamasbi et al., 2012). According to ISO 9241-11: 2018, usability is a benchmarking tool used to determine the extent to which a system, product, or service can be used by specific users to achieve the expected goals with effectiveness, efficiency, and user satisfaction. Measurement of website usability can be done by several methods, namely usability inspection, and usability testing.

Usability inspection is a usability measurement to identify problems regarding usability and the improvement of usability interface design by examining each element, whether it is by the principles of usability (Holzinger, 2005). Heuristic evaluation is used to find usability problems in the user interface design, carried out using an evaluator (Nielsen, 1994). The benchmarks that can be used in heuristic evaluations is Nielsen's usability principle. Nielsen's heuristic principle is the most widely used measure in heuristic evaluation (Penha et al., 2014).

Usability testing is a measure of usability by involving user representatives to do specific predetermined tasks. The benchmarks that can be used in the usability testing method is ISO 9241-11: 2018. ISO 9241-11: 2018 is an international standard regarding guidelines on usability. These standards should be used more in measuring usability because they can define the right practice, are objective, can ensure consistency in work, and can

On the Role of Industrial Engineering in the COVID-19 Era

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ABSTRACT

The purpose of this study is to consider the role of industrial engineering in the era of COVID-19. This paper is divided into three parts. Firstly, the history of industrial engineering are reviewed to confirm the richness and compensation of life brought by the division of labor. Second part describes the exchange that should be paired with the division of labor, and what it is like to be, and then explain that the integration of division of labor and its exchange is the future issue for humanity. Third part, regarding the touch strategy that is the first step of exchange, reviews the concept of visual management, which is a precedent case, and try to systematize the three touch strategies that people tried in the early stages of the spread of COVID-19 in Japan.

The results obtained from this survey argue that it is important for industrial engineering, which has been trying to understand management resources from various perspectives, to engage not only in the division of labor, but also in their exchange. Also, in an era where environmental destruction and digitalization are progressing at a speed that humanity does not notice, the findings can be considered as a problem in order to create human resources people whose value is higher than ever.

CCS CONCEPTS

• Surveys and overviews • Empirical studies • Network design principles • Ethnography

KEYWORDS

Industrial Engineering, the Division of Labor, Value exchange, Touch strategy, Visual Management, Systematic diagram, COVID-19

ACM Reference format:

Koichi Murata. 2020. On the Role of Industrial Engineering in the COVID-19 Era. In *Proceedings of International Conference on Engineering and Information Technology for Sustainable Industry (ICONETSI 2020), September 28-29, 2020*, Tangerang, Indonesia. ACM, New York, NY, USA, 5 pages.

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1 Introduction

The original purpose of industrial engineering was the pursuit of richness of life through "the division of labor". Whether it's a government, a citizen or an enterprise, there are various works to enrich a life, and people can create a society by the interaction of two works such as "the division of labor" and "the exchange of values obtained from it". In recent years, humankind has to face serious problems like earthquakes, typhoons, and infectious diseases that threaten life as well as economy. By the spread of COVID-19 infection that continues from early spring, people were divided and deprived the opportunity to “touch” for "the exchange of values".

This paper reviews the history of "the division of labor" and the basic theory of “the exchange of values”, investigates what happened in practical scenes during this time, and reports the "touch strategy" to smoothly exchange the deepened values by the division of labor.

This study was conducted from March to April 2020, which is the early stage of the spread of COVID-19 in Japan. It have collected the examples of the countermeasures against this infectious disease. They are carried out in the lives of citizens and in corporate activities that are introduced through TV and the Internet. Then, they are grouped, extracted common keywords, and put them together in a systematic diagram as a touch strategy.

2 The History of the Division of Labor

About 250 years ago, Adam Smith, the father of modern economics, observed the society around the Industrial Revolution, and discovered the base of the "division of labor" [1][2]. The principle is very simple. It's about sharing what is essential for living. Agriculture, construction, and medical service are all necessary to live, and the social division of labor, a system that supports all people by all people, was deeply rooted in society at the time.

And the manufacturing industry especially studied the principle of this division of labor. They divided production activities from three perspectives.

An HiL-Approach for Factory Acceptance Testing of Gravimetric Dosing Systems

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ABSTRACT

Based on the necessity to improve the fabrication and assembly of a gravimetric dosing system, an automated testing system, based on Hardware-in-the-Loop (HiL) simulation, has been developed to assess its Factory Acceptance Testing (FAT). The developed testing system consists of (i) a limited real-time HiL simulation and interface implemented with off-the-shelf components, (ii) a user interface for defining the test automated execution, and (iii) a verification engine for the automated collection and validation of the test. Although experimental, the adopted testing system architecture proved sufficient for the specified test procedures, while the modularity of the implementation could prove beneficial for further applications. The proposed setup is able to recreate the real system behaviour along the necessary process parameters, which was proofed by computing the correlation coefficients between real-world data and the simulation.

CCS CONCEPTS

• Model checking • Simulation and emulation

KEYWORDS

Factory Acceptance Test, Hardware-in-the-Loop, Gravimetric Dosing, Control Theory, Automated Inspection

ACM Reference format:

Dominik Aufderheide, Marco Antonio Rodriguez and Luigi Di Matteo. 2020. An HiL-Approach for Factory Acceptance Testing of Gravimetric Dosing Systems. In *Proceedings of International Conference on Engineering and Information Technology for Sustainable Industry (ICONETSI 2020), September 28-29, 2020, Tangerang, Indonesia. ACM, New York, NY, USA, 7 pages.*

1 Introduction

The development of automation plants (e.g. production facilities in factories, processing facilities in the chemical industry, baggage routing facilities at airports), require complex planning and engineering tasks. Such automation plants are typically highly customized, and therefore their creation can span years, from the first idea to final commissioning, and can involve different disciplines like process engineering, shopfloor design, mechanics, electronics and software engineering [1].

