

# **Case Study: Knowledge Management System (KMS) using the Maynard Operation Sequence Technique (MOST) Approach to Improve Manufacturing Efficiency at CV. XYZ Leathercraft**

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## **Abstract**

This research aims to design a system that supports innovation towards the value of efficiency in the production process by achieving a better documentation and dissemination of knowledge to all employees at CV. XYZ Leathercraft. Knowledge Management System (KMS) is a part of development and maintenance process in a company. The factors of this research are people, process, and technology. Maynard Operation Sequence Technique (MOST) is required to implement Knowledge Management System towards the value of efficiency in the production process as a work measurement technique that concentrates on the movement of objects. This strategy is designed to obtain the features of application that are relevant to the situation at CV. XYZ Leathercraft. The result of this research shows that the implementation of Knowledge Management System has features that consist of discussion forum, knowledge sharing, library, event, record of production process, and marketing map.

## **Keywords**

Efficiency, Knowledge Management System, Maynard Operation Sequence Technique.

## **1. Introduction**

Usaha Menengah Besar (UMB) of a leathercraft industry has higher efficiency level than Usaha Menengah Kecil (UMK), based on three levels of efficiency which are low, medium, and high. With that number of percentages of UMB, the high level of efficiency business, which is 71.72%, is more than the low level of efficiency business, which is 70.21%, and the medium level of efficiency business, which is 67.82%. Unlike UMK, the low level of efficiency business, which is 7.79%, is more than the high level of efficiency business, which is 7.79%, and the medium level of efficiency business which is 0.75%. Business entities consist of Limited Company PT, CV, Firm, Coop, Foundation, Business Permit, and Company Representatives (Badan Pusat Statistik (BPS) 2016).

In terms of increasing the efficiency of a business, it needs the assessment of innovation in order to increase the business value toward efficiency. Therefore, Central Bureau of Statistics of Indonesia shows the percentage of UMB in terms of doing innovation from some sectors which are innovation from products, process, marketing, and organization. The percentage of UMB with low level of efficiency which has the highest innovation score is product innovation with the score is 79.79%, 44.68% for marketing, 41.49% for process, and 24.47% for organization innovation.

CV. XYZ Leathercraft is a manufacturing UMB which was founded since 2010 and has been exporting its products to 4 Asian countries and now manufacturing leathercrafts that focuses on product and marketing innovation. At current condition, in doing leathercraft manufacturing process, CV. XYZ Leathercraft has not done much on innovation of efficiency, such as still implementing 40% outsourcing personnels in its operations, which is almost equal to the total number of its employees.

The advantage of outsourcing is one of the answers for business consideration as the response to the global economy development which makes a flexibility in a company to fulfil production targets. However, the outsourcing practice in CV XYZ Leathercraft has several negative impacts such as the undocumented documentation or knowledge related to employees, therefore the learning repetition takes 5 days in each training, and increases personal transportation funds by the outsourced workers.

Córdova and Gutiérrez (2018) conducted a research study entitled “Knowledge Management System in Service Companies”. In research, it was stated that Human capital management must be aligned with the business strategy, in the sense that it is possible to emphasize cooperation and the exchange of knowledge among employees and translate them into information technologies so that the organizational culture is solid and invariable in terms of results when there is employee turnover. In this sense, knowledge becomes a fundamental organizational trend and a key factor in the creation of value. In this context, this work proposes models, methods, and tools for the management of the experience (expertise) of people, as well as the promotion of cooperation among them, from the Knowledge Management (KM). Through an application a Damage Adjuster company, it is shown the design and implementation of the Knowledge Management System (KMS). KMS can be applied in a company that uses outsourcing personnels in making a solid and effective organizational culture towards the creation of knowledge management value for the outsourcing workers and providing a systematic model that can solve knowledge management problems.

The implementation of knowledge management system at CV. XYZ Leathercraft in terms of increasing the efficiency of operational process needs an approach where in the previous study entitled “Increasing Overall Tools of Effectiveness Using MOST: A Case Study from an Indonesian pharmaceutical company in 2017”, Maynard operation sequence technique (MOST) was used as a method to increase the operational effectiveness of workers by determining the standard time of cleaning process.

