Article

Gamification as an Improvement Tool for HR Management in the Energy Industry—A Case Study of the Ukrainian Market

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Abstract: Today, the energy sector requires special attention, and the widespread introduction of digital technologies, including gamification, allows key problems related to the energy policies of the European Union to be solved. The literature analysis presented here discusses the use of gamification among home energy production customers. However, there is a lack of analysis on the use of this tool in the management of energy sector companies. When considering the advantages of gamification elements in the training process, there was mention of this tool potentially being able to be used in HR management to realize the EU's energy goals. The relevance of the topic has been explored in international studies that have shown that gamification increases employee productivity and motivation. In the article, the directions of gamification in the practices of Ukrainian organizations are investigated. The main principles of effective gamification implementation in HR management, at energy enterprises in particular, are highlighted. A survey on gamification perception by Ukrainians from educational and related areas has been organized and analyzed. The survey results are supplemented by the results of the digitalization state analysis conducted for energy companies, which represent an important foundation for the implementation of gamification into practice. The prototype of a simulation model in which a solar panel must be connected to a controller is worked out as an example of the element usage incurred by gamification in the learning and training process, both in enterprise and in university activity. The present research underlines the importance of an interdisciplinary approach in gamification utilization, as it allows the skill-gaining processes in managerial and technical fields to be combined. The main advantages of gamification in HR management in enterprises are described by impact categories, such as staff appraisal, motivation, and corporate culture and internal communications. The use of gamification in companies in the energy sector is expected to contribute to the support of energy policy, as well as to the efficient integration of Ukrainian energy companies into the EU energy market.

Keywords: energy companies; energy industry; energy management; digital instruments; HR management; gamification; energy policy; simulation model; employee; social networking

1. Introduction

EU energy policy states that the EU has committed to achieving three main goals by 2020 [1]. The first one is a 40% reduction in greenhouse gas emissions compared to 1990 levels, the second target is a 27% share of Renewable Energy Sources (RESs), and the last one is to increase energy savings by 27% compared to the 1990 level without making any changes [2,3]. Strengthening the role of consumers as strategic key players in the energy market was declared as an explicit means through which these goals could

be achieved [4]. These types of requirements imply improvements in information flow regarding energy consumption [5] and increasing the level of consumer awareness in terms of energy metering and billing.

The transformation of traditional electricity grids in Europe into Smart Grids that have bidirectional electricity and information flowing between power plants and all points from plant to delivery is something that is crucial to achieve the aforementioned targets [6,7]. Smart metering systems should be the core of this transformation because smart meters are fundamental for monitoring the performance and energy use characteristics of the grid load [8,9]. The roll-out of smart metering infrastructure is stressed in EU Recommendation 2012/148/EU [10]. The recommendation clearly states that the involvement of individual customers in the successful planning and use of electricity is one of the most important policy objectives for smart meter roll-out [11,12].

It should be noted that the development of smart meter systems may not be sufficient on its own [13–15]. It is still uncertain how this will impact individual customers and their energy-related behaviors [16,17]. According to previously conducted research, customers are critical drivers for the successful development of policy roll-out [18]. Because of this, one aspect that supports development efforts is the identification of what is needed to change the energy-related behaviors of customers so that they want to participate in energy-saving initiatives [19].

Specifically, new practices in the implementation of production tasks in this area require new skills and experiences [20]. Traditional forms of education are unable to react quickly to the emergence of new professions and the needs of relevant specialists [21]. New approaches to the organization of education both at universities and directly at enterprises is determined on the basis of the application of modern management methods and tools. It is also particularly important for EU "coal regions" to begin their transition away from coal and towards renewable energy.

The purpose of this paper is to discuss the relevance of gamification in enterprise management in the energy industry and to identify the barriers and challenges for its implementation. The research problem that the article addresses is the lack of use of this tool in energy companies. For this reason, the article focuses on finding solutions and recommendations for how to effectively implement these methods based on the experience and research of companies from other sectors.

The literature review has shown that the topic of gamification is starting to become more popular [16], especially in the energy sector [19,20]. Its practical use in companies in this sector is not sufficiently included in this field of discipline [21]. What is clear is the further need to develop and explore this issue in the literature. Currently, gamification tools are only used by consumers (external gamification) [22]. This article shows that this tool can contribute to more effective management inside companies from the energy sector (internal gamification).

Therefore, the directions of gamification development in practical applications in Ukrainian organizations were examined first. The main principles of the effective implementation of gamification in HR management, especially in energy companies, are indicated. A survey on the perception of gamification by Ukrainians from educational and related fields was conducted and analyzed. The results of the survey were supplemented by the results of the analysis determining the state of digitalization in energy enterprises. A prototype of a simulation model connecting a solar panel to a controller was developed as an example of applying the gamification element in the learning process. The paper emphasizes the importance of an interdisciplinary approach for the use of gamification, allowing the skill acquisition process in managerial and technical fields to be combined.

2. Literature Review

The development of the energy sector and management methods requires new knowledge and education in the form of advanced training that allows for competencies to be developed to generate solutions for future problems that are consistent with global trends

and national development programs [20]. Advances in education should be based on sophisticated measures that are strengthened by an interdisciplinary approach taking into account the various activities that are necessary for achieving a company's goals and, more specifically, for achieving production or services that consumers need and that meet the requirements of the time. Such an interdisciplinary approach allows for the education and enterprise activities to line up with each other, creating an environment where gamification could be utilized as a tool to improve performance. Specifically, company culture building, project management, taking care of employee health [23], creating employee onboarding, as well as enabling them to join an active online community, are relevant for marketing purposes in business. In the post-pandemic era, personnel onboarding is shifting towards focusing more on the person and their integration into the team, rather than on specific learning goals or requirements [24]. These experiences have shown that the usage of the gamification approach during employee onboarding processes can increase the employee retention rate, because information that is delivered through a gamified approach is better absorbed and retained [25].