The physical configuration of automation plants, as per designed by the required process, mandates the conception of hardware devices usage and their interrelationships, which then enables the development of the automation control software. Concerning the construction stage of machines, validation through a Factory Acceptance Test (FAT) of the physical assembly and the control software is required to assure the expected functionality of the plant, to achieve its successful commissioning.

Typical methods of factory testing of control systems present severe limitations, requiring either manual point-to-point check of individual instrumentation components (i.e. loop checking), or require an on-site installation to test the complete integration of distributed control systems, thus resulting in the impossibility to validate the performance of the main operation and complementary subsystems within the actual commissioning procedure. Therefore, even a large part of the delivered control components of machine-built systems are still fully tested manually, which often results in incomplete test results as well as the increasing complexity of the implemented functionality and against the background of increasing requirements regarding the cost and time efficiency of projects leads. These traditional tests are incomplete since the interaction of the device with the other parts of the system is simply ignored.

On this regard, simulation-based testing techniques are increasingly gaining importance expand beyond highly specialized and sophisticated sectors; such as aerospace, automotive, power generation systems and medical devices, applications which typically employ Embedded Control Systems. A Hardware-in-the-Loop (HiL) simulation is suitable for the assurance of properties and operations of an automation plant. Its task is to replicate the behavior of the machine coupled with the real control, allowing manufacturers to develop measures to increase quality and reliability at their factory pre-commissioning and on-site commissioning procedures. [2]

The Di Matteo Group is a German manufacturer and solution provider company, specialized in industrial bulk handling. In recent years, the use of conventional fossil fuels has started a transition towards the use of alternative fuels, especially in the

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Analyzing Structural Loss of Sustainable Distillation Process by Material Flow Cost Accounting

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ABSTRACT

Nowadays, the use of fossil fuel is growing rapidly and forests are widely lost due to fires and logging. It means massive CO2 emissions and a decline in CO2 absorption capacity, and drives to the situation that people should recognize global warming as world issue. The SDGs and COP-FCCC are the efforts that gain attention from around the world. In Japanese industry, the chemical industry using large plants is expected to contribute to the problem. In particular, the distillation process consumes as much as 40% of the energy of all production processes. For profit-making companies, as the technological challenge, the quality of distillation process is improved to meet customer requirements while keeping costs down. There is not energy perspective. This study focuses on this point, and aims at a performance improvement of distillation process in the corroborative chemical company by adapting Material Flow Cost Accounting (MFCA), an environment accounting method. This study gets two results as follows: First, three types of distillation structures are classified by waste type. Second, the relationship between the composition ratio of products in distillation and energy performance was clarified. From this result, the course of improvement direction can be shown by changing the operating condition of distillation.

CCS CONCEPTS

• Supply Chain Management • Command and Control • Business Process Modeling • Environment science • Evaluation

KEYWORDS

MFCA, Environment Accounting, Distillation Process, Production Management

ACM Reference format:

Rena Ohara, Koichi Murata. 2020. Analyzing Structural Loss of Sustainable Distillation Process by Material Flow Cost Accounting. In Proceedings of International Conference on Engineering and Information Technology for Sustainable Industry (ICONETSI 2020), September 28-29, 2020, Tangerang, Indonesia. ACM, New York, NY, USA, 6 pages.

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1 Introduction

Nowadays, the use of fossil fuel is growing rapidly and forests are widely lost due to fires and logging. It means massive CO2 emissions and a decline in CO2 absorption capacity, and drives to the situation that people should recognize global warming as world issue. The SDGs and COP-FCCC are the efforts that gain attention from around the world [1][2].

In Japanese industry, the chemical industry using large plants is expected to contribute to the problem. In particular, the distillation process which is a method of manufacturing essential products such as petroleum and food consumes as much as 40% of the energy of all production processes [3]. This technique is old one that established in the early 20th century, but it has been used for many years without major technical improvements because it is easy to secure stable quality even when scaled up. For the companies, as the technological challenge, the quality of distillation process is improved to meet customer requirements while keeping costs down. There is not energy perspective.

This study focuses on this point, and aims at a simulation of performance improvement of distillation process in the corroborative chemical company by adapting Material Flow Cost Accounting (MFCA), an environment accounting method.

MFCA is one of the environmental accounting. First, applicant will grasp the products and wastes produced during the manufacturing process, the costs for processing and recycling and the flow of materials in a consistent unit. Next, applicant classify all the substances produced in the manufacturing process into two types: positive products and negative products. This is a method that makes it possible to visualize waste in the manufacturing process. By applying MFCA, it is expected that existing operations will be proposed not only for energy reduction but also for innovation in the structure of the operation itself.

This paper is like the previous research of Karim et al. that targets distillation equipment [4]. Karim et al. used a simulation software and paid attention to changes in the amount of energy in product manufacturing and product quality involved by changing raw materials. On the other hand, this study focusses on the change of the negative product amount by changing only the flow rate ratio by changing the existing manufacturing condition, and aim to identify the manufacturing condition with a small negative