SYSTEMATIC LITERATURE REVIEW ABOUT GAMIFICATION IN PUBLIC MANAGEMENT

REVISÃO SISTEMÁTICA DA LITERATURA SOBRE GAMIFICAÇÃO NA GESTÃO PÚBLICA

Felipe Moura Oliveira

Master's student in Administration and Controllership, Universidade Federal do Ceará (UFC).

E-mail: felipe.moura.o@hotmail.com

Igor Lopes Cordeiro

Master's student in Administration and Controllership, Universidade Federal do Ceará (UFC).

E-mail: igorcordeiro85@gmail.com

Ana Lidia de Oliveira Silva Ramalho

Master's student in Administration and Controllership, Universidade Federal do Ceará (UFC).

E-mail: analidiaramalho@alu.ufc.br

Thamara Marcos dos Santos

Master's student in Administration and Controllership, Universidade Federal do Ceará (UFC).

E-mail: thamara.marcos@alu.ufc.br

ABSTRACT

Gamification has been suggested as a promising alternative to traditional techniques for increasing engagement among public service employees. Despite its apparent advantages in motivating behavior change in management, its effectiveness is still not well understood. This article aims to evaluate the quality of empirical support and the effectiveness of gamification applied to public service management. A systematic review of the literature on gamification in public management was carried out, through searches in the Web of Science and SCOPUS databases. Initially, 23 articles were identified, of which only 11 were included in the final analysis, focusing on the quality and application domain of gamification in this sector. The study reinforces gamification as a valuable tool for engaging users and solving problems in the public sector, contributing to the modernization and improvement of public management and increasing the effectiveness and legitimacy of public policies.

KEYWORDS

Gamification. Public management. Systematic literature review.

RESUMO

A gamificação tem sido sugerida como uma alternativa promissora às técnicas tradicionais para aumentar o engajamento entre os colaboradores do serviço público. Apesar de suas aparentes vantagens para motivar a mudança de comportamento na gestão, sua eficácia ainda não é bem compreendida. Este artigo visa avaliar a qualidade do suporte empírico e a eficácia da gamificação aplicada à gestão de serviços públicos. Realizou-se uma revisão sistemática da literatura sobre a gamificação na gestão pública, por meio de buscas nas bases de dados Web of Science e SCOPUS. Inicialmente, foram identificados 23 artigos, dos quais apenas 11 foram incluídos na análise final, focando na qualidade e no domínio de aplicação da gamificação nesse setor. O estudo reforça a gamificação como uma ferramenta valiosa para engajar usuários e resolver problemas no setor público, contribuindo para a modernização e o aprimoramento da gestão pública e para o aumento da efetividade e legitimidade das políticas públicas.

PALAVRAS-CHAVE

Gamificação. Gestão pública. Revisão sistemática da literatura.

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

INTRODUCTION

The public sector attracts the interest of several steakholders, for this reason, participation and engagement has always been a relevant topic in the area. Key drivers of engagement in this sector include transparency in operations, efficiency in the allocation and use of resources, and accountability to citizens (Bisht & Sharma, 2011; Ljungholm, 2015; Lyrio et al. 2018). Transparency helps on building trust and facilitates public oversight of government activities (Ljungholm, 2015), while efficiency ensures that limited resources are used in ways that maximize positive impact on communities (Bisht & Sharma, 2011). In addition, accountability stimulates results-oriented management, encouraging civil servants to act in accordance with the expectations and needs of the population (Lyrio et al. 2018).

In addition, the use of gamification in public management can be used to encourage citizen participation, improve the efficiency of public services, increase employee engagement, and promote transparency and accountability (Hassan & Hamari, 2020). By incorporating elements of games, such as challenges, scores, and rewards, public management can make its activities more attractive and accessible to the public, as well as stimulate the creativity and innovation of its employees. In this sense, gamification has proven to be a promising strategy for the modernization and improvement of public management, contributing to increasing the effectiveness and legitimacy of public policies.

Gamification, in its various frameworks, can be understood in such a way as to use points, badges, and achievements (Oliveira & Graças 2020) to improve a certain action. Public management appropriates itself to deliver an environment of empowerment to the citizen, that is, to improve the impact of its actions on its user. However, the scope of the impact of gamification cannot be observed only from positive points, Araújo Filho et al. (2020) report that gamification can cause activities that become tiring for users, which can lead to disinterest and frustration. In addition, the excessive use of gamification can result in alienation, distancing users from reality and generating harmful dependency. Another point is the presence of intangible goals, which can demotivate users by setting objectives that are difficult to achieve or without a clear purpose. Also, gamification's excessive control over the user's real-life journey can be seen as a threat to users' privacy and freedom.

Gamification comes in as a means of streamlining the innovation process of governments, empowering the population, and including them in their management. Damiani et al. (2019, p. 3) point out that "gamification aims to visualize a given problem and think of an alternative from the point of view of a game designer", however its effectiveness has not yet been properly studied and lacks research (Girdauskiene et al., 2022). Thus, this study aims to exhibit scientific studies on the impact of gamification in the public sector through a systematic analysis of the literature. As procedures, there is the exploration of the term in the Scopus and Web of Science databases, after that, the filtering of the results obtained, to be able to analyze the available works on gamification and public management. Gamification in public management still represents a gap, especially in terms of studies that intend to understand its impacts on public management. Sousa et al. (2022) report that these studies are concentrated around teaching and learning strategies, thus, gamification is seen as an active methodology, focused on the area of education and not as a management strategy for public administration.

