Modeling and Simulation for the Development of Innovative Ideas for Video Games in Smartphones

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Introduction

In a society addicted to technology and its every aspect, the importance of innovative ideas (Abdel Aziz and Rizkallah 2006) is undoubted. Even in the video game (Zackariasson et al. 2010) industry, it can constitute a major issue. The smartphones' (Castro Soeiro et al. 2016) uprising has created a demand for video games compatible with those devices. That is why it is important to understand what a company of this sort is necessary to do, to become viable and competitive in this market section. Proving the importance of those innovations and the factors that affect them is going to be the main focus of this paper, as seen and analyzed below.

Methodology

After the theme was chosen (modeling and simulation for the development of innovative ideas for video games in smartphones), the necessary research on the Internet was conducted, in order to identify the factors that constitute and influence a company of this sort and the correlations between them. Subsequently a model was made, using the simulation modeling software (Hunecker 2009) and it was constructed in such a way that the majority of the factors and percentages used in it would be easily accessible and altered. Finally, the simulation turned up some conclusions.

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Both the model construction process, and the conclusions, can be found in the following sections.

Main Factors' Analysis

Internet Connection and Database Access

The first main factor that was considered is the Internet connection and database access. The company's staff has to be able to search in the Internet for new trends and the demand associated with them. They also have to be sure that their idea has not already been copyrighted. After taking these steps, they should have access to relevant databases so as to conduct research and procced with coming up with an innovative idea.

Staff Training and Seminars

As technology progresses ceaselessly, so should the employees' knowledge. They must always be up to date for new advancements in their field, which can be accomplished through constant training and seminars. That is why this is considered to be a main factor in the model.

Game Testers

The importance of the game testers cannot be denied. Although their role may seem easy or even unimportant, they are charged with the responsibility of testing their coworkers' ideas. When an idea may seem great in development, it main fail to deliver when it comes to gaming experience, so it is up to the Game Testers to try out these ideas and give feedback to be taken into consideration.

Users' Feedback Validation Staff

An idea or innovation could keep on improving, even after its release to the public. That's where the users' feedback comes in. They are given the ability to criticize the game and its features and suggest additions and adjustments, which the Users' Feedback Validation Staff takes into consideration and, if important and manageable, includes them in the game.

Data Mining Staff

As mentioned above, an idea may look good in paper but fail to pass game experience tests or cannot even be programmed correctly into the game. As time goes by, video games change and new programming methods and languages come up making these ideas more suitable in playstyle and easier to import. That is where data mining (Jun Lee and Siau 2006) Staff comes in. These employees are responsible for either searching in data bases, or on official web pages and blogs or forums, or even in social media and finding ideas such as the ones described above. This is very important because it can bring huge changes into the video games that could not be done in the past.

Dynamic Simulation Model

Every company needs its resources and the one in this simulation is no exception. As seen above, in Fig. 1, the resources are feeding into two factors, Infrastructure and Staff. The Infrastructure, in turn, divides the resource that were received into two sub-factors, Buildings & Maintenance (B&M), and Internet Connection & Database Access (IC&DA). The B&M sector includes all the expenses regarding the premises of the company, such as acquiring them, fitting them with the necessary equipment, and maintaining them. The IC&DA sector refers to the expenses that the company makes to obtain their employees access to all the indispensable information, needed for developing innovative ideas. This factor is further analyzed above.

The second factor is Staff. It includes four sub-factors, three of which are responsible for the company's profit. These factors are Staff Training (Dirani 2012)
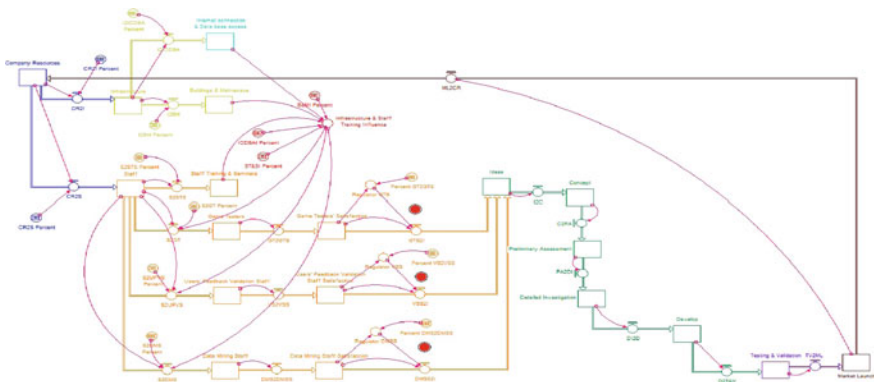

Fig. 1 Dynamic simulation model

and Seminars (ST&S), Game Testers (GT), Users' Feedback Validation Staff (UFVS), and Data Mining Staff (DMS).

