

THE USE OF GAMIFICATION TO IMPROVE KNOWLEDGE SHARING PROCESS IN AN UTILITY COMPANY by USING ARCS MODEL: CASE STUDY IN AN UTILITY COMPANY

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ABSTRACT

Knowledge is neither data nor information, but knowledge cannot exist without data and information. To manage a collection of knowledge on an ongoing basis, a Knowledge Management System (KMS) is required which is created to manage knowledge electronically and can be accessed by all employees so as to facilitate the knowledge creation process. PT PLN (Persero) has KMS to manage the knowledge creation process, one of which is in terms of knowledge sharing (KS) activities. Gamification can be used to motivate employees to participate in the knowledge creation process, especially in knowledge sharing, so that it can encourage the creation of new knowledge that can encourage the creation of new innovations for PT PLN (Persero). Motivational design ARCS model and MDA framework are used as the basis for the design of the user interface gamification in PT PLN (Persero) knowledge creation process so that it can provide a gamification system that can motivate employees' desire to share knowledge at PT PT PLN (Persero).

Keywords: *Gamification, User Interface Design, Knowledge Management System, Knowledge Creation, Knowledge Sharing, ARCS Model, MDA Framework.*

1. INTRODUCTION

Knowledge is not in the form of data or information, but knowledge cannot exist without data and information [1]. Knowledge is information that is combined with the experience and judgment of an individual and with good management, knowledge can create new knowledge [1]. To manage knowledge requires knowledge management (KM) and according to Umemoto (2000) the pronunciation of knowledge management in Japanese contains two meanings; Chishiki Kenri emphasizes the management of existing knowledge and chishiki keiei refers to management through the continuous management of new knowledge [2].

PT PLN (Persero) has an obligation to continue to innovate so that it can grow and improve organizational performance so that it requires KM as a means to manage employee knowledge, especially in 2020 the number of PT PLN (Persero) customers reached 76,8 million [3]. The knowledge in question is in the form of tacit knowledge (knowledge contained in a person's brain or mind according to the person's own understanding and experience) and explicit knowledge (knowledge that has been collected and

translated into a form of documentation or summary so that it is easier for people to understand. other), where this knowledge can be managed so that it can lead to innovations which then produce other innovations (knowledge that becomes new knowledge).

PT PLN (Persero) has implemented KMS which aims to improve company performance through knowledge management. The knowledge in question is the company's knowledge in accordance with the corporate KM taxonomy which consists of 12 Knowledge Subjects with 158 Knowledge Subjects.

To ensure that KM runs continuously at PT PLN (Persero), several company regulations have been issued so that KM can be assured that it runs from the central organization to the smallest organization in PT PLN (Persero). These regulations also explain what Explicit Knowledge that must be included in PT PLN (Persero) KMS, including Community of Practices (CoP), Knowledge Capturing (KC) and Knowledge Sharing (KS) with the following explanations:

1. Community of Practices (CoP) is a group of people who have the same interests and

interests on a problem and try together to find a solution.

2. Knowledge Capturing is the documentation / acquisition of knowledge and experience from employees / retirees whose expertise is recognized for their seniority.
3. Knowledge Sharing, the activity of sharing knowledge, experiences and ideas that are owned by and among employees, which is not a job duty or obligation, either a task attached to a title or an obligation attached to the Team.

Explicit knowledge as described above is basically the same as knowledge creation where according to Nonaka's SECI model, knowledge creation is about continuous transfer, combination and conversion of different knowledge that can be used for practice, interaction and learning [4]. To accommodate this knowledge creation, PT PLN (Persero) uses a web-based KMS with login access using Single Sign On (SSO) technology.

The data creation knowledge for a period of 3 (three) years (2017 to 2019) in one of the operational units of PT PLN (Persero) that has entered the PT PLN (Persero) KMS system can be seen in the following graph:

1. Based on the number of employees involved.

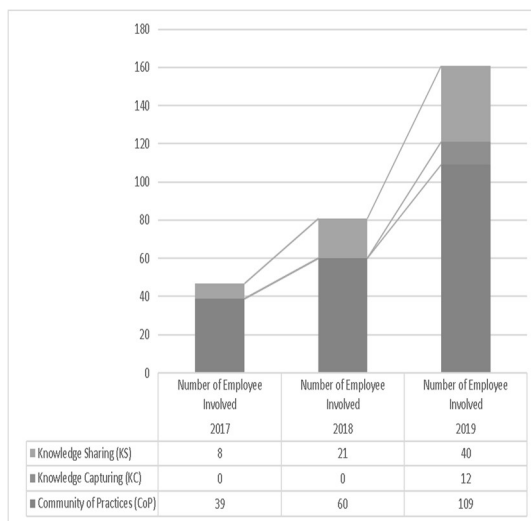


Figure 1: Graph of the Number of PT PLN (Persero) Employees in one operational unit involved in Knowledge Creation (2017 - 2019).

