



ASSESSING THE LEVEL OF CREATIVITY IN OPEN SOCIO-ECONOMIC SYSTEMS: THE CASE OF THE VIDEO GAME INDUSTRY

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Abstract. The aim of the study is to develop and empirically validate an integrated mixed-methods toolkit that combines expert and quantitative indicators for the systematic measurement of creativity in the process of creating video games in open socio-economic systems in the context of the Ukraine. The object of the study is the systemic manifestation of creativity within the video game development process as an open socio-economic system under extraordinary conditions. The scientific objective of the study is to develop a theoretical basis for assessing creativity in the video game development industry and to formulate a methodology for a comprehensive assessment of creativity, including qualitative and quantitative methods, to ensure objectivity and reliability of the results. The research methodology includes the method of expert analysis, together with the Delphi method and the method of integral assessment. The researchers managed to produce results like a new methodological approach to assessing the level of creativity among workers in the video game development industry. Limitations of your study may include reliance on subjective judgment in the peer review and Delphi methods, which may affect the objectivity of the results. Future research prospects could include expanding the methodology to more companies to ensure greater representativeness and using automated tools to analyze creativity, which could help improve the objectivity of the assessments.

Keywords: creativity, creative processes, innovative thinking, creative potential, video game development, creative industries, integral assessment, technological creativity.

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1. Introduction

1.1. Relevance of the chosen topic

Creativity is becoming a decisive factor in the survival and development of various types of socio-economic systems, since this parameter is the basis of organisational sustainability and innovative potential (Hall et al., 2020; Krisiukėnienė & Pilinkienė, 2023). The results of empirical studies indicate that the current situation in the world dictates new conditions and forms new problematic situations, from local failures to large-scale problems. Such problematic conditions determine the need to form new, more adaptive approaches to thinking and the creative process (Xie et al., 2021; Palmiero et al., 2022). Moreover, a deeper theoretical understanding of modern technologies for the development of creative thinking is a fundamental step towards optimizing their practical implementation. A striking example of this is the formation of a more detailed theoretical context for Game Jam, which is based on modeling the processes of idea generation under conditions of high leadership influence (Contreras-Espinosa & Eguia-Gomez, 2022), language-independent remote associate tasks designed for cross-cultural creative evaluation (Becker et al., 2022), and documented emotional creativity

enhancements through gameplay (Čábelková et al., 2020). Although there are already a large number of studies on the assessment of creativity due to complex meta-analyses of psychometric approaches (Plucker, 2022) and research on creativity in entrepreneurship in start-ups (Palos-Sanchez et al., 2020; Ganter-Argast et al., 2024), none of these studies provides any practical insight into their proposal. However, our study solves this problem by using expert analysis, the Delphi method and an integrated scoring system together.

1.2. Purpose, structure and object of research

The aim of the study is to develop and empirically validate an integrated mixed-methods toolkit that combines expert and quantitative indicators for the systematic measurement of creativity in the process of creating video games in open socio-economic systems under extreme challenges. The object of the study is the systemic manifestation of creativity within the video game development process as an open socio-economic system under extraordinary conditions. The structure of this study is designed to provide an in-depth understanding of creativity in the video game industry and an assessment of this phenomenon among industry workers.

2. Literature review

2.1. Theoretical background supporting the constructs

This research draws from recognised creativity frameworks to substantiate the constructs measured. Specifically, Amabile's Componential Theory of Creativity (2012) underlines the importance of domain-relevant skills, creativity-relevant processes, and intrinsic motivation; Sternberg's Investment Theory emphasises creative intelligence and willingness to take intellectual risks; and Guilford's Structure of Intellect model highlights divergent and convergent thinking as key processes.

To fully analyze the topic under study, we have defined three key areas of the section. First of all, the first subsection of the section outlined the foundations of creativity. The second section defines how empirical indicators of creativity were defined and practically tested in similar studies. Finally, the last section examines the problems and gaps that exist in the theoretical definition and practical application in this area. Such a structured analysis will allow us to fully outline the theoretical basis of the study. Beaty and Johnson (2021) focus on automating creativity assessment through the development of a platform that uses semantic distance to measure creativity. However, Khalil et al. (2020) examine the effects of transcranial direct current stimulation on divergent creative thinking. They find that changes in inhibitory control can alter the effects of stimulation on creativity, suggesting the possibility of physiological interventions to enhance creativity. Li et al. (2022) examine the effects of transcranial stimulation on the dynamics of divergent thinking.

