






What are the Project Management Practices in the Digital Games Industry? A Survey Study

Lucas Pieva  [Federal University of Pampa (Unipampa) | lucaspieva.aluno@unipampa.edu.br]

Raquel Pillat  [Federal University of Pampa (Unipampa) | raquelbasso@unipampa.edu.br]

João Batista Mossmann  [University Feevale | mossmann@feevale.br]

Maicon Bernardino   [Federal University of Pampa (Unipampa) | bernardino@acm.org]

 Postgraduate Program in Software Engineering (PPGES), Federal University of Pampa, Av. Tiaraju, 810 – Ibirapuitã, Alegrete – RS, 97546-550, Brazil.

Received: 06 March 2025 • **Accepted:** 06 June 2025 • **Published:** 28 June 2025

Abstract: *Background:* The Brazilian digital games industry has been expanding rapidly, requiring effective Project Management (PM) practices to ensure success across cost, time, and scope dimensions. *Purpose:* This study investigates the PM practices, artifacts, and systems adopted by game studios and independent developers in Brazil, aiming to provide an empirical reference for researchers and practitioners. *Methods:* Using the Linaker survey methodology, we collected responses from 41 professionals across 21 studios, addressing four key research questions related to PM approaches, artifacts, and tools. *Results:* The findings reveal Scrum and Kanban as the most widely used methodologies, with artifacts such as the Game Design Document (GDD), prototypes, and Kanban boards frequently supporting project activities. Tools such as Trello, Miro, and ClickUp dominate the usage, but the lack of a standardized PM system highlights significant variability between studios. Despite the diversity, agile methods are preferred for their adaptability and alignment with industry demands. *Conclusion:* The study concludes that while Brazilian studios exhibit good PM practices, there are still gaps in the integration of academic insight with practical applications. The results provide valuable insights for the development of customized PM solutions for the digital games industry, emphasizing the need for further research to address scalability and complexity in larger projects.

Keywords: Digital Games, Project Management, Survey

1 Introduction

The digital games industry has experienced exponential growth over the past few decades, becoming an important force in the global entertainment and technology sectors [Newzoo, 2021]. In Brazil, this industry has consistently expanded, contributing significantly to the national economy and fostering innovation [Cardoso *et al.*, 2023]. For example, digital sales in Brazil increased from 54% of all game sales in 2021 to 62% in 2023, reflecting the industry's upward trajectory [Dealessandri, 2024].

However, the development of digital games is a complex process that requires robust Project Management (PM) practices to balance creativity, technological challenges, and market demands. Effective PM is essential to ensure timely delivery, budget control, and high-quality products in a highly competitive market. Nevertheless, each new project faces difficulties in adapting these processes to the realities of specific domain areas, with the digital games industry being one of the most prominent. Studies such as Amélio [2018] present aspects of the Brazilian scenario, revealing the challenges faced and also indicating possibilities to reverse this situation. Xavier *et al.* [2021], in turn, emphasize the need for software engineering in independent game studios to ensure organized project management and stronger relationships with consumers through well-designed artifacts.

Project management in digital games presents unique challenges [Dwijaputra *et al.*, 2023]. Unlike traditional indus-

tries, game development merges technical disciplines, such as programming and design, with creative processes, including narrative development and user experience design. This multidisciplinary nature often leads to a dynamic and iterative workflow, necessitating adaptable methodologies that align with the fast-paced and innovative characteristics of the industry. Consequently, traditional PM approaches are often inadequate, prompting studios to adopt agile and hybrid models tailored to the specific needs of game projects [Zackariasson *et al.*, 2006].

Despite its importance, there is a lack of empirical research examining the specific PM practices, tools, and artifacts used in the Brazilian digital games industry. Most existing studies focus on general project management or case studies of individual games, leaving a significant gap in understanding the broader trends and challenges faced by studios. This gap is particularly critical as the industry continues to grow, requiring more sophisticated approaches to handle increasing complexity and competition [Pieva and Bernardino, 2023].

In order to bridge this gap, this research investigates the project management practices, artifacts, and tools used by game studios and independent developers in Brazil. Through a detailed survey based on the Linaker *et al.* [2015] guideline, we collected insights from industry professionals to identify the prevailing methodologies and highlight areas for improvement. The study focuses on answering four research questions that explore the approaches, artifacts, and software tools used in Digital Game Project Management (DGPM).

This study aims to contribute to the field by exploring current practices and methodologies in project management for the games industry. It examines widely adopted approaches, such as Kanban and Scrum [Schwaber and Sutherland, 2020], and considers the role of key tools such as Trello and Miro. In addition, it identifies areas for improvement in standardization and integration, providing insights that can contribute to future research and practical applications. By addressing these aspects, the study seeks to support the development of tailored PM solutions that improve efficiency and innovation in this rapidly expanding sector.

Highlights:

- ▲ Presents an empirical survey with 41 professionals from 21 Brazilian digital game studios, offering a comprehensive overview of DGPM practices;
- Identifies Scrum and Kanban as the most widely adopted project management approaches in digital game development;
- Maps the main supporting artifacts used in DGPM, highlighting the Game Design Document (GDD) and prototypes as the most frequently employed;
- ▲ Reveals the predominance of lightweight, web-based software tools (e.g., Trello, Miro, ClickUp) over traditional project management platforms;
- Provides empirical evidence of methodological variability and the preference for agile practices, emphasizing the absence of a standardized DGPM model;
- Bridges the gap between academic findings and industry practices, offering insights for the development of tailored PM solutions for the game industry.

Notably, this article is an extended version of the study published in the proceedings of the XXIII Brazilian Symposium on Digital Games (SBGames 2024) [Pieva *et al.*, 2024]. To clarify the study's development and analysis, this article is structured as follows: Section 2 outlines the survey protocol, Section 3 discusses the data collection results, Section 4 addresses threats to validity, Section 5 reviews related works and surveys in the gaming field, and Section 7 presents our conclusions.

2 Survey Study

Among the instruments for data collection and analysis, the survey is one of the most widely adopted. Several methodologies and guidelines have been proposed for its implementation, including those by Wagner *et al.* [2020], Fowler Jr. [2013], and Kitchenham and Pfleeger [2008]. However, in this study, we used the approach proposed by Linaker *et al.* [2015] due to its relevance and objectivity. Figure 1 outlines the steps followed in this research, each of which is addressed in subsequent sections. Additional aspects of the implemen-

tation are discussed alongside the evaluation of the survey instrument in Section 2.2.

2.1 Protocol

Research Objective: This stage began with data extracted from the Systematic Literature Review (SLR) conducted by Pieva and Bernardino [2022] and Pieva and Bernardino [2023], which identified potential Project Management (PM) solutions reported in academic studies. These solutions needed to be analyzed by industry professionals to verify potential connections, or absence thereof, between the proposed approaches and actual practices in the digital games industry.

Thus, the objective of this survey was to identify potential PM solutions adopted in the digital games industry and compare them with the findings from the SLR. To this end, we defined a set of Research Questions (RQs) to guide the study:

- RQ1.** What approaches are commonly used for the practice of DGPM?
- RQ2.** Which PM approach is currently used in projects based on the participant's professional experience?
- RQ3.** What supporting artifacts are used in DGPM to assist in the practices of these approaches?
- RQ4.** What software tools are adopted to ensure the organized execution of DGPM stages?

The purpose of **RQ1** is to identify and map the PM approaches that have been historically adopted in the practice of DGPM. By understanding which methods are most frequently applied, e.g. agile methodologies or traditional models, we aim to reveal patterns, preferences, and potential gaps in the industry. This knowledge is crucial for contextualizing current practices and evaluating how well these approaches meet the specific demands of game development projects.

RQ2 seeks to capture an updated, real-world perspective of the project management approaches currently applied in the digital games industry. While RQ1 focuses on practices commonly known or historically used, RQ2 emphasized ongoing, practical implementations based on the participants' direct experiences. The objective is to detect emerging trends, methodological shifts, or adaptations that reflect the industry's dynamic nature and evolving needs.

