Feasibility and prospective analysis of logistics engineering study program as the demands of the digital business era

R M Masri1, *, I M Purwaamijaya1 and B M Purwaamijaya2

1 Civil engineering department, Faculty of Technology and Vocational Education, Universitas Pendidikan Indonesia, West Java, Indonesia
2 Digital Business Study Program, Tasikmalaya Campus, Universitas Pendidikan Indonesia, West Java, Indonesia

*rinamasri@upi.edu

Abstract. The rapid development of information and communication technology will deliver the public to the changing era, including in the business industry. The global community is currently in a transition towards digital society which is characterized by intensive use of science, technology and humanities, integrated infrastructure that demands human resources to be able to creative and innovative in order to face the demands in the digital business era. The existence of these changes affect global trends in logistics business practices in the industry, including by the movement towards free markets and regional cooperation to expand markets. Market expectations also change as global competition in products and services pushes for higher standards, lower costs and increasingly diverse choices of customers in the market. Research is needed with a comprehensive qualitative approach, mechanism, and exploration of needs to be anticipated by university to become a center of excellence and contribute to the real world by producing human resources that have strong character and integrity accompanied by the ability to innovate and utilize their digital knowledge to be able to work and win competitions in the global business industry, both as practitioners and academics, one of them is by opening a logistics engineering study program by focusing on e-logistics that suits market needs.

1. Introduction

Global developments occur very rapidly in the digital age, now information technology has taken a very important role in changing the industrial landscape and business development. The existence of these developments makes the industry make various efforts to change the business in terms of offering products and services. It is also found in the Jones Lang LaSalle Report titled Southeast Asia Industrial that the global change also affects Indonesia which is experiencing growth in the industrial sector. One of them was triggered by a change in the strong domestic trend in the e-commerce sector, intraregional trade growth which resulted in a rapid increase in logistical efficiency [1].

The logistics business is one of the sectors that will be exposed to the Industrial Revolution in the Digital Era. A number of key challenges that logistical businesses must be able to overcome and need to understand are all those that lead to automation, using artificial intelligence (AI) technology and the internet of things (IoT), which then exerts influence on the industry, logistics and supply chains. Therefore, all related parties are expected to be able to face the challenges in it [2].

The University environment is also undergoing rapid change. Globally, changes are seen in the form of a science and technology-based information society. In society, every person and or organization is...
forced to always update their knowledge and skills if they want to develop. This condition requires a proactive response from all walks of life, especially universities as a center of excellence must be able to do repositioning in the context of the external environment through internal restructuring efforts that are well planned, carried out properly, and properly evaluated on an ongoing basis [3].

Considering aspects of Industry Context which include market trends, technology trends, value creation and disruption in logistics, as well as aspects of future horizons in the form of information services, logistics services, delivery capabilities, circular economy, shared logistics capabilities, digital logistics roadmaps and digital initiatives [4]. Universities must be able to prepare human resources by opening a Logistics Engineering Study Program at the University level, which in the teaching method will be a curriculum with in-depth research for student progress. Students are prepared to face all the challenges that logistical businesses must face in order to increase competitiveness among logistic business people and have sufficient knowledge to face the industrial revolution in the digital business era [5].

2. Disruptive trends in logistics

Global consulting firm PricewaterhouseCoopers (PwC) identified five main forces that will change the trends of the transportation and logistics industry this year, which should be anticipated by the world's logistics business, including digitalization, changes in world trade, changes in processes driven by software, changes in domestic trade and changes in the machining process. However, anticipation is most needed in relation to technological disruption [6]. With reference to these phenomena, the University when making a study program needs a lot progress in various relevant fields has taken place and consequently preparing an updated curriculum. On the other hand, some initial ideas either did not work in practice or were found to be complicated in practical implementation [5].

2.1. Market trends

Trend data pattern is one of the forecasting activities with the time series analysis method, occurs when observational data has increased or decreased over a long period. An observational data that has a trend is called non-stationary data. Trend data plot in the form of price data of a product which increases from year to year. In facing the digital era, market research becomes very important to exist in the curriculum that students learn with appropriate learning approaches provided by educators [5,7].