2.2. Analysis of creativity and its assessment in the video game industry

A study by Contreras-Espinosa and Eguia-Gomez (2022) illustrates how Game Jams serve as valuable tools for developing creative skills. They create an intense environment where developers can experiment and innovate, which is important for enhancing the creativity of

participants. At the same time, Plucker (2022) highlights the importance and dynamics of creativity assessment in an academic context, providing insights that can be adapted for video games, particularly in techniques for assessing the creative process and the original product. Similarly, a study by Krišukėnienė and Pilinkienė (2023) examines the theoretical underpinnings of innovativeness in creative industries, focusing on the relationship between creativity and performance, which is relevant for video games, where innovation becomes a key success factor. Becker et al. (2022) make an important contribution to creativity assessment methods by developing language tools that can be useful for international game developers as they allow creativity to be assessed without the barriers of language. Similar to the study by Handrich et al. (2022) and Čábelková et al. (2020) explore the relationship between product innovativeness and video game success, showing how creativity affects consumer acceptance of a game and its market success, highlighting the importance of accurately measuring and developing these abilities. A study by Adcock et al. (2020) and Kandemir and Kaufman (2020) focuses on the use of video games to train older adults, examining their feasibility and effectiveness. The authors study how multi-component video games can improve cognitive and physical abilities in older adults. Hall et al. (2020) explore expressive creativity and creative design aspects in digital games. Rykała (2020) analyzes the growth of the video game industry in the context of the creative industries.

2.3. Comparison of results with relevant sources

Han et al. (2022) and Palos-Sanchez et al. (2020) examine the impact of feedback on creativity, specifically how perspective taking influences the creative process. Although their study focused on mechanisms for stimulating creativity through feedback, our study provides a comprehensive methodology for assessing creativity that includes both qualitative and quantitative methods, providing a more comprehensive approach to measuring creativity. From the point of view of assessing creativity, the studies of Ganter-Argast et al. (2024) are interesting, studying the positive effects of games on creativity and brain plasticity. While Lin and Chang (2020) and Rahimi and Shute (2021) examine whether open office environments support creativity, particularly due to workers' positive mood.

Rosen et al. (2020) and Ceh et al. (2022) explore design for creative thinking, learning and assessment in schools, focusing on methods to promote creativity in educational environments. Their research highlights the importance of creating learning programs that support and develop students' creativity through interactive and innovative approaches. Chaminade et al. (2020) and Kovalkov et al. (2021) explore global innovation networks in the video game industry in Southern Sweden. Their study focuses on regional and global aspects of innovation, while our study proposes a methodology for assessing creativity at the individual and team levels, focusing on the specifics of video game development. Mazur and Duchlinski (2020) and Bostan and Şengün (2023) examine issues of trust and creativity in a networked society.

2.4. Unexplored aspects of creativity in the video game industry

Despite significant and significant research, the area of creativity in the video game industry remains poorly understood. Many aspects require deeper analysis and understanding to fully understand the role of creativity in this dynamic field (Table 1).

Table 1. Key gaps in the literature on creativity in the video game industry (source: created by authors)

Gap	Essence
Lack of unified methods for assessing creativity	Most existing approaches are subjective and context-specific, making difficult to compare results between different studies and companies.
The lack of research on the impact of creativity on long-term gaming performance	Most studies focus on short-term results such as sales and ratings, but little attention is paid to how creativity affects long-term player engagement and market sustainability of games.
The lack of research on creative processes in interdisciplinary teams	Video game development involves specialists from different industries (designers, programmers, artists, screenwriters), and how creativity manifests and interacts in such teams has not yet been sufficiently studied.