2. Based on the number of documents stored (knowledge assets)

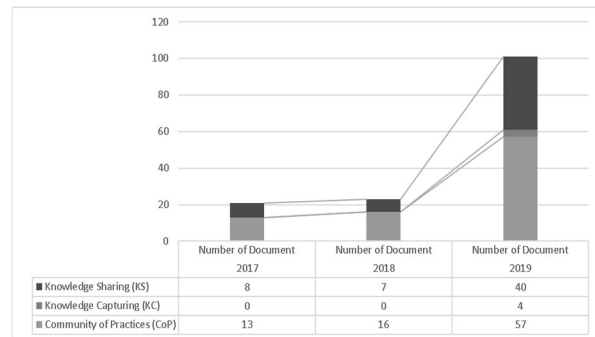


Figure 2: Graph of the number of documents (Knowledge Asset) produced (2017 - 2019).

From the data above, it can be seen that based on the number of employees involved and the number of documents used as knowledge assets from year to year, it is increasing, but when compared with the targets the company wants to achieve, especially for knowledge sharing (KS), the existing achievements are felt. still not enough. Because according to the experience of the company knowledge creation (KC), knowledge sharing is the easiest knowledge creation method than the other 2 (two) methods of knowledge creation of the company which are knowledge creation (KC) and community of practice (CoP). The target that the company wants to achieve for this knowledge sharing (KS) is that as much as 15% of the total employees can contribute to sharing knowledge through the knowledge sharing and from that 15% there are assets knowledge sharing as much as 75%, so if the two achievements mentioned above (the number of employees involved and number of documents obtained), there will be a GAP that must be filled in as illustrated in the graph as follows:

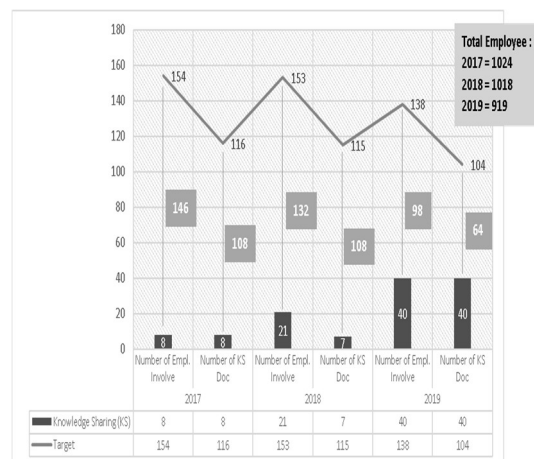


Figure 3: Gap of PT PLN (Persero) Knowledge Creation in One Operational Unit (2017 - 2019).

To fill the GAP, a strategy is needed to motivate employees more involved in sharing of knowledge which will ultimately result of increasing PT PLN (Persero) knowledge asset. One of the possible strategies used to motivate employee involvement in this knowledge creation is by using the gamification method. The gamification method is intended to increase people's natural desire to socialize, learn, master, compete, achieve, status, express themselves, altruism, or simply respond through framing a game situation [5]. Previous studies have shown that applying gamification elements in websites engages users, has a good rank (mean > 4.00) for all usability elements in gamification website and also has a positive motivation in person performance [6].

The process of knowledge creation that needs to be modified is the process that lies between the employees and the PT PLN (Persero) knowledge management system (KMS), as shown in the following figure:

1. Before Gamification

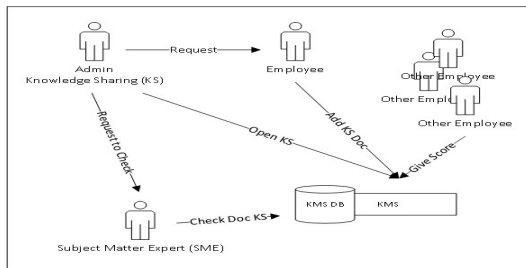


Figure 4: Knowledge creation process before gamification PT PLN (Persero).

Figure 4 shows KMS admin plays important role in managing knowledge creation such as:

- (1) Providing access to employees and SMEs into KMS.
- (2) Encouraging employees to input data and information into KMS database. Other employees will provide feedback and assessment to KMS database.
- (3) Requesting the Subject Matter Expert (SME) to verify the material and update into KMS database.

The article applies the gamification method in knowledge creation process such as: (see Figure 5 Knowledge Creation process with Gamification).