It is essential to highlight the role of studies in public administration, especially after the country's democratization process, as mentioned by Oliveira (2023). This area significantly impacts the daily lives of citizens. This research provides an insight into the current state of academic literature related to the impact of gamification in the governmental context, considering the importance of gamification as a tool to promote civic participation and social inclusion. Thus, this study contributes to the promotion of a more inclusive and participatory society, while boosting innovation and efficiency in the public sector through the mapping of available works. In addition, it delivers empirical advances by applying a gamification framework in public management through data obtained in a systematic review.

GAMIFICATION AS AN INNOVATION STRATEGY IN PUBLIC MANAGEMENT: APPLICATIONS AND IMPACT

Innovation in the public sector goes beyond the search for efficiency, finding more effective ways to accomplish tasks, or doing more with fewer resources (Santosa, 2023). It is

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

about creating solutions that are more meaningful and that add greater perceived value to society. In addiction, it aims to overcome bureaucratic limitations and go beyond the abstract ideas expressed in laws, regulations, and ordinances, seeking to achieve concrete and tangible results. The focus is on providing public services of greater relevance and impact, meeting the real needs of society, and going beyond the idealized conceptions that may exist in the bureaucracy (Silva & Medeiros, 2019).

Furthermore, the crucial importance of the public sector in developing smart cities and achieving sustainable goals is crucial, highlighting the need for extensive reforms in systems and paradigms to drive meaningful innovations (Zait, 2023). In this context, open innovation should also be highlighted as a transformative element in public innovation, especially in the creation of effective energy solutions, without forgetting the influence of public management levels in improving the quality of public services and creating social benefits (Kim & Kim, 2022; Salvalai et al., 2023). Finally, it is emphasized that innovations in business models in the public sector can offer added value to citizens, industry, and government, emphasizing the need for balanced strategies that meet both demand and supply (Agarwal et al., 2021).

According to Costa (2016), gamification is not about playing video games, but about using elements that exist in games to motivate some task or activity, not taking the person out of the real world. The conceptual difference between gamification and gaming is because the first is the systematic application of game mechanisms in a non-game context that aims to motivate and engage users to solve real problems (Vianna et al., 2014). Meanwhile, the other term is understood as a system in which players engage in an abstract challenge, defined by rules, interactivity, and feedback, which may result in a quantifiable output and often elicits an emotional reaction (Kapp, 2012). Mirza-Babaei and Stahlke, (2023), emphasize the relevance of centering design on user experience within interaction design, underlining the interconnection between interaction design, user experience, and game design, underscoring the importance of experience in the design of such systems.

In this study, gamification is ideally addressed. In the words of Costa (2016, p. 50), "gamification can be seen (...) as a serious risk if applied in the wrong way." Without a

proper planning phase for this action, gamification can become a weapon of control and manipulation for users (people immersed in this program). On the other hand, if well applied, it may be able to innovate. To make it possible, it relies on clear rules, steps, rewards, and instant feedback (Thiel, 2017). In this way, it can be used in public administration to solve problems such as performance evaluation, fulfillment of the social mission, progression, and motivation of civil servants.

Gamification has proven to be effective in several areas of the public sector, providing positive results and user engagement. Research such as that of Tesi et al. (2023) highlight the effectiveness of gamification in public health interventions, especially in promoting healthy lifestyles, with physical activity-related interventions being particularly useful and engaging. In addition, studies simmilar of Nair et al. (2023) demonstrate that gamification is a valuable tool in organizational training in public sector organizations, significantly increasing learners' levels of learning, reaction, and motivation. This scenario is corroborated by forecasts resembling those of Cloke (2023), which point to a continuous growth of gamification in the public sector, with emphasis on its use in recruitment and training programs, evidencing its effectiveness in engaging and training employees in a dynamic and interactive way.

Furthermore, as emphasized by Taylor (2021), gamification is recognized as a powerful design tool to engage citizens in public initiatives, promoting behavioral change in areas such as health, sustainability, and education. Practical experiences, such as the implementation of the "Run That Town" game by the Australian Bureau of Statistics, as described by Chambers (2015), illustrate how gamification can increase population awareness and engagement on important issues such as sense, especially among young people. This evidence highlights the potential of gamification as an innovative and effective approach in the context of the public sector, promoting citizen engagement, learning, and participation in diverse spheres of government.

METHODOLOGY

This paper consists of a Systematic Review of the Literature (RSL), it follows the preferred Reporting Items for Systematic Reviews (Prisma) checklist (Liberati et al., 2009). Thus, it

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

presents a quantitative and applied approach with exploratory purposes. Its nature allows the development of studies based on the practical application of knowledge oriented to the solution of real problems. Its purpose, on the other hand, allows for flexible planning (Prodanov & Freitas, 2013).

The purpose of this approach is due to the need to know the points to be worked on about the impact of gamification on public management. Thus, it is necessary to understand the main authors of this idea, and which years the increase in research has been observed. To carry out the selection process of studies that met the predefined criteria for eligibility (in other words, eligible studies), a cautious and meticulous methodological approach was adopted, based on a thorough and in-depth consideration of the information, and guidelines contained in the population, intervention, comparison, outcome (PICo) table, as described in Table 1 (Robinson et al., 2011).

TABLE 1 – PICo panel

| PICo		
What is the impact of gamification in the public sector?		
P	**I**	**Co**
Construction Gamification	(effect OR influence OR consequences OR impression OR repercussions OR ramifications)	("public administration" OR "public sector")
Use	Gamification AND (effect OR influence OR consequences OR impression OR repercussions OR ramifications) AND ("public administration" OR "public sector").	

Source: Authors, 2024.