Through **RQ3**, we intend to identify the specific artifacts that support the execution of PM approaches in DGPM projects. Artifacts such as the Game Design Document (GDD), prototypes, and Kanban boards play a key role in organizing, communicating, and managing development workflows. Identifying which artifacts were most valued and widely adopted helped to reveal how teams ensure alignment, maintain quality, and manage complexity during game production.

RQ4 aims to explore the technological ecosystem supporting DGPM practices. Software tools facilitate planning, coordination, and tracking across the various stages of game development. Understanding which tools were favored (e.g., Trello, Miro, ClickUp) enables us to assess how digital environments influence project execution efficiency, collaboration, and adaptability. This question also highlights the

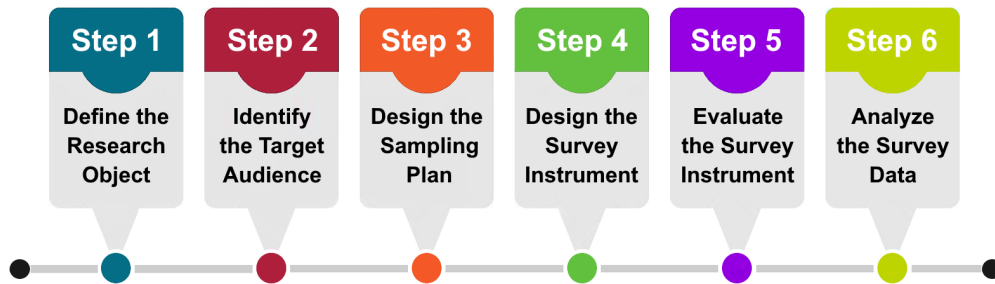


Figure 1. Research Methodology, adapted from Linaker *et al.* [2015].

industry's reliance on agile-supportive platforms over traditional PM software, offering insights into tool effectiveness and gaps.

By conducting this survey, we also aim to identify potential gaps to be addressed in our research, applying these findings to DGPM in the future.

Target Audience: The target audience of this research consisted of professionals affiliated with game studios or independent producers, from any area of expertise. Within this target audience, we can identify a profile that is better suited to address questions related to game project management. This profile included professionals involved in team management, software engineers, agile methodology product owners, or any other professional who assumes such role(s). This profile defines our sampling framework.

Sampling Plan: Considering the sampling framework and the definition of motivation, in accordance with Linaker *et al.* [2015] guidelines, the sampling plan was non-probabilistic and judgment-based. This approach is justified by the possibility that, within the population, the sampled professionals have a deeper understanding of the technical issues related to the field of project management.

Research Instrument: Using the previously cited guideline as the basis for designing this survey research and drawing from the authors' educational and professional experiences, we defined a set of tasks to organize this activity.

Alignment of Questions with Research Objectives: In our effort to identify a standard for digital game project management or even an opportunity to propose a new alternative, we formulated closed-ended questions classified into three groups:

- (i) **Personal Data:** We defined a set of personal data about the participants, but ensuring their anonymity;
- (ii) **Professional Data:** We outlined a set of questions about their areas of expertise and professional experiences in the digital gaming industry, as the diverse range of industry roles will provide fundamental insights for the future direction of this research;
- (iii) **Project Management Data:** In alignment with the research questions of the SLR and an ad hoc search for PM systems, we formulated questions related to approaches, tools, and experiences in using PM approaches among participating professionals.

Type of Questionnaire: The geographical dispersion of the target audience made it impractical to conduct in-person questionnaire sessions, while the large number of potential respondents renders synchronous remote administration un-

feasible. To address these limitations, we developed a self-administered questionnaire, enabling participants to access and complete the survey independently, without external intervention. Additionally, we embedded textual explanations within the questionnaire to enhance clarity and ensure a better understanding of each question.

Types of Questions: We sought to ensure better understanding and accurate tabulation of information, avoiding misinterpretation. The questions are closed-ended, with multiple predefined alternatives and an additional "other" field to allow participants to provide their response if it is not among the given options.

Survey Execution Method: Due to the geographical dispersion of the target audience and its status as information technology users across various fields of expertise, a web-based remote method was chosen for conducting the survey. Among the available software options, LimeSurvey¹ was selected as it is an open-source tool specifically designed for surveys, offering extensive documentation and global usage. Its features for result tabulation and processing are also notable, further reinforcing the importance of this choice. The tool was hosted using the infrastructure provided by the research group.

Question Sequence: The definition of the question sequence was designed with two complementary aspects in mind. The first aspect involves progressing from general to specific, starting with questions about personal data, moving to professional data, and concluding with the final group of questions addressing DGPM characteristics. Secondly, the questions were organized in a logically sequential manner. Except for the last question, participants do not need to revisit previous questions to answer subsequent ones.

Response Format: As shown in Table 1, the established data groups are represented in the first column of the table, the numerical identifiers and question titles in the second, the response types in the third, the fourth column indicates whether the question allows the participant to choose an option different from those provided, and finally, the last column defines whether the question is mandatory or optional. Most questions use tabulated response formats, either as List (radio) or Multiple Choice. The former allows participants to select only one of the alternatives, while the latter permits them to choose one or more options from those provided. Three questions allow users to input freeform data. However, Question 10, which is numeric, can be tabulated normally, while Questions 1 and 11 require qualitative analysis.

Question 1 is not mandatory, since it is intended for par-

¹<https://www.limesurvey.org/>. Access: 28 June 2025.

Table 1. Questions Applied in the Survey Research

Data	Question	Type	Other	Mandatory
Personal	1. E-mail	Text	-	-
	2. Age	List (Radio)	-	✓
	3. Sex	List (Radio)	-	✓
	4. Education level (completed)	Multiple Choice	✓	✓
	5. Education level (ongoing)	Multiple Choice	✓	-
Professional	6. Job	List (Radio)	✓	✓
	7. Current or previous role	Multiple Choice	✓	✓
	8. Experience time outside the digital gaming industry	List (Radio)	-	✓
	9. Experience time inside the digital gaming industry	List (Radio)	-	✓
	10. Published digital game projects you have participated in	Numeric	-	✓
	11 Name the digital game studio(s) you work or have worked for	Text	-	✓
PM	12. Approaches used in digital game projects you have participated in	Multiple Choice	✓	✓
	13. Artifacts supporting professional activities in DGPM	Multiple Choice	✓	✓
	14. Coordination systems used for project activities in digital game projects	Multiple Choice	✓	✓
	15. Report on how the GP of the digital games in which you operate is carried out.	Long Text	-	✓

ticipants who wish to receive feedback on the survey's final results, as outlined in the participation terms. It is worth noting that other questions of Text and Long Text types, even if mandatory, allow participants to use the term "Not Applicable" in cases where the information is sensitive and cannot be disclosed due to contractual obligations.

This question, while seemingly similar to the previous one, contains two distinct aspects that might appear imperceptible at first glance. We asked participants not to present the approaches they have commonly used in the past but rather to indicate the one they are currently using, providing a textual description of how project management is implemented. This aimed to capture not only the PM relationship at the managerial level, but also insights from the various professionals involved in game development. In doing so, we seek to gather experiences and a comprehensive understanding of the whole process from the perspective of each contributing part.

Qualitative Analysis: For this purpose, an open question was used, allowing participants to describe the PM approach that they use based on their perception. We aimed to mitigate potential response avoidance by including a supporting header with a concise guide illustrating the expected response. Participants were encouraged to relate their responses to the approaches, tools and artifacts previously selected in their survey responses.

Aware that using an open-ended question would result in challenges in interpreting the results, shifting the evaluation from quantitative data to qualitative analysis, we chose to adopt the QAnubis tool² to organize and categorize the terms provided by the participants, employing a coding technique commonly used in qualitative data analysis [Skjott Linneberg and Korsgaard, 2019]. This tool was chosen over others for its objectivity, convenience, quality, and because it is developed and maintained by the LESSE (Laboratory of Empiri-

cal Studies in Software Engineering), research group at UNI-PAMPA, with which we are affiliated.