The latter three are responsible for returning profit in the form of innovative ideas, but for them to produce any results, the must first be satisfied. Each sector's satisfaction (Martin Cruz et al. 2009) can be altered by any user of the model, through the interface.

The innovative ideas that the staff produces are going through many stages, before they are approved to be included in a new game. Between those stages, there

Table 1 Resources flow

Months	Initial	1	2	3	4	5	6
Company resouroes	100.00	41.43	23.03	36.07	61.72	108.49	180.96
Infrastructure	20.00	15.48	9.38	7.10	8.58	13.83	23.47
Buildings & maintenance	16.00	31.24	41.60	48.17	54.07	62.26	75.91
Internet convection a data base access	4.00	7.31	10.40	12.04	13.52	15.58	18.98
Staff	80.00	0.00	0.00	0.00	0.00	0.00	0.00
Staff training and seminars	8.00	11.29	11.65	11.94	12.35	13.07	14.32
Game testers	78.64	58.35	37.16	30.34	37.92	61.71	104.99
Game testers' satisfaction	73.64	53.66	30.22	0.00	27.39	0.00	62.30
Users' feefibaoe validation staff	78.64	53.23	17.91	5.67	1.79	0.57	0.18
Users' feedback validation staff satisfaction	78.64	53.66	23.91	36.16	48.03	41.28	41.65
Data mining staff	78.64	42.32	13.39	4.24	1.34	0.42	0.13
Data mining staff satisfaction	78.64	52.56	18.35	27.51	30.40	31.32	31.61
Ideas	13.554.26	13.316.37	10.271.36	7.580.47	5.549.62	4.127.65	3.021.8.3
Concept	5.586.28	8.537.26	9.568.30	9.444.17	8.713.90	7.697.07	6.615.03
Preliminary assessment	1.889.88	3.084.55	4.687.32	6.000.16	8.853.97	7.247.00	7.252.24
Detailed investigation	500.96	953.07	1.698.30	2.648.61	3.648.24	4.558.53	5.286.69
Develop	150.29	286.47	538.35	948.35	1.511.41	2.184.42	2.902.98
Testing & validation	45.09	85.94	163.54	304.33	534.12	866.22	1.296.00
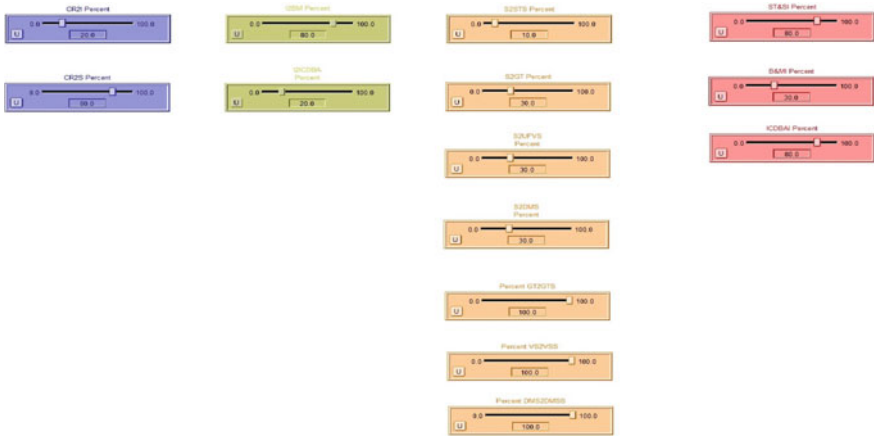
Fig. 2 Resources and satisfactions

Table 2 Resources flow

Months	7	8	9	10	11	12
Company resources	281.28	407.49	553.78	711.54	370.85	1.022.00
Infrastructure	38.18	58.24	83.20	111.94	142.82	173.97
Buildings & maintenance	98.77	135.00	188.80	263.80	362.54	486.19
Internet connection & data base access	24.69	33.75	47.20	65.95	90.64	121.55
Staff	0.00	0.00	0.00	0.00	0.00	0.00
Staff training seminars	16.36	19.48	23.91	29.84	37.35	46.45
Game testers	171.08	261.26	373.62	503.14	642.45	783.10
Game testers' satisfaction	0.00	39.97	0.00	0.00	0.00	0.00
Users" feedback validation staff	0.08	0.02	0.01	0.00	0.00	0.00
Users' feedback validation staff satisfaction	41.77	41.81	41.82	41.82	41.62	41.83
Data mining staff	0.04	0.01	0.00	0.00	0.00	0.00
Dots mining staff satisfaction	31.70	31.73	31.74	31.74	31.74	31.74
Ideas	2.361.11	1.847.09	1.622.02	1.518.37	1.550.22	1.687.40
Concept	5.577.36	4.653.38	3.866.68	3.238.58	2.762.00	2.429.12
Preliminary assessment	8.968.82	6.494.13	5.913.40	5.295.02	4.690.49	4.136.03
Detailed investigation	5.788.07	6.056.76	6.113.32	5.993.77	5.741.12	5.398.91
Develop	3.600.35	4.220.11	4.722.46	5.085.66	5.304.33	5.386.22
Testing & validation	1.802.26	2.352.48	2.909.43	3.437.15	3.905.28	4.291.67

is a quality control checkpoint, with a set of criteria that the product must pass to reach the next stage. Those stages will be explained below.