The exclusion criteria were defined to facilitate the synthesis of the study, as follows: (1) studies that are not complete; (2) language other than English, Portuguese, and Spanish; (3) duplicates; and (4) documents, book chapters, and conferences. Risk of bias and study quality were assessed at study level using the Cochrane Collaboration Review Manager (RevMan) tool, the version used was 5.4. A questionnaire based on the Joanna Briggs

Institute (JBI) was created for bias analysis, consisting of 10 questions that could be classified as low risk (represented by green), not applicable (represented by white) and high risk (represented by red). For the question to be considered of low bias, the sum of the green and white parts must be 75% (Canto & Massignan, 2021).

The Prisma flowchart, in Figure 1, shows that the identification of studies by database (articles in the Scopus and Web of Science databases) totaled 23 units, in the identification of studies by gray base (Science Direct) there are 25. After that, there was the extraction of duplicate documents, two units were removed from the databases. Subsequently, 29 units were isolated, and 29 articles were read in their entirety. However, only 11 articles covered the scope of this study.

FIGURE 1 – Prisma Method
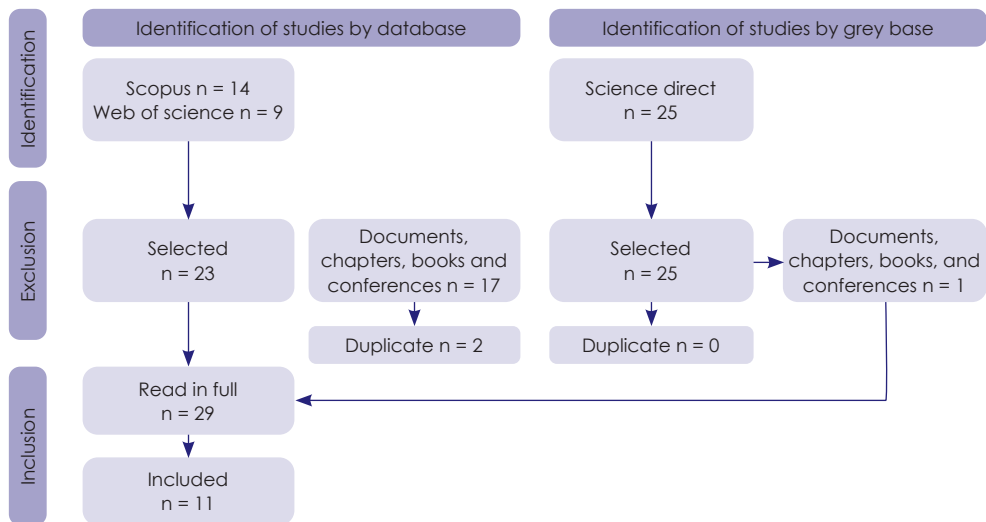
Source: Authors, 2024.

According to Figure 1 and according to the proposed objective, of the 11 articles selected for complete reading, five of them did not comply with the pre-established criteria and were removed from the scope of the study. After the data collection procedures, there was a need to verify (analyze) a possible bias in them and how it could interfere in

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

the research. Thus, a tool was used to measure the risk of bias in the surveys, in this case, all included studies were analyzed by 10 questions. If the answer was positive, it would be represented by a green score. If the answer to the question was based on maybe or uncertainty, it would have a yellow space. Finally, if the question were answered in the negative, it would occupy a red space.

To include the study, it was necessary to adopt the 75% reliability parameter. Consequently, to identify the percentage, the green spaces are added to the blank spaces.

FIGURE 2 – Critical evaluation of the selected articles

	1	2	3	4	5	6	7	8	9	10
Al-Rayes et al.										
Alibakhshi et al.										
Almeida et al.										
Balalle										
Behl et al.										
Benitez et al.										
Braüuer and Mazarakis										
Bucchiarone										
Chamaret et al.										
Cónego et al.										
Degirmenci and Breitner										
Flavián et al.										
Guillen Mandujano et al.										
Hsu										
Huang et al.										
Iorgulescu										
Koo and Lee										
Lai and Langley										
Legaki et al.										
Legaki et al.										

FIGURE 2 – Critical evaluation of the selected articles

	1	2	3	4	5	6	7	8	9	10
Nuanmeesri										
Romanov and Holler										
Sanina et al.										
Sharma et al.										
White et al.										
Wu et al.										
Zainuddin et al.										
Zenk et al.										
Zhang										

Source: Authors, 2024.

The questions answered by the authors for the preparation of Figure 2 can be seen in Table 2. There are 10 questions that guide the studies towards the objectives of this research.

TABLE 2 – Checklist

CHECKLIST FOR THE ARTICLES
1 - Is the article aimed at public management?
2 - Is the article directed to the citizen?
3 - Is the article aligned with the general objective?
4 - Is there congruence between the general objective and the methodology adopted?
5 - Is there congruence between the methodology applied and the procedures performed?
6 - Is there congruence between the applied methodology and the data analysis?
7 - Does the article clearly define and delimit the target audience?
8 - Does the article clearly define the locus (site of application) researched?
9 - Is the article directly related to any sphere of public management?
10 - Did the article provide recommendations for other studies involving gamification and public management?

Source: Authors, 2024.

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

ANALYSIS AND DISCUSSION OF RESULTS

In this section, we explore the main findings of this study, their implications, and their relationships with the literature (Ramalho et al., 2024). Through this approach, it is feasible to identify connections and correlations between the findings of this study and the theories, research, and discoveries already existing in the scientific literature.

In Koo and Lee's (2017) research, gamification in public management is presented as a strategic tool to promote citizen participation and effective communication. The study identifies that gamification can be used by public institutions for various purposes, including the delivery of information, using elements of challenge, achievement, personal expression, altruism, status, and competition to motivate and engage users in different phases of the gamification experience; behaviour change, promoting citizens' awareness and behavioural change in relation to critical social issues; promotion of political participation activities, encouraging the active participation of users in policy-making activities, among others.