## **2. Literature Review**

### **2.1. Knowledge Management System (KMS)**

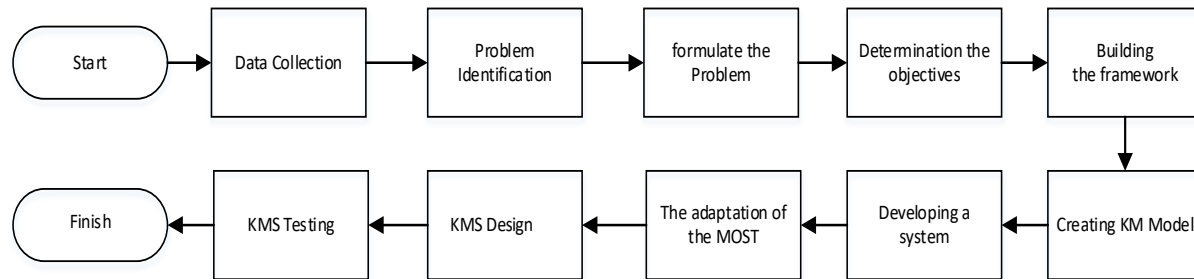
Knowledge Management System (KMS) as the conjunction of four interacting components: technology, knowledge management process, people, and organizational context. Technology refers to IT-based knowledge management tools used to support the organizational actors while carrying out the knowledge management process activities. KMS include knowledge repositories, knowledge expert catalogues, and web tools. People refer to organizational actors who carry out the knowledge management process. Such actors belong either to the organization concerned with knowledge management or to its partners (external consultants, providers, customers, etc). Organizational context refers to a set of organizational characteristics that influence knowledge management. It includes organizational culture, national cultures of organizational actors, organization's structure, and management style. Therefore, knowledge management systems have four facets - a technological facet, a human resources facet, a process facet, and a context facet which determine the drivers of their effectiveness while interacting and influencing each other (Zouari and Dakhli 2018).

### **2.2. The Maynard Operation Sequence Technique (MOST)**

The previous study conducted by Karad, Waychale, and Tidke (2016) with the title “Productivity Improvement by Maynard Operation Sequence Technique (MOST)” aims to reduce or eliminate the idle and downtime of operations, and also for the improvement of the current working methods. The implementation of MOST in the study was carried out in system design section for the production process in order to determine and analyze the activities of the production process using descriptive workflow data storage for value adding, value engineering, and as the method of technical analysis. Therefore, the use of MOST helps in implementing Knowledge Management System towards the redesign process, flow analysis process, material handling, and workflow improvement. MOST is used to help CV. XYZ Leathercraft in reducing or eliminating the idle and/or downtime, improving the working methods, standardizing the worktime and improving the overall capacity planning and in this case, MOST plays a vital role.

## **3. Research Method**

This section explains the method used for research. Research stages is shown in Figure 1.



**Figure 1.** Research stages.

### 3.1. Data Collection

The process of data collection from the research objects is the employees who are the users of organizational knowledge and familiar with the use of organization's Knowledge Management program. This research population is 16 workers consisting of all staffs, employees, and managers in CV. XYZ Leathercraft which is carried out in the following ways:

#### 3.1.1. Literature Review

Data collection is obtained from literatures which are sourced from books, scientific journals, internet sites related to knowledge, Meyer & Zack models, Nonaka Takeuchi models, the creation of knowledge management and materials related to analysis and design that will be applied to develop the system.

#### 3.1.2. Field Study

Data collection is obtained by direct observation to the object, CV. XYZ Leathercraft, which includes manager, employees, and document review. The field study was conducted by observation and interview. Observation is done by observing the work procedures and reviewing the documents. While interview is conducted with the CV. XYZ Leathercraft operational manager and employees.

### 3.2. Problem Identification

This stage is done by doing interview, object observation, and document review at CV. XYZ Leather. The result of this stage is finding out the problems at CV. XYZ Leathercraft.

### 3.3. Formulation

Based on the previous stage, the problems are formulated at this stage to find out the problem solvings. The method is conducted with data analysis. The results of this stage is research title.

### 3.4. Determining the Objectives and Building the Framework

This stage conducts scientific study through the previous research by doing comparison, combination, and construction of scientific journals that are relevant to this research. The result of this stage is the analysis of scientific study toward this research and will be the framework.