- (1) Admin manages the knowledge sharing mechanism into KMS database.
- (2) Gamification application acquires knowledge

from employees and summarise it into certain KM format.

- (3) SME verifies the KM format and approves the knowledge storage.

2. KMS with Gamification.

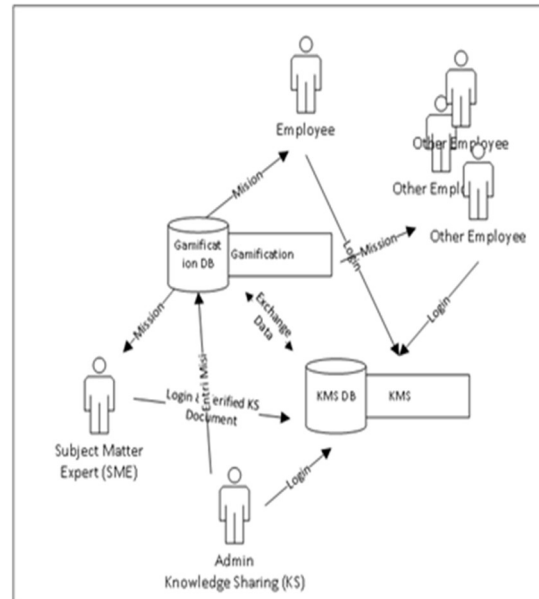


Figure 5: Knowledge creation process after gamification PT PLN (Persero).

With the gamification system that has been added to the KMS, it is hoped that employees can always interact with the knowledge creation process in the company so that they can always produce innovations and can improve company performance.

2. LITERATUR REVIEW

2.1 Knowledge Management (KM) and Knowledge Management System (KMS)

Budihardjo [2] explained that Knowledge Management (KM) is a systematic activity that offers knowledge management in terms of obtaining, using, sharing, storing, retrieval and development so as to produce new ideas that have an impact on an innovation. While the Knowledge Management System (KMS) is a technology that supports Knowledge Management (KM) in organizations, especially in terms of obtaining, coding and sharing knowledge [7].

According to the Knowledge Management Practice survey conducted in 2000 [8], 81% of

organizations use Knowledge Management System (KMS) to support Knowledge Management (KM), but the KMPG survey also states that Knowledge Management System (KMS) does not effectively support Knowledge Management (KM) implementation because Knowledge Management System (KMS) is not designed to provide the functionality that organizations need to run Knowledge Management (KM) effectively [9].

2.2 Knowledge Management (KM) Activities

According Davenport and Prusak [10], in Knowledge Management (KM) there are 3 (three) main activities, namely; knowledge generation, knowledge sharing and knowledge codification. Nonaka [11], also explain these 3 (three) activities in a comprehensive theory of knowledge creation in organizations, namely starting from the enrichment of individual tacit knowledge through experiences that support the formation of knowledge, then there is socialization in which there is mutual sharing and transfer of tacit knowledge between individuals so that it can lead to externalization, which transforms tacit knowledge into explicit knowledge. The last one is combining existing knowledge with internalized knowledge (internalization codified). The description of the Nonaka model referred to and has been simplified by Nevo, D [9], looks like in Figure 1 below:

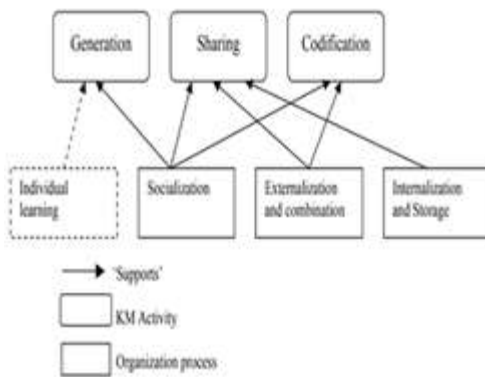


Figure 6: KM Activities and Supporting Processes [9].

Meanwhile, knowledge creation uses the SECI model [12] where this model explains how new knowledge (new knowledge) appears in an organization which ends in the innovations that arise due to this new knowledge (in the SECI model it is called Internalization). The following is a picture of the SECI model in question:

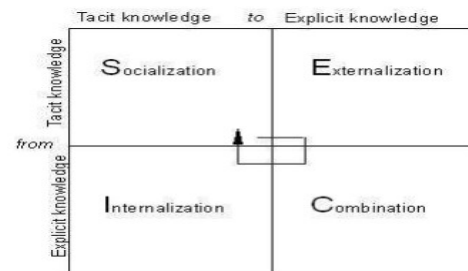


Figure 7: SECI Model for Knowledge Creation [12].

