Data-driven Model for Mobile Game Self-publishing

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Abstract. The emergence of new game value chain makes game developer self-publishing possible, but how game developers conduct the self-publishing business is unclear. Besides this, business intelligence has been applied in game development for game design and optimization, but few systematic research efforts are focusing on game publishing, especially on mobile game self-publishing. In this paper, a research proposal for adopting a data-driven model to conduct mobile game self-publishing is proposed. My Ph.D. research aims to identify and remedy the main problems faced by game developers during mobile game self-publishing, then introduces a brand-new model to drive the whole process of mobile game publishing. This new model combines user behavior data with in-game system analysis effectively. The main contribution is based on the survey of business intelligence used in the game area and also the interviews, to identify the key issues for self-publishing and then, to propose a new data-driven model for mobile game self-publishing, primarily targeting independent (indie) game developers.

Keywords: Business Intelligence, Data-driven, Game Analytics, Game Metrics, Independent Game Developer, Game Self-publishing.

1 Introduction

The traditional game industry value chain is a retail-driven value chain [1]. It includes game developers, publisher, distributors, retailers, and players. This value chain is derived from the giant game companies, producing big title games. During the early stages, the game business was dominated by big companies who owned the game distribution chain themselves, such as the Nintendo and Sony. So it's hard to compete with these giants as they control the whole game industry process from hardware development to the game distribution to the players. However, with the appearance of mobile game devices and also the third-party game distribution channels, such as App Store, Google Play and online websites. The original retail-driven value chain has been complemented with the mobile and online value chains, meaning that there are now several different value chains evolving and existing in parallel, as shown in Figure 1. The mobile value chain refers to a new situation where the game developer can release a game on the mobile phone and launch on all kinds of App Stores themselves. The online value chain refers to a new distribution model where developers can sell their games to

the players by other digital channels directly, such as their official website. So the emergence of new game value chains makes it possible for developers to publish games themselves.

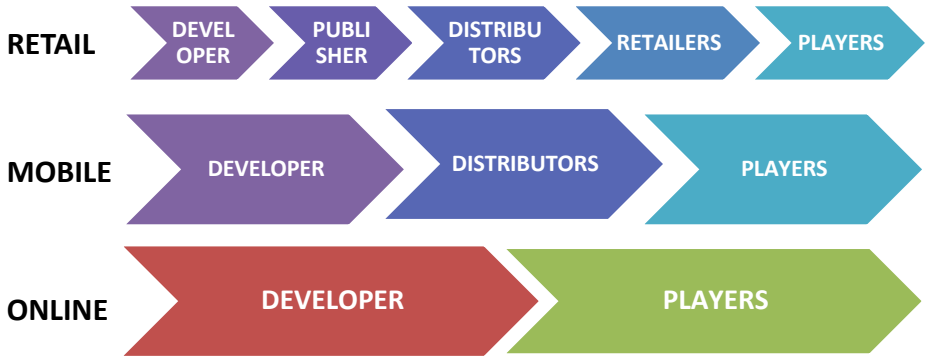

Fig. 1. Comparison between different game values chains.

Game publishing is about connecting game products with consumers, which is a vital part of the game industry. A publisher needs to handle issues related to publishing, such as advertising, marketing, and distribution [2]. Traditionally, publishing has been handled by separate actors on the market. However, with the emergence of new value chains, it has become possible for developers to handle publishing themselves. Hence, self-publishing means that the game developer handles all of the publishing work themselves instead of making a deal with a publisher.

As for the indie game, Garda, et al. [3] point out that three separate types of independence can be used to define the indie game: financial, creative and publisher independence. Indie games usually lack resources compared to AAA games which use a large amount of budget, including game development cost and marketing expenses. However, Indie games are commonly developed and published by a single person or small developer studio with limit resources [4]. Financial independence means that the developers are typically funding the games themselves. Creative independence means that indie game developers have creative and artistic freedom. Publishing independence means game self-publishing that the developers can publish the game themselves. As many indie studios are small or medium-sized businesses, doing the self-publishing may make sense from a resource perspective, but the drawback is the loss of the publisher's expertise and experience. However, the game industry has moved towards a new situation where indie game developers are commonly depending on self-publishing [5]. This allows game developers to publish their games to the target player directly. These changes put forward the new requirements for game developers and they must become familiar with the game publishing business. Therefore, self-publishing will be a transition to a completely new business model for the game industry which will bring more challenges for indie game developers. In this context data-driven means that an activity is guided by data, rather than by intuition or personal experience. The data-

driven model for mobile game self-publishing could be an opportunity to provide support for decision making when small and medium-sized indie studios with limited resources to publish their mobile games.