To organize similar responses, we relied on the creation of keyword (code) sets derived from the alternatives presented in survey's questions and processed data from the SLR. In order to structure the qualitative data from questionnaire's reports in a tabular format, we used the QAnubis tool for software-assisted qualitative analysis. We began by importing the textual responses to question 15 of our questionnaire, the only mandatory open-ended question. This allowed us to analyze and annotate the participants' statements using the system's coding feature, which assigns labels (codes) to segments of text. These codes enable the hierarchical organization of one or more sets of responses, as a code (or quote) can be arranged in parent-child relationships with others. To define the codes, we drew on both the standard survey responses and the values entered in the "other" fields. This approach allowed us to corroborate and enrich the information provided in previous questions, expanding the analytical scope and capturing information that might not have been covered by predefined answer options.

We proposed the following set of possible codes:

- (i) **Approach:** Sets of methods, techniques, guidelines, processes, or methodologies for GP presented in the responses;
- (ii) **Stages:** Tasks and sub-tasks presented for organizing the GP workflow;
- (iii) **Artifacts:** Software products produced or utilized to support the conduction of stages;
- (iv) **Professional Profile:** Presentation of the participant or team involved in conducting one or more stages;
- (v) **Software:** Computational systems supporting stages or approaches.

For each parent code, we created a list of codes from responses previously identified in the survey. Once the steps

²QAnubis tool: <http://168.138.132.249/>. Access: 28 June 2025

of importing the responses and defining the code hierarchy were completed, we began marking the codes in each of the reports, allowing us to identify which parent and child codes were most frequently reported by participants. The results of this tabulation of reports of quotes from the reports are presented in Section 3³.

It is important to note, before presenting the results of this RQ classification, that 7 out of 41 participants did not provide useful responses, as they did not present relevant results. These participants cannot be disregarded from the survey, since only the response to this question did not yield insights. However, their other responses are useful for the other RQs in this survey.

2.2 Execution

Survey Instrument Evaluation: We evaluated the survey using a control group composed of six participants, including industry professionals, researchers, and game design professors. They provided feedback on the questionnaire, and the average time to complete it with full understanding was 13 minutes and 30 seconds. One participant encountered difficulties due to professional commitments. Two participants offered suggestions for improvement, which were incorporated into the survey for the target audience.

Survey Promotion Strategy: We initially chose to use LinkedIn for survey promotion, but discontinued this approach due to contact restrictions. Therefore, we shifted our focus to other social media platforms, emails, and studio websites. We created personalized links to track participant traffic sources, with the results shown in Figure 2.

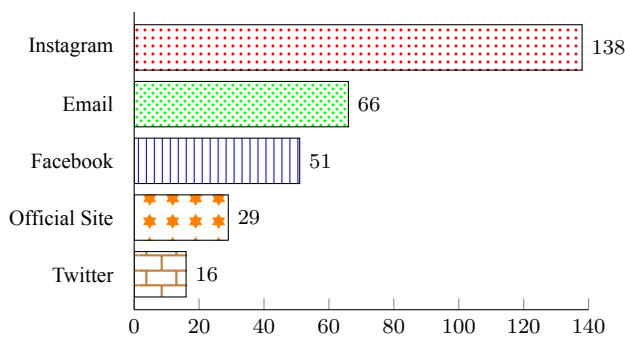


Figure 2. Source of Survey Access

The volume of access from Instagram showed that this platform was the most effective promotional channel, with significant engagement also coming from institutional emails provided on studio websites and professional social media. In total, there were 300 accesses, resulting in 107 responses, but only 41 completed the survey in full. Further details of this stage and its results were made available in the Zenodo⁴ repository for anyone interested in additional validation of the activities conducted.

³In the Zenodo repository, we make available the complete data of the qualitative analysis conducted in QAnubis, consulting the file “Qualitative Analysis (QAnubis).zip”

⁴Repository: <https://doi.org/10.5281/zenodo.15338198>. Access: 28 June 2025

2.3 Participant Profile

The participants shared characteristics that allowed us to describe an average profile. Most were male (78%), aged between 25 and 34 (65.8%), and held a completed higher education degree (56%).

Regarding professional data, responses were diverse, covering 16 different professions. The most prominent roles were programmer (29%) and graphic artist (2D and 3D) (17%). This highlighted the multidisciplinary nature of the gaming industry and the accumulation of responsibilities, with participants averaging three roles each. The most common roles included programmer (50%), graphic artist (2D and 3D) (39%), game designer (34%), and project manager (29%).

In terms of professional experience within the gaming industry, most participants had worked for less than a year (26.8%), followed by those with 1–2 years (24%) and 3–5 years (22%) of experience. Regarding experience outside the gaming industry, most of the participants had worked for 3–5 years (26.8%) and 10–15 years (17%).

This highlighted both the entry of new professionals into the field and the migration of professionals from other industries. Regarding professional practice, we received responses from 38 participants about companies they had currently or previously worked for on digital game projects, encompassing more than 21 distinct studios. Notable mentions included global companies such as Ubisoft, along with several major Brazilian studios such as Hermit Crab Studio, Animvs Game Studio, Double Dash Studios, Fira Soft, Aquiris, Iziplay Game Studio, Mad Mimic, among others.

Although this study aimed primarily at identifying PM practices in digital game development, the scope of respondents was intentionally broad and not restricted to formal project managers. This choice was based on the multidisciplinary and dynamic nature of the game development industry, in which PM responsibilities are often shared among team members in different roles. As indicated in Section 2.1, our target audience included not only managers but also professionals engaged in planning, coordination, and execution tasks—such as software engineers, producers, game designers, and product owners.

The actual participant profile confirmed this broader scope: while only 29% self-identified as holding a “project manager” role, the majority were professionals actively involved in operational and technical activities (e.g., programmers, artists, designers) who routinely interact with or perform PM-related tasks. This distribution reflects an important aspect of the Brazilian digital games industry: in many studios, particularly small and medium-sized ones, project management roles are either informal or distributed.

We acknowledge that the prevalence of respondents with less than five years of experience (72.8%) represents a limitation in terms of seniority and strategic perspective. However, we argue that this scenario offers relevant insights into current operational practices and tool adoption, especially considering that they are often directly responsible for executing day-to-day project tasks. The broader inclusion of these voices enriches our understanding of how PM practices are implemented in real-world settings and highlights the need

for adaptable, accessible, and context-aware management approaches in game development environments.

3 Analysis of Results

Based on the responses of the 41 participants, this section analyzed the answers to our survey's Research Questions (RQs). All tabulated responses and additional charts generated by the LimeSurvey tool were made available for auditing in the Zenodo repository. Any options not selected by the participants were omitted to reduce text length and simplify the understanding and presentation of the charts.

3.1 RQ1. What approaches are commonly used for the practice of DGPM?

Considering that the question posed in the survey for this research question was mandatory, multiple choice, and included an "Other" option for participants to input additional responses not covered by the predefined options, a total of 127 items were selected by the 41 participants.

As shown in Figure 3, which presents the distribution of responses, Scrum was identified as the most used approach by 78.6% of the participants. However, it is important to note that the Kanban methodology was selected by 57.1% participants, the iterative process by 35.7%, and the waterfall methodology by 26.1%, all of which represent significant portions of the overall scenario.

Summary of RQ1. The study identified Scrum as the most adopted methodology, selected by 78.6% of participants, followed by Kanban (57.1%), iterative models (35.7%), and the waterfall approach (26.1%). Agile methodologies dominate, with some mentions of other approaches like Giflow and Design Thinking. This indicated a preference for flexibility and adaptability in managing digital game projects, though no single standardized approach prevailed.

Among the options marked as "Other", we received mentions of Giflow and Design Thinking, with one response each.

Thus, we identified 13 approaches indicated by the participants, which suggests that there is no standardized approach to project management in digital games, even though agile methods and methodologies predominate.

3.2 RQ2. Which PM approach is currently used in projects based on the participant's professional experience?

Approach: We identified nine different approach codes presented, as can be observed in Figure 4, however, we identified a predominance of Scrum, Kanban, and a classification named Agile, as the response was understood as using sprints but did not explicitly classify the adopted methodology, among the most adopted approaches currently by participants.