### 3.5. Creating KM Models and Determining System Features

This stage creates KM model which combines Meyer & Zack model with Nonaka & Takeuchi model. The process is acquired, refine, store, and distribute which are combined by grouping knowledge with socialization, externalization, internalization, and combination.

### 3.6. Developing a System

The adaptation of the knowledge management system method lies in evaluating innovation while the adaptation of the MOST method lies in evaluating which standard time should be prioritized to choose an effective knowledge management strategy. The data obtained in the results of the analysis is a knowledge management model that is used by users in developing information systems. User requirements are translated into design models in the development of software. The design carried out is as follows:

1. The design of this study is conducted by designing the Knowledge Management System which combines the Meyer & Zack model with the Nonaka & Takeuchi model.
2. The design of Information Systems Architecture is designing how users and systems are interrelated.
3. The design of Software, the design used is Data Flow Diagram for the system model and Entity Relationship Diagram for the data model. Interface Design is the design of the interface display for system users.

#### 4. Results and Discussion

This stage explains the results of this research.

##### 4.1. Zack & Meyer's Analysis Cycle

Zack & Meyer's analysis cycle is used as an approach through the knowledge management cycle to understand a knowledge that is formed in the organization, spread and ultimately can be used by employees of CV. XYZ Leathercraft. The approach taken by Meyer and Zack (1996) with the cycle consists of the stages of acquisition, refine, storage, distribution and present.

Acquisition, this stage collects and identifies the sources of knowledge at CV. XYZ Leathercraft. Table 1 shows the sources of knowledge at CV. XYZ Leathercraft. These are the results of knowledge that have been identified.

Table 1. Knowledge identification at CV. XYZ leathercraft.

Code	Knowledge	Explanation
X01	Products	The products of CV. XYZ Leathercraft are wallets, belts, straps, key wallets and custom leathers.
X02	Reports	Reports are information given to account for the activities carried out
X03	Meeting documentation	Meeting documentations: employee performance, product knowledge and sales turnover in one year and plan for the next year
X04	Training documentation	Training documentation is presented in a power point or pdf. Example: Training of products.
X05	Briefing Documentation	Briefing or weekly meeting discusses attendance, performance, sales reports within a week and how to overcome problems encountered
X06	Event Documentation	An agenda documentation which consists of scheduled events that have been planned every month.
X07	Information	Information is a collection of data / facts obtained from users and purchasing, such as the competitors in the field
X08	Skills	The skill of operator is not only operation process, but must have other skills such as installation, maintenance, and understanding tools.

From Table 1. There are 7 general knowledge at CV. XYZ Leathercraft, i.e., Products, Reports, Briefing Documentation, Training Documentation, Meeting Documentation, Information, dan Skills.

##### 4.1.1. Refine

This stage is conducted by grouping the knowledge from the data obtained at the previous stage, based on structural category (knowledge, functional knowledge, dan behavior knowledge). From Table 2. The knowledge is grouped into three categories, and that are structural knowledge, behavior knowledge, and functional knowledge.

Table 2. Knowledge category.

Code	Knowledge	Category	Explanation
X01	Products	Structural Knowledge	This knowledge has been well in hardcopy and softcopy
X02	Reports		
X03	Meeting Documentation	Behavior Knowledge	Routine activities carried out by the organization to discuss the problems together
X04	Training Documentation		
X05	Briefing Documentation		
X06	Event Documentation		
X07	Information	Functional Knowledge	

#### 4.1.2. Storage

At this stage, the knowledge that has been grouped into categories is retranslated into Nonaka (1998) and Bandera et al. (2017). Here are the results of the knowledge translation:

Table 3. Knowledge category based on seci model.

Code	Knowledge	Category	KMS Component	SECI
X01	Products	Structural Knowledge	Document Management	Internalization
X02	Reports			Combination
X03	Meeting Documentation	Behavior Knowledge	Organization Documentation	Socialization
X04	Training Documentation			
X05	Briefing Documentation			
X06	Event Documentation			
X07	Information	Functional Knowledge	Actualization	Externalization
X08	Skills			Externalization

From Table 3. The knowledge obtained is translated into Internalization, Combination, Socialization, and Externalization.