In this context, the results of this study highlight the diversity of applications of gamification in the public sector and its ability to promote public engagement in various areas of public management, providing benefits for both governments and citizens. For example, by incorporating gamification elements into policy-making activities, governments can stimulate greater citizen involvement in the democratic process, increasing the representativeness and legitimacy of the decisions made.

The study by Guillen Mandujano et al. (2021) mainly addresses the application of gamification in participatory backcasting processes to promote social innovations towards sustainability. The framework proposed in this study shows how participatory backcasting processes, when they incorporate gamification elements to increase engagement, affect participants. Specifically, it is highlighted that these processes become positive and collaborative experiences, creating a solid foundation for future actions. It should be noted that the study introduces an innovative framework that integrates gamification and playful activities to promote sustainable development, especially in the areas of consumption and decision-making.

11

From this, when considering the implementation of sustainability policies and initiatives, managers and policy makers can benefit from this innovative approach. The use of gamification in participatory processes can promote greater citizen buy-in and involvement, strengthening sustainable development initiatives. In addition, the framework proposed in this study provides a solid basis for the formulation of public policies that aim to address environmental challenges and promote more sustainable practices in consumption and decision-making. By integrating gamification, participatory processes can become more effective and impactful, generating positive results for society.

Legaki et al. (2021) present the creation of a web application called JudgeIt, developed exclusively to meet the needs of research. This app aims to provide a complementary educational tool that teaches and raises awareness of the heuristics and biases that impact human judgment. In addition, gamification is worked on in this article as an innovative and effective approach to improve the learning of complex concepts, such as judgment and prediction heuristics, through game elements and challenges that engage students and promote a more engaging learning experience.

In this context, the game-based learning approach has been shown to be more effective and beneficial compared to traditional teaching methods such as lectures and passive reading. More specifically, the results directly indicated the potential of using game-based learning approaches in the context of cognitive biases in human judgment in a prediction course and imply a positive expectation of their potential in other similar settings as well.

By specifically addressing training and capacity building programs for civil servants, by incorporating game-based learning approaches into courses and workshops on decision-making, public policy management, and communication, governments can promote a better understanding of cognitive biases and heuristics among their employees, which can improve their ability to make informed decisions and avoid cognitive pitfalls.

Romanov and Holler (2021) conducted a research proposing the use of gamification to address public energy management, specifically in the context of sustainable district heating. The authors identified gamification as a promising educational tool, viable for both higher education and non-professionals.

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

It is interesting to highlight the importance of public awareness and acceptance of technology to achieve climate goals. Within the public sector, incorporating gamification as a tool can play a crucial role in increasing the uptake of the technology and encouraging the adoption of more sustainable behaviors. By sensitizing society and engaging it, the application of gamification provides a unique opportunity for the development of participatory and collaborative strategies, as well as more impactful educational programs, aiming at a successful transition to more sustainable practices.

Zenk et al. (2021) led an innovation workshop aimed at high-ranking city managers in Vienna, with focus on redefining the municipality's digital open data strategy. Participants were tasked with carrying out group innovation activities, using two different types of materials: moderation cards and LEGO bricks. It was observed how the use of the LEGO brick configuration not only stimulated the development of alternative perspectives, but also allowed a reinterpretation of specific issues or problems. In addition, it provided a playful exploration of possibilities and facilitated the discovery and creation of new solutions to problems. This illustrates the practical applicability of gamification as a strategic tool that facilitates the exploration of new perspectives and innovative solutions, enhancing creativity in the early stages of innovation projects.

Considering this, the potential of playful techniques to drive innovation and effectiveness in the public sector is highlighted, promoting a more creative and participatory approach to problem-solving and policy development. By promoting a more participatory approach, playful techniques allow those involved to actively contribute ideas and solutions, resulting in policies that are more tailored to the needs of the community. Additionally, by creating a more relaxed and interactive work environment, these approaches can increase the engagement and motivation of public servants, leading to more effective and innovative outcomes.

Knowing that gamification in the tourism industry aims to motivate and retain consumers while also promoting sustainable tourism, Nuanmeesri (2022) developed a gamification-based mobile application to raise business standards in emerging cities by optimizing the tourist experience and maximizing points of interest, while minimizing operational costs. Adaptive tourism recommendation strategies were identified, capable of balancing the tourist offer, avoiding overcrowding and promoting competitiveness.

13

The results of this research have significant implications for the public sector, especially in terms of tourism management in urban areas. By applying adaptive tourism recommendation strategies and taking advantage of gamification, governments can substantially improve the tourist experience, optimize the use of tourism resources, and mitigate negative impacts such as overcrowding. Additionally, by promoting sustainable tourism, these initiatives can contribute to local economic development, the preservation of cultural and environmental heritage, and job creation in the tourism industry.

Chamaret et al. (2023) set out to investigate the impact of gamification on the transformative practices of families in search of energy sufficiency, considering the various concerns faced on a daily basis. In this context, the authors' focus is on understanding how gamification can influence these practices, evidencing both the effort and the time required to modify habits towards sufficiency. The results revealed mixed effects of the challenge, depending on the profiles of the households, especially in terms of the liveliness of their practices before, during, and after the challenge, and their responses to the gamification elements.

In practical terms for the public sector, the results highlight the need for policymakers to invest in interventions that facilitate the integration of energy sufficiency into household routines. This involves adopting gamification strategies to encourage family participation and engagement. In addition, it is crucial to personalize these interventions according to different family profiles, aiming to increase their effectiveness and acceptance.