One solution is the use of motivation techniques from the field of gamification [26–28], which is now starting to experience strong development. Gamification uses the features of interactive systems that motivate and engage users because of their use of game elements [29,30]. It has been used as an effective engagement tool in many fields, such as in business, education, technology adoption, sustainability, health care, and transport [31,32].

Recently, gamification has also been used as a tool to increase the commitment of individual customers to specific energy systems [33,34] by rewarding them through customer-centered motivations, such as economic and environmental goods, as well as through social motives, such as contributing to the community [35,36]. An example that shows this kind of solution is the effect of passive and interactive gamified information, and the potential of serious games [37] on changes in behavior when used in the context of solar energy adoption among residential customers [38,39].

Gamification is used wherever a game or competitive element is introduced. Figol et al. claim that gamification is used to control the behavior of certain groups of people [22]. In this regard, there are two types of gamification:

- External gamification—aimed at consumers in order to increase their loyalty and company revenue. This type of gamification is used on groups of individual clients who already use the company's services and who benefit from the gamification at the same time.
- Internal gamification—aimed at company personnel to increase their productivity. Additionally, this group is equally important regarding gamification tools, because when implemented by competent HR management, they enable the dynamic development of the company by acquiring suitably qualified employees as well as ensuring the best use of their potential.

Gamification involves games or competitive elements that can be used in non-game contexts as well as motives to develop the whole energy production system in a sustainable way [30,40]. However, this possibility should not only work using external gamification, where the clients are involved, but also through the use of internal gamification [41,42]. This will result in employees being more productive and an increase in the energy production efficiency of a given company and its development.

Gamification provides an interdisciplinary approach that is connected with learning. The complexity, pace, and non-continuous changes in modern life result in special and specific educational tools that can make the learning process easier, more understandable, and practical while not detracting from work, reducing anxiety, developing creativity, and allowing results and progress to be seen. Gamification responds to these challenges by proposing game tools, which have been described in the literature from this field [43].

It is possible to view the entire picture of the influence that gamification can have by becoming acquainted with the forecasts and trends that describe its benefits and progress. However, when considering the advantages, it is important to be reminded of the contro-

versies of this digital tool. The most commonly underlined weaknesses of gamification are as follows: poor design [44], the careful deliberation needed to determine the gamification mechanism and its elements [45], the fact that gamification can decrease motivation if it is based on money alone, and the fact that it can create a false set of incentives [46].

Taking the research and reports that have already been conducted on gamification into account, we can say that gamification could be efficiently incorporated into HR management through personnel development and learning. The following questions arise from this conclusion: what gamification tool can we use in HR management? How can its implementation improve the functions of HR management? How could enterprise or branch peculiarities be accounted for during gamification tool selection?

The review of the literature showed that there are limited studies on internal gamification examples, especially in energy sector companies. Studies emphasizing the use of this instrument in the energy sector are presented in Table 1.

Table 1. Description of examples of gamification in the energy sector.

The Example of Game Elements Utilization	Description
Study of energy consumer behaviour	Built an app that will be used to engage the energy consumer, enabling them to understand and change theirbehaviors related to energy consumption [47]
Study of the interactions of people or groups of people with energy consumption	Gamification for energy consumption through user involvement in a game-oriented way. Through cooperation and competition, the applications motivate users to achieve energy efficiency goals. Moreover, gamification techniques are a fundamental element of smart energy meters [48]
Design of strategies that optimize energy consumption	By 2019, companies around the world are expected to have spent a total of USD 2.1 trillion on digital transformation.
Motivate energy consumer behaviour towards energy use	Utility-sponsored energy challenges that reward customers for reducing their energy use as dramatically as possible [48]
Simulations for procedural learning about carrying out the right safety procedures in servicing wind turbines and for the use of different equipment	Usage of an interactive simulation program that would help trainees learn how to perform necessary actions inside the wind turbines and to do so in the right order. The trainee demonstrates their skills to move on in the game [49]

The above publications tend to focus on the interaction element of gamification that motivates and inspires employees to perform efficiently, as well as on the feedback element, providing a connection between the energy companies and the customers. At the same time, there is a significant problem when considering the further development of companies in the energy sector. Taking into account the dynamic development of customer incentives for gamification for energy savings, it is important that the companies in these industries be prepared for this by ensuring proper internal functioning. Based on the advantages of gamification mentioned by experts and researchers in this field, we consider the features of gamification as helpful tools in HR management, especially when used to encourage the learning of new skills to training young specialists or experience workers.

To identify possible applications for gamification in the energy sector, the following considerations are discussed in the present research: a description of different types of gamification, the determination of the principles of gamification, an assessment of the current state of gamification in Ukraine, a study of the methods and mechanics of gamification

as a tool in HR management, and the findings related to the benefits of this management tool. The gamification pre-conditions that were implemented in the current were tested on energy companies and were supplemented by an investigation of people's perceptions of gamification implementation into practice.

3. Methodology

The study was designed to determine the level of familiarity and usage of the gamification methods by conducting a survey. A survey was used to identify the factors and challenges of using gamification. The research tool—a survey questionnaire (prepared in the first half of 2021)—was prepared based on literature analysis. The following survey topics were extracted: familiarity with gamification, experience with gamification, tool efficiency, influence on staff relationships, and methods of gamification. The survey was created for all of Ukraine. Of all of the respondents, 60% were men and 40% were women who had received secondary or higher levels of education. The survey questions instructed the participants to select one choice, but there were also some open questions. Representative samples were identified was based on the literature [43]. More detailed calculations are presented in the chapter on the survey results.