Market Research will narrow down all important information obtained so that it can be used to overcome various problems, how to design methods for gathering all information, manage and implement data collection processes, analyze results and disclose findings and conclude them. Market Research is one of the key factors used in maintaining competitiveness compared to competitors. Market Research provides important information for identifying and analyzing market needs, market size and competition. Market research techniques include qualitative techniques such as focus groups, in-depth interviews, and ethnography, as well as quantitative techniques such as customer surveys, and secondary data analysis [8].

Recent data shows that there has been a development in logistics throughout the history of mankind, the latest logistics trends have a broader concept than just supply chain management, but turned into a business function that has the scope to make goods available where and at any time in the quantities needed. There are market trends in logistics, including a growing customer base, the rise of the digital consumer, and political and economic developments, it is useful for logistic engineering students to learn to be able to become academics or practitioners when working in the industry [4,9].

2.2. Technology trends

According to the exposure obtained from the World Economic Forum, technology trends in the logistics industry can be divided into three, including the third age of the internet, rise of the platforms, 3D printing and driverless vehicles. There are 3 recent technology trends for the logistics industry, the first technology is "Uber-ization" truck transportation, the logistics industry is starting to create tools for the need of truck transportation to get price transparency, the second technology is robotization in the
warehouse. The need for human labor is increasing, especially in e-commerce which demands a very large volume picking process. With picking automation technology, it certainly becomes very useful. The third technology is Augmented Reality and Wearables technology. Along with the growing trend of using and implementing the concept of Augmented Reality in many trusted applications, it will also be useful in the logistics world, wearables that are also growing can also be used as a substitute for tools that have been used in warehouses, such as barcode scanners or RF Gun Scanners [4,10].

The university as a center of excellence must be able to anticipate various technology trends, so in making the curriculum of the logistics engineering study program it is necessary to explore methods and approaches to technology through the curriculum, including programming and computer applications, e-commerce logistics, transportation system design and e-logistics and most importantly logistic simulation. As for this matter, FlexSim software can be applied in logistics engineering with a capacity that combines CAD and 3 dimensions, which has been routinely used in systems analysis approaches in completing supply chain management in terms of modeling and simulation [2,5].

| Specialty Skill Development | B | Option                  | Option                     | Industrial Internship | Thesis                      | Community Service Program |
|-----------------------------|---|-------------------------|----------------------------|-----------------------|-----------------------------|----------------------------|
|                             | 7 | Research methodology   | Performance and Risk Management | transportation system design and e-logistics II | decision analysis | Distribution and project management |
| Advanced Technical Skills Development | 6 | Indonesian             | designing logistics and warehousing areas | transportation system design and e-logistics I | logistics simulation | Logistics and Supply Chain Management |
|                             | 5 | Global and Marketing Logistic | transportation system and management | organizational management and human resources | environmental system | Protective packaging and material handling |
|                             | 4 | Engineering and Business Economics | Digital Entrepreneurship | network theory | logistical design and control | warehousing and management system |
|                             | 3 | E-Commerce Logistic     | system modeling concepts | Industrial and Business Statistics I | Operations research I | Business Mathematics |
| Basic Skills Development    | 2 | Pancasila and Citizenship Education | Religion | Industrial and Business Statistics I | Operations research I | Calculus II |
|                             | 1 | English                 | Introduction to logistics engineering | Programming and computer applications | engineering drawings | Calculus I |

**Figure 1:** Logistics engineering program curriculum.

In facing technology trends, one of the most vital aspects is the rise of the platforms. Not only the knowledge needed by students, but also skills and attitude. This attitude is needed to shape the character in order to survive in the industry as outlined in the curriculum into a digital entrepreneurship course. It is expected that students have the enthusiasm, attitude, behavior and ability of a person to handle a business or activity that leads to efforts to find, create and implement new ways of working, technology and products by increasing efficiency in order to provide better services and or obtain greater profits [4, 5, 11].

**Figure 2.** Competence structure.

3. Implications for logistics engineering study program
This section will explain the implications for the Logistics Engineering Study Program based on the results of industry interviews and the distribution of questionnaires to high schools in Indonesia, especially in West Java, including Tasikmalaya, Banjar and Ciamis. The location chosen was based on the number of interested students who wanted to continue studying at the Faculty of Technology and
Vocational Education, Universitas Pendidikan Indonesia. The reason for opening and developing new study programs, because Faculty of Technology and Vocational Education, Universitas Pendidikan Indonesia have competitive advantages and have qualified educators and adequate facilities so that they are able to develop Logistics Engineering as a Study Program with digital expertise, so it has a significant impact on engineering practices, both in industry, academia and technical education.