#### 4.1.3. Distribution

This stage shows how knowledge is formed and can be distributed to users through technology of information.

Table 4. Knowledge mapping towards functional application.

Code	Knowledge	SECI Process	Functional
X01	Products	Internalization	Collective Knowledge Networks, notes database, pattern recognition, neural networks
X02	Reports	Combination	Systemic Knowledge Tools, collaborative computing tools, intranet, groupware, discussion list.
X03	Meeting Documentation	Socialization	Socialization Face to face communication, webcams, virtual reality tools
X04	Training Documentation	Socialization	Socialization Face to face communication, webcams, virtual reality tools
X05	Briefing Documentation	Socialization	Socialization Face to face communication, webcams, virtual reality tools
X06	Event Documentation	Socialization	Socialization Face to face communication, webcams, virtual reality tools
X07	Information	Externalization	Process capture tools, traceability, reflective Peer to Peer network, expert system
X08	Skills	Externalization	Process capture tools, traceability, reflective Peer to Peer network, expert system

From Table 4. The knowledge is mapped on the functionality that can form it. The functionality is obtained from various sources.

#### 4.1.4. Present

At this stage, a functional mapping has been carried out on the implementation of application features. From Table 5, knowledge can be built through information system with the features in the table.

## 4.2. System Design

The following is a system design developed based on the analysis obtained in the process of forming knowledge through the Zack & Meyer model. The system design includes:

### 4.2.1. Use Case Diagram

From Figure. 2, it shows the use case diagram design of the system that will be developed, where there will be 2 main actors who are an admin and an operator. The following is a draft of the resulting online features. From the several system designs, one feature is chosen to display the design result. The selected feature is online learning. The following is the design of online feature that is obtained.

**Table 5.** Functional mapping to be a feature requirement.

Code	Knowledge	SECI Process	Functional	Feature
X01	Products	Internalization	Collective Knowledge Networks, notes database, pattern recognition, neural networks	About, forum, message sending, knowledge sharing, library, learning
X02	Reports	Combination	Systemic Knowledge Tools, collaborative computing tools, intranet, groupware, discussion list.	Forum, message sending, knowledge sharing, library, learning
X03	Meeting Documentation	Socialization	Socialization Face to face communication, webcams, virtual reality tools	Forum, message sending,
X04	Training Documentation	Socialization	Socialization Face to face communication, webcams, virtual reality tools	Forum, message sending, marketing map, learning
X05	Briefing Documentation	Socialization	Socialization Face to face communication, webcams, virtual reality tools	Forum, message sending
X06	Event Documentation	Socialization	Socialization Face to face communication, webcams, virtual reality tools	Forum, message sending, event
X07	Information	Externalization	Process capture tools, traceability, reflective Peer to Peer network, expert system	Knowledge sharing, learning, library, about, marketing map
X08	Skills	Externalization	Process capture tools, traceability, reflective Peer to Peer network, expert system	Knowledge sharing, learning, library, marketing map

