

# DEVELOPMENT OF CLOUD-BASED INTEGRATED SUPPLY CHAIN LEARNING ON SUPPLY CHAIN LEARNING AND SUPPLIES AT VOCATIONAL HIGH SCHOOL MAJORING IN OFFICE GOVERNANCE AUTOMATION

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## Abstract:

Learning about supply chains and infrastructure or supplies contains planning, managing, and evaluating the process of managing goods in an organization commonly called supplies and supply chains. However, the existing learning is still simple in managing supplies, and does not follow the development of industrial needs in the future. The purpose of this study is specifically to improve the quality of prospective workers in managing inventory and supplies in an organization. The method used in this study is the design thinking process in the first year which has 5 procedural steps, namely empathize, define and ideate, prototype, product test, evaluation and preparation. The results of this study are in the form of cloud-based integrated supply chain learning. Several learning features are presented such as LMS, Inventory, Supply Chain, and IoT Tracking. And inventory feature, there are several learnings of supply practices based on the case studies that have been provided. The LMS provides learners with cognitive learning content. The use of this media has succeeded in increasing the quality of prospective workers especially vocational school students in managing inventory and supplies in an organization. This research can be followed up in the following year as the development of integrated cloud learning that is connected to industry and implementation that can be carried out not only on a small scale.

**Keywords:** Integrated Supply Chain Learning, Cloud, Supply Chain, Supplies

## A. INTRODUCTION

Learning about supply chains and infrastructure or supplies is a lesson that discusses the development of infrastructure management in an organization (Rahmaningtyas et al., 2017). This lesson contains planning, managing, and evaluating the process of managing goods in an organization commonly called supplies and supply chain (Asifa & Afriansyah, n.d.). The management of supplies and infrastructure in the industrial world has developed very rapidly, starting from the development of digital management of infrastructure (Agrawal & Narain, 2018), digital management of supplies and supplies (Yu et al., 2015), as well as simple to complex supply chain management in the stages of digital management (Raza et al., 2020). However, this cannot be followed by educational institutions as providers of prospective workers in the future, because existing learning is still simple in managing their supplies (Sinha et al., 2016), and does not follow the development of industrial needs in the future (Mian et al., 2020).

One of the existing learning solutions in the development of supply learning media in Indonesia is carried out by Nefolena in 2021 (Nefolena & Churiyah, 2021), which develops website-based learning containing an inventory system. There is still not much research related to the learning and management of supplies management at the higher education level, and there has been no research or development on learning at the Vocational level, especially those who study about the management of supplies, namely office management in Indonesia (Li, 2020). In fact, learning adjustments to supply management and supply chains are very important to be made because the smooth flow of distribution of goods (Aldakhil et al., 2018), facilities and infrastructure of the organization is the main determinant of the quality of the organization and the performance of the organization (Deshpande, 2012) .

Based on these problems, the researcher initiated the development of supply management learning and inventory supply chain cloud learning-based systems to improve the quality of learning and prepare a reliable workforce in this era of industrial management 4.0. The purpose of this study is specifically to improve the quality of prospective workers in managing inventory and supplies in an organization, improving the quality of various aspects, ranging from basic technical management that increases in terms of management complexity, to increasing the mindset of supply management and supply chains based on critical thinking that can help students make improvements on the challenges of the industrial world, especially supply chain management.

## **B. METHOD**

The research method used in the development of this research is the design thinking process (Wrigley et al., 2018), kbk research on cloud learning-based development has been carried out at the Kbk Office Administration and the best method that can be used is the design thinking process for educators (Suputra et al., 2021) . This method is a very suitable method to be used in the development of technology-based learning media, especially in the world of education (Tu et al., 2018). This development method consists of 5 stages as follows:

### **Empathize and Define**

This stage is the first step in analyzing learning needs in the field of supply management and supply chains at the VOCATIONAL HIGH SCHOOL level, especially in the field of Office Automation, at this stage a research Operational Design Seminar was also carried out in compiling technical research targets and stages (Shé et al., 2022).

### **Ideate**

At this stage, the researcher will formulate research ideas and form a solution design clearly, this stage is expected to produce a minimum viable product that can be used as material for design validation developed both in terms of system design and user interface design, which will be validated by experts in their fields (Shé et al., 2022).