Lai and Langley (2023) proposed a company-level case study to highlight the importance of research on gamification in FinTechs. The study addresses how companies have implemented gamification techniques to illustrate the fundamental role of socio-technical knowledge, new configurations in the financial relationships of Application Service Providers, and changes in the intermediation of FinTechs.

It is relevant to highlight the role of gamification, as intermediaries use this approach to make finance more engaging and accessible, while promoting a business strategy to attract and retain customers. Transforming financial activities into attractive and fun experiences, these apps seek to integrate deeply into users' daily routines. In this case, this

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

innovation is not seen as risky, but rather as an effective way to promote financial services while providing a dynamic and engaging experience for users.

In the context of the public sector, governments can draw inspiration from FinTech's approach to making financial services more accessible and attractive to citizens. By incorporating gamification elements into finance-related government applications, such as taxes, social security, or benefits, governments can encourage citizens to better manage their personal finances while promoting healthy financial habits.

The study by White et al. (2023) highlights gamification as a promising strategy to engage and motivate the older population in health promotion initiatives, especially during the Covid-19 pandemic. However, it is essential to strengthen regional capacities and skills to scale up the effective use of these tools by a growing number of people.

Thus, within the scope of public management, gamification offers an opportunity to improve the design of interventions and promote the health and well-being of the elderly population, especially in times of social distancing. These interventions can include programs to encourage physical activity, digital health screening, and health education initiatives tailored to the specific needs and interests of older adults, thereby contributing to a better quality of life and reducing burdens on the healthcare system.

Zhang (2023) explores the impact of the internet-driven green public welfare model in promoting sustainable behaviors. Focusing on the case study of the "Ant Forest", the article investigates how gamification and the use of technology can motivate citizens to adopt a low-carbon lifestyle. By transforming sustainable practices into interactive and rewarding challenges, the model demonstrates how gamification can be an effective tool for promoting positive behavioral change towards a more environmentally conscious society.

Flavián et al. (2024) conducted research that highlights the complexity of the user experience at cultural events in the metaverse, revealing attention and authenticity challenges. In this case, the incorporation of gamification as a possible solution to the identified challenges represents a significant innovation in the field. The authors identified that gamification can mitigate the negative effects of users' lack of attention, promoting more authentic experiences and positive behaviors. In addition, it is worth noting that this is one of the first studies to empirically analyze the tourist experience in the metaverse.

When considering holding virtual cultural events, managers and policymakers can benefit from these insights to improve users' experience in the metaverse. Gamification can be an effective tool to promote attendee participation and engagement, making events more attractive and impactful. Additionally, by better understanding the challenges faced by users, decision-makers can develop more efficient strategies for organizing virtual cultural events that meet the needs and expectations of the audience.

In addition, starting with the analysis of keywords, VOSviewer version 1.6.19.0 was also used. The software is used to visualize the bibliometric networks present between the studies. The analysis seeks to enrich the understanding of the thematic clusters and to assist in the elaboration of the content based on each thematic cluster. Another goal is to use it to predict future research in the highlighted fields, in this case, gamification and public management.

Figure 3 – Co-occurrence of keywords
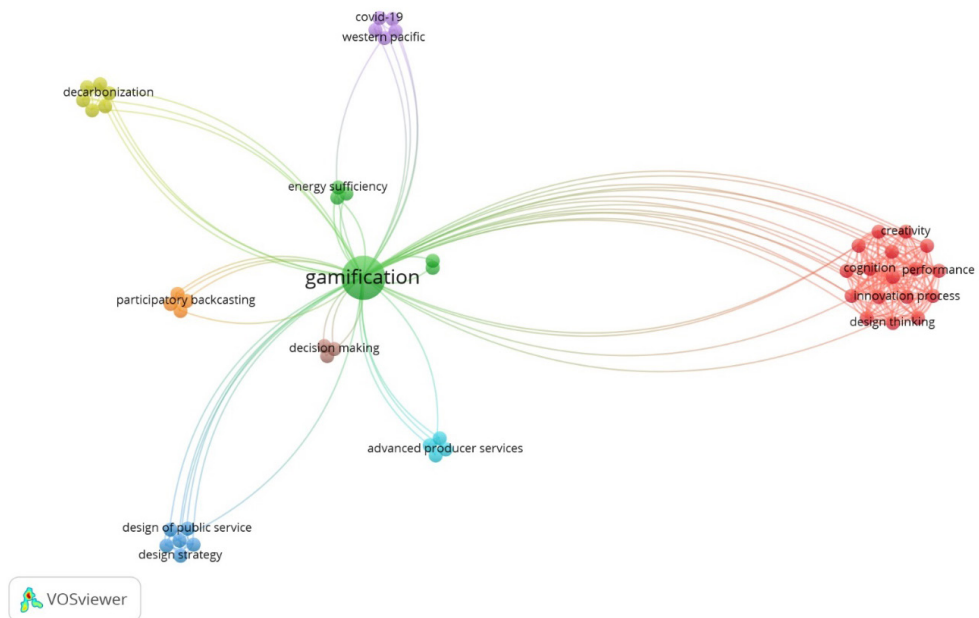
Source: Authors, 2024.

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

Eight clusters were identified. At the center of the map, gamification stands out as a central element, drawing connections with virtually every other term, suggesting its integrative nature and its role as a catalyst for innovation and engagement in the public sector.

The first cluster, highlighted in red, focuses on creative and innovative potential in the workplace. Terms such as cognition and creativity, along with design thinking and lego serious play, indicate a trend towards the use of playful approaches to solve problems and stimulate innovation in organizations. It highlights the way in which cognitive processes benefit from the use of artifacts, such as LEGO bricks, to enhance cognitive activity and creativity, as explored by Zenk et al. (2021).