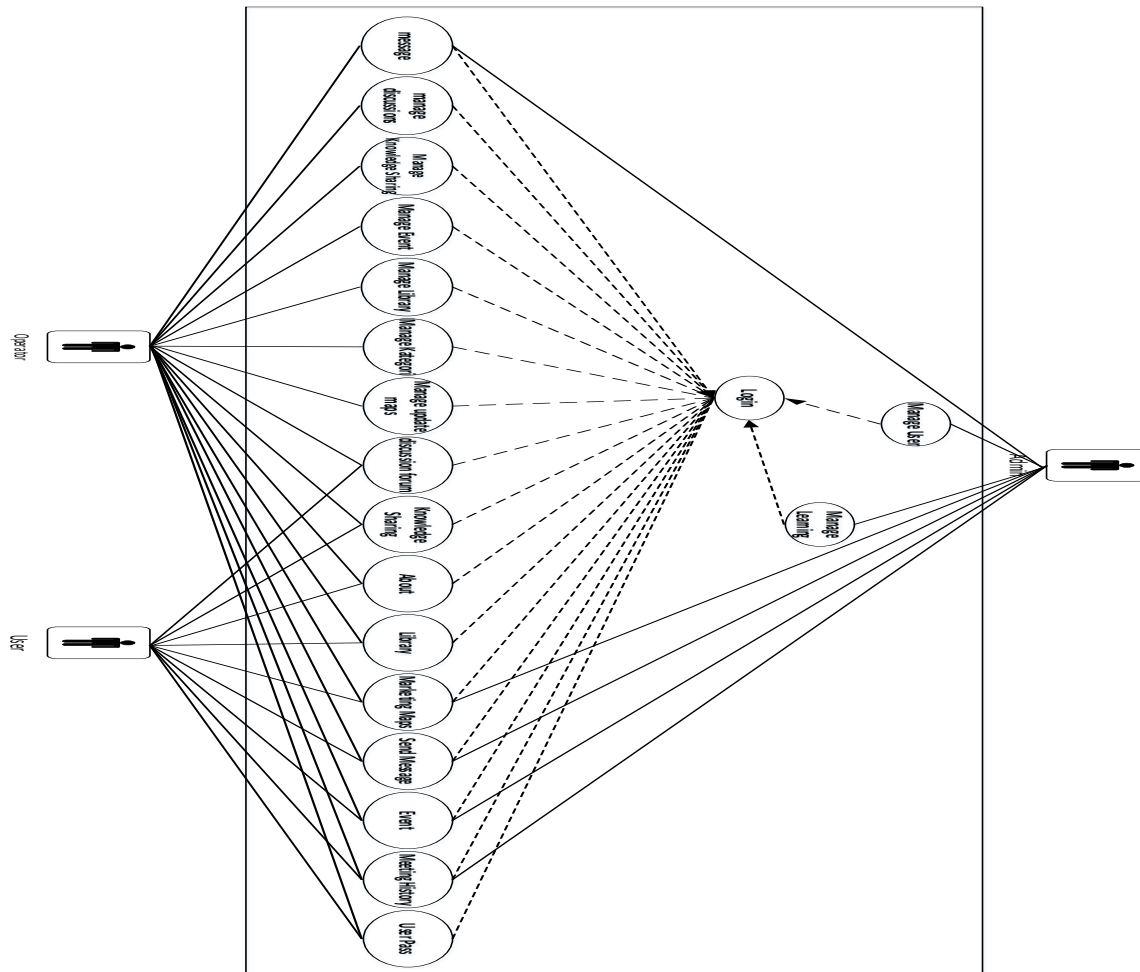


Figure 2. Use case diagram.

#### 4.2.2. Activity Diagram Online Learning

Figure 3. explains the design of online learning that is developed on knowledge management system at CV. XYZ Leathercraft.