### **Prototype**

At this stage, researchers collaborate with technicians in the process of developing cloud learning technology programs, at this stage it is expected to be able to produce early-stage cloud learning devices and be able to produce continuous learning content, reference books, and system usage guidebooks, so that at this stage there are validation results that are expected to provide complete validation of the results of the initial development that has been carried out (Nakano et al., 2018).

### **Test**

At this stage, product trials will be carried out on a small scale, field scale, to large scale in several schools, this stage is expected to be able to test the smoothness of users through usability testing products, data collection from various testing scales, and data analysis results that can be used in the next stage (Nakano et al., 2018).

### **Finishing**

At this stage of completion, the researcher will carry out the evaluation stage of the preparation of the final report, the preparation of the results of processing and data analysis towards the publication of indexed international journals and the preparation of Intellectual Property Rights, at this stage also the researcher will evaluate the final development of the platform (Kim, 2019).

## **C. RESULTS AND DISCUSSION**

The following are the findings of the research which is a solution to the two urgency raised in the research, namely 1) improving the quality of prospective workers in managing inventory and organizational supplies, and 2) being a solution to industrial needs in the supply process.

### **RESULT**

Inventory of supply chain cloud learning-based systems is an integrated learning with various features in it. The features in the development of this application consist of LMS, Inventory, Supply Chain and IoT and also in this LMS has been adapted to the independent curriculum and industry needs in its current development. The following are some of the appearances of the learning system consisting of the home, about, features, LMS, inventory system, supply chain and IoT tracking.

#### **1. Homepage**

This homepage supply chain cloud learning-based systems display includes a description of the learning system. A description of an important integrated supply chain learning system is shown on the start to confirm to the user what the system is referring to. The following is a description of the integrated supply chain learning system developed in this page.

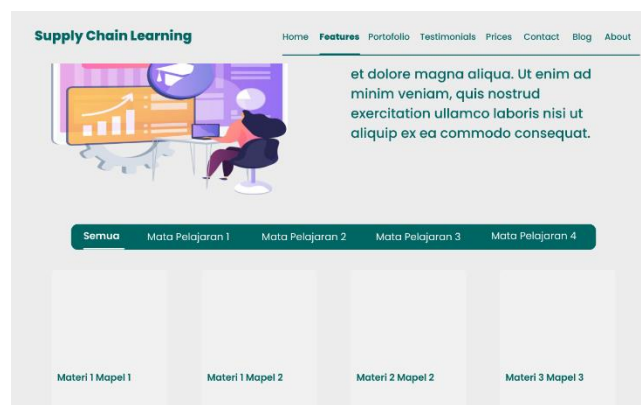


**Figure 1. Homepage**

This system is integrated into a supply chain learning development system consisting of various features. Responsive appearance in the development of cloud learning and data security is the main thing when developing later. The homepage display on the supply and inventory learning website has a button to get started.

## 2. Content Learning

The development of this product continued on the content learning. This subscription plan contains this features includes snippets of learning products and choices of learning features. Inventory of supply chain cloud learning-based systems website-based practicum mode, researchers develop inventory systems based on case studies from industrial cases. Here's what the subscription features looks like.

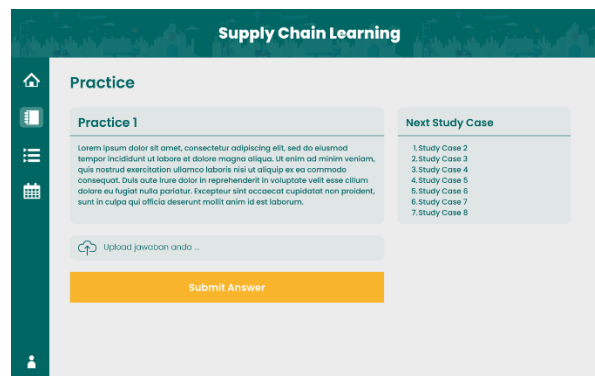


**Figure 2. Content Learning**

In this modern learning system, it is adapted to the needs of the industrial world, where in this system there are all supply chain cloud learning-based systems that can be easily accessed, there is ease of use. In this menu, several learning features are presented such as LMS, Inventory, Supply Chain, and IoT Tracking. The LMS provides learners with cognitive learning content.