The second cluster, highlighted in dark green and centrally located, brings together keywords such as adaptive tourism recommendation and emerging city. This grouping focuses on urban resilience and community tourism in developing cities, highlighting the use of gamification to raise the quality of tourism products and services, both in offline and online environments (Nuanmeesri, 2022). It is also important to note the inclusion of the term mindfulness, which refers to the practice of maintaining a conscious and focused attention on the present. This notion is linked to social practices and energy sufficiency, suggesting that policies inspired by game mechanics can promote the democratization of energy access and its efficient use. Gamification, thus, emerges as a promising vehicle to encourage transformations towards more sustainable lifestyles, integrating momentary awareness, conscious social practices, and energy efficiency (Chamaret et al., 2023).

In the third cluster, highlighted in dark blue, the words engagement loop and public engagement highlight the potential of gamification as a tool to involve citizens in the formulation of public policies. On the other hand, user experience, design strategy, and design of public service indicate the initiative to use gamification in public institutions for strategic purposes, aiming at a more effective participation of the public in the public services and policy sectors (Koo & Lee, 2017). The fourth cluster, in light green, is focused on sustainability and social acceptance of new energy practices. Keywords such as decarbonization, energy transition, and district heating indicate a discussion about the transition to cleaner and more sustainable energy, with gamification emerging as a mean of awareness and education through serious games (Romanov & Holler, 2021).

The fifth cluster, in purple, highlights topics such as Covid-19 and digital inclusion as well as health promotion and older adults. The pandemic period has changed service delivery models and boosted the delivery of digital services, including health promotion interventions. In this context, it is emphasized how gamification and serious games are increasingly used to engage and motivate users, including among the elderly, who are becoming increasingly familiar with technology in their daily activities, as explored by White et al. (2023). The sixth cluster, highlighted in light blue, addresses the intersection between advanced producer services, fintech, and intermediation. This reveals how digital gamification is integrating into financial intermediation practices, which are especially important for fintech companies. This integration refers to the incorporation of video game elements into applications, aiming to engage users in the fields of advanced financial services and technology (Lai & Langley, 2023).

In the seventh cluster, highlighted in orange, the terms participatory backcasting and sustainable lifestyles indicate the use of gamification as a tool to plan and realize sustainable futures. These themes explore how participatory backcasting processes, which incorporate gamification elements to increase engagement, impact participants by making the process a positive and collaborative experience (Guillén Mandujano et al., 2021). Finally, the eighth cluster, in brown, with the keywords decision making, forecasting, and judgment bias, emphasizes game-based learning and how this approach can reduce cognitive biases and improve comprehension and performance in complex cognitive tasks, such as decision-making (Legaki et al., 2021).

DISCUSSION

After the Systematic Review of the Literature, the information was compiled, resulting in the construction of a propositional framework for the use of gamification by public management. This process allowed not only the identification of the various applications of gamification in government contexts, but also the analysis of its impacts and potential benefits.

The propositional framework (Figure 4), based on the literature of Oliveira and Farias (2020), called the Gamified Modeling Framework (GMF) is a tool for the understanding

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

and implementation of gamification in public management, and it is composed of eight distinct categories for analysis, this framework offers a clear and accessible structure to guide public managers in the construction and implementation of gamified strategies. In addition, its easy-to-access and easy-to-understand language makes it uncomplicated to understand the concepts and principles involved in using gamification.

FIGURE 4 – GMF on gamification in public management based on the literature.

How to win?	Rules	Pain	Author
Following the planning carried out by the public administration	Use of available resources to obtain results	Lack of citizen engagement and participation	Public management
Game Elements User's experience, playful dynamics, scores, levels, challenges, narrative, leaderboard, and physical materials.			**Players** Citizens
Costs Costs involving awards, advertisements, and platform development for users		**Expected benefits** Increase citizen engagement and participation	

Source: Authors, 2024.

In Figure 4, public management plays the role of the author, being responsible for designing and implementing gamification strategies. Citizens are the players, in this context, representing the target audience of gamified initiatives. The pain perceived by public management is the lack of engagement and participation of citizens in public issues and services. The expected benefits include increased citizen engagement and participation, which can lead to greater effectiveness and efficiency in the delivery of public services. However, achieving these benefits does not come without costs, which can include investments in awards, marketing campaigns, and platform development for users. To win, public management must follow carefully crafted planning, implementing gamification strategies consistently and in line with the community's goals and needs.

The reviewed studies present a variety of gamification elements that are applied in different contexts of public management. For example, Koo and Lee (2017) proposed a user experience design approach to engage the public and promote the active participation of

users in public policymaking. Guillen Mandujano et al. (2021) developed a gamified framework for backcasting processes, while Legaki et al. (2021) used scores, levels, challenges, narrative, and leaderboard to improve learning outcomes on biases and heuristics of human judgment. Romanov and Holler (2021) focused on the development of gamified strategies for the transformation of heat supply systems, while Zenk et al. (2021) explored gamified workshop materials, including LEGO bricks and moderation cards.

CONCLUSION

The analysis of the works revealed an interconnection between themes related to gamification and public management, highlighting the centrality of gamification as a catalyst for innovation and engagement in the public sector. The studies identified several areas of application of gamification, from the promotion of creativity and innovation in the workplace to digital inclusion, public health, and the transition to more sustainable energies. In addition, the potential of gamification to engage citizens in the formulation of public policies and promote a more sustainable future was highlighted. These findings emphasize the relevance of gamification as a versatile and promising resource for fostering innovation in the public sector, as well as confirming its effectiveness.