This research in progress paper presents a research proposal about a data-driven model used for mobile game self-publishing aims to fill the research gap about how to use data analytics guide the decision making for indie mobile game self-publishing. My main contribution is based on a literature review about Business Intelligence (BI) used for game research and also the interviews with indie game developers about their game publishing challenges to introduce a brand-new model for supporting the whole process of mobile game publishing. It combines analysis of the player's behavior with in-game system data. My research has used a combination of search terms "Business Intelligence", "Analytics", "Game Metrics", "Game Publishing" and "Indie games" to collect materials. For the following parts, I will give a relevant research background, a problem description, research question, research method and also expect results and contributions.

2 Framing Research Area

Stackowiak et al. [6] define BI as the process of obtaining large amounts of data, performing in-depth data analysis, and outputting analytical reports, helping management to make the right business decisions. Cui et al. [7] believe that BI is an effective way to improve business performance which can provide strong support for the decision-makers. Davenport and Harris [8] propose different degrees of BI, spanning from access and reporting to analytics, focusing on statistical analysis, forecasting, extrapolation, predictive modeling, and optimization.

Analytics can be recognized as a pattern for discovering and communicating data that is used to solve business problems and improve business performance. Analytics can be understood as a subset of BI. Davenport and Harris [8] give a definition of analytics which means by using data, quantitative analysis, explanatory and predictive models to drive the business decision. Analytics also can be regarded to obtain valid information by using methods beyond just querying and report. As for game analytics, according to the definition from Drachen et al. [9], game analytics can be recognized as the application of analytics to game development and research. In fact, game analytics not only can be used to identify in-game balancing issues [10], visualize players' movement trajectory on the game map[11], but also to save game development costs [12], and help with in-game bugs testing during the game development process [13]. As for the game metric, it can be recognized as the behavioral data source used for game analytics [9]. Game metrics are the quantitative measures of the attributes of objects that operate in the context of games. As for data-driven which is used to describe a process or activity, is based on data, not just by intuition or personal experience. In short, data-driven means the decision is made based on data analysis.

However, previous game analytics research only includes game development and research, few of the research focus on the game publishing side [9]. According to my

literature review, research about the use of analytics in game publishing is sparser, especially for mobile game publishing which lack of standards for reporting work in mobile game analytics [14].

My Ph.D. research is a multidisciplinary work that involves theories and concepts from different fields. As shown in Figure 2, game analytics combine game research and BI together and my research field will focus on game analytic from the publishing side which is closer to the real players compared with game development. The overall research is based on game research and BI, and aims to explore how game analytics can be applied in the field of game publishing.

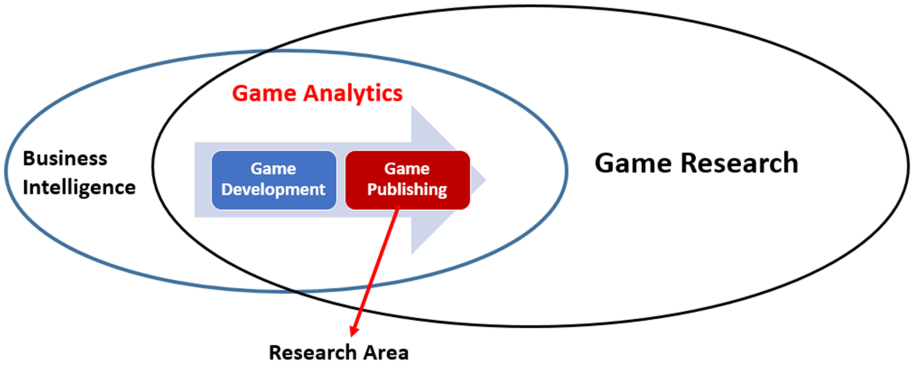

Fig. 2. Game Analytics for Game Publishing Research Area.

3 Problem Description

From the game industry side, for BI and analytics used in the game industry, most of the companies stay in the initial data collecting phase or use third-party data analytic tools to make a simple report [14]. So most of these reports can be recognized as standard reports, ad-hoc reports, query, and alerts. They rarely rise to the analytics angle and provide statistical analysis, forecasting, prediction, and optimization suggestions. As for the mobile game analytics, Drachen et al. [14] point out that in essence, the field is in its infancy and the available knowledge is heavily fragmented. This is to be expected in the explorative phase of a new domain, especially for the mobile game publishing.