### 3. Practice Learning

The development in website -based practicum mode, researchers developed case study -based inventory systems from industrial cases, as well as supply chains conducted have adjusted to the needs of the industrial world. Until in the curriculum based on the development of cloud-based futures supply chains, it can apply the development of tracking system learning in decision making in the management of supplies and inventory that is very dynamic in today's time, especially in the world of business development



**Figure 3. Practice Learning**

In this inventory feature, there are several learnings of supply practices based on the case studies that have been provided. This learning system has been used by various industries and is trusted by various institutions to manage office education in a modern way. Some educational institutions that collaborate with this system, one of which is the vocational school educational institution VOCATIONAL HIGH SCHOOL which has a choice of majors in automation and office governance.

### Expert Validation

Every study must be validated. The validation carried out in this study is the validity of the content. Luque-Vara et al. (2020) explain that the validity of content can be interpreted as "how far the elements of the measuring instrument are comprehensive, relevant, and represent the construct for a particular assessment purpose". As a result, a higher level of content validity in an instrument indicates a higher level of precision in the measurement of the target construct. In order for the measuring instrument to be considered valid, it must be simple and affordable, free from bias, correspond to the problem under study, have clear dimensions, and sufficiently reflect the concept to be measured. The usual procedure for assessing the validity of the contents of the instrument is to consult an expert. Expert assessment can be defined as an opinion based on information from individuals with a track record in the field, who are considered by others to be qualified experts in their field, and who can provide information, evidence, and assessments. The following is a table of the results of content validation or content with experts.

**Table 1: Material and media expert validation**

No.	Indicators	Statement	Score				
			5	4	3	2	1
1	Uses	a. Compliance with graduate learning outcomes standards	✓				
		b. Learning activities using media can improve the competence of students	✓				
		c. The use of learning media can provide opportunities for students to practice indepently	✓				
		d. Learning media can support learning activities	✓				
		e. Learning media is easily accessible		✓			
2	Presentation of the material	a. Conformity of the material with learning objectives	✓				
		b. Conformity of contents with menus and needs		✓			
		c. Compatibility of learning media with material	✓				
		d. The language used in the learning media is appropriate	✓				
		e. The language used in learning media is easy to understand	✓				
3	Ease	a. Ease of menu access	✓				
		b. Ease of entering data		✓			
		c. Ease of editing data		✓			
		d. Ease of operation	✓				
4	Serving	a. Suitability of writing	✓				
		b. Color and typeface suitability	✓				
		c. Suitability of the image		✓			
		d. Accuracy of menu arrangement	✓				
		e. Linkages between menus	✓				
		f. Suitability of icon function	✓				
		g. Clarity of the flow of the use of learning media	✓				
		h. Completeness menu	✓				

Content validation with media experts and the content is carried out after the product has gone through the manufacturing process. This corresponds to (Fernández-Gómez et al., 2020) which explains that content validation is generally carried out either during test design or for translation validation and instrument standardization is used in different ways. The indicators carried out in the validation of media experts and material expert consist of indicators of ease of use and presentation of integrated supply chain learning system. The scoring based on this indicator follows the calculation of the Likert scale (Iskamto, 2021). This Likert scale consists of 5 scoring scores namely: a score of 5 for excellent grades, 4 for good grades, 3 for sufficient



grades, 2 for less grades and 1 for very less grades (Joshi et al., 2015). The following is a table of validation results by media experts and material expert.

**Table 2: Expert Validation**

No.	Indicators	Media Expert	Material Expert
		Total Score	Total Score
1.	Ease	18	
2.	Serving	39	
3.	Uses	-	24
4.	Presentation of Material	-	24
<b>Sum (<math>\Sigma x</math>)</b>		<b>57</b>	<b>48</b>
<b>Percentage (<math>(\Sigma x / \Sigma i \times 100\%)</math>)</b>		<b>95%</b>	<b>96%</b>
<b>Information</b>		<b>Very Valid/ Very Worthy</b>	<b>Very Valid/ Very Worthy</b>

Validation results are obtained in the form of a brief recapitulation of validation data (Adams & Wieman, 2011). A recapitulation of the data is presented in the results of the study to facilitate interpretation. Based on (Anindo Saka Fitri et al., 2022) data recapitulation is part of data analysis carried out by abbreviating or recapturing. The percentage of validation results from media experts shows a figure of 96%, while the percentage of validation results from material experts shows a figure of 96%, which means that it has a strong value or is worthy of being used as research development material (Louangrath & Sutanapong, 2018). Percentages with more than 80% rated strong, 60-79% rated neutral and less than 60% rated weak (MacLean Correspondence et al., 2006). Based on the results of expert validation and the results of hypothesis testing that have been carried out, it can be seen that the development of an office management simulation learning system can improve the quality of learning inventory and supply management practices with inventory systems that is integrated with the curriculum and industry needs.

