

# Data and Application Management Models for Content Services Architecture: Example of Project Approach to Education Process of Master Students in IT

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**Abstract.** The purpose of this study is to develop a model for managing data and applications in the architecture of content services using the example of an e-sports agency for student. A data management model was developed in the Powersim Studio 7.0 simulation environment, which allows determining the economic result of the company in the electronic sales architecture. The presented model includes several functional blocks, consisting of the key parameters of the model, such as: sales, customers, orders, income from additional services. The selected blocks were formed on the basis of the analysis of the company's business processes, which allowed us to identify the main processes that affect the formation of the nailed enterprise in the project training. After a series of simulation experiments, taking into account the initial values specified in the model and taking into account the inclusion of additional values (income from the provision of additional services to the company), results were obtained confirming the economic feasibility of including additional services. The proposed system of indicators and the developed model are an analytical comprehensive toolkit that allows you to reasonably assess the current state and results of the system, taking into account the introduction of additional services and activities, and without it, which, in turn, makes it possible to study in more detail and deeply their impact on the economic result company.

**Keywords:** Data Management, Online Advertising, Customer Base, Information Architecture, Educational Process, Simulation, Education, Computer Simulation, Modeling Methodology, Project Training System Dynamics.

## 1 Introduction

The growth of cash flow in the sphere of electronic sales stimulates the emergence of a new type of advertising - internet advertising. This segment of the advertising market is highly promising and has been developing rapidly lately. That is why there is a need to introduce new services and activities to ensure the higher competitiveness of enterprises. However, there is a problem of determining the specific segment of consumers which advertising will be aimed at and its feasibility that is, the ratio of the spent funds

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and the final result, that is, the efficiency of online advertising [4]. The need to solve this problem causes the necessity to develop data management tools in the architecture of content services.

The purpose of the research is to develop a simulation model for data and application management in the architecture of content services that will help to analyze and structure the functioning of companies in the growing market of online advertising. This research will be the basis for teaching students a system dynamics project [5,9].

## 2 The methodology of data management modeling in the content service architecture

Russian e-sports agency «M19» was selected for research and analysis of data in the content service architecture that provides advertising services, organizes competitions in various disciplines and has several own teams. The research will be focused on these internet advertising services[6,7,8].

The clients of this organization are world-famous brands: Intel, SVEN, ASUS, Red Bull, YOTA, Tele2, Russian Post and many others.

E-sports competition is the main product of the organization «M19». This type of activity consists of organizing a branded competition in various e-sports disciplines. Different companies and organizations that want to get higher brand awareness at the end of the competition can be a customer. The main organizational processes of the company are presented in the Fig 1.

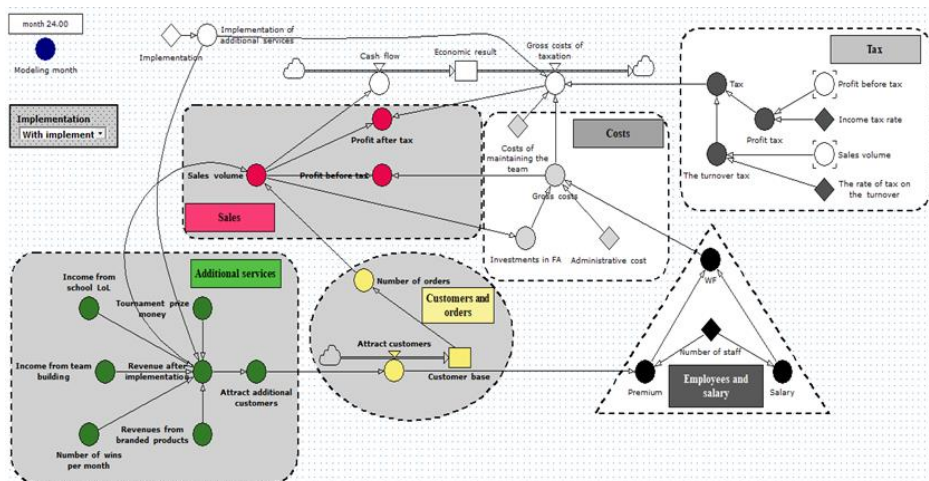


**Fig. 1.** The hierarchical structure of organizational processes of the company

Agency uses streamers as the general channel of ad promotion, people who conduct online broadcasts, where they play games, communicate with their viewers and share

their lifestyle with the audience. In most cases, the agency uses the placement of the banner on the broadcasts.

Based on the above factors and additions, we will develop a system-dynamic data management model in the Powersim Studio 7.0 application software package that will include the ability to connect and provide additional services and activities that will affect profit (Fig 2) [1].



**Fig. 2.** View of the model made in Powersim Studio 7.0.

The main parameters that are investigated in this model:

- 1) Sales that means the number of orders from the customer base and also the direct impact of the implementation of additional services and activities on this number;
- 2) Additional services that will be added at a certain modeling phase - a fundamental part of this system-dynamic model because the direct impact of the implementation of additional services and activities will be investigated;
- 3) Clients and orders which will be affected by the implementation of additional services and activities.