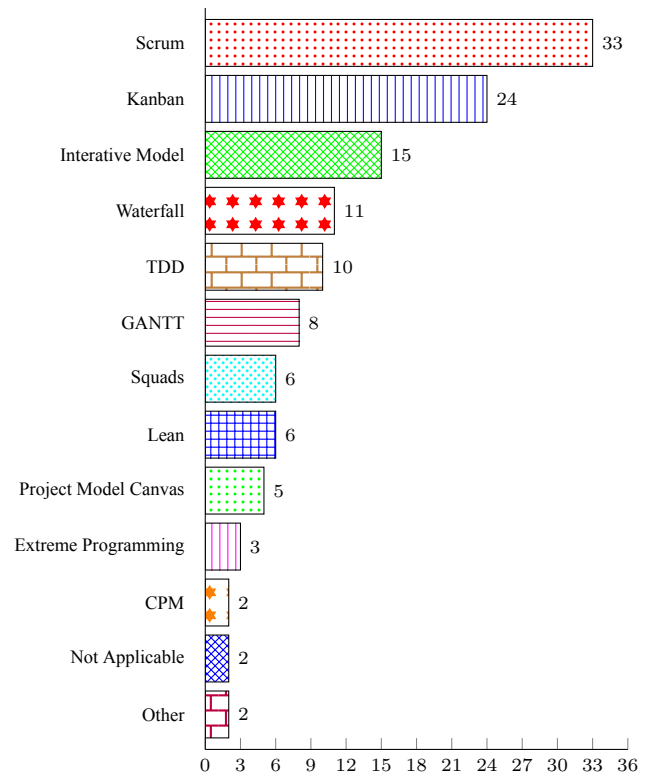


Figure 3. Graph Representing the Responses to RQ1

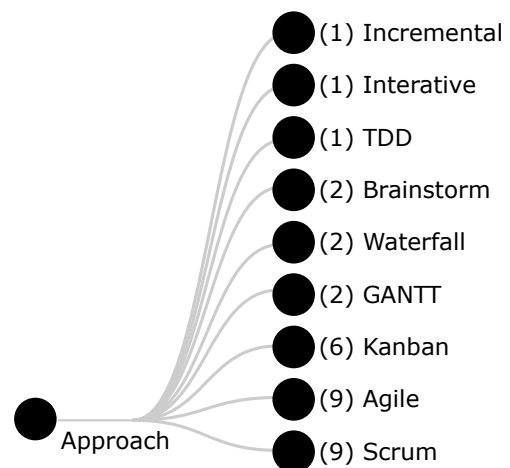


Figure 4. Approaches Presented in Survey Responses

It is important to note that some approaches are adopted without strong preferences, and teams within the same project may use more than one approach. For instance, Participant P2 states: "After the script is approved and the level designer informs the Senior Lead of the prototypes to be made, each programmer receives a task in Scrum (or Kanban) with a specific deadline to meet." A similar situation involving multiple approaches is described by Participant P5: "We developed a GANTT chart to schedule and divide tasks, and we also use the Agile Scrum methodology with tasks linked to Trello." Participant P23 shares their personal preference: "Personally speaking, the unification of Scrum, Kanban and TDD (Test-Driven Development) is my favorites and seems to yield the best results when applied correctly." Lastly, Participant P40 highlights: "The company runs two methodologies: the development teams use Scrum divided by areas, with a producer acting as the PO. Other collaborators

operate with an adapted Kanban.”

Stages: Figure 5 illustrates seventeen stages identified in the responses of the participants. However, there is a noticeable limitation in the quality of the reports, as most participants simply cite the stage directly without providing further details. However, it is essential to highlight the responses of Participants **P2**, **P3**, **P4**, **P15**, **P27**, **P39**, and **P40**. Despite inconsistencies in the level of detail regarding the stages, their contributions allow for an organized perspective on how tasks are conducted within the project.

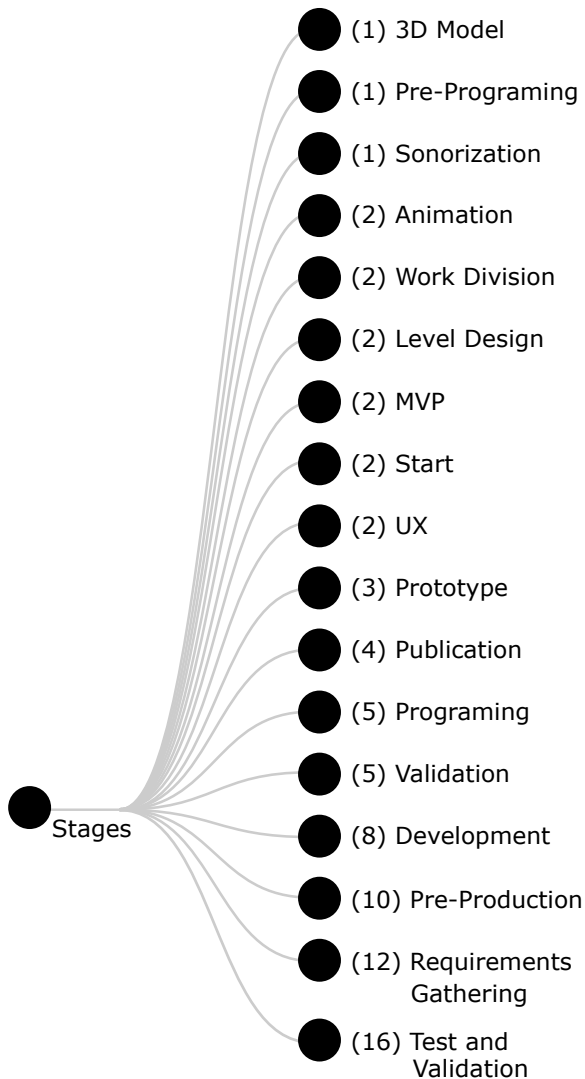


Figure 5. Stages Presented in Survey Responses

However, there were significant accounts from participant **P35**, who provided an excellent description of the project stages that he observes as an artist: “Organization of research documents and artistic references, creation of the Assets checklist. Ideation phase and explorations in Concept Art, refinement of Concepts up to the final versions of the assets to be used in the Game.”

Artifacts: We identified thirteen artifacts coded, as shown in Figure 6, classified within the participants’ responses in the survey. We could consider merging the terms To-Do List and Checklist, but we kept them as defined by the participants’ textual descriptions to avoid interpretative interference with the results.

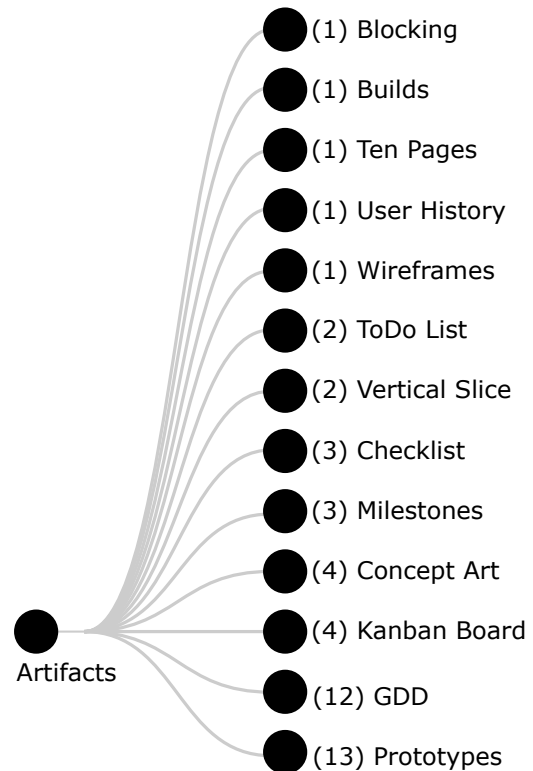


Figure 6. Artifacts presented in Survey Responses

It was evident that the use of prototypes supported by the GDD (Game Design Document) is the solution widely adopted in the participants’ current projects. However, only two participants provide accounts of the stage and use of the GDD. According to participant **P10**: “All project information is consolidated in the GDD, including the setup of sprints.” Participant **P17** states: “GDD enhancement, alignment of mechanics, rules, and artifacts with the Producer, Game Designer, and Technical Director.”