The explanation of this model is as follows [13]:

- **Socialization (S)**
is the process of sharing tacit knowledge through observation, imitation, practice, and participation in formal and informal communities. Socialization usually starts with building a field or space for social interaction.
- **Externalization (E)**
is the process of articulating the tacit-as-explicit concept of knowledge; this is the key to knowledge creation.
- **Combination (C)**
is the process of integrating concepts into a knowledge system (KMS) to integrate multiple explicit knowledge.
- **Internalization (I)**
is the process of realizing explicit knowledge into tacit knowledge [12] or it can be called realizing an innovation

If we look at the two models above, we can see the relationship between the SECI model and the KM Activity Flow and its supporting processes, so that what the SECI model does can be articulated into organizational processes, so that organizations can easily accept activities carried out in the SECI model. The relationship between individuals, groups and organizations in the SECI model is shown in the following figure:

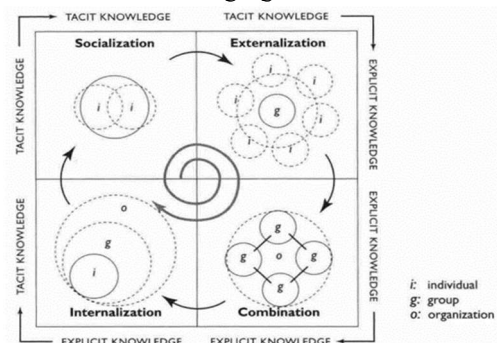


Figure 8: The Spiral Evolution of Knowledge Conversion and the Transcending Process [14].

2.3 Tacit Knowledge and Explicit Knowledge

According to Nonaka and Takeuchi [14], Tacit Knowledge is the knowledge contained in a person's brain or mind according to the person's own understanding and experience. Usually this knowledge is unstructured, difficult to define and convey in formal language to others and its content includes personal understanding. This knowledge is generally undocumented because it is still in a person's mind. Tacit knowledge has characteristics, namely: Tacit is obtained from experiences, experiences that have been felt and are not easily communicated or given to others because they are difficult to express. This knowledge can be transferred effectively through face to face (person to person), namely the knowledge that is obtained by us will be easy to transfer through conversations from us to other people.

Meanwhile, explicit knowledge is knowledge that has been collected and translated into a form of documentation (summary) so that it is easier for others to understand. This knowledge is formal and easy to share with others in the form of documentation because it is generally theoretical knowledge that makes it easier for someone to share their knowledge with others through books, articles and journals without having to come directly to teach that person. In the application process, explicit knowledge is easier because the knowledge obtained is in the form of writing or documentation.

2.4 Motivational Design ARCS Model

Motivation is the strength or energy of a person that can lead to a high level of persistence and enthusiasm in carrying out an activity either from oneself or from outside. There are 2 (two) requirements to increase a person's motivation where a person is rational and voluntary to do so, namely [15] :

1. There is an understanding of motivation itself, namely in the form of an overview of the main components of motivation to do something, and the types of strategies that will have a positive effect on this.
2. It is necessary to know what types of strategies are used, how many will be used, and how to design them into an activity.

One approach to the motivation design model to realize the 2 (two) conditions mentioned above is to use the ARCS Model [16]. The ARCS model

that can describe or understand motivation is made into 4 (four) main categories and several sub-categories called the motivational design of the ARCS model shown in the following table:

Table 1. ARCS Model.

No	Category	Sub Category
1	Attention	A.1. Perceptual Arousal A.2. Inquiry Arousal A.3. Variability
2	Relevance	R.1. Goal Orientation R.2. Motive Matching R.3. Familiarity
3	Confidence	C.1. Learning Requirements C.2. Success Opportunities C.3. Personal Control
4	Satisfaction	S.1. Natural Consequences S.2. Positive Consequences S.3. Equity

The Motivational Design of the ARCS Model is the basis for selecting gamification elements that will be used to develop gamification designs in the knowledge creation process in PT PLN (Persero) knowledge management system.

The previous research also found that the level of participants' motivation increased with the presence of gamification elements designed based on the ARCS Model [6].

2.5 Gamification and MDA Frameworks

Gamification is the process of a gamer's mindset and game mechanism to bind users and solve problems [17]. Gamification can also be interpreted as a framework created to solve problems by influencing humans through motivation and behavior.

A person or group of people can learn through a game. This is evidenced from research Dr. Arne May from the University of Regensburg in Germany that studying a new assignment can improve brain intelligence and brain intelligence researchers around the world also agree that the challenge-achievement-reward cycle can increase the production of dopamine in the brain which strengthens the desire to play.