Blocs that are considered in this model:

1) Bloc «Sales» - represents the quintessence of the concept of sale and includes indicators such as sales volume, profit before taxation and profit after taxation. This bloc is key to characterize the successful functioning of the company and occupies a crucial place in this research using the system-dynamic model.

2) Bloc «Additional services» - there are services and actions that will be added at a certain phase of modeling. This section influences the result of the total modeling because it increases the number of customers in the customer base that increases the number of orders. It is connected to the specifics of the services and activities that will be added. Let us consider the following components of this bloc in more detail:

- Income from the school «LoL» - relatively small income from League of Legends school activities, however, this type of activity has a positive effect on attracting attention to the M19 website because this format of activity is in demand among players in this e-sports discipline;
- Team building income - income from a completely new product for the market, which will develop steadily and attract more and more customers;
- Income from branded products - M19 will also get income from its branded products and printing services in common;
- Prizes for the competition - the money that teams receive for winning prizes in various tournaments;
- The number of winnings per month - a value that shows the number of winnings of teams signed by the M19 organization.

Level equations:

1) Economic result

Where:

- economic result at a time  $t$ ;
- starting moment of modeling;
- final moment of modeling;
- the rate of cash inflow received from the company at a time;
- the pace that characterizes amount of expenses at a time. In this case, gross costs including taxation.

2) Client base

Where:

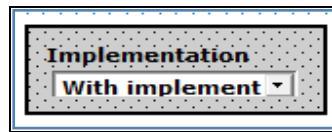
- number of clients at a time  $t$ ;
- starting moment of modeling;
- final moment of modeling;
- the rate of the standard inflow of customers into the customer base at a time;
- the rate of the additional inflow of customers into the customer base after implementation of additional services and actions at a time.

**Table 1.** Basic value of levels

№	Name	Value	Units	Description
1	Economic result	0	RUB	The economic result of the organization, taking into account the deduction of gross costs and taxation
2	Client base	35	people	A drive with the number of contacts, some of which making an order for a service; according to the conditions of the model, modeling starts from 50 contacts

We will conduct a simulation experiment taking into account the basic conditions shown in the tables “Basic value of levels” and “Values of constants and model parameters”, where we consider the numerical results that were received during the modeling and compare the modeling with and without additional services and activities [10].

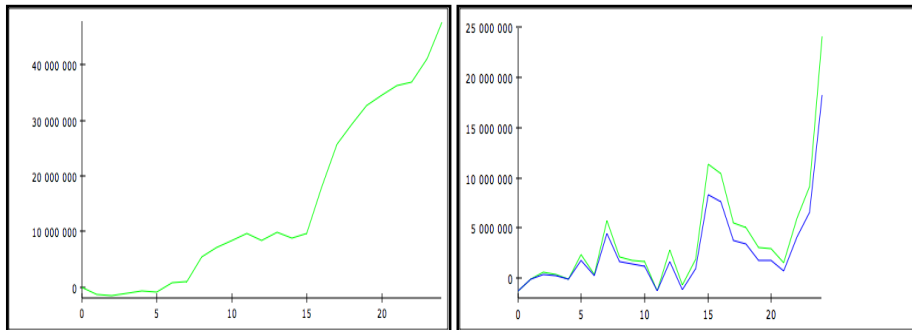
For this purpose the model has an «Implementation» switch, which allows to make experiments without introducing additional services and then switch the model to «With implement» mode and spend the next series of experiments (Fig. 3).



**Fig. 3.** Model’s «Implementation» switch.

The results of modeling economic indicators for 24 months without implementation have reached a lower level than with the implementation of additional services and activities. The growth rate of the economic result has been growing since the 9th month when M19 stopped to be a loss-making organization[11].

However, as a result of the following simulation experiment, at the 12th modeling step (12th month), additional services and activities that were described earlier are implemented, so that the “Implementation” switch is moved to the “With Implementation” position (Fig. 4).



**Fig. 4.** Comparison of economic results with the implementation of additional services and activities

As we can see from the received results, after the implementation of additional services and activities, M19 begins to grow steadily. However, it is worth noting that spasmodic values of profit are the result of the specifics of the M19 company. Most orders have a high cost, but their number per month is not large, which leads to undulating indicators of the graph.

From the received data it is clear that using only standard tools for service the M19 company stops to be unprofitable only in the 16th month and not in the 9th as it was in the case with the implementation of additional services and activities. It is also worth

noting that the final economic result is 26 507 813.71 rubles. As soon as with implementation the final economic result was 48,889,389.43 rubles that clearly shows the positive impact of the implementation of additional services and activities.

So based on the received graphs we can say that the implementation of additional services and activities was successful as it had a positive effect on the economic result and profit.

### 3 Conclusion

Using the Powersim Studio 7.0 software, a system-dynamic model of electronic sales management was developed and tested supported by the example of an agency that organizes e-sports competitions. The presented model allows managing data in the architecture of the agency's content service with the help of a regulator for turning on and off additional services that makes it possible to research deeply and in more detail the effect of implementation on the economic result of the agency.

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