The reliability of the survey was tested by determining the internal reliability of the questionnaire, for which Cronbach's alpha coefficient was used. This coefficient is based on the correlation of the individual questions that make up the questionnaire, and assesses whether all statements on the scale sufficiently reveal the size of the study and allow for the number of questions required on the scale. It states that the value of Cronbach's alpha coefficient for a well-structured questionnaire should be above 0.7, which means that the individual questions correlate with each other and reflect the same phenomenon. In order to confirm the reliability of the questionnaire, a Cronbach's alpha coefficient of 0.767 was calculated, indicating that the internal consistency level of the tool was high. This means that the developed instrument is suitable for application.
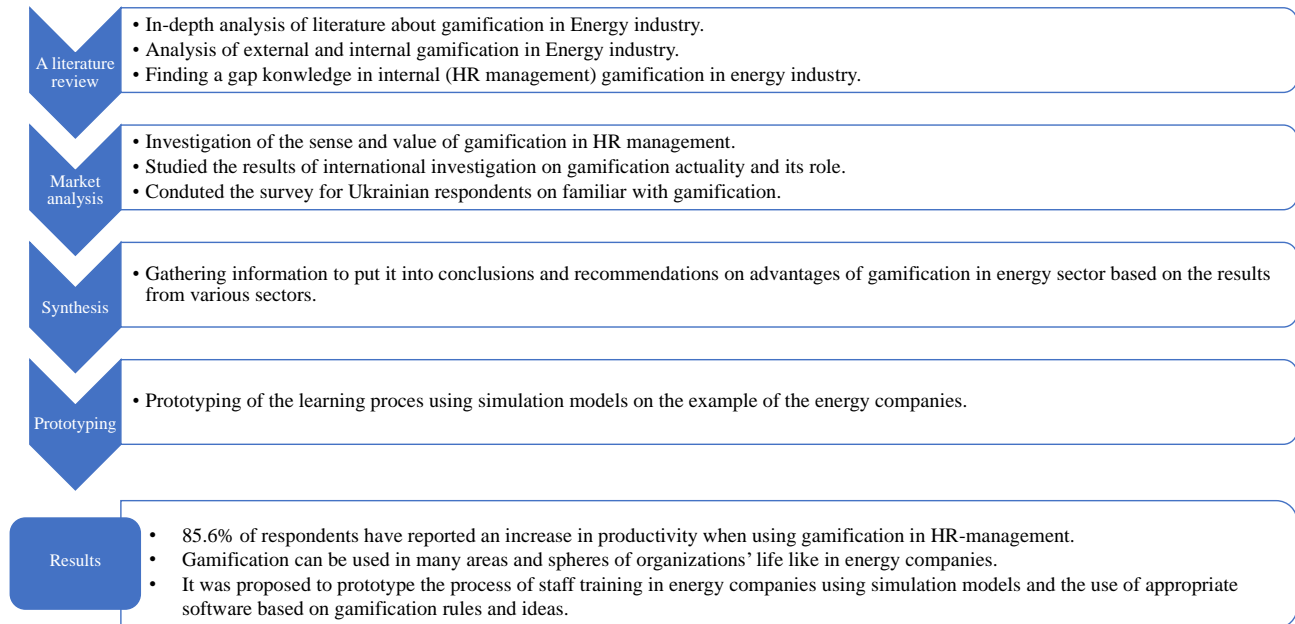
The next stage was to conduct the empirical study. The survey questionnaire was distributed electronically using Google Forms, as this is one of the most convenient methods currently available. To streamline the process, the questionnaire was distributed by sending an invitation to participate in the study with a referral to complete the questionnaire. Data were collected and analyzed in the second half of 2021 (July and August).

The article was prepared based on four stages:

1. A literature review—The literature review focused on the application of gamification in the energy industry and the identification of the lack of examples in the literature on the use of this method in HR management in energy companies. The review was based on literature from around the world. The selection of primary literature was based on databases (Elsevier Scopus, Elsevier ScienceDirect, Google Scholar, BazTech) and the available publications. The choice of literature was associated with the use of a few keywords: "gamification", "gamification in energy sector", "HR management", "energy management", "energy", and "smart grids". The literature review also helped to prepare the survey.
2. Market analysis—The purpose of the market analysis was to investigate the sense and value of gamification in HR management. In the framework of this usage method, the results of international investigations on gamification actuality and its role were studied, and a survey was conducted with Ukrainian respondents to determine how familiar they were with gamification.
3. Synthesis—Information was gathered to create conclusions and recommendations regarding the advantages of gamification, principles of gamification, and directions and methods for gamification implementation into practice in the energy sector based on the results from various sectors.
4. Prototyping of the learning process using simulation models on examples of energy companies.
5. Results and recommendations of using gamification in the energy industry.

Figure 1 shows the conduct chain used in the analysis.

A literature review
- In-depth analysis of literature about gamification in Energy industry.
- Analysis of external and internal gamification in Energy industry.
- Finding a gap konwledge in internal (HR management) gamification in energy industry.

Market analysis
- Investigation of the sense and value of gamification in HR management.
- Studied the results of international investigation on gamification actuality and its role.
- Conduted the survey for Ukrainian respondents on familiar with gamification.

Synthesis
- Gathering information to put it into conclusions and recommendations on advantages of gamification in energy sector based on the results from various sectors.