3.1. Research methods
The research method for feasibility and prospective analysis in this study uses a qualitative descriptive study with a comprehensive, mechanistic, exploratory approach. A qualitative method with a descriptive analytic study approach used in this study to obtain in-depth and meaningful data. Qualitative methods can significantly affect the substance of research. This means that in this method, the relationship between researcher and informant, subject and object of research is presented directly [12,13]. Based on the characteristics of qualitative research, it can be stated in this study, the researcher directly acts as a key instrument, which conducts research processes directly and actively interviews, collects various materials related to public knowledge related to logistics engineering in Indonesia, especially in students and industry for reinforcing the reason for the need to open a logistics engineering study program at the University.

![Figure 3. The flow of qualitative descriptive research.](image)

To find the results of this study, the researchers took several steps, namely data collection, data processing or data analysis, preparation of reports and drawing conclusions. This process is carried out in order to obtain objective results. The process of collecting data in this study was carried out by means of observation, interviews and documentation studies. Observation is not only done in schools and industry, but also looks at the activities of people who live in the city and surrounding areas, while interviews are conducted to all subjects involved in this study, namely students and industry. The results of the observation and interview process are then added to the initial analysis by the previous researcher, so conclusions are made regarding the knowledge of logistics engineering as the needs of study programs in the digital age.

In addition to the above approach, the approach used is a comprehensive mechanistic explanatory approach. Comprehensive approach is an overall approach, taking into account the interrelationship of various aspects that are united together. While the mechanistic approach is a traditional approach and is based on what is known from one's own experience starting from simple to more complex, through this approach humans are considered as machines. Then exploratory research is one research approach that aims to find information about a topic or problem that is not fully understood by a researcher [14,15].
3.2. Data results are based on industry interviews
In this study, the industries referred to for interviews were Tiki, JNE, J&T Express and Pos Indonesia Agents, all located in Bandung. Based on the results of interviews, it is known that Tiki, JNE and J&T Express are private businesses while Pos Indonesia agents are state-owned enterprises. The number of employees in each company in the four companies is less than ten people, and the number of logistic engineering employees in each company is less than five people.

While based on the results of interviews about initial logistical engineering alumni positions come to work, each company has different answers. At TIKI, the initial logistical engineering alumni positions can come to work as Assistant Supervisors, at JNE as managers, at J&T Express as Engineers, and at Pos Indonesia Agents as ticket counters. Regarding the initial income of the logistics engineering position at the beginning of coming to work, at JNE, J&T Express and Pos Indonesia Agents were obtained less than four million rupiah. Meanwhile, TIKI ranges from four to six million rupiah.

Recruitment of new graduates with bachelor's degree is done every one to 2 years for JNE and J&T Express companies, while at TIKI companies, recruitment of new graduates with bachelor's degree is done every less than one year, and for Pos Indonesia agents every more than two years. For the results of interviews regarding the percentage of logistics engineering graduates recruited from the total recruitment, company stakeholders also have different answers. At TIKI more than 25%, JNE and Pos Indonesia agents answered less than 10%, while J&T Express answered between 10-25%.

3.3. Data results are based on questionnaire distribution
The results of the questionnaire data were distributed to 457 respondents in three different Vocational High Schools and three different high schools spread in Tasikmalaya, Ciamis and Banjar, namely the Integrated Vocational Al Ittihad Tasikmalaya, 5 Tasikmalaya State High Schools, 1 Baregbeg Ciamis High Schools, SMA Ciamis 2 Schools, SMA Negeri 1 Banjar and SMK Negeri 2 Banjar.

The final results of a total of 122 respondents in Tasikmalaya, as many as 94.26% of students want to continue their studies to college, 41.8% want to continue to the Faculty of Technology and Vocational Education. As many as 22.13% have an interest in study programs in the field of technical education and 24.59% in the engineering field and as much as 53.28% are still unsure. The Study Program at the Faculty of Technology and Vocational Education of the most interest of students is Civil Engineering which ranks first, followed by Industrial Chemical Engineering, Architecture, Food Technology and Logistics Engineering in the last place.