Basically there are 2 (two) categories of gamification, namely: generic frameworks and business-specific frameworks [18], the framework method referred to in these two categories are as follows:

1. Generic Frameworks
 - a. Self-Determination Theory (SDT), proposed by Ryan and Deci in 2000,

- b. Six Steps to Gamification (6D), proposed by Werbach and Hunter in 2012,
 - c. MDA game design framework, proposed by Hunicke et al. in 2004,
 - d. GAME framework, proposed by Marczewski in 2012,
 - e. Gamification design process based on Human-Computer Interaction (HCI) principles, proposed by Marache-Francisco and Brangier in 2013,
 - f. General guidelines to gamification, proposed by De Paz in 2013,
 - g. Six categories of gamification elements inspired from several valid sources on the literature, proposed by Robinson and Bellotti's taxonomy in 2013.
 - h. Francisco-Aparicio et al.'s framework, proposed by Francisco-Aparicio et al.'s in 2013,
 - i. Simplified framework for moral persuasive gamification design, proposed by Versteeg in 2013,
 - j. Octalysis, proposed by Yu-kai Chou in 2013.
2. Business-specific frameworks
 - a. Player Centered Design Methodology, proposed by J. Kumar in 2013,
 - b. Role-Motivation-Interaction Framework of Gears, proposed by D. Gears and K. Braun in 2013,
 - c. Gamification Framework, proposed by Jacobs in 2013,
 - d. Concrete framework for gamification in the business context, proposed by Julius and Salo in 2013,
 - e. Theoretical Model for Gamification in Workplace IS context, proposed by Li in 2014,
 - f. Framework for Designing Gamification in the Enterprise, proposed by N. Kumar in 2013,
 - g. Gamification Model Canvas, proposed by Sergio Jim'enez in 2013,
 - h. Gamification development as a Technology-Centred Design process, proposed by Herzig in 2014.

Of all the frameworks mentioned above, the MDA Framework was chosen to be used as a gamification framework for knowledge creation at PT PLN (Persero). MDA Framework was chosen as the gamification framework to be used because this framework has 3 (three) categories namely Mechanics, Dynamics and Aesthetics which can answer the motivational design of the ARCS model. [19].

The MDA framework (short for Mechanics, Dynamics, and Aesthetics), was developed and taught as part of the Game Tuning and Design Workshop at the Game Developers Conference held in San Jose from 2001 to 2004. MDA formulated the game by dividing it into 3 parts, namely rules (mechanics), system (dynamics), fun (aesthetics). [20].

Table 2. Variety of Mechanics Content.

No	Type	Description of Mechanics
1	Player Progression	Points (Score), Achievements (badges, trophies, reward system, etc), Leaderboard, Levels (level up system)
2	Tasks	Mission (quest, optional assignment, mission election, collect object, etc), Mini games (quiz, puzzle)
3	Game Content	Role playing, Unique controllers, Simulations, Drag and drop, Turn – Based
4	Additional Feature	Feedback, Map, Background story, Characters, GPS location, Obstacles and enemies, Tutorials (audio, video, animation), Social media platform (chat feature or forum), Items, Increasing difficulty, Tooltips & hints, Augmented reality, Virtual reality

The explanation of mechanics, dynamics and aesthetics is as follows:

1. Mechanics: describes certain components of the game, at the level of data representation and algorithms.
2. Dynamics: describes the run-time behavior of mechanics that work based on player input and output to each other over time.
3. Aesthetics: describes the emotional response desired and generated by the player, when the player interacts with the game system.

The variations of the MDA Framework content in question can be seen in Table 3 and 4.

Tabel 3. Variation of Dynamics

No	Type	Description of Dynamics
1	Get a badge, achievement, or other reward	Players with the best scores get rewards in the form of badges, achievements or rewards to spur motivation in the activities provided
2	Role playing	Players can choose a character to play in the mission / task scenario provided
3	Non linear progression	Missions / tasks can be completed separately so that player can choose the mission / task to be completed.

No	Type	Description of Dynamics
		There are tutorials in various forms that can be selected by the players (optional, can be selected or not) If there is a mission / task that involves collectable objects, player can collect these objects randomly
4	Real exploration	Players must be able to complete missions / tasks that can also be recorded through GPS
5	In-game exploration	Players can explore the virtual environment within the game itself
6	Puzzle solving	Players can use their own way to complete missions / tasks
7	Difficulty adjustment	Challenges are adjusted automatically based on player performance
8	Hints	The game will provide directions / tutorials that will help players when completing missions / tasks
9	Management-simulation	Players can build cities / zoos / other businesses using resources such as money and ensure the business is successful
10	Turn-based	During the game, both opposing / competing parties will be given a limited amount of time and steps for each game move
11	Adaptation system	The system will adapt to player data and activity, so that these changes will affect the game either directly or indirectly
12	Quiz system	Multiple choice set can give value (points) and this value will be given / shown after each question is answered by the player

Table 4. Aesthetics variations in gamification models.