## DISCUSSION

The results of the study by (Nefolena & Churiyah, 2021) increased the effectiveness of learning inventory and supply management practices with inventory systems. Improving inventory management by prospective workers can be done through learning media such as practice using the system (Sinaga Suskim; Hendayana, Yana; Saudi, Mohd Haizam Mohd; Zainudin, Zalina, 2019). Supporting supply chain learning is measured in quality based on validation from experts, namely media experts and material experts. Based on the literature by (Adams & Wieman, 2011) that development validation is carried out to determine the feasibility of product development, supported by (Anunobi et al., 2018) there are two types of validation that must be done, namely content validation and product validation. Inventory management in organizations and companies is effectively implemented using the system (Prasetya, 2019). This is in accordance with the problems that occur in agencies (Rahmaningtyas et al., 2017) that supplies carried out offline have many obstacles such as minimal file storage space, few human resources or inventory officers and the skills to use the inventory system that are still not maximized. The use of the inventory system has not been optimally used due to limited

knowledge about how to manage it in an organization (Wijoyo et al., 2020). Several countries in Southeast Asia have implemented a lot of supply chain and supplies management effectively (Ma'rifat et al., 2020). Digitalization of the supply chain has many impacts on the key roles in various phases of the Supply Chain network such as manufacturing, procurement, logistics, warehousing, and fulfillment (Nair, 2021).

Industry 4.0 is reshaping the future of education, the knowledge and skills possessed by students, especially at the vocational level, are required to improve both in terms of speed and skills because they are prospective workers in the industry (Li, 2020). One of the industrial needs is the effectiveness of work in the supply chain system (Ageron et al., 2020). Supply chain management can run effectively with an adequate system followed by skilled human resources (Huo et al., 2020). Acceleration 4.0 encourages the creation of a digital supply chain and several concepts that support this (Garay-Rondero et al., 2020). Supply chain management applied in the world of education can indirectly optimize activities in the institution (Badawood, 2021). The concept of modern supply chain digitization consists of various processes, namely inbound and outbound transportation management, warehousing, material handling, ordering, inventory management, supply demand, IT and procurement services to packaging where a series of processes can be digitized in the process of accessing, storing and processing data from outside companies (Schniederjans et al., 2020).

The quality of prospective workers in inventory management can be optimized by learning in practice with learning systems and media that are integrated with cloud learning components. The importance of research in improving the quality of learning so that this research can be followed up in the following year as the development of integrated cloud learning that is connected to industry and implementation that can be carried out not only on a small scale. This research has implementation limitations only on subjects in one of the vocational schools majoring in certain office automation. So that further research can be expanded or spread to a wider scale. According to research by (Rahmat et al., 2018), non-formal education such as learning courses or additional learning media specifically to train the performance of prospective employees who will be involved in the field of supply chain management and inventory, can improve their performance in the process of operation, management, delivery, and production in a series of supply chains or supply chains.

This cloud-based supply chain learning brings a different learning atmosphere than before for students. According to (Crick et al., 2013) this learner is divided into learning power that contains an element of creativity, where students are able to see things in a different way and imagine new possibilities. They are more receptive to the premonitions and premonitions that arise in their minds, and more use imagination, visual imagery and images and diagrams in their learning. This cloud-based learning is not only for learners as prospective workers but can also be applied to managers. In the research (Badakhshan & Ball, 2022) learning about supply chains with systems can improve managers' work performance, especially in terms of decision making. Learning about the supply chain is very important considering that the supply chain is one of the important assets that helps meet customer demand with the right amount at the right time (Kurian et al., 2020). Supply chain management itself is the management of all



manufacturing and processes, from raw materials to finished customers, covering the entire value chain from material extraction to product life (Momeni & Azizi, 2018).

## CONCLUSION

The conclusion of this study are in the form of cloud-based integrated supply chain learning. Several learning features are presented such as LMS, Inventory, Supply Chain, and IoT Tracking. And inventory feature, there are several learnings of supply practices based on the case studies that have been provided. The LMS provides learners with cognitive learning content. The use of this media has succeeded in increasing the quality of prospective workers especially vocational school students in managing inventory and supplies in an organization. This research can be followed up in the following year as the development of integrated cloud learning that is connected to industry and implementation that can be carried out not only on a small scale.

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