Based on the evidence, this study proposed the elements of gamification necessary to solve problems faced by public management based on citizen engagement and motivation. Evidencing the rules to be followed, which refer to the use of the resources available by the author to obtain the results expected by him and understand that there are costs related to the use of this innovative approach.

It is important to note that, when conducting a systematic analysis, gamification should not be confused with the simple use of games in serious contexts. This highlights the authors' considerable knowledge on the subject, highlighting the benefits that gamification can provide to public organizations, especially when aimed at obtaining results that benefit users of public services. As suggestions for future work, it is proposed to study the applicability of the strategy proposed by this article, listing its points of improvement and evolution, given that it was carried out based on the available literature.

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

REFERENCES

Agarwal, R., Mittal, N., Patterson, E., & Giorcelli, M. (2021). Evolution of the Indian LPG industry: Exploring conditions for public sector business model innovation. *Research Policy*, *50*(4), 104196. https://doi.org/10.1016/j.respol.2020.104196

Araújo Filho, R. C., Oliveira, F. M., & Nolasco, J. G. (2020). A carta fora do baralho: o lado obscuro da gamificação. *Revista Valore*, *5*(1), 355–361.

Araújo, C. A. G., & Tenório, L. E. F. (2012). *Proposta de um processo de Gamification utilizando redes sociais como ferramenta* [Apresentação oral]. XI SBGames, Brasília, DF, BR.

Bisht, B., & Sharma, S. (2011). Social Accountability: Governance Scenario in the Health and Education Sector. *Journal of Social Sciences*, *29*, 249–255.

Canto, L., S., M., & Massignan, C. (2021). Apresentação e Interpretação do Risco de Viés nos Resultados e Meta-análise. In L. S. M. Canto, C. M. Stefani, & C. Massignan (Orgs.), *Risco de Viés em revisões sistemáticas: guia prático* (Cap. 15, pp. 245–270). Brazil Publishing.

Carolei, P., Munhoz, G., Gavassa, R., & Ferraz, L. (2016). *Gamificação como elemento de uma política pública de formação de professores: vivências mais imersivas e investigativas* [Apresentação oral]. Simpósio brasileiro de games e entretenimento digital (SBGames), São Paulo, SP, BR.

Cavalcante, P. P. (2023). *Avaliação da mudança na qualidade dos relatórios com a aplicação da gamificação em atividades de inteligência policial.* [Dissertação de Mestrado Profissional]. Universidade de Brasília.

Chamaret, C., Guérineau, M., & Mayer, J. C. (2023). When saying "enough" is not enough: How cultivating households' mindfulness through gamification can promote energy sufficiency. *Energy Research & Social Science*, *105*(1), 103294

Chambers, J. (2015, 7 April). Gamification: When governments up their game. *Civil Service World*. https://www.civilserviceworld.com/in-depth/article/gamification-when-governments-up-their-game

Cloke, H. (2023, 27 May). 19 gamification trends for 2023-2025: Top stats, facts & examples. *Growth Engineering*. https://www.growthengineering.co.uk/19-gamification-trends-for--2022-2025-top-stats-facts-examples/

Costa, L. F. C. (2016). *Gamificação: regras claras para uma gestão pública orientada a resultados*. [Dissertação de Mestrado]. Universidade de Brasília.

Damiani, C., Machado, G. M., & Gasparini, I. (2019). Personalização e Gamificação no Contexto de Cidades Inteligentes. *Cadernos de Informática*, *10*(1), 15–27.

Flavián, C., Ibáñez-Sánchez, S., Orús, C., & Barta, S. (2024). The dark side of the metaverse: The role of gamification in event virtualization. *International Journal of Information Management*, *75*(1), 102726.

Girdauskiene, L., Ciplyte, E. A., & Navickas, V. (2022). Gamification as an innovative instrument for employee engagement. *Marketing and Management of Innovations*, *1*, 10–17. https://mmi.sumdu.edu.ua/volume-13-issue-1/article-1/

Guillén Mandujano, G., Quist, J., & Hamari, J. (2021). Gamification of backcasting for sustainability: The development of the gameful backcasting framework (GAMEBACK). *Journal of Cleaner Production*, *302*(4), 126609.

Hassan, L., & Hamari, J. (2020). Gameful civic engagement: A review of the literature on gamification of e-participation. *Government Information Quarterly*, *37*(1), 101461.

Kapp, K. M. (2012). *The gamification of learning and instruction: game-based methods and strategies for training and education*. John Wiley & Sons.

Kim, M. Y., & Kim, S. W. (2022). Deriving public innovation capacity: Evidence from the Korean public sector. *Frontiers in Psychology*, *13*(1), 898399.

Koo, Y., & Lee, S. (2017). Developing UX design strategies for the better engagement of the public through the use of gamification in the public service and policy sector. *Archives of Design Research*, *30*(4), 87–107.

Lai, K. P. Y., & Langley, P. (2023). Playful finance: Gamification and intermediation in FinTech economies. *Geoforum*, *2*(1), 103848.

Legaki, N. Z., Karpouzis, K., Assimakopoulos, V., & Hamari, J. (2021). Gamification to avoid cognitive biases: An experiment of gamifying a forecasting course. *Technological Forecasting and Social Change*, *167*(5), 120725.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *Journal of Clinical Epidemiology*, *151*(4), 65–94.

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

Ljungholm, D. P. (2015). The impact of transparency in enhancing public sector performance. *Contemporary Readings in Law and Social Justice*, *7*(1), 172–178.

Lyrio, M. V. L., Lunkes, R. J., & Castelló Taliani, E. (2018). Thirty years of studies on transparency, accountability, and corruption in the public sector: The state of the art and opportunities for future research. *Public Integrity*, *20*, 512–533.