Professional Profile: We classified twenty professional profile codes based on the participants’ responses (Figure 7). This high number of codes stems from respecting the textual definitions provided by the participants.

Once again, the vast majority of participants did not provide detailed observations regarding the activities of each professional profile, with only a few participants offering brief mentions with some detail. Participant **P21** stated: “**he guidelines (for sprint stages) are conducted under the direction of a software engineer.**” Participant **P2** mentioned: “A meeting is initiated with the Senior Head of the department, who distributes tasks among the programmers.” ... “After the script is approved and the level designer informs the Senior Head about the prototypes to be developed, each programmer is assigned a task in Scrum.” Participant **P27** reported: “Depending on the characteristics of the project, the first stage may involve a prototype, a Vertical Slice, or an MVP. Once the first stage is defined, the Producer consults with the Game Director to establish the characteristics of this stage to determine everything that needs to be included.”

Given the objective of this research question, the lack of detail regarding professional profiles in the participants’ responses does not compromise the question’s intent, as this classification was only made to support future work plan-

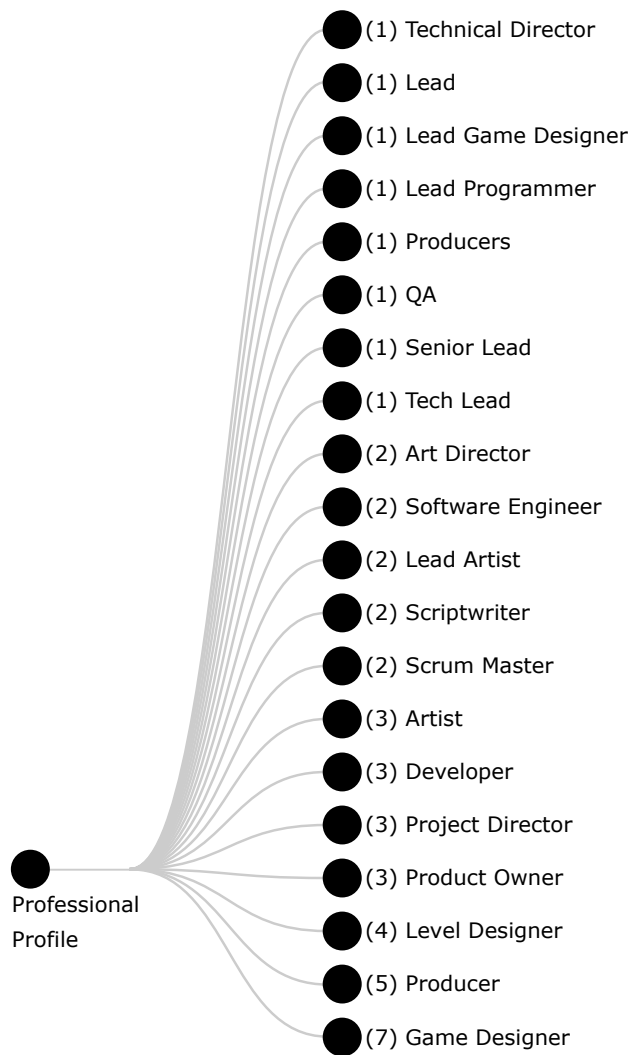


Figure 7. Professional profile presented in Survey Responses

ning.

Software: We classified twelve codes referring to software tools mentioned by participants in the survey (Figure 8). It is notable that this code exhibits significant diversity, not due to the number of responses but because of their distribution, since each tool is mentioned only a few times. This suggests that participants use different systems to support their projects. We grouped all mentions of cloud tools under a single “cloud” code for references to data storage tools using cloud computing, without specifying the tool’s name when it was not explicitly mentioned in the responses.

The adoption of Trello was mentioned by participants P1, P5, P28, and P39, while the Notion tool was cited by participants P4, P22, and P30. The participant P15 is the only one who reported using both systems, each mentioned twice, as we can observe in their accounts: “The start of the phase occurs when we capture an idea from the players or have an idea for an improvement. This becomes a milestone on the roadmap in Notion” and “The milestones in Notion are broken into user stories for each department (design, illustration, dev, back-end, QA). For each one, we create tasks in Trello.” ... “The Trello board reflects our production, and we compare it to the Notion roadmap, making adjustments.”

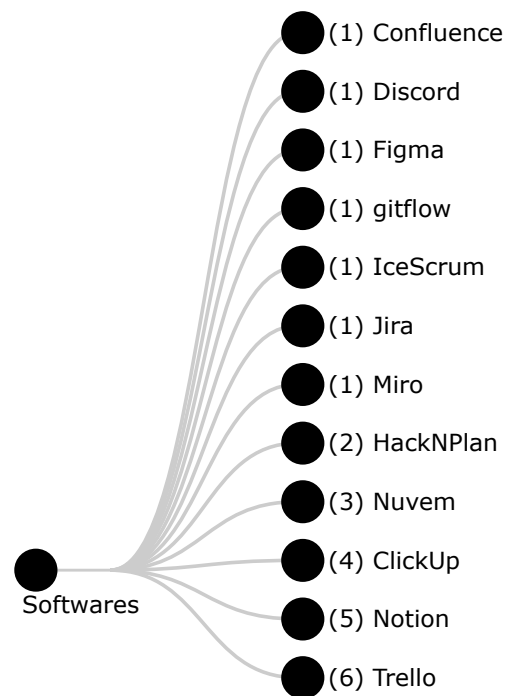


Figure 8. Softwares presented in Survey Responses

Summary of RQ2. Participants primarily used a mix of agile methodologies, including Scrum and Kanban, often combining them with iterative approaches or Test-Driven Development (TDD). The analysis revealed variability within teams, with some integrating multiple methodologies based on project phases. Tools like GANTT charts were occasionally used alongside agile methods to complement planning and execution stages.

The results obtained in this question were likely similar to those found in the subsequent RQs presented below. However, the upcoming RQs will likely have greater objectivity since they consist of closed and quantitative questions.

3.3 RQ3. What support artifacts for DGPM are used to sustain the practices of these approaches?

This question allowed participants to present solutions not included among the predefined options through the “Other” choice. The 41 participants selected a total of 172 items. In Figure 9, we observed that the GDD (83.3%) and Prototypes (78.6%) were the most commonly used artifacts for organizing, managing, and advancing digital game projects.

The Kanban board, checklists, scripts, and storyboards were artifacts also mentioned by the participants. It should be noted that user stories and processes were infrequently used, contrasting with their prominent presence in the data obtained from the SLR research conducted. Among the responses selected as “Other”, one was disregarded because it did not align with the question. However, the others were: ideation, priority matrix, interview results, and usability testing reports. Considering that each artifact could be combined with others, the low number of responses for the last three artifacts (process, other, user stories) in the survey supports the

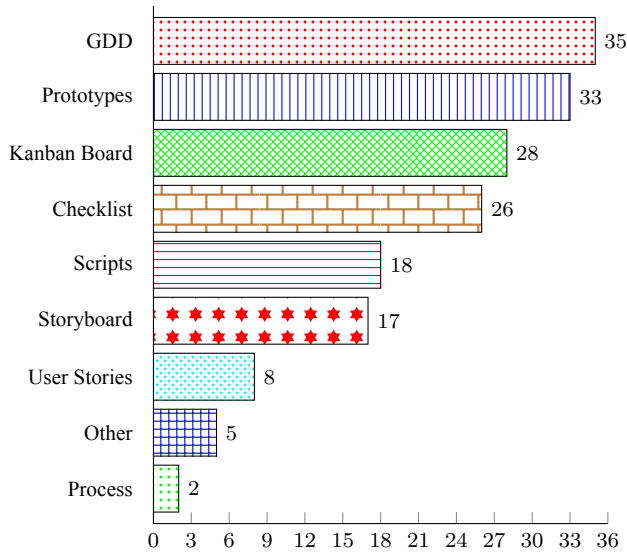


Figure 9. Graph Representing Responses to RQ3

understanding that they were not commonly used in projects within this industry.