Existing ARM Funnel Model: As for game publishing, Moreira et al. [15] use the ARM (acquisition, retention, and monetization) funnel as the basic analysis. This funnel model is developed by the company Kontagent [16]. It just visualizes the process of how gamers pass through a funnel which can be used for visualizing the game publishing process by acquisition, retention, and monetization. As it's originally designed for social games, mainly focus on the metrics viral K factor promotion effect evaluation. Whether K-LTV (Life Time Value) is great than CAC (Customer Acquisition Cost). It only evaluates how the player's performance changes by tracking acquisition, retention, and monetization. As the mobile game is different from the social game, it is hard to use this model to guide the mobile game publishing whole process.

Shortcomings of ARM Funnel Model: As the ARM funnel model is originally designed for social games. It ignores the channels' attributes, the interaction between the players and in-game system, the game revenue changes and new game content performance and also the players' behavior changes during the game publishing process. It's hard to evaluate the in-game tutorial system, in-game level system and also the in-game economic system performance by ARM funnel model. Issues such as: how new game version updates impact the game revenue and user retention? How to change the players from silence to active by in-game events? How to keep the dynamic balance for the in-game economy and how to effectively evaluate distribution channel qualities for user acquisition and monetization? So, a new model is needed to drive the mobile game self-publishing process and give guidance to the indie game developers' decision making. It should have more effective metrics for data collection and deep analysis which combines the players' behavior with in-game system data together.

4 Research Question

According to the latest survey from Newzoon Survey [17], the mobile game revenues account for more than 50% of the global games market in 2018. This means that for the first time, more than half of all game revenues will come from the mobile segment. As more and more mobile games appear, we also see an increasing number of indie game studios (typically small and medium-sized companies, often with limited resources). However, most indie game studios lack game publishing experience as pointed out by Guevara-Villalobos [5]. Mendez also points out that indie game developers don't know how to do user acquisition and how to transfer users into loyal and payment players [18]. However, by now, there are no associations of mobile game business analytics that can help promote knowledge and experiences sharing between indie game developers. As some revenue data are recognized as confidential information for many companies. In general, the mobile game analytics field remains in its infancy and the current knowledge about mobile game analytics is highly fragmented [14].

As for my Ph.D. research, the main research objectives are to understand how data analytics can be used for guiding the indie mobile game self-publishing. As shown in Figure 3, my research questions from the cross area and mainly target to the indie game developers and the main research question include:

Fig. 3. Research Questions from the Cross Area.

How can game analytics guide indie game developers' decision making during mobile game self-publishing? Based on the application of game data in the field of mobile game self-publishing, and the current research status from the academic side, four sub-questions can be derived. Sub-question 1: What are the main challenges related to mobile game self-publishing for indie game developers? Sub-question 2: How should indie game developers be guided during their mobile game self-publishing? Sub-question 3: What kind of game metrics could be involved in mobile game self-publishing? Sub-question 4: How should indie game developer self-publishing results be evaluated?

My Ph.D. research aim is to provide an effective solution for data-driven mobile game self-publishing from the BI side, supporting indie game developers in mobile game publishing. This research is expected to produce a new model that is able to frame mobile game publishing as a BI problem. The new model will be based on the optimization of existing ARM funnel model [15] as a starting point to analyze how to combine both the player's behavior and in-game data and how to use a data-driven approach to support mobile game self-publishing whole process which including the soft launch (only launch on some small areas for testing) and global launch [19] (launch on all areas), and the online services update (keep update after launch).

5 Research Method

Design Science Research (DSR) is research that creates this type of missing knowledge using design, analysis, reflection, and abstraction [20]. Hevner et al. [21] point out that design science is the creation of artifacts by the knowledge expressed in the form of constructs, techniques and methods, models, and mature theories. As shown in Figure 4, the design science in information system research describes the conceptual framework for understanding, executing and evaluation information system research which matches well with my research and it can be used in game research as well.