The final results of a total of 165 respondents in Ciamis, as many as 70.3% of students want to continue their studies to college, 38.79% want to continue to the Faculty of Technology and Vocational Education. As many as 21.82% have an interest in study programs in the field of technical education and 15.15% in the engineering field and as much as 63.03% are still unsure. The Study Program at the Faculty of Technology and Vocational Education of the most interest of students is Architecture which ranks first, followed by Civil Engineering, Electrical Engineering, Industrial Chemical Engineering, Food Technology and Logistics engineering are ranked last.

The final results of a total of 165 respondents in Banjar, as many as 68.24% of students want to continue their studies to college, 27.65% want to continue to the Faculty of Technology and Vocational Education. As many as 11.76% have an interest in study programs in the field of technical education and 15.88% in the engineering field and as much as 72.35% are still unsure. The Study Program at the Faculty of Technology and Vocational Education of the most interest of students is Civil Engineering which ranks first, followed by Logistic Engineering, Architecture, Electrical Engineering, Industrial Chemical Engineering, and Food Technology is ranked last.

The results of data on logistics engineering enthusiasts have not been as many as other study programs, except in Banjar. Based on interviews, this is due to lack of student information about the Logistics Engineering study program. If socialization can be carried out early as the University of Indonesia has done at the opening of a new study program namely Digital Business which became the Top 500 SBMPTN in Indonesia in 2019, it is still possible for students to be interested in the Logistics Engineering Study Program.
4. Conclusions
Global changes in the digital era affect the entire business industry, one of which is the logistics sector. The University also has a direct impact on making changes in order to produce human resources and also contribute to the real world, one of which is by opening a new study program as a real answer to market needs in the industry context in the coming era. Taking into account disruptive trends in logistics including market trends and technological trends. Based on observations on these two things, a curriculum for logistical engineering study programs that is right on target can be formed in accordance with business demands in the digital age. The Implications for Logistics Engineering Study Program is obtained from research methods using a qualitative descriptive study with a comprehensive, mechanistic, exploratory approach. Based on the results obtained related to feasibility, it can be said to be very feasible to open a logistics engineering study program at the Faculty of Technology and Vocational Education, Indonesia University of Education, although there needs to be more in-depth socialization to schools about it, and so is related to prospective analysis of logistics engineering study program as the demands of the digital business era, very prospective for human resources in the future if the University can also produce human resources who have good character and expertise to be able to compete in the digital era in the logistics sector, thereby convincing the industry to be able to use human resources and also research produced by the University.

References
[1] Lang LS 2019 Southeast Asia industrial: an emerging destination for manufacturer and capital 3-25
[2] Yu Y, Wang X, Zhong R and Huang G Q 2016 E-commerce logistics in supply chain management: Practice perspective Procedia Cirp
[3] Hellström T 2018 Centres of excellence and capacity building: from strategy to impact Science and Public Policy 45(4) 543-552
[4] Transformation of Industries: Logistics 2016 World Economic Forum
[5] Pawlesi P and Pasek Z P 2019 Evolution of Integrated Project-Based Logistics Engineering Curriculum 1-5
[6] Five Forces Transforming Transport & Logistics 2019 Transport & Logistics Trend Book onPwC CEE
[7] Jacaruso L C 2018 A method of trend forecasting for financial and geopolitical data: inferring the effects of unknown exogenous variables Journal of Big Data 5(1) 47
[8] Ali A H, Osman A and Suberi A H M 2014 The Importance of Market Research in Implementing Marketing Programs 151-158
[9] Grazia SM 2016 Trends in transportation and logistics 2-6
[10] The Wall Street Journal Logistics Report website: https://www.wsj.com/news/logistics-report. (The Wall Street Journal is a U.S. business-focused, English-language international daily newspaper based in New York City)
[11] Rathee R and Rajain P 2017 Entrepreneurship in The Digital Era 53-61
[12] Nassaji H 2015 Qualitative and descriptive research: Data type versus data analysis 130-131
[13] Lambert A V and Lambert C A 2012 Pacific Rim International Journal of Nursing Research Qualitative Descriptive Research: An Acceptable Design 255-256
[14] Williams C 2007 Research Methods 65-70
[15] Žukauskas P, Vveinhardt J and Andriukaitienë R 2018 Exploratory research 190-202