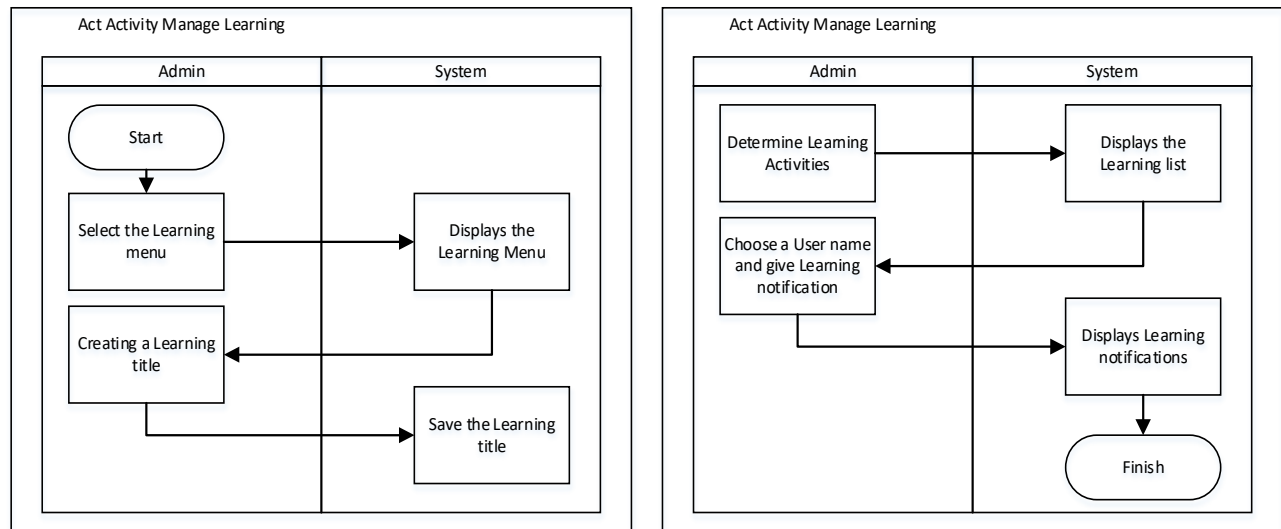


Figure 3. Activity diagram online learning.

#### 4.2.3. Sequence Diagram Online Learning

The result of activity diagram designs a sequence diagram for online learning activity. Figure 4 is a sequence diagram for online learning at CV. XYZ Leathercraft.

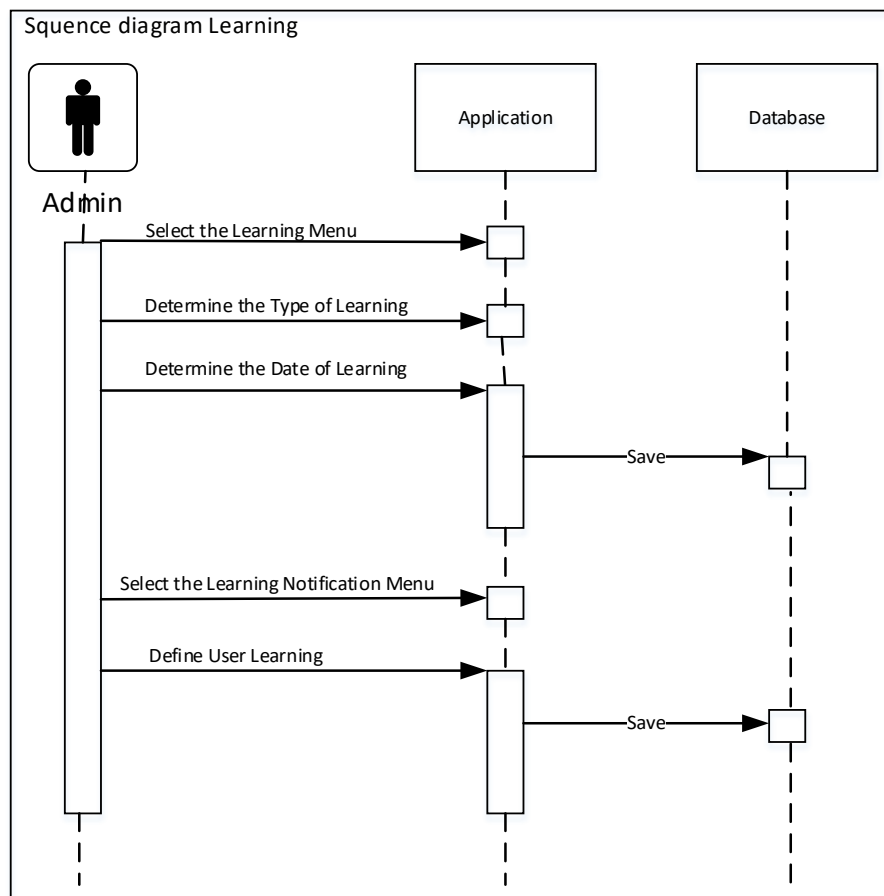




Figure 4. Sequence diagram online learning.

The result of activity diagram designs a sequence diagram for online learning activity. Figure 4 is a sequence diagram for online learning at CV. XYZ Leathercraft.

## 5. System Implementation

### 5.1. Login/Sign Up Implementation

The beginning display of KM application at CV. XYZ Leathercraft can be seen from Figure 5, such as Login menu features that display columns consisted of email and password user, and Sign Up that displays columns consisted name, email, telephone number and new password making by the user in this application. This is users' first step to go to the next display menu which is Knowledge Sharing.