Summary of RQ3. The most commonly used artifacts were the Game Design Document (GDD) (83.3%) and prototypes (78.6%), essential for organizing and advancing projects. Other frequently used artifacts include Kanban boards, checklists, scripts, and storyboards. User stories and processes were less commonly employed. This highlights the emphasis on visual and iterative tools to align team efforts.

3.4 RQ4. What software tools are adopted to ensure the organized execution of DGPM stages?

Among the productivity software used for task organization and project management in digital games, 99 tools were selected by the participants.

We were surprised that the proposed alternatives did not accurately anticipate all possible options. Figure 10 highlights Trello (57.1%), Miro (35.7%), ClickUp (33.3%), and Jira (26.2%) among the participants' responses. We observed a considerable number of selections for other software not listed among the survey options, notably *Notion* (16.6%) and *Hack n' Plan* (9.5%), which were mentioned but were significantly less popular than the other tools. Based on our participants, we found that software considered major *players* in project management solutions, such as Redmine and Microsoft Project, are not commonly used in digital game projects.

Summary of RQ4. The survey found that tools such as Trello (57.1%), Miro (35.7%), and ClickUp (33.3%) are the most popular for managing tasks and workflows. Tools such as Jira and Notion were also mentioned but had lower adoption rates. Traditional PM tools like Redmine and Microsoft Project are rarely used, indicating a preference for lightweight, agile-compatible platforms.

It is also worth noting, as shown in the Folksonomy [Xu et al., 2008] in Figure 11, that the majority of tools used are web-based, with particular attention to those supporting agile methods and Kanban boards, which aligned with the responses obtained in RQ1 and RQ3. When addressing the research questions in this survey, we must note that the data obtained is consistent with the participants' profiles and the date of the research. If you wish to review the full responses and reassess the data from this study, we have made them available on the Zenodo repository, respecting the sensitivity of certain information.

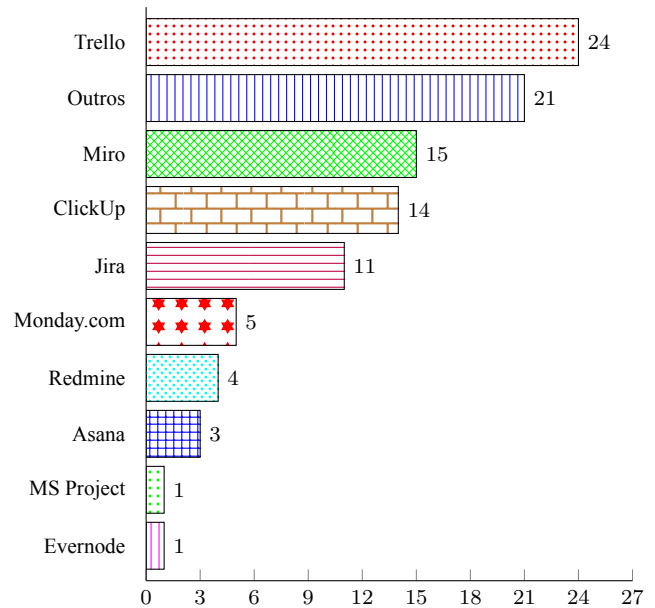


Figure 10. Graph Representing Responses to RQ4.



Figure 11. Folksonomy [Xu et al., 2008] of PM Software Used

4 Threats to Validity of the Study

To mitigate the threats to the validity of this survey, we used the categories proposed by [Wohlin et al., 2012]:

Construct Validity: To mitigate biases and flaws in the development of our work, we based its design and execution

on the guidelines proposed by Linaker *et al.* [2015]. This concern for methodological rigor was also reflected in the choice of specific tools for conducting and processing the data.

We used the *LimeSurvey* tool to administer the questionnaire, which demonstrates alignment with best practices in applied research. *Google Forms* was used exclusively to collect feedback from the control group, as this task did not require advanced features and could have been performed with a simple text file.

In the qualitative data analysis phase, to support the methodological rigor, we used a dedicated tool (QANubis tool⁵), which was developed at Unipampa and is under continuous improvement, offering greater confidence in the tool's effectiveness.

Internal Validity: Aiming to minimize potential biases that could compromise the standardization of data organization, tabulation, and classification, we prioritized the use of multiple-choice questions in the questionnaire design, leaving only question 15 as an open-ended (long text) question.

Even so, for the aforementioned open-ended question, we applied a predefined coding scheme based on both RQ1 and the SLR to define the data to be extracted. This approach, combined with the tool used, allowed for a reduced margin of interpretation and ambiguity in the text analysis.

External Validity: As a threat to external validity, we faced the challenge of recruiting participants. To understand how and from where participants accessed the survey, we created trackable links for outreach via email, social media, and official websites of studios and independent professionals. This approach allowed us to identify, at the moment of access, which method generated the most engagement, guiding us toward the most effective dissemination strategy.

Another external threat stemmed from the diversity of participants' professional backgrounds, which, although enriching, could affect the consistency of responses regarding project management practices. This choice was part of the master's research to which this survey belongs, aiming to understand the stages, tools, and communication among the various roles within the project.

Finally, to ensure transparency and traceability of the study, in addition to the sections of this text that describe the guideline by Linaker *et al.* [2015], we published a repository on Zenodo containing a detailed set of artifacts produced during this survey research.

Conclusion Validity: To ensure the validity of the conclusions, most research questions were multiple-choice, simplifying tabulation and enhancing result reliability. RQ1 covered a wide range of approaches aligned with the expectations of the digital game industry regarding project management. For RQ3 and RQ4, the proposed alternatives were the most relevant for participants, with only a few mentions of other options. These findings align with the expectations outlined in the questions. We performed a direct analysis of the results without altering the original data, incorporating both qualitative and quantitative responses to avoid interpretative bias.

RQ1 presented a highly representative set of approaches consistent with the expected alternatives, demonstrating that the conclusions from previous studies accurately reflect the industry's real expectations for PM in digital games. RQ2 was the only question that required qualitative analysis, supported by a specialized tool. This approach mitigated external factors by using standardized "codes" derived from the responses to RQ1 and from the RQs in the SLR [Pieva and Bernardino, 2022] [Pieva and Bernardino, 2023]. For RQ2 and RQ3, the proposed response options were the primary choices mentioned by participants, with minimal references to other options. This reinforces that the tabulated results are consistent with the formulated questions and proposed alternatives.

To mitigate interpretative bias, we adopted direct tabulation of responses without applying any filters, for qualitative or quantitative questions, using the exact terms and data provided by participants to derive the results.

5 Related Work

Surveys have proven to be an effective method for data collection and for producing practical results based on the characteristics of the applied methodology.

Martins *et al.* [2021] aimed to analyze the adoption and application of project management practices in the Brazilian digital games industry, focusing on identifying the methodologies, tools, and artifacts utilized by professionals in game development studios. By conducting a comprehensive survey from industry professionals, the research provides valuable insights into the prevailing trends and practices, such as the widespread use of agile methodologies like Scrum and Kanban. The study highlighted critical contributions, including the practical applications of game design documents (GDD), prototypes, and Kanban boards in project workflows. It also identifies key tools such as Trello, Miro, and ClickUp as commonly adopted solutions. The research achieves a detailed overview of the current state of project management in the Brazilian digital games sector while pinpointing gaps in standardization and integration. These findings serve as a foundation for improving project management practices and tools, aligning them more closely with the unique demands of the industry.

The study conducted by Petrillo *et al.* [2009] presented a survey of 20 postmortem projects from the digital game industry to identify the main problems faced during game development, many of which are directly related to failures or limitations in project management practices. The authors highlight issues such as inadequate planning, lack of realistic schedules, absence of scope change control, and poor communication between teams. The study reinforces the need to adopt more mature and tailored project management practices to address the dynamic and interdisciplinary nature of game development.