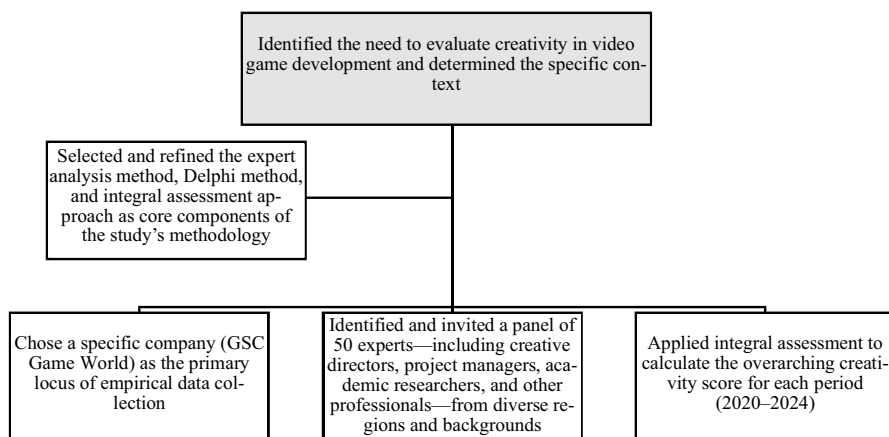
Considering certain gaps and problems, our study, through the use of an integrated methodology, will provide an opportunity to more deeply reveal the dynamics of creativity indicators in the context of the video game industry.

3. Methodology

3.1. Method of integral assessment of creativity

Our approach is based on a comprehensive integrated assessment approach, the structure of which includes expert assessment methods, consensus building through the Delphi method, and quantitative assessment. Accordingly, the expert assessment method makes it possible to identify specific and innovative ideas in this area. Using such a set of methods will allow us to achieve a greater degree of empirical rigor, in the context of which most of the principles and requirements of game design and development will be implemented. Systematizing the process of integral assessment is depicted in Figure 1.

Our approach adopts an umbrella-like “integral evaluation” framework, merging expert reviews, Delphi consensus-building, and quantitative scoring into a cohesive methodology.

**Figure 1.** Features of the integral assessment (source: created by authors)

3.2. Expert analysis method for assessing creativity in the video game development industry

Using the expert analysis method allowed us to formulate and structure groups of creativity indicators that are critical for assessment. Experts, working individually, determined not only the key indicators but also their maximum values and weight, which makes it possible to take into account the significance of each indicator separately.

Systematizing the entire process of conducting expert research is described in Table 2.

Table 2. Key aspects of expert assessment using the Delphi method in creativity research (source: created by authors)

A key aspect	Essence
Number of experts	50 experts
Helper method	Delphi method
Questionnaire type	In our study, the survey type involved remote questioning of experts. This allowed us to collect objective and detailed responses from professionals from different geographic regions.
Criteria for selecting experts	Experts must have significant professional experience in the field of video game development (at least 5–10 years), an appropriate educational level, recognition in the professional community, as well as practical achievements in the development of successful commercial games

Our protocol begins by selecting experts based on a minimum of five years' experience in video game development, proven creative output (e.g., shipped titles, design innovation), and recognized standing within the community. Parallel to Delphi, we use an expert assessment method wherein participants assign weighted importance to each indicator, typically via a 1-to-5 scale.

3.3. Research design, protocol, ethics, and sample selection

From the above description of all methods that make up the structure of the methodology, it can be concluded that the study is based on a convergent mixed-methods design. This design is formed by integrating qualitative components – expert review, consensus building using Delphi (e.g., Dalkey & Helmer, 1963; Linstone & Turoff, 1975), thematic analysis of expert comments – with a quantitative integral assessment using weighted indicators and a numerical assessment.

4. Results

4.1. Input data and stages for creativity assessment

The process of enhancing creativity is characterized by highly dynamic changes in basic parameters, requiring quick reactions and active engagement from employees in the video game development industry. These basic parameters include changes in the external environment and adjustments to internal processes, which provoke new challenges, increased risks,

and the necessity to counter threats. We have selected a video game development company in Ukraine: GSC Game World.

All expert options were quantified using a continuous scale of creativity levels (0.00–1.00): segmented into low (0.00–0.33), medium (0.34–0.66), and high (0.67–1.00). The graphical construction of this scale is shown in Figure 2. Such threshold values were established by conducting pilot analyses that correlated our integral creativity scores with the Torrance tests of creative thinking. In this way, we will ensure confirmation of the validity of the criteria and align the percentile groups with empirical control indicators. In addition, internal consistency (Cronbach's $\alpha = 0.82$) and test-retest reliability ($r = 0.79$) further demonstrated the stability of the formed scale in accordance with technical, creative, and collective indicators.