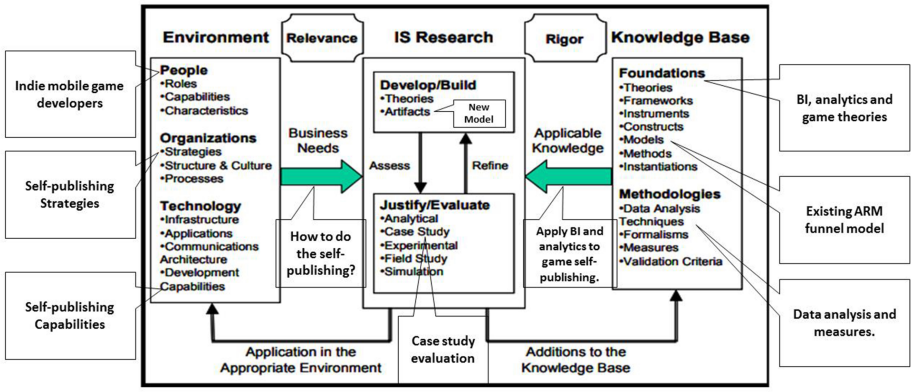

Fig. 4. Design Science in Game Research.

Hevner et al. [21] also discuss that design science can address research through the building and evaluation of artifacts to meet the identified business needs. As for my Ph.D. research is to provide a new model for indie mobile game self-publishing to solve

the main business issues which will be faced by the indie game developers and give them guidance during their game self-publishing business. The DSR Method is considered suitable. According to DSR Process [20] which divide the design science research process into different steps, I made the design science research process about the new data-driven model for mobile game self-publishing which is shown in Figure 5.

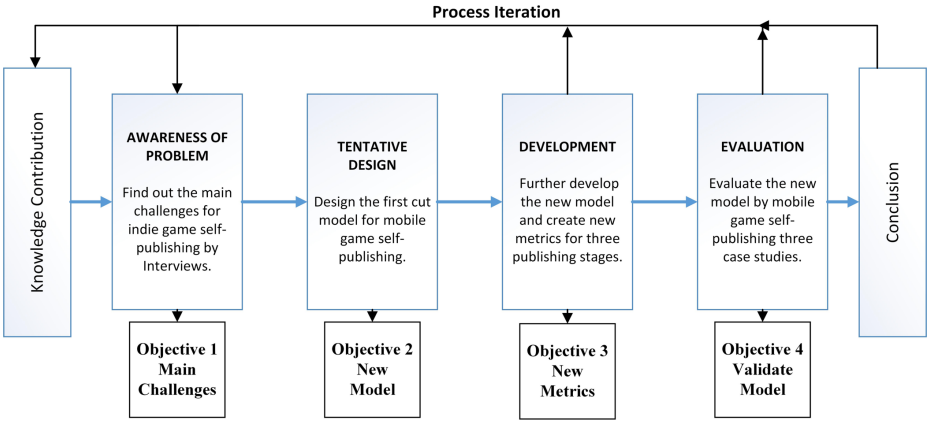

Fig. 5. Design Science Research Process about New Data-driven Model

Step 1 (objective 1): Awareness of Problem. An awareness of an interesting research problem can come from multiple sources, including new developments in industry or identification of problems within a reference discipline and the output of this step is a proposal. I plan to focus on the relevant literature review and find out the potential research gap, especially the research on game analytics for the mobile game publishing research then combine with at least five semi-structured interviews with indie game developers and find out the main challenges for indie game self-publishing.

Step 2 (objective 2): Suggestion for the first cut model. This phase immediately follows the proposal and is intimately connected with the proposal developed based on the awareness of a problem. As for my Ph.D. research, based on the indie game publishing interview and also the deep analysis of existing models pros and cons, I plan to provide a new model which can be used to drive indie game developer mobile game self-publishing decision making by data analytics.

Step 3 (objective 3): Development of a refined model. The tentative design is further developed and implemented in this phase and the proposed model may require the construction of formal proof to show its correctness. Based on the tentative design, I plan to further develop the new model and make it more suitable for guiding the whole process of indie mobile game self-publishing. I will create new metrics which could be used for measuring the three different mobile game publishing stages.

Step 4 (objective 4): Evaluation. Observe and measure how well the artifact supports a solution to the problem. According to the DSRM evaluation method, combined with the mobile game publishing three stages, I plan to involve in three case studies for the new model evaluation. It will include the soft launch case study, global launch case study and also the online services case study as shown in Figure 6.