Ullmann *et al.* [2022] investigated negative patterns (anti-patterns) in the management of digital game projects, identified through the analysis of 440 game project postmortems. The authors map these anti-patterns in relation to the software engineering literature, highlighted practices such as

⁵QAnubis GitHub: <https://github.com/gilischmidt/qanubis>
| QAnubis App: <http://168.138.132.249>. Access: 28 June 2025.

Table 2. Related Works in Digital Games.

Aspect	Our Survey	Martins <i>et al.</i>	Petrillo <i>et al.</i>	Ullmann <i>et al.</i>	Linaker <i>et al.</i>
Year Conducted	2022	2021	2009	2022	2024
Scope	Project Management	Project Management	Project Management	Project Management	Project Management
Target Audience	Professionals	Professionals	Postmortem projects	Postmortem projects	Professionals
Questions	14	26	-	-	-
Participants	41	13	20	440	10
Contributions	Mapping of practices, artifacts, and systems for game project management.	Opportunities, challenges and experiences in managing two game projects developed in the study.	Analysis of main problems faced during game development.	Mapping of anti-patterns in the management of game projects.	Challenges and strategies related to experimentation practices in independent game development studios.

“Feature Creep”, “Feature Cuts”, and “Working on Multiple Projects” as recurrent and harmful. The study emphasizes the importance of recognizing and mitigating these practices to improve the effectiveness of project management in the digital games industry.

Another relevant study was conducted by Linaker *et al.* [2024], which explores the practices of Continuous Experimentation (CE) in independent digital game development studios. Through interviews with 10 indie developers, the authors identify challenges and strategies related to experimentation and testing prior to game release. The study highlights the importance of planning and implementing experiments, even with limited resources, to validate ideas and improve the quality of the final product.

Table 2 presents data associated with these surveys, showing that they collect information on practices related to project management. However, none directly contributed to our research objectives. Our contributions are specifically related to the research questions presented in this study.

6 Differences Between General Software Project Management and Digital Game Project Management

Although digital games are software products, managing their development entails distinct challenges and characteristics that differ from the general software PM. This section discusses the specificities of DGPM, supported by the literature and empirical evidence from our survey.

A key difference lies in the multidisciplinary nature of game development, which integrates technical domains such as programming and software architecture with creative domains such as narrative design, game art, sound design, and user experience. Unlike traditional software projects, which often follow functional or technical requirements, game projects must balance creative freedom with technical feasibility and user engagement [Zackariasson *et al.*, 2006; Petrillo *et al.*, 2009].

This complexity requires greater coordination among heterogeneous roles, such as game designers, artists, and sound

engineers, in addition to developers. Our survey captured this diversity in the professional profiles of the respondents, including artists (39%), game designers (34%), and programmers (50%), reinforcing the need for flexible and collaborative management models.

Another significant difference is the centrality of iteration and playtesting in game projects. While iterative development is also present in general software engineering, in game development it is fundamental due to the exploratory nature of gameplay design and the emergent behavior of users interacting with dynamic systems. This requires continuous adjustments to narrative flow, mechanics balance, and player feedback, often beyond what is observed in conventional software cycles [Ullmann *et al.*, 2022]. Our results confirm this emphasis: prototypes were the second most reported artifact (78.6%), frequently used alongside the GDD, which itself is a game-specific planning artifact that consolidates creative, technical, and narrative components. In contrast, traditional software projects typically rely more on requirement specifications and user stories.

Unlike general software, whose success criteria are largely based on functionality, performance, and usability, digital games must provide a compelling emotional and entertainment experience. Consequently, DGPM must account for subjective elements such as fun, immersion, challenge, and aesthetic coherence, which are not easily quantifiable or covered by traditional PM frameworks.

These subjective goals influence decision making and scope negotiation in game projects, often requiring trade-offs that do not occur in business-oriented systems. This also impacts risk management, as market acceptance and user satisfaction can be highly unpredictable despite technically sound implementations.

Finally, the tooling ecosystem reflects the informality and agility required in DGPM. Our findings indicate the preference for lightweight, visual, and collaborative tools (*e.g.*, Trello, Miro, Notion), instead of more structured platforms such as MS Project or Jira, which are prevalent in enterprise software PM. In addition, artifacts such as concept art, vertical slices, and storyboards are widely used in games, but not in other software domains.

Finally, while methodologies like Scrum and Kanban are common to both domains, their application in DGPM is adapted to accommodate creative iteration, team heterogeneity, and affective user experiences. The presence of game-specific artifacts (GDD, storyboards, vertical slices), the prioritization of prototypes, and the use of non-traditional tools underscore the unique demands of managing game projects. These distinctions support the need for a tailored understanding of project management in the game development context.

7 Final Remarks

In this survey research, we addressed issues related to digital game project management, allowing professionals from various fields involved in game production to contribute information from their perspectives based on the projects they have participated in.

The adoption of Linaker *et al.* [2015] guideline for designing this survey provided clear organization for each stage of the study, from the formulation of research questions to the execution method, question types, and sequence, effectively supporting data collection from 41 participants who responded to the survey questions.

The dissemination strategy allowed us to identify the highest access rates via social media platforms like Instagram and Facebook, as well as through email contacts with studios. However, we cannot confirm that these accesses resulted in actual survey participation. Among the participants, we obtained professionals from diverse areas, ranging from independent producers to renowned professionals working in AAA digital game studios.

The questions were designed to include multiple-choice answers, enabling a quantitative analysis with clear and objective tabulation, highlighting the most frequent responses selected by participants. While recognizing that the majority of respondents had limited experience, this profile offers a valuable snapshot of operational realities in the Brazilian game industry, particularly among emerging professionals and small studio contexts. It is important to correlate the data obtained in the DGPM survey with the findings from the SLR by Pieva and Bernardino [2022] Pieva and Bernardino [2023].

The most commonly used methodology (Scrum) among participants was also the most frequently studied and cited in the SLR. Additionally, GDD and Prototypes are commonly adopted artifacts, whereas in the SLR, the use of processes was the main focus of the selected studies. However, processes were barely mentioned in the participants' responses, indicating a gap between academia and professional practices in this area.

RQ2 was supported by an open-ended question, which required qualitative analysis. For this purpose, the QAnubis system was used, meeting expectations effectively by supporting the process and simplifying the subsequent analysis of the responses. Being the most complex question to address, unfortunately, not all 41 participants had their responses analyzed, as some did not contribute any relevant information.

The results of the study indicate that there is no single

solution among approaches, artifacts, and supporting software for DGPM tasks. The evidence suggests a preference for agile methods (Scrum and/or Kanban) combined with prototypes supported by GDD. However, we cannot assert the existence of an ideal system for managing DGPM, as even the most frequently mentioned tool (Trello) did not surpass the combined responses for the second (Miro) and third (ClickUp).

The game development industry is diverse, encompassing a variety of game types, such as action, RPGs, puzzles, and more. Moreover, this diversity allows studios to vary in size, ranging from small independent teams to large corporations. This variety means that each project faces unique challenges.

In this analysis, examining the triangulation of the research question outcomes revealed that DGPM involves identifying requirements, setting precise goals, and harmonizing the different game elements. Additionally, it is essential to adjust the difficulty of challenges based on gameplay experience during product development.

In this context, methodologies such as Scrum, Kanban, and iterative approaches can be employed to ensure project success, as discussed in RQ1. Consistently, the supporting artifacts (RQ3) used align with the adopted management methodology and meet the specific needs of each project. The appropriate selection of these artifacts, combined with the incorporation of tools (RQ4), contributes to effective DGPM.

Lastly, future research should focus on identifying best practices for large-scale project management in the game development industry, investigating methodologies to address the complexity of coordinating multiple teams.

Declarations

Acknowledgements

We thank all digital games industry participants in the research and the members of the LESSE Research Group for their support.