Prototyping
- Prototyping of the learning proces using simulation models on the example of the energy companies.

Results
- 85.6% of respondents have reported an increase in productivity when using gamification in HR-management.
- Gamification can be used in many areas and spheres of organizations' life like in energy companies.
- It was proposed to prototype the process of staff training in energy companies using simulation models and the use of appropriate software based on gamification rules and ideas.

Figure 1. Graphical representation of the research methodology.

4. Results of the Ukrainian Market Analysis

In order to investigate the conditions for gamification implementation into the current practices of Ukrainian enterprises, a survey was conducted using a questionnaire. Figure 2 shows a chart depicting the participation of the respondents based on age category. A total of 41 people responded. The reason why the survey was conducted on such a small number of people was due to the fact that gamification is a relatively new digital instrument in the industrial sector of the national economy. Gamification has mainly been focused on people who are directly connected to digital activity, work with gamification instruments, or work closely with it.

■ Number of respondents ■ Respondents who are in favor of using gamification
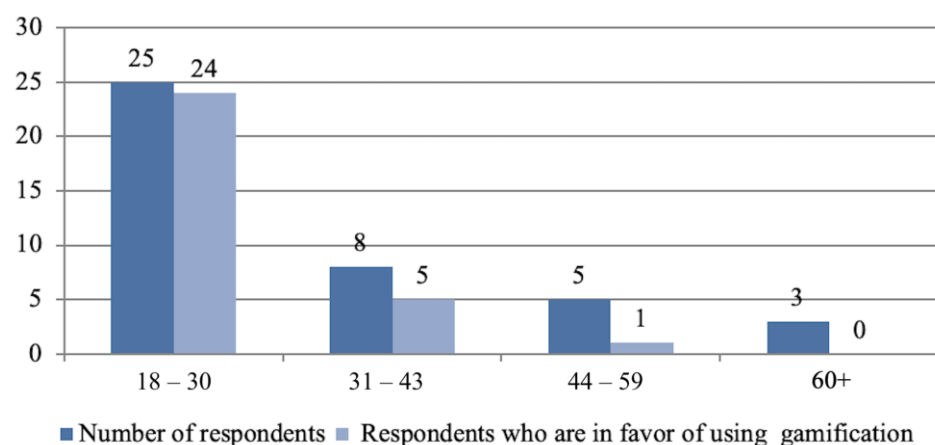
Figure 2. Participation of respondents by age category.

The vast majority of the respondents (61%) belonged to the age group spanning from 18 to 30 years old. A total of 19.5% of the respondents belonged to the age group that spanned from 31 to 43 years old, 12.2% belonged to the age category spanning from 44 to 59 years old, and the fewest respondents (namely 7.3%) belonged to the category of people aged 60 years old and older.

The main obstacles that were determined from this research were the poor recognition of this type of management tool, a poor understanding of the value of games for personnel learning, and lack of experience. To study the relevance of gamification at Ukrainian enterprises and to assume the readiness of people for the usage of gamification cools, the online study that was conducted involved students and teachers from the Ivano-Frankivsk National Technical University of Oil and Gas and Lviv Polytechnic Department of Management and Applied Economics, who are familiar with the activities of domestic enterprises, or have practiced or worked in such enterprises.

In order to validate the results of the conducted survey, the representativeness of the sample was determined [50]:

$$n = \frac{t^2\sigma^2 N}{\Delta_x^2 N + t^2\sigma^2} \tag{1}$$

where N is the size of the general population of respondents, and N = 243 for the conducted survey;

σ^2 is the mean square deviations in the sample, with σ^2 = 0.19 calculated for the conducted survey;

Δ_x is the marginal error of representativeness, with Δ_x = 0.6 calculated for the conducted survey;

t is the confidence factor depending on the probability determination of the marginal error, and t = 2 with 95% confidence probability.

The necessary calculations were performed to determine the representative sample needed to determine the sample size:

$$n = \frac{t^2\sigma^2 N}{\Delta_x^2 N + t^2\sigma^2} = \frac{2^2 \times 0.19 \times 243}{0.06^2 \times 243 + 2^2 \times 0.19} = 38$$

To increase the representativeness of sample, the obtained value was rounded to n = 41.

This calculation shows that, given 41 respondents were studied from the 243 representatives from the relevant fields, then the reliability of the acquaintance results with gamification will approach 0.95, which is a fairly high level of reliability for the study.

The results of the survey are presented at Table 2.

Table 2. The results of the gamification knowledge survey.

The Questions of the Survey	The Result of the Survey		
Familiarity with gamification	30% know about it	27.5% do not know but have heard about it	42.5% do not know
Experience with gamification	60% have		40% have not
Enterprises that use gamification	Ukr Post, Vodafone UA, KFC, Alfa Bank, Teple misto, Interpipe, cafe "Desiatka", McDonald's, PwC, "Nova Poshta", Netpeak, Promavtomatika Vinnytsia, Silpo, Furshet, 100ok and ATB.		
Tool efficiency	72.5% confirm the effectiveness of gamification		27.5% against its efficiency
Influencing the relationship of staff	71.4% confirmed the impact of it, of which 72.2% was positive and 28.2% negative		28.6% said that there was no impact
Methods of gamification	Quests, accrual of rating points for completed tasks and the opportunity to receive award for it, strategic, situational and corporate games and tournaments, simulation games for training and stimulants.		

Based on the survey, which aimed to elucidate the knowledge and understanding that the participants had about gamification, 42.5% of the respondents indicated that they did

not know about it, 27.5% answered "No, but heard about it", and only 30% stated that they were familiar with this tool.