The employees are coming up with ideas, but not all of them are suitable to be included in a product. The ones that are clever and original, proceed to the next stage, which is the Concept (Jalonen et al. 2016) The Concept stage performs a quality check and decides which concepts will proceed for Preliminary Assessment, where they will be evaluated from an economic standpoint. Concepts that pass both evaluations get the necessary budget to be developed. Finally, the developed ideas are going through testing and validation and those that see it through, are produced from the company. In the Market Launch stack can be found, only the ideas that passed through all the stages successfully, and they are the ones to bring the company profit.

As can be seen in Table 1, regarding the Company's Resources, during the first 4 months, there is a loss. On the fifth month, the resources are about the amount they were in the beginning and from the sixth month until the end of the simulation, a profit can be seen. In the end, the resources are 10 times the initial company budget.

Taking into consideration both, Table 1 and Fig. 2, it is safe to come up with the ascertainment that since the company is able to achieve its employees' satisfactions, it is able to keep a steady idea producing pace. Those ideas are, in turn, evaluated and the best ones are developed and launched in the market, bringing the company profit (Table 2).

In Fig. 3 can be seen the interface for this dynamic model. From there the user can decide the percentages of the company's resources that are provides to each factor. Each flow is colored the same as the stack it draws funds from, so the blue sliders are referring to the flows coming straight from the Company Resources stack, feeding into the Infrastructure and Staff factors, while the yellow ones draw
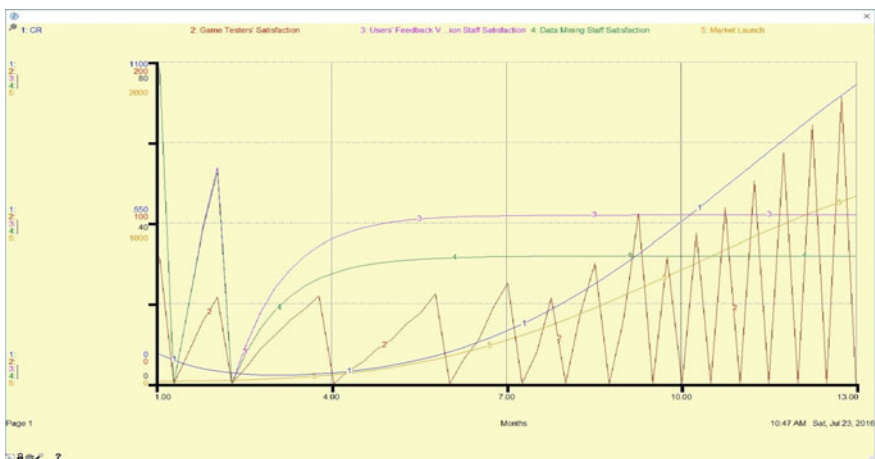

Fig. 3 Interface

funds from Infrastructure and divide them between the Buildings and Maintenance and Internet Connection and Database Access sub-factors. The orange sliders are not only arranging the percentage of the funds that each Staff sub-factor receives from the Staff stack, but also the amount of resources that need to be received from the GT, UFVS, and DMS for them to be satisfied and begin producing innovations. Lastly, the red sliders are used to set the amount of influence the Internet Connection and Database Access and the ST&S exercise upon the Staff's sub-factors, affecting their productivity.

Conclusions

While studying about the "Modeling and simulation for the development of innovative ideas for video games in smartphones," after extensive research and with the help of the Dynamic Model and the Simulation analyzed above, while there is always room for further analysis, there has been reached a conclusion regarding the main factors responsible for the success or failure of a company that operates on this technology field. Such factors were found to be the Internet Connection and Database Access as also ST&S which give the company's staff the ability to conduct research and stay up to date regarding upcoming breakthroughs in technology and provides them the means necessary to exploit them in order to come up with new ideas. Given these tools, the GT, UFVS, and DMS produce innovations, some of which will fulfill the requirements and reach the market. For a company of this instance, the importance of having a steady flow of ideas cannot be denied, as its survival depends on it.

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