Mirza-Babaei, P., & Stahlke, S. N. (2023). *Interaction design in digital games* [Oral Speech]. Chi '23: Chi Conference on Human Factors in Computing Systems, Alemanha.

Nair, S., Mathew, J., & Ravikumar, T. (2023). Levelling up organisational learning through gamification: Based on evidence from public sector organisations in India. *South Asian Journal of Human Resources Management*, *10*(1), 64–84.

Nuanmeesri, S. (2022). Development of community tourism enhancement in emerging cities using gamification and adaptive tourism recommendation. *Journal of King Saud University – Computer and Information Sciences*, *34*(10), 8549–8563.

Oliveira, F. M., & Farias, G. A. de. (2020). *Quadro de modelagem gamificada: manual para gamificadores*. Gráfica e Editora da Uespi.

Oliveira, F. M., & Graças, R. R. (2020). Gamificação com foco em resultados. *Revista Valore*, *5*(1), 204–214.

Oliveira, J. A. (2023). Evolution of the Brazilian public administration. *Вопросы государственного и муниципального управления*, (6), 30–43.

Prodanov, C. C., & Freitas, E. C. (2013). *Metodologia do trabalho científico: métodos e técnicas da pesquisa e do trabalho acadêmico* (2a ed.). Editora Feevale.

Ramalho, A. L. de O. S., Oliveira, F. M., Cabral, A. C. de A., Santos, S. M. dos, Costa Holanda, T., & Ricarte, T. L. (2024). Bibliometric Study of Scientific Production on Greenwashing. *Revista De Gestão Social e Ambiental*, *18*(5), e05280. https://doi.org/10.24857/rgsa.v18n5-061

Robinson, K. A., Saldanha, I. J., & McKoy, N. A. (2011). Development of a framework to identify research gaps from systematic reviews. *Journal of Clinical Epidemiology*, *64*(12), 1325–1330.

Romanov, D., & Holler, S. (2021). District heating systems modeling: A gamification approach. *Energy Reports*, *7*(4), 491–498.

Salvalai, G., Sesana, M. M., Dell'Oro, P., & Brutti, D. (2023). Open innovation for the construction sector: Concept overview and test bed development to boost energy-efficient solutions. *Energies*, *16*(14), 5522.

Santosa, H. D. (2023). Role of Service Innovation in Enhancing Customer Satisfaction in the Public Sector Organization. *Jurnal Ilmiah Ilmu Administrasi Publik*, *13*(1), 183–188. https://doi.org/10.26858/jiap.v13i1.45356

Silva, G. H. T., & Medeiros, C. (2019). Jogo da regulação: gamificação e design thinking para gerar empatia e experiências de aprendizagem no ambiente regulatório. In P. Cavalcante (Orgs.), *Inovações e políticas públicas: superando o mito da ideia* (Cap. 22, pp. 409–427). Instituto de Pesquisa Econômica Aplicada.

Sousa, J. R., Gomes, D. R. D., Oliveira, F. M., Lima, L. de M., Silva, J. de S., Silva, R. S. da, Batista, M. V. R., & Silva, M. V. A. e. (2022). O uso da gamificação no ensino de educação financeira com alunos de um projeto de extensão. In A. C. Castro (Orgs.), *Administração: Princípios de Administração e Suas Tendências* (Cap. 9, pp. 119–128). Editora Científica Digital.

Taylor, J. (2021, 24 November). Game Design for Public Services. *Public*. https://www.public.io/report-post/game-design-for-public-services

Tesi, B., Donia, P., Covelli, A., Aloise, I., Renzi, E., Massimi, A., & Villari, P. (2023). "Health is a serious game": Gamification as a tool for primary prevention in Public Health. *The European Journal of Public Health, 33*(1), 122.

Thiel, S. (2017). Let's play urban planner: The use of game elements in public participation platforms. *PlaNext-next generation planning*, *4*, 58–75.

Vianna, Y., Vianna, M., Medina, B., & Tanaka, S. (2014). *Gamification Inc. Recreating companies through games*. MJV Press.

White, B. K., Martin, A., & White, J. (2023). Gamification and older adults: Opportunities for gamification to support health promotion initiatives for older adults in the context of COVID-19. *Lancet Reg Health West Pac.*, *35*, 100528.

Zahn, J., Silva, M. da, Mourão, E., Gracioli Neto, C., Grilo, E. S. Viterbo, J., & Bernardini, F. C. (2021). *Ajuda aí, Sinop!: Uma ferramenta para crowdsourcing com gamificação aplicada a cidades inteligentes* [Apresentação Oral]. IX Workshop de Computação Aplicada em Governo Eletrônico, Porto Alegre, RS, BR.

FELIPE MOURA OLIVEIRA, IGOR LOPES CORDEIRO,
ANA LIDIA DE OLIVEIRA SILVA RAMALHO, THAMARA MARCOS DOS SANTOS

Zait, A. (2023, 13 September). *Social innovation – the root of all public sector transformations*. In Proceedings of the Central and Eastern European eDem and eGov Days 2023. Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/3603304.3603337

Zenk, L., Hynek, N., Krawinkler, S. A., Peschl, M. F., & Schreder, G. (2021). Supporting innovation processes using material artefacts: Comparing the use of LEGO bricks and moderation cards as boundary objects. *Creativity and Innovation Management, 30*(4), 845–859.

Zhang, S. (2023). How the internet+ green public welfare model cultivates a low-carbon and green lifestyle: Case of Ant Forest. *Journal of Urban Planning and Development, 149*(3), 04023015.

Zichermman, G., & Cunningham, C. (2011). *Gamification by design: implementing game mechanics in web and mobile apps*. O'Reilly Media.