Funding

The present work was supported by the Federal University of Pampa (Unipampa), Brazil, and FAPERGS Notice 02/2022 - Innovates Technological Clusters.

Authors' Contributions

LP and MB contributed to the conception, planning and validation of this work. LP performed the survey and is this manuscript's main contributor and writer. LP, JBM, RP, and MB contributed to writing (Review & Editing). All authors read and approved the final manuscript.

Competing interests

The authors declare that they do not have any competing interests.

Availability of data and materials

We are committed to promoting transparency and reproducibility in research. In line with this commitment, we provide all the data supporting the findings of our study, which is openly available on Zenodo at <https://doi.org/10.5281/zenodo.8103006>. Access: 28 June 2025.

Ethics Issues

CNS Resolution Nº. 510 of 2016 (CNS [2016]), in its Article 2, XIV, adopts the definition of public opinion research as:

Art. 2, XIV - public opinion research: verbal or written consultation of a specific nature, carried out using a specific methodology, through which the participant is invited to express his/her preference, evaluation or the meaning he/she attributes to themes, actions of people and organizations, or products and services; without the possibility of identifying the participant;

In turn, Article 1 establishes the rules applicable to research [...]

Art. 1, Sole Paragraph. The following will not be recorded or evaluated by the CEP/CONEP system: I - public opinion research with unidentified participants; V - research with databases, whose information is aggregated, without the possibility of individual identification;

Therefore, the researches classified here have the sole purpose of describing the value that the participant attributes to the object of consultation. Therefore, the understanding of the Unipampa CEP Commission is that public opinion surveys, without the possibility of identifying the participant, should not be submitted for assessment by the CEP/Conep System. The Informed Consent Form used in this research is provided as supplementary material and can be accessed alongside the manuscript.

References

- Amélio, C. d. O. (2018). A indústria e o mercado de jogos digitais no Brasil. In *Anais do XVII Simpósio Brasileiro de Jogos e Entretenimento Digital (SBGames'18)*, pages 1497–1506, Foz do Iguaçu, PR. SBC.
- Cardoso, M. V., Gusmão, C., and Harris, J. J. O. (2023). Pesquisa da indústria brasileira de games 2023. Technical report, ABRAGAMES.
- CNS (2016). Resolução Conselho Nacional de Saúde nº 510, de 7 de abril de 2016. https://bvsms.saude.gov.br/bvs/saudelegis/cns/2016/res0510_07_04_2016.html. Access on 28 June 2025.
- Dealessandri, M. (2024). The Brazilian games industry in numbers. <https://www.gamesindustry.biz/the-brazilian-games-industry-in-numbers>. Access on 14 June 2025.
- Dwijaputra, J., Purwitasari, D., and Zulaikha, E. (2023). Identifying gamification project challenges through literature review and post-mortem documents. In *Proceedings of the Asian HCI Symposium 2023*, Asian CHI '23, pages 15–21, New York, NY, USA. Association for Computing Machinery. DOI: <https://doi.org/10.1145/3604571.3604574>.
- Fowler Jr., F. J. (2013). *Survey Research Methods (Applied Social Research Methods Series)*. Sage Publications, 5 edition.
- Kitchenham, B. A. and Pfleeger, S. L. (2008). *Personal Opinion Surveys*, pages 63–92. Springer London, London. DOI: https://doi.org/10.1007/978-1-84800-044-5_3.
- Linaker, J., Sulaman, S. M., Höst, M., and de Mello, R. M. (2015). Guidelines for Conducting Surveys in Software Engineering v. 1.1. Technical report, Department of Computer Science, Lund University.
- Linåker, J., Bjarnason, E., and Fagerholm, F. (2024). Pre-release experimentation in indie game development: An interview survey. *arXiv preprint arXiv:2411.17183*. DOI: <https://doi.org/10.48550/arXiv.2411.17183>.
- Martins, L., Carneiro, N., Miranda, D., Aquino, F., Castro, R., Andrade, R. M., and Darin, T. (2021). Interação entre academia e indústria no processo de desenvolvimento de jogos: Percepções e lições aprendidas. In *Anais Estendidos do XX Simpósio Brasileiro de Jogos e Entretenimento Digital*, pages 779–785, Porto Alegre, RS, Brasil. SBC. DOI: https://doi.org/10.5753/sbgames_estendido.2021.21514.
- Newzoo (2021). Global Games Market Report 2021. <https://newzoo.com>. Access on 14 June 2025.
- Petrillo, F., Pimenta, M., Trindade, F., and Dietrich, C. (2009). What went wrong? a survey of problems in game development. In *Proceedings of the 2009 ACM symposium on Applied Computing*, pages 1410–1415. ACM. DOI: <https://doi.org/10.1145/1529282.1529563>.
- Pieva, L. and Bernardino, M. (2022). Tendências e Pesquisas em Gerenciamento de Projetos de Jogos Digitais: Uma Revisão Sistemática da Literatura. In *Anais Estendidos do XXI Simpósio Brasileiro de Jogos e Entretenimento Digital*, pages 11–20, Porto Alegre, RS, Brasil. SBC. DOI: https://doi.org/10.5753/sbgames_estendido.2022.225341.
- Pieva, L. and Bernardino, M. (2023). Trends and Research in Digital Game Project Management: A Systematic Literature Review. *Journal on Interactive Systems*, 14(1):533–545. DOI: <https://doi.org/10.5753/jis.2023.3196>.
- Pieva, L., Pillat, R., Mossmann, J., and Bernardino, M. (2024). Identificando as práticas de gerenciamento de projetos da indústria de jogos digitais: Uma pesquisa de levantamento. In *Anais do XXIII Simpósio Brasileiro de Jogos e Entretenimento Digital*, pages 252–262, Porto Alegre, RS, Brasil. SBC. DOI: <https://doi.org/10.5753/sbgames.2024.240616>.
- Schwaber, K. and Sutherland, J. (2020). *The Scrum Guide: The Definitive Guide to Scrum*. Access on 17 June 2025.
- Skjott Linneberg, M. and Korsgaard, S. (2019). Coding qualitative data: a synthesis guiding the novice. *Qualitative Research Journal*, 19(3):259–270. DOI: <https://doi.org/10.1108/QRJ-12-2018-0012>.

- Ullmann, G. C., Politowski, C., Guéhéneuc, Y.-G., Petrillo, F., and Montandon, J. a. E. (2022). Video game project management anti-patterns. In *Proceedings of the 6th International ICSE Workshop on Games and Software Engineering: Engineering Fun, Inspiration, and Motivation*, GAS '22, page 9–15, New York, NY, USA. Association for Computing Machinery. DOI: <https://doi.org/10.1145/3524494.3527623>.
- Wagner, S., Mendez, D., Felderer, M., Graziotin, D., and Kalinowski, M. (2020). *Challenges in Survey Research*, pages 93–125. Springer International Publishing, Cham. DOI: https://doi.org/10.1007/978-3-030-32489-6_4.
- Wohlin, C., Runeson, P., Höst, M., Ohlsson, M. C., Regnell, B., and Wesslén, A. (2012). *Experimentation in Software Engineering*. Springer Berlin. DOI: <https://doi.org/10.1007/978-3-662-69306-3>.
- Xavier, B., Viana, D., and Santos, R. (2021). Modelo de negócio para estúdios independentes em ecossistemas de software de jogos digitais. In *Anais Estendidos do XX Simpósio Brasileiro de Jogos e Entretenimento Digital*, pages 903–906, Porto Alegre, RS. SBC. DOI: https://doi.org/10.5753/sbgames_estendido.2021.19745.
- Xu, S., Bao, S., Fei, B., Su, Z., and Yu, Y. (2008). Exploring folksonomy for personalized search. In *31st Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*, SIGIR'08, page 155–162, New York, USA. ACM. DOI: <https://doi.org/10.1145/1390334.1390363>.
- Zackariasson, P., Walfisz, M., and and, T. L. W. (2006). Management of creativity in video game development. *Services Marketing Quarterly*, 27(4):73–97. DOI: https://doi.org/10.1300/J396v27n04_05.