No	Type
1	Sensation
2	Challenge
3	Fellowship
4	Discovery
5	Fantasy
6	Narrative
7	Expression
8	Submission

The key to the successful implementation of the MDA Framework into a gamification activity is to use 2 (two) points of view, namely the application developer's point of view and the player's point of view (user). The application developer's point of view is to pay attention to the order of M-D-A, while the point of view of the player (user) is to pay attention to the sequence A-D-M.[20].

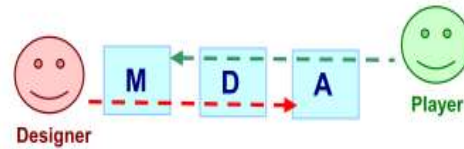


Figure 6. Designer and Player Viewpoints.

2.6 Gamification Best Practices

Gamification system really depends on the willingness of user or player involvement [21]. As for Lazzaro, N. [22], there are 4 (four) factors that can affect the user/player in a game, namely:

1. Hard Fun: When the user/player tries to win the competition from the game.
2. Easy Fun: When the user/player tries to explore the game system.
3. Altered States: When the game affects or changes the user's/player's emotions.
4. The People Factor: When users / players interact with other users/players.

A part from these 4 (four) factors, there are other factors that can greatly influence player engagement, namely rewards.

According to research of Thom. J. [23], if there is a gamification feature removed (in this case, the points feature), there will be a significant decrease in employee involvement in interacting in a system, the amount of decrease is around 50% from the initial condition. This shows that the effect of the incentives created by the gamification system is very influential on employee involvement in a company system.

Richard Bartle in G. Zichermann and C. Cunningham [17] identifies players into 4 (four) types, namely:

1. Explorers : love to explore
2. Achievers : like the competition
3. Socializers : like to play with the purpose of social interaction
4. Killers : similar to achievers, but this type of player must either win or lose

The average value of the 4 (four) types of players is socializer = 80%, explorer = 50%, achiever = 40%, and killer = 20%. This illustrates that players are more likely to prioritize social interaction than promote winning or losing in a game system or gamification.

According to G. Zichermann and C. Cunningham [17], to design a good gamified system there must be 7 (seven) main elements, namely:

1. Points is the most important part of the gamification system
2. Levels is a means to show the progress of the player
3. Leaderboards, a means to compare players with one another
4. Badges, can be used several things, examples to show levels
5. Challenge or Quest: is a means to give players a challenge and provide hints to go up to a higher level
6. Onboarding: is a means to train novice players
7. Engagement loops: is a means to repeat the involvement of a game where players will feel addicted and try things that have been done before.

3. RESEARCH METHOD

3.1. Design Method

For the design method used is to use the MDA Framework where the MDA elements included are derived from the ARCS motivational design model with the complete steps as follows:

1. Mapping the MDA Framework gamification elements that will be used in accordance with the ARCS motivational design model
2. Design the gamification elements to be used
3. Designing the knowledge creation process flow with gamification in the current KMS Application
4. Perform gamification simulations for the Mechanics and Dynamics categories to ensure that the gamification elements used can be interconnected
5. Redesigning PT PLN (Persero) Knowledge Management System (KMS) user interface by incorporating selected gamification elements according to the ARCS model

3.2. Existing KMS

PT PLN (Persero) has a KMS to accommodate the knowledge creation process which consists of 3 (three) activities, namely Community of Practice (CoP), Knowledge Capturing and Knowledge Sharing. The KMS used by PT PLN (Persero) is a web-based information system application with login access using Single Sign On (SSO) technology with an overview of the KMS as follows:

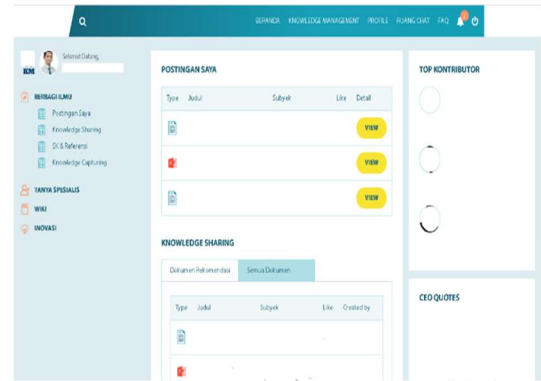


Figure 7. Existing KMS.