To classify creativity levels (low, medium, high), we employed a tiered scale validated through pilot analyses correlating integral scores with established creativity measures (e.g., the Torrance Tests of Creative Thinking). The numeric cutoffs – 0.0–0.33, 0.34–0.66, and 0.67–1.0 – stemmed from percentile-based groupings, where values below 0.34 indicated limited or inconsistent creative output, while those above 0.67 aligned with top-tier creative performance in prototyping and market success. Internal consistency checks (e.g., Cronbach's $\alpha \geq 0.80$) and test-retest reliability established that these intervals accurately differentiate degrees of creative capacity across technical, artistic, and collaborative roles.

The initial step in applying the developed model involves determining five groups of indicators specific to the chosen company (in our case, GSC Game World) through a survey of experts, including employees from various management levels and invited creativity development specialists (Table 3).

The main feature of the proposed approach is that the evaluation can be conducted quarterly and annually, based on an understanding of the changes that have occurred in the working conditions of the company's employees, the internal process adjustments, and the overall creative approach.

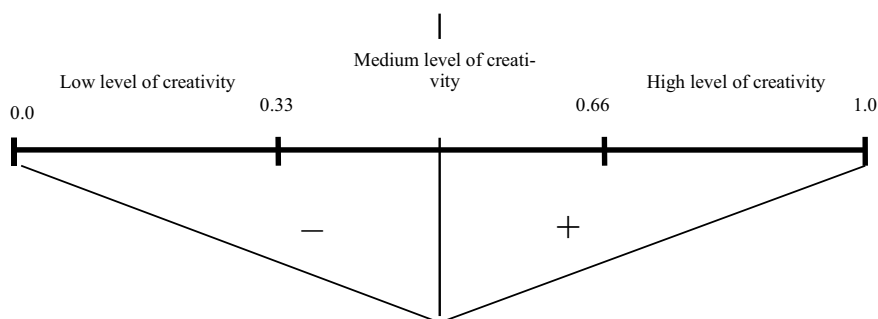


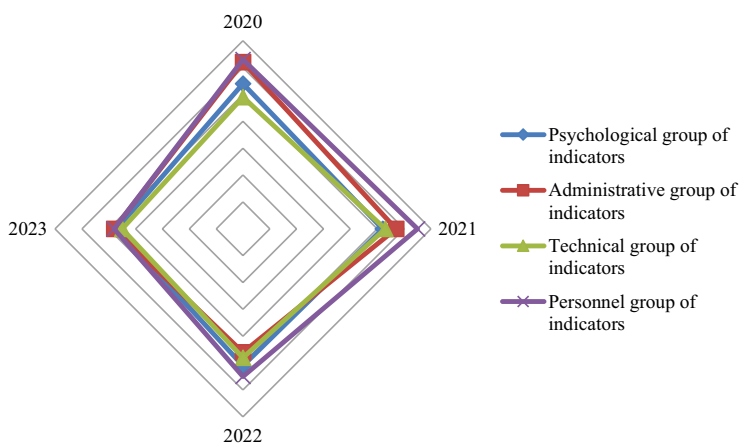
Figure 2. Scale for evaluating the level of creativity (source: created by authors)

Table 3. A model for evaluating the development of creativity in the company (source: created by authors)

Indicators	Essence
Psychological group of indicators	0.2
Level of use of innovative potential	0.3
Psychological climate	0.4
Motivation of employees	0.3
Administrative group of indicators	0.2
Democratic nature of norms and rules	0.4
Level of protection of employees	0.2
Level of use of free time	0.4
Technical group of indicators	0.2
Activity of application of digital technologies	0.3
Updating of material and technical base	0.3
Improvement of technologies for creative thinking	0.4
Personnel group of indicators	0.2
Targetedness of employees' actions	0.4
Improvement of innovative competence	0.3
Coherence of actions in making creative decisions	0.3

4.2. The results of the evaluation of the development of creativity

The invasion of Ukraine in early 2022 had profound repercussions across global industries, including the video game sector. For the video game company in question, the war likely led to a significant disruption in both their supply chains and workforce, impacting the various groups of indicators described in the article. Particularly, the technical group of indicators, such as the activity of application of digital technologies and the updating of material and technical bases, would have been affected (Figure 3).