The study confirmed the relevance and role of gamification in HR management in Ukrainian enterprises, which was concluded from the fact that 60% of the respondents had experienced it in their enterprises, namely Ukr Post, Vodafone UA, KFC, Alfa Bank, Warm City, Interpipe, Cafe Ten, McDonald's, PwC, Nova Poshta, Netpeak, Promavtomatika Vinnytsia LLC, Silpo, Furshet, 100ok, and ATB.

The respondents indicated that quests, the accrual of points for completed tasks, the ability to receive gifts for accrued points, rating points, strategy, situational and corporate games, corporate tournaments, domestic currencies, simulation games for training, and stimulants were the most popular ways that gamification could be used in enterprises.

To confirm the effectiveness of this tool in HR management, 72.5% of the respondents (mostly aged 18–30 years) agreed with this conclusion, and 85.6% of the respondents reported an increase in productivity when using gamification in HR management, confirming its effectiveness. It was noted that the 44+ age group is reluctant to support this tool. Some of the respondents had been informed of the negative impacts of gamification because many computer games are known to cause aggression. As such, 71.4% of the respondents said that gamification resulted in changes, and in particular, of these, 72.2% indicated that these changes were positive, and 28.2% indicated that they were negative. For the question regarding whether the participants would like to use this type of digital tool in their enterprises, 71.8% of the respondents answered "yes". Most of these positive answers were given by students.

Since such positive attitudes were observed towards gamification in the current study, we can determine from the survey that gamification could be used in HR management, especially for facilitating management functions as well as for learning and training personnel at the enterprises in which it has been implemented.

Despite the results of the survey, the digitalization environment, which is mandatory for the use of gamification technologies, was also examined using the results of the assessment of the level of digitalization in energy companies in Ukraine, which are presented in Table 3.

Table 3. Assessment of the digitalization level of energy companies.

Indicators for Assessing the Level of Digitization	Enterprises		
	JSC "Prykarpattyaoblenergo"	PJSC DTEK Kyiv Regional Electric Networks	PJSC "Lvivoblenergo"
Indicators of digital infrastructure			
The number of computers used in the company per 100 employees	9.3	38.6	17.4
Number of specialized programs at the enterprise	14	27	17
Indicators of logistics			
The share of equipment with Internet access in the total volume of equipment	0.96%	2.64%	1.02%
The share of artificial intelligence equipment in total equipment	0	0.05%	0
Indicators of labor resources			
The share of employees with IT education	8.4%	13.2%	8.2%
The share of employees who use digital technologies at work	4.8%	5.1%	4.9%
The share of employees trained in digital literacy	-	10.8%	6.3%

Table 3. *Cont.*

Indicators for Assessing the Level of Digitization	Enterprises		
	JSC "Prykarpattyaoblenergo"	PJSC DTEK Kyiv Regional Electric Networks	PJSC "Lvivoblenergo"
Financial indicators			
The share of digital technology costs in the overall cost structure	2.4%	7.8%	3.5%
The share of training costs, training of employees in digital literacy in the overall structure of staff training costs	-	45.6%	62.3%
Organizational and managerial indicators			
The share of managers with IT education in the management structure of the enterprise	4.5%	6.2%	3.8%
The share of digital document flow	32%	39%	35%

Thus, monitoring the performance indicators of the mentioned energy companies permits the conclusion that the preconditions for digital transformation are different and are as follows: the amount of investment in digital technologies, the level of provision of enterprises and staff with digital infrastructure, digital competence of employees, etc. However, the current environment created preconditions for the application of gamification, particularly in HR management, as well as indicating relevant changes.

Hence, the survey and the analysis of its results have allowed the benefits of gamification in HR management functions to be identified. Table 4 shows the general advantages of gamification in HR management.

Table 4. Advantages of using gamification in HR management.

Functions of HR-Management	Advantages of Using Gamification
Staff appraisal	Enterprises and organizations that use gamification methods, based on the experience of the pioneers in using this instrument HR, potentially have advantages in different areas of management. The use of the mentioned methods of gamification in personnel management is aimed not only at increasing productivity, but also forcing employees to increase motivation.
Motivation	1. Visualization of the employee results 2. Operational feedback on staff results
Training and staff development	1. Determining the direction of team development and each employee individually and stimulating their activities towards these directions 2. Increasing the involvement of staff in the work of the company
Corporate culture and internal communications	1. Involvement of employees in the training process without administrative efforts. 2. Softskills development for staff: uniting employees with a common idea; involvement in teamwork; identification and development of leadership qualities in employees. 3. Assimilation of a certain sequences of actions (up to automatism); the formation of correct behaviour. 4. The use of game techniques in the formation of the personnel efficiency.

It should be noted that the implementation of the advantages of using gamification in HR management should be carried out in accordance with the principles of management in the context of digitalization, in particular [51]:

1. The principle of effective management, which ensures the achievement of goals, directing activities within the criteria of minimizing the cost of resources as well as maximizing revenues from digitization processes;
2. The principle of optimality, which provides for the consistent implementation of tasks related to the digitalization of the enterprise within the entire system and by individual elements;
3. The principle of complexity, which takes into account the priorities of digitalization, ensuring the interaction and level of implementation of tasks related to digitalization in each area or field of activity;
4. The principle of flexibility, which allows one to adapt to the needs of digitalization in a timely manner;
5. The principle of security, which provides implementation measures for cybersecurity and for the protection of personal data, confidential information, etc.