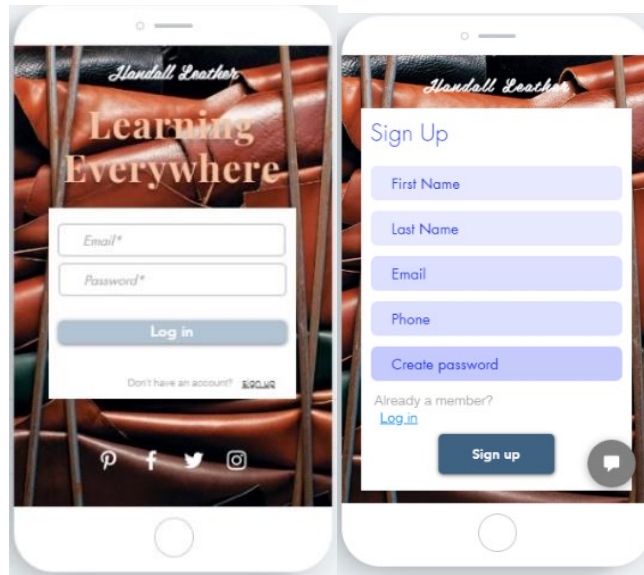


Figure 5. Login and sign-up display.

The beginning display of KM application at CV. XYZ Leathercraft can be seen from Figure 5, such as Login menu features that display columns consisted of email and password user, and Sign Up that displays columns consisted name, email, telephone number and new password making by the user in this application. This is users' first step to go to the next display menu which is Knowledge Sharing.

### 5.2. Home Implementation

The home display of KM application at CV. XYZ Leathercraft can be seen from Figure 6. The graphic shows the features in this application, i.e. About, Learning, Library, Marketing Map, Event, and Forum.

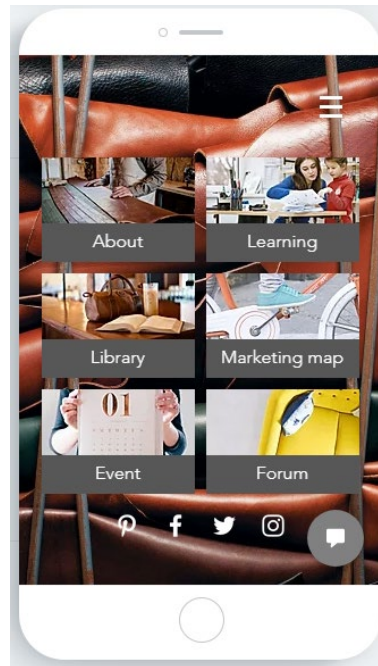


Figure 6. Home display.

### 5.3. Learning Implementation

The most important thing on Knowledge Management implementation is the module provided on learning menu that consists of the implementation method of MOST for the production process operational that allows users to learn the knowledge in the company and as the space to store it at Figure 7. In this menu, users as the administrator are allowed to store files in the form of documents, pictures, and videos that are used as the knowledge management sharing material.