KMS PT PLN (Persero) as seen in the picture above, currently has a rank and points feature that is only visible on the profile menu (outside the Knowledge Management menu), but because PT PLN (Persero) KMS is still in the renewal stage, the rank and points features are still not visible what activities are involved in the feature as follow:

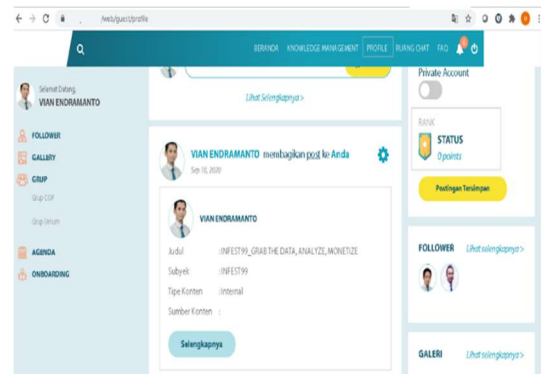


Figure 8. Gamification Element in Existing KMS PT PLN (Persero).

3.3. Mapping Gamification Elements based on the Motivational Design ARCS model.

The results of mapping the gamification elements of the MDA framework using the ARCS motivational design model based on the observations made can be seen in the following table:

Table 5. Mapping ARCS Model with MDA Framework.

No	Categories and Sub Categories	Question Process	MDA Elements
1	Attention A1. Perceptual Arousal.	What can be done to attract perceptual	Player Progression Points, Badges, Rewards, Leaderboard, Level

N o	Categories and Sub Categories	Question Process	MDA Elements	N o	Categories and Sub Categories	Question Process	MDA Elements
	A.2. Inquiry Arousal	and actual attention?	System, Progress Bar Additional features Tutorial, Tooltips and Hints, Characters, Follow and Follow Back, Chat and Forum		R.3. Familiarity	How to link instructions to player interaction?	Additional features Feedback, Player Progression: Level System Tasks: Mission Additional features Tutorial, Tooltips and Hints, Characters, Follow and Follow Back, Chat and Forum
	A.3. Variability	What can be done to stimulate the asking behavior? How can you maintain the attention you have received?	Player Progression Points, Badges, Rewards, Leaderboard, Level System Tasks Mission, Mini Games Additional features Feedback, Tutorial, Tooltips and Hints, Characters, Follow and Follow Back, Chat and Forum Player Progression: Leaderboard, Level System, Badges, Rewards, Tasks: Mission, Mini Games Additional features: Feedback, Increasing difficulty.	3	Confidence C1. Learning Requirement.	How do you get players to be encouraged to build positive expectations for each activity?	Player Progression Points, Badges, Rewards, Leaderboard, Level System Additional features Tutorial, Tooltips and Hints, Characters, Follow and Follow Back, Chat and Forum
					C2. Success Opportunities	How can activities increase players' confidence in their competence/ ability?	Player Progression: Leaderboard, Level System, Badges, Rewards, Tasks: Mission, Mini Games Additional features Tutorial, Tooltips and Hints, Characters, Follow and Follow Back, Chat and Forum
2	Relevance R1. Goal Orientation	How do you know what the player's goals are?	Player Progression Points, Badges, Rewards, Leaderboard, Level System Additional features Feedback, Characters, Increasing difficulty, Tooltips & Hints Tasks: Mission, Mini Games (Quiz)		C3. Personal Control.	How do you make players understand that success is based on their efforts and abilities?	Player Progression Points, Badges, Rewards, Leaderboard, Level System Tasks: Mission, Mini Games Additional features Tutorial, Tooltips and Hints, Characters, Follow and Follow Back, Chat and Forum
	R2. Motive Matching	How and when is choice, responsibility and influence provided to the player?	Player Progression Points, Badges, Rewards, Leaderboard, Level System Tasks: Mission, Mini Games (Quiz).	4	Satisfaction S1. Natural Consequence	How do we provide opportunities for players to participate in an activity?	Tasks: Mission, Mini Games
					S2.	What assistance	Additional features: Tutorial,

N o	Categories and Sub Categories	Question Process	MDA Elements
	Positive Consequence.	can be provided to players in ensuring player success?	Tooltips and Hints, Characters, Follow and Follow Back, Chat and Forum. Player Progression: Leaderboard, Level System, Badges, Rewards, Tasks: Mission, Mini Games Additional features: Tutorial, Tooltips and Hints, Characters, Follow and Follow Back, Chat and Forum
	S3.Equity	How do you get the player (user) to get a positive feeling for the success of the player?	

out is the traditional millennial theme, where the traditional elements and contemporary elements are typical of Indonesia. The traditional elements brought to the game on the knowledge management system PT PLN (Persero) which is identified with the military system in the Majapahit era, while the present elements that are brought are the badge model and characters that display a contemporary figure combined with weapons traditional so that it can give rise to the level and character that is expected to be accepted by all age generations in PT PLN (Persero). The reason for choosing a combination of traditional themes with the theme of mobile games is because during the observation there were several employees in Generation X who liked wayang characters, which are usually illustrated when the person concerned gives directions at meetings held every morning.

