Knowledge Management System Architecture Design

G C Pamuji¹, A Hadiana² and R Lubis³

¹,² Department of Information System, Faculty of Postgraduate, Universitas Komputer Indonesia, Indonesia.
³ Department of Informatic Engineering, Faculty of Engineering and Computer, Universitas Komputer Indonesia, Indonesia.

Email: gc pamuji@unikom.ac.id

Abstract. This study proposes a model of Knowledge Management System (KMS) design as the solution to the problems that occur in a software company especially knowledge management project which is the core business of the company. The main problem why is documents and knowledge spread is the employee turnover rate is quite high among employees who transfer from one project to another or when the employee leave the company so that each individual’ knowledge had come to move or disappear. Based on these problems, it can be concluded that PT. XYZ requires knowledge management to improve the performance of the company. Research conducted are using 6 steps from the 10 Step method Knowledge Management Roadmap to manufacture a blueprint. Research supported by the Knowledge Management Assessment Kit (KMAK) tools that serve to facilitate the research stages. The result of the sixth step is a Knowledge Management System blueprint which fulfil the seven layers of infrastructure. With this result, the design of KMS model is adjusted to the company’s needs, designed as a centralized architecture to support KMS.

1. Introduction

PT. XYZ is a company in Bandung that specializes in software creation services. Currently existing knowledge about project management information in this company is unstructured so that has caused the knowledge spread among employees. Hence, a knowledge management is needed to simplify and improving the process of sharing, distribution, creating and learning knowledge in an organization [1].

Based on previous studies [2,3,4,5,6,7], knowledge management system was researched with different approach. In this study Tiwana’s roadmap [8] is used to design a suitable KMS as a solution for problems that occur in PT. XYZ especially project management knowledge which is the company’s core business.

Ten (10) steps Knowledge Management Roadmap is a method that provides a roadmap for planning, developing, alignment, and implementing Knowledge Management System (KMS) or Incremental Knowledge Management. The main result on this research is a Knowledge Management System blueprint which fulfil the seven layers of infrastructure.

2. Methods

Knowledge Management is a process carried out by an organization and produce benefits from knowledge or from intellectual capital, based on intellectual and knowledge assets. This process involves employees, division and even with other companies in producing best practices. Knowledge management can be implemented for almost every field, such as insurance [2], institutions [3,4,16], corporation [5], automotive [15], and organizations [6,7,14].
The 10 step Knowledge Management Roadmap provides overall process guidance in making knowledge management strategy based on business, designing, developing and implementing KMS and influence the small changes needed to work in accordance with the needs of the company. This roadmap consists of 4 phases which consisting of 10 steps described in Figure 1. The research itself will be only using 6 steps to manufacture a blueprint.

Figure 1. 10 Steps Knowledge Management Roadmap.

In the designing of Knowledge Management, it will be using a tool called Knowledge Management Assessment Kit (KMAK). It consists of questions list, evaluation format, diagnostic instrument and techniques in starting the roadmap.

3. Results and Discussion

3.1. Analyze the existing infrastructure

The first step is to understand various components in the strategy and technology framework of knowledge management. The input in this stage is the result of interviews and questionnaires at PT. XYZ. The result of this process is described in Figure 2.
Existing knowledge is not centralized and spread in each office. Even though, existed infrastructure is already covering the transport layer in the seven layers of knowledge management layers.

3.2. Align knowledge management and business strategy
Before aligning knowledge management with business strategy, it is required to analyze competitor maps, knowledge gap and knowledge management focus in the company.

3.2.1. Competitors and industries knowledge map
Interview and observation at PT. XYZ resulted in 3 knowledge that is most needed by the company, which is technical knowledge, non-technical knowledge and project knowledge. Mapping company competition with competitors in knowledge based on the analysis that has been done using KMAK. The result of interviews with senior managers in PT. XYZ states that broadly speaking, the knowledge held by each competitor is considered the same and competes in the same area. Table 1 shows an explanation of each competing company.

Table 1. Competing companies.

| Company | Average knowledge score |
|---------|-------------------------|
| A PT. ABC | 3 |
| B DEF | 3 |
| C GHI | 3 |
| D PT. JKL | 3 |
The score scale compared as follows: 1 is for much lower, 2 is for lower, 3 is for equal, 4 is for higher, and 5 is for much higher.

3.2.2. Competitors and industries knowledge map
PT. XYZ already had the knowledge needed. However, it is still not centralized and integrated. The knowledge ownership had a different location and still saved at each project team. Therefore, other teams occasionally had to search or learn from the beginning.

3.2.3. Company knowledge management focus
Generally, knowledge management focus approaches divided into two, codification strategy and personalization strategy. However, in its implementation, both strategies could be implemented together with different weights. Based on analysis using KMAK, the result is that the codification approach has a weight of 65%, while the personalization approach has 36%. In conclusion, based on the analysis result, the codification approach has more weight. However, in its application, personalization approach will still be implemented to support knowledge sharing between employees.

3.3. Design the knowledge management infrastructure
PT. XYZ already has the required infrastructure for implementing Knowledge Management System (KMS). Optimized infrastructure based on existing infrastructure is described in Figure 3.