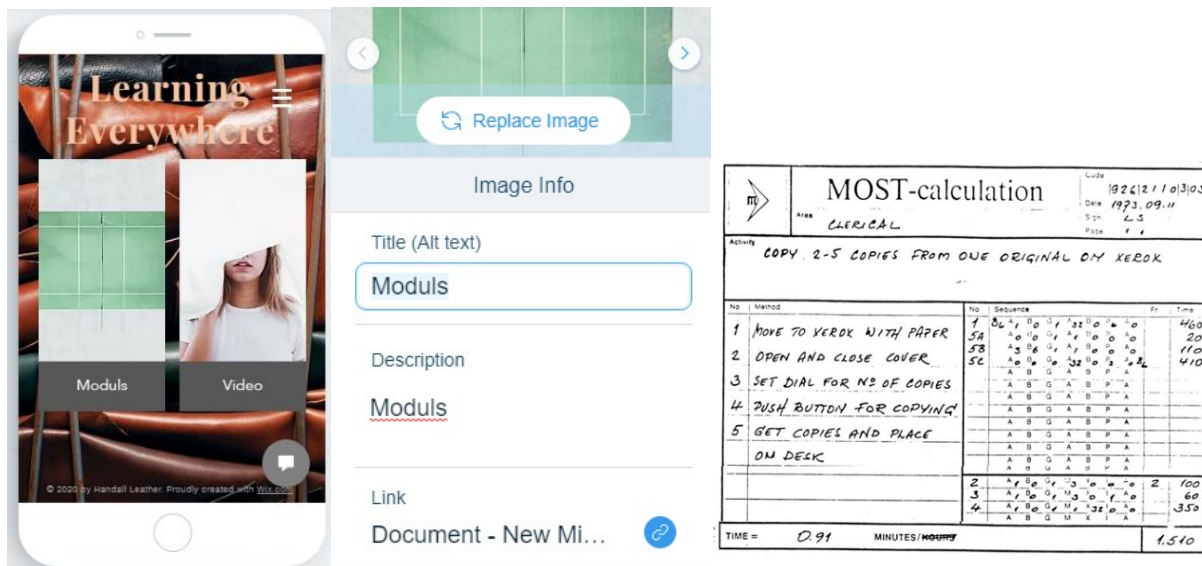


Figure 7. Learning display.

## 5.2. System Testing

The following are some examples of the form used to perform user testing (User Acceptance Test).

**Table 6.** Test case admin.

No	Action	Expected Result	Actual Result	Yes/No
1	Login	1. Input user name & password 2. Click login to run the system		
2	Sign Up	1. Click signup to add user data 2. Input user data 3. Save, then back to login		
3	Learning Notification	1. Click forum menu 2. Add learning list 3. Save		
4	Learning Process	1. Click learning menu 2. Click modules or videos		
5	Log Out	Click Log Out		

This testing form is used by the researcher to perform user testing. Table 6 shows the checklist for system testing. This system testing is the last stage of the developing stages of knowledge management application at CV. XYZ Leathercraft.

## 6. Conclusion

In a journal review on "Knowledge Management System (KMS) Using the Maynard Operation Sequence Technique (MOST) Approach to Improve Manufacturing Efficiency at CV. XYZ Leathercraft ", researcher found the results of research conducted, it can be concluded that:

- KMS at CV. XYZ Leathercraft is as a knowledge management system especially on outsourcing personnels implementation, as knowledge sharing by downloading the knowledge from operator, online learning, and discussion forum.
- Knowledge sharing process can be done more effectively. Previously, it was done through the tacit knowledge, with KMS it can be done more interactively on the system.
- KMS can create knowledge sharing culture. Previously, knowledge sharing was only done by meetings, with this system through the feature of forums and discussions, the culture of knowledge sharing can be done any time.
- With KMS, the employees at CV. XYZ Leathercraft can obtain the completed and updated knowledge from documents that have been arranged well through the library feature. Previously, the knowledge in documents was often incomplete because there was not a neat storage media.

## References

- Badan Pusat Statistik (BPS), *Analisis Efisiensi Industri Manufaktur*, Badan Pusat Statistik, Jakarta, pp. 42-50, 2016.
- Bandera, C., Keshtkar, F., Bartolacci, M.R., Neerudu, S., and Passerini, K., Knowledge management and the entrepreneur: Insights from Ikujiro Nonaka's Dynamic Knowledge Creation model (SECI), *IJIS, International Journal of Innovation Studies*, vol. 1, no. 3, pp. 163-174, 2017. doi.org/10.1016/j.ijis.2017.10.005.
- Córdova, F.M., and Gutiérrez, F.A., Knowledge Management System in Service Companies, *Procedia Computer Science*, vol. 139, pp. 392-400, 2018. doi.org/10.1016/j.procs.2018.10.275
- Zouari, M.B.C., and Dakhli, S.B.D., A Multi-Faceted Analysis of Knowledge Management Systems, *Procedia Computer Science*, vol. 138, pp. 646-654, 2018. doi.org/10.1016/j.procs.2018.10.086
- Karad, P.A.A., Waychale, N.K., and Tidke, N.G., Productivity Improvement by Maynard Operation Sequence Technique, *International Journal of Engineering and General Science*, vol. 4, no. 2, pp. 657-662, 2016.
- Meyer, M., and Zack, M., The design and implementation of information products, *Sloan Management Review*, vol. 37, no. 3, pp. 43-59, 1996.
- Nonaka, I., *The Knowledge-Creating Company*, The Economic Impact of Knowledge, Elsevier, pp. 175-187, 1998. doi.org/10.1016/b978-0-7506-7009-8.50016-1