**Figure 3.** Evaluation results by key groups of indicators (source: created by authors)

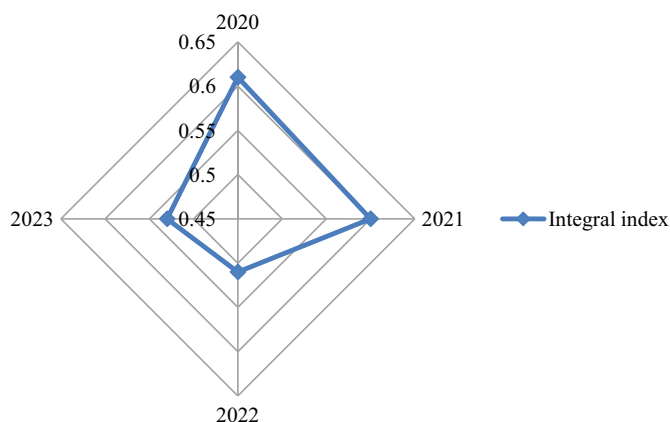


Figure 4. Evaluation results by main integral indicator (source: created by authors)

The generalized integral index, which aggregates the various specified indicators into a singular measure of overall performance or health of the company, showed a decline, reflecting the cumulative impact of the disruptions across all groups of indicators due to the war in Ukraine. This decline can be understood as the result of compounded stressors across the board (Figure 4).

It is need to note that the research was conducted as a longitudinal study spanning four consecutive years, from 2020 to 2023. The panel of experts has been consistent over the years. Furthermore, the adverse effects on the psychological and administrative aspects of the company contribute to the decline in the generalized integral index.

5. Discussion of results

By comparing the results of our study with other relevant studies, we can conclude that our study is relevant (Table 4). Our findings confirm the importance and effectiveness of the proposed methodology for assessing creativity and responding to modern challenges and requirements of the video game development industry (Table 4).

Table 4. Aspects of innovativeness of research

Aspect of innovativeness	Essence
Integration of qualitative and quantitative methods	Using a combination of qualitative and quantitative methods to ensure objectivity and reliability of the results.
Using the Delphi Method	Introduction of the Delphi method to achieve consensus among experts, which minimizes subjectivity and increases the reliability of estimates.
Focus on industry specifics	Formulates a methodology based on the unique requirements and context of the video game industry to ensure results are relevant and practical.

Our findings are consistent with similar findings from Rosen et al. (2020), who also identify the critical importance of developing creative skills, as well as the fact that external disruptive factors negatively affect cognitive flexibility. A similar relationship with our results can be found in Beaty and Johnson (2021), who emphasize the role of structured iterative assessment in maintaining creative output under conditions of uncertainty.

6. Conclusions

6.1. General conclusions of the study

To conclude our study, we developed and successfully applied a comprehensive methodological approach to assess the level of creativity of workers in the field of video game development. The study included the formulation of theoretical foundations for assessing creativity, which made it possible to in-depth analyze creative processes in the industry. We used a combination of qualitative and quantitative methods to ensure the objectivity and reliability of our results.

6.2. Practical application of the existing methodology

Our study provides an important step in the development of methods for assessing creativity, and the results of this study have significant practical implications. Applying established methodology to the real world of the video game development industry can bring significant benefits, including greater efficiency in identifying and managing creative talent.

6.3. Limitations and prospects of the study

One of the key limitations is the potential subjectivity of the methods, in particular the peer review method and the Delphi method, which depend on the personal experience and beliefs of individual experts. Need to note that, hence, the omission of Amabile (2012), Kandemir and Kaufman's (2020), and other established creativity models is not an oversight but a deliberate choice. We specifically sought to design an assessment method that could capture the multifaceted demands and extraordinary conditions of the video game industry – an approach that might not fit neatly into preexisting, more generalized models.

Given the identified limitations, future research prospects include expanding the sample and recruiting more companies from different segments of the video game industry.

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