According to these principles, gamification can be used in many areas and spheres of organizational life, and in the activities of energy companies in particular. The implementation of measures for the digital transformation of Ukrainian energy companies in terms of their operation activity, infrastructure maintenance, and customer service through the use of gamification elements will evenly load staff through innovative solutions such as a remote transfer of tasks through a mobile application, taking into account the availability of resources as well as controlling action implementation and employee location through the mobile application and the visualization of reports, which helps to identify the factors reducing employee productivity [52]. Table 5 shows measures for the introduction of digital technologies in the activities of the staff of Ukrainian energy companies [53].

Table 5. The samples of measures for the introduction of digital technologies in the activities of the staff on Ukrainian energy companies.

Directions of Digital Technologies Introduction	Measures to Improve the Work of Staff
Development of digital literacy and digital competencies of employees	1. Formation of necessary digital competences list and skills for the work of the enterprise. 2. Determining the level of inconsistency in the digital competence of employees and the tasks they perform. 3. Development of a program for the development of the digital competencies of the staff. 4. Staff training.
Automation of personnel processes	Implementation of personnel accounting automation software (For example, PersonPro 2.0 and PersonPro 2.0 SQL, jSolutions cloud system)
Introduction of HR-analytics	1. Consolidation of employee data from disparate sources (spreadsheets, documents) into a single database—central storage). 2. Creating a personnel control panel (a visual representation of information). 3. Creating an HR analyst position. 4. Building analytical capabilities and using HR analytics in practice.
Creation of "digital" jobs	1. Defining a list of positions whose functions can be performed on the basis of a "digital" workplace. 2. Providing the workplace with devices and access tools (laptops, Internet). 3. Replacement of individual positions on the basis of "digital" workplace technology.

Some of the noted measures could be realized on the basis of gamification. The following example shows gamification use in the training process at different energy companies. In particular, an example of a simulation model is provided that allows for the employees to acquire competencies related to the skills required to install solar panels to the controller. Thus, the game-oriented tool in that simulation could be aligned with the one mentioned and described at the beginning of the manuscript when describing examples of gamification in energy companies (Table 1). This is a prototype of a learning simulation model that allows trainees to be engaged in the virtual working environment and to acquire the skills needed to work in an energy company. A solar connection system consisting of a solar panel, connection cables, connectors, and a controller that includes an inverter, a tube switch, a battery pack, and a consumer device is presented as an example. When connecting batteries (battery pack), the employee must take into account their polarity. When connecting solar panel units, it is necessary to take their number and the volume of energy that they produce as well as the connection scheme (parallel, series) into consideration.

The trainee has the opportunity to use a simulation model for the skills required to work with solar panels. Figure 3 shows the developed simulation in which the trainee connects the solar battery to the controller and the controller to the battery pack. The simulation model for connecting the solar battery to the controller was developed using UNITY software, which uses a game creation environment.
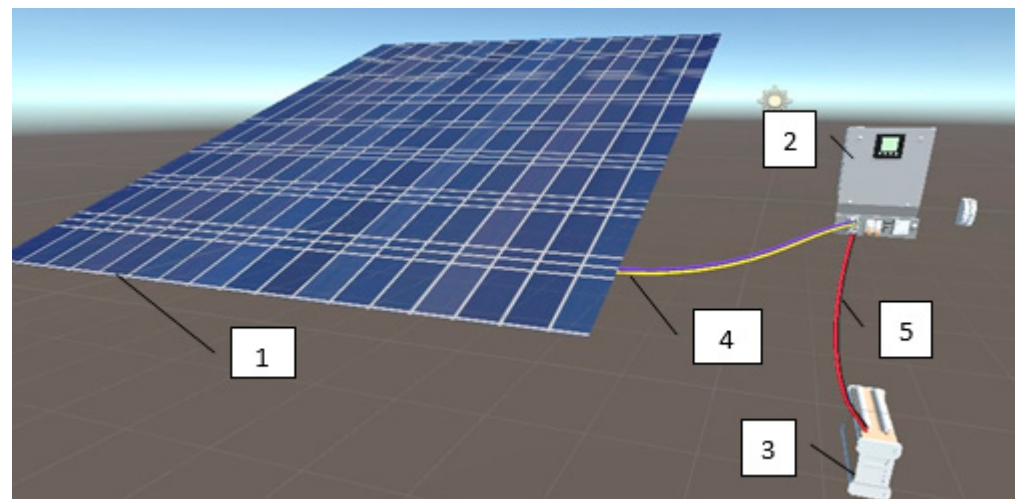
Figure 3. Simulation model for solar panel connection to controller. 1, solar panel; 2, controller; 3, battery; 4, cable to connect solar panel and controller; 5, cable to connect battery and controller.

In order for the presented simulation model to work as a learning tool, software has been developed that allows an instructor to control the actions of the trainee in order for the trainee to connect the battery to the controller and teaches them how to do it correctly. In Figure 4, a part of the script describing the process of connecting the cables to the connectors of the controller is presented. In fact, this program ensures that the employee is properly trained how to do this type of work while using the system.

Similar training can be conducted for other types of work, particularly for the work that takes place in energy companies, not only for technical staff but also for management to better understand the operational areas of the enterprise. In particular, this training can be relevant for tasks such as power plant start-up, the repair of damaged power units, working with equipment powered by alternative energy sources, becoming acquainted with the structure of the office, becoming acquainted with the supply chain at the enterprise, becoming acquainted with the work of individual equipment, etc. Note that the results of the training can be presented in the form of visualization, which is also implemented using gamification technology.

```
Touch touch = Input.touches[0];
Vector3 pos = touch.position;

if (touch.phase == TouchPhase.Began)
{
    Ray ray = Camera.main.ScreenPointToRay(pos);
    RaycastHit hit;

    if (Physics.Raycast(ray, out hit))
    {
        if (hit.collider.tag == "connector")
        {
            toDrag = hit.transform;
            distance = hit.transform.position.z - Camera.main.transform.position.z;
            directionVector = new Vector3(pos.x, pos.y, direction);
            directionVector = Camera.main.ScreenToWorldPoint(directionVector);
            offset = toDrag.position - directionVector;
            dragging = true;
        }
    }
}
```

Figure 4. The part of the script describing the process of connecting the cable to the controller.