![Figure 3. KMS-Optimized Infrastructure.](image)

The key feature of this optimized architecture is the integrated and centralized knowledge server to handle multiple offices and project teams [11]. Additional Hardware that proposed to support KMS implementation is a scanner for making document digitalization that could be saved and shared.
accordingly in KMS. The platform that will be used in implementation is a web platform. This platform will be supported with suitable software that is corresponding with the needs of KMS implementation.

3.4. Audit Existing knowledge assets and systems
Maturity level or company position in knowledge management could be analyzed using Bohn’s Stages Knowledge of Growth. Based on interview result, PT. XYZ gets a score of 4.44. Table 2 shows an explanation of how the company acquires the score. When the weight is mapped into Bohn’s Stages Knowledge of Growth, the result is that the company’s position is in the 4th stage. On this stage, the knowledge is already in an explicit form even though it has not been used optimally.

| Company Score | Characteristic Evaluation | Knowledge stages         |
|---------------|---------------------------|---------------------------|
| 5             | Nature of Production      | Procedure based           |
| 3             | Role of workers           | Problem-solving           |
| 4             | Location of knowledge     | Written and oral          |
| 4             | Nature of problem-solving | Scientific method         |
| 4             | Natural organizational type | Mechanistic              |
| 4             | Suitability for automation | Low                      |
| 6             | Ease of transfer          | High                      |
| 5             | Feasible product variety  | Medium                    |
| 5             | Quality Control           | Statistical process control|
| 40            | Total Score               |                           |
| 4.44          | Average                   |                           |

3.5. Design the knowledge management team
The team design is based on the analysis result of available human resources in the company. The team member will be assigned based on their skills and experiences background. Due to limited human resources, this team will be a functional position rather than structural. Meaning, these are additional responsibilities for assigned employees which already has a structural position. The KM Team is described in Figure 4.
3.6. Create the knowledge management blueprint
The last stage of this research is designing KMS blueprint that adopted seven layers of the KMS Architecture. The design is adjusted with PT. XYZ condition and requirement. The seven layers will be used in infrastructure components found at the company. Based on the classification of infrastructure components, the design of the KMS infrastructure to be built is described in Figure 5.

![Figure 5. The proposed KMS Architecture blueprint.](image)

This stage generates different blueprint designs adjusted to the condition and needs of each organization [9,10,12,13]. The blueprint design resulted from this research is expected even when the company has several office locations, it will not affect the knowledge that is spread at each office or project team as long as they have the same architecture.

4. Conclusion
From the analysis that has been done, can be drawn some points of conclusion as follows Current KM condition within the company is adequate. However, the knowledge is still spread at each project team and each employee. The design of the KMS model is adjusted to the company’s needs, especially in the company’s core business, namely project management. The results of the KM model designed as a centralized architecture to support KMS that will be implemented within the company.
Acknowledgements

Author would like to thank the support from DR. Ir. Yeffry Handoko Putra, M.T as the Head of Magister of Information System Department UNIKOM who provided advice and insights during this research and to all parties from Universitas Komputer Indonesia that involved in writing this report either directly or indirectly.

References

[1] Gottschalk P 2005 Strategic Knowledge Management Technology (London: Idea Group Publishing)
[2] Maghfirah, Hilmiana and Bagenda W 2018 Int. J. of Business, Economics and Law 15(5) p 55-64
[3] Gharamah A, and Noordin M F, Ali N I and Brohi I A 2018 Int. J. of Engineering and Technol. 7(2.34) p 74-8
[4] Usino W and Hadi R U 2018 Seminar Nasional Sistem Informasi dan Teknologi Informasi p 699-703h
[5] Abidin Z 2018 Jurnal Informasi X(1) p 78-93
[6] Aprilianto D, Setiyadi D, Retnoningsih E and Atmojo W T 2018 Information Sys. for Educators and Professionals 2(2) p 177-190
[7] Ghorbani A and Esmaeli A 2019 2nd Int. Cong. on Sci. and Engineering
[8] Tiwana A 2002 The Knowledge Management Toolkit (New Jersey: Prentice Hall PTR
[9] Hidayad R, Fauziati S and Nugroho E 2019 Seminar Nasional Teknologi Komputer dan Sains p 813-821
[10] Ratwiyanti P and Rosyidi R 2018 Jurnal Pro Bisnis 11(2) p 1-13
[11] Liu F, Anumba C J, Jallow A K and Carrillo P 2019 J. of Information Technol. in Construction 24 p 112-128
[12] Vijai J P 2018 Int. J. Knowledge Management Studies 9(3) p 203-221
[13] Prabowo H, Cenggoro T W, Budiarto A, Perbangsa A S, Muljo H H and Pardamean B 2018 Int. J. of Interactive Mobile Technologies 12(6) p 62-73
[14] Chibozur A A, Jovita O U and Onyemachi U C 2019 Strategic J. of Business and Social Sci. 2(2) p 1-19
[15] Najafi A and Taghikhani 2018 J. Biostat Epidemiol. 4(4) p 203-215
[16] Fiscal R R 2019 Asia Pacific J. of Multidisciplinary Research 7(1) p 33-41