Fig. 6. DSRM Case Studies Evaluation for Mobile Game Publishing Three Stages

Soft Launch Case Study: The first case study will focus on the mobile game soft launch stage which means only launch on some small areas for testing. I plan to focus on the new indie mobile games which plan to do the soft launch. As this stage target will focus on the game stability testing, I plan to figure out how the new model can be used for guiding the soft launch decision making. I will collect and analyze related game retention data which will help the indie game studio to meet the game benchmark required by the market and channels.

Global Launch Case Study: The second case study will focus on the second stage the global launch which means the game to be launched all over the world. As this stage target is to bring more players than the soft launch. I plan to figure out how the new model can be used for guiding the global launch. I will collect and analyze related game install data and marketing data which will help the indie game developer to take an effective way for the global launch user acquisition.

Online Services Case Study: The third case study will focus on the third stage about online services. This stage means the game has already been launched, the target for indie game developer needs to maintain the player and increase the revenue by online services during the game self-publishing. I plan to figure out how the new model can be used for guiding the online services. I will collect and analyze related revenue data which will help the indie game developer to maintain players and improve the revenue.

After evaluation of the new model in the real indie game projects, I will summarize all the results and make the conclusion about how the new model drives the indie mobile game self-publishing business and will give the answers to the related research questions by different methods as shown in Table 1.

Table 1. Ph.D. Research Questions, Objectives and Methods.

Questions	Objectives	Methods	Reasons

Sub-question 1: What are the main challenges related to mobile game self-publishing for indie game developers?	Main Challenges	By Interview and Literature Review	Interview and literature review should be the initial methods to understand the specific challenges and problems.
Sub-question 2: How should indie game developers be guided in their mobile game self-publishing?	New Model	By DSRM (Design New Model)	As my research aim is to provide a new model for guiding the indie game self-publishing, it should be suitable for the DSRM. I plan to create a new model based on the interview and optimization of the existing model, according to DSRM Process.
Sub-question 3: What kind of game metrics could be involved in mobile game self-publishing?	Game Metrics	By DSRM (New Metrics)	Based on the new model, I plan to create new metrics which can be used for measuring the mobile game publishing the whole process. It includes the soft launch metrics, global launch metrics and also the online services metrics.
Sub-question 4: How should indie game developer self-publishing results be evaluated?	Validate the model	By DSRM (Case Study Evaluation)	Valuate the new model with real indie mobile game project three case studies and see how well the model supports the indie mobile game self-publishing three steps. I will keep polishing and iterating the new mode and make it more suitable for the mobile game self-publishing.

In short, my research first starts with the interview study about the current situation of indie game developers for mobile game self-publishing to find the main challenges. Second, according to the interview study results, based on the existing model optimization, I will design a new model to drive the mobile game self-publishing. Third, I plan to further develop the new model and create new metrics which can be used for measuring the different mobile game publishing stages. Last, I will evaluate the new model by indie mobile game self-publishing projects with three stages of case studies

including the soft launch case study, global launch case study and also the online services case study and iterate the new model.

6 Expected Results and Contributions

With the appearance of new game value chain, it makes the game developer self-publishing possible, but how they conduct the game self-publishing business is unclear. Business intelligence has been applied in game development for game design and game optimization. However, few systematic research efforts are focusing on game publishing, especially for indie game self-publishing. So my Ph.D. research plan to fill the research gap about indie game self-publishing and expect to produce a new model which can drive the indie mobile game self-publishing process by game analytics. I also plan to create effective metrics for the new model to measure and improve the indie mobile game self-publishing process. The main contribution of my Ph.D. research is to provide a new generic model for guiding indie mobile game self-publishing through game analytics. My research plan to solve the potential issues which will be faced by indie game developers during their mobile self-publishing three stages. Based on the new model, reasonable decisions and solutions should be given by game data analysis. It will help to reduce the game publishing user acquisition cost and maximize the indie game revenue.

In summary, the expected results and contributions are based on the main question and four sub-questions and derive from the interviews with indie game studios and combine with the literature review and also the case studies. It will give guidance for indie game developers during the mobile game self-publishing and help indie mobile game developers to make optimal business decisions for self-publishing. By now, the interviews with indie game developers from different countries have been finished. The new data-driven model research is based on the optimization of ARM funnel model and combines user behavior data with in-game system analysis by new metrics for data collection and analysis. It had been accepted by the ISD 2019 (28th International Conference on Information Systems Development) and will be published soon.

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