At the same time, besides the complex nature of gamification in HR management, this digital instrument has received increased attention around the world [54]. Hence, it is recommended that part of the transformation process should be to work out ways that it can be used for gamification implementation on the basis of:

- Encouraging employees to evolve and adopt to a new digital tool such CRM (Customer Relationship Management), digital workplace, service management, ERP (Enterprise Resources Planning), internal, etc.;
- Improving employee productivity using competition driven by games for stronger motivation;
- Determining gamification start-up and performance, as well as a strategic plan for its implementation by successfully involving employees in new processes and practices;
- Tracking and evaluating individual performance through evaluation by rankings, levels, or statuses and developing reward systems that meet each employee's need for recognition;
- Encouraging knowledge sharing and creating healthy competition in order to promote a positive approach to transformation within the company;
- Engaging communities of managers or ambassadors to make them change management representatives.

A description of the methods and mechanics of gamification [11–18] creates a range of activities that allows employees to engage in their work more intensely and to perform their work more efficiently. Among them are:

1. Competition: In competitive mechanics, there is one winner. This method will help to motivate employees and encourage them to improve the quality of their work. Over the course of the game, it is possible for the employees to accrue points, to create publicly accessible tournament tables, and to cover a course of competition in social networks. The main advantage of competitions is that they increase the overall level of quality and speed of work, identifying a leader in the team.
2. Win-Win strategy: There are no winners or losers in such games, and they allow the players to reach the maximum number of participants. Employees can be rewarded with badges of different levels, depending on the quality of work performed. It is very important not to forget about the visualization of awards. All employee achievements should be kept in an accessible place. The best option is to place the awards in the employee's profile on the Internet, and the news that an employee has received the award can be public.
3. Aesthetics: Employee achievements should be aesthetically visualized. Diagram and graph formats used to be popular, but this format is now considered obsolete. Instead,

ratings can instead be depicted in the form of a tree that grows and becomes more fertilized as the employee increases their knowledge or that dries up if it does not develop. This visualization will allow the employee to clearly see their results and determine the vector for further development.

4.　Quests: Quests not only help to find a leader in the team, but also to unite the team. Employees are united by common problems; together, they look for ways to solve a certain problem, bringing them closer to the team as a result.

Despite the positive role of gamification in employee development, gamification has a range of negative consequences. These were determined from the survey and should be taken into consideration:

- Employees may feel that "only figures matter, they (i.e., company managers) do not take into account the person, the human".
- Employees reported "gamification challenges as being a source of stress because their poor performance may cause them to get fired".
- One employee expressed wariness of privacy breaches and potential shaming as a result of gamification.
- Some of the respondents expressed opinions that the extra pressure to succeed and win might push some employees to cheat.
- It was suggested that personal job performance is subjective, and some people consider their performance to be better than what is indicated by objective performance indicators.

5. Discussion

Gamification is a digital economy phenomenon and one of the results of digitalization. In turn, we consider digitalization the introduction of digital technologies in all spheres of life: from interaction among people to industrial production, from household items to children's toys, clothes, and so on. Transformation from a linear to a network model of value creation involves the transition of one's own resource usage to coordination with others by taking into account the emphasis on the quality of internal business processes and the improvement of external communications between the users of a platform. All these transactions are aimed at maximizing consumer value to the overall value of the entire digital ecosystem. In this way, modernization at the present stage of development is based on the predominance of high-tech industries that have been implemented by the fourth industrial revolution, which has already had a significant impact on people and is reflected in the characteristics of personal identity. Gamification creates a link between the instruments used in the artificial world by creating real-life situations, preparing the player to make decisions in the created conditions. These features of games can be used for more than entertainment: they can also be used for educational purposes. The literature review showed that companies use gamification for different purposes. Start-ups use gamification to create a product that best satisfies a need [14]; medium-sized companies gamify marketing processes to increase brand awareness and customer loyalty to goods and services [16]; large companies mainly gamify HR processes [24,25].

The literature mainly focuses on gamification among the customers of companies, i.e., external gamification [7,12,21,22]. This is a good step towards meeting the energy policy requirements set by the EU. However, in addition to external gamification, internal gamification is also important [22], which is currently not strongly developed in energy sector companies [21,25,42]. The study that was conducted on the digitalization environment of energy companies showed the rationale for the use of gamification technologies in their operations. The research shows that only 30% were familiar with this tool. A total of 72.5% confirmed the effectiveness of gamification, and 27.5% were against its efficiency. Ukr Post, Vodafone UA, KFC, Alfa Bank, Teple misto, Interpipe, cafe "Desiatka" McDonald's, PwC, "Nova Poshta", Netpeak, Promavtomatika Vinnytsia, Silpo, Furshet, 100ok, and ATB were among the companies analyzed. These are companies from different sectors of industry, but their experience using gamification can be applied to companies in the energy sector.

What is worth emphasizing here, after analyzing the Ukrainian market, is that the pioneers in the use of gamification are foreign capital entities that have invested in Ukraine. It is also important that gamification in the energy sector can be useful for EU "coal regions" to begin their transition away from coal and towards renewable energy.