For the contemporary element, which is based on the observation that PT PLN (Persero) employees often use characters with the theme of super heroes (such as Avengers and League of Justice) during semester or annual work meetings and Mobile Role Playing Games (RPG) are in favor, especially those with the 5 player genre vs 5 players like Mobile Legends so there is a tournament to play the game together which is usually done to celebrate Indonesia's independence day.

Before designing badges and characters, the first thing to do is determine the rank levels that will be used during the game in the knowledge management system of PT PLN (Persero). Based on observations and the chosen game theme, a rank level mapping was carried out between the traditional rank and the mobile game rank so that the rank levels were obtained as follows:

4. GAMIFICATION DESIGN

4.1. Gamification Design with MDA Framework

In accordance with the mapping of the MDA framework gamification elements with the motivational design ARCS model as above, the following gamification elements will be used:

Table 6. MDA Framework Gamification Element Design.

Type	Description
Player Progression	1. Points 2. Badges 3. Rewards 4. Leaderboard 5. Level System 6. Progress Bar
Tasks	7. Missions 8. Mini Games (Quiz)
Additional features	9. Feedback 10. Tutorial 11. Tooltips and hints 12. Characters 13. Follow and follow back 14. Chat and forum

4.2. Badges, Characters Design and Level Rank

The theme or stage of the game that is carried

Table 7. Rank Level.

N o	Majapahit Warrior Rank	RPG Mobile Legends Rank	KMS Gamification Rank
1	Sri Maharaja	Glorious Mythic	Sri Maharaja
2	Mahapatih Hamangkubumi	Mythic	Mahapatih
3	Rakryan Tumenggung	Legend	Tumenggung
4	Rakryan Rangga	Epic	Rakryan Rangga
5	Senopati	Grand Master	Senopati
6	Bekel	Master	Master
7	Lurah Prajurit		

N o	Majapahit Warrior Rank	RPG Mobile Legends Rank	KMS Gamification Rank
8	Prajurit Pasukan Khusus	Elite	Elite
9	Prajurit	Warior	Kesatria

After we decide the rank level, we can design badges and characters according to the game theme, like the following figures:



Figure 9. Badges example.



Figure 10. Character Example.

4.3. Redesign KMS User Interface

After the gamification element design was made in accordance with the ARCS model, then the existing KMS is redesign as follows:

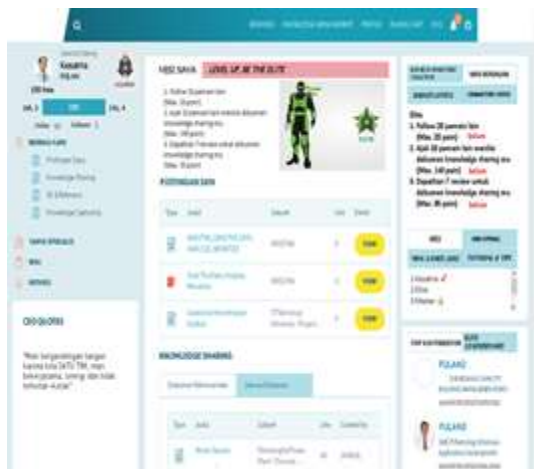


Figure 11. New KMS User Interface with Gamification.

5. LESSON LEARNED

1. The design of a knowledge management system with gamification to increase employee motivation can be done by using the ARCS motivational design model as a design basis where by using this model, application developers, especially for user interface (UI) and user experience (UX) design, can easily

identify things what is needed in accordance with the framework used to develop a design in accordance with the purpose of gamification.

2. The MDA framework can identify the needs of players for the appropriate gamification elements to motivate employees to share knowledge.
3. Gamification can be used as a means of PT PLN (Persero) management in communicating the goals or achievements both individually and corporately, so that employees can also be more motivated to achieve these achievements.
4. Communication through gamification can be done on a mission basis and a decision of rewards from the company is needed, so that employees can felt the rewards directly when employees carry out knowledge creation process activities so can encourage sustainable innovation in company.

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