Of course, it is debatable to summarize the prevalence of gamification based on the results of the survey, but these results testify to the prospects of this digital technology. The demonstrated example of prototyping the learning process using a simulation model of connecting a solar panel to a controller shows the possibilities and methods of applying gamification in HR management. Additionally, the survey results showed that the younger generation has positive feelings about the prospects of gamification. The analysis conducted in this article showed that scientists, experts, and users of gamification have determined the influence of gamification and provided a basis for its increased use, especially in HR management. This research demonstrated that the use of this digital instrument has an impact on employee engagement, satisfaction, and performance. Therefore, this topic requires more attention and further study.

6. Conclusions

Ongoing energy sector progress and dynamic changes in the law and EU regulations mean that enterprises have to change their activities and, accordingly, need to develop new approaches for the management of HR development. This issue is relevant for energy companies, whose activities are related to their ability to meet the energy needs of various consumer groups while discovering and exploring new sources of energy. These demands mean that staff have to perform new types of work. It is difficult to meet this need to train and re-train specialists through traditional forms of education. Simultaneously, the creation of an appropriate environment that is close to a real industrial area is a challenge to HR management departments. In this way, an interdisciplinary approach allows the involvement of professionals from different subject areas of science and practice to address issues of increased uncertainty and complexity, including on the basis of virtual communications that require consideration in terms of personnel learning. An example of solving this problem is the use of gamification in HR management, particularly in staff training and development. The article considers the preconditions for the usage of gamification in Ukrainian energy companies, works out the results of a survey conducted with Ukrainians familiar with digitalization usage in the practice, points out possible ways to use gamification-based tools in HR management in energy companies, and proposes the learning process prototype using a simulation model, an example of which is discussed in the article, as well as stresses the advantages that can be incurred by companies in the investigated field after using gamification.

In general, the research conducted in the article has approved the following provisions that could be used in HR management through the use of gamification tools:

- The analyzed literature shows that the role of gamification is increasing in HR management. Current applications involve the presentation of simulation samples in HR management, which can be used for learning purposes at energy companies.
- Using elements of games and social networks for personnel management to explore the use of gamification tools in HR management has indicated that it has become a powerful instrument in increasing personnel engagement and the efficient performance of professional tasks, meaning that it could be recommended for application in the energy sector, where this type of management tool is missing.
- Considering different types of gamification provides possibilities for determining the principles of gamification in terms of the rules players have to follow to achieve the goals of the activity put into a game.
- There are many methods and mechanics that are used for gamification in HR management that could also be used at energy companies: the competition method to motivate employees and encourage them to improve the quality of the work; the Win-Win strategy, a method that rewards employees depending on the quality of work

performed; aesthetics and emotional coloring, a method that uses an aesthetically visualized measure of the employees in the enterprise; and quests, a method that helps to not only identify a team leader but to also unite the team by resolving common situations and participating in the decision making process.

— One limitation that was mentioned in the HR management context was that the team representatives could be from multiple generations, meaning that the manager would have to determine each employee's individual level of technical skills and to decide if they would be able to use the game as a performance indicator.

— This study presented a prototype of a simulation developed using appropriate software that could be used in energy companies, showing that gamification is relevant for not only HR management needs at the enterprise level, but that it could also be used for education processes at universities as well.

— Relevant measures were proposed for gamification implementation at the organizational level, such as learning, creating and evolving appropriate digital platforms, ensuring that these actions were compliant with the organization's strategy and plans, enhancing of the gamification environment, and motivating employees to be engaged in the gamification process to fulfil HR management functions. Gamification should be considered in the context of digital transformation, as shown in the example of energy companies.

Taking the noted provisions of the impact of gamification on HR management at energy companies into consideration, we can recommend this tool to improve management functions as well as for educational purposes; the fields of its implementation are very universal and not limited to the energy sector. It can be used for different industrial sectors, in different regions, as well as at universities as a learning instrument that makes the education environment closer to the work environment. Many companies and countries are progressing towards gamification, though some have made less progress, but the results of the research conducted in Ukraine demonstrate that this issue is becoming especially relevant to young people, who are ready to implement gamification for their development. The energy sector is trying to implement gamification due to the move towards renewable energy, so this tool could be used to improve the implementation of the guidelines set by the EU.

This tool is very universal, and it can thus be used in different sectors and in different regions. The results of the research conducted in Ukraine can be implemented in other countries. The energy sector is currently undergoing a structural transformation due to the transition to renewable energy; therefore, tools for management improvements are welcomed.

Moreover, it is important to consider the benefits to other groups in society. Gamification tools are a great way to manage employees in a company. In fact, the people who use these tools are satisfied after completing tasks through competition and based on the rules drawn from these games. Additionally, this tool is not likely to be used by policy makers, but it will improve the implementation of the guidelines set by the EU.

Besides these practical recommendations as they relate to gamification in enterprises, further research can be performed aiming to detect the particular conditions through which game mechanisms can be implemented in various situations within companies, and to work out a special digital management system that could ensure effective employee performance by engaging the two types of gamification—ongoing gamification for continuous improvement and challenges for one-time and time-limited actions. Currently, gamification research lacks more exploratory and confirmatory approaches, such as interviews, surveys, and experimental studies.

Generally speaking, gamification has to provide or generate three main impacts: job satisfaction, job engagement, and job performance. Besides this, the application of gamification in energy companies will allow the energy policy requirements set by the EU to be implemented, the energy system to transform with the "just transition" mind set, as well as facilitate integration processes.

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