Simulation-dynamic model of influence of various advertisement on sales of services

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Abstract. The article considers the influence of various types of advertising and identifies those that have the greatest impact on sales of services of different organizations. The model is built with consideration of the following types of advertising: event advertising, advertising on social networks, television and outdoor advertising. Also taken into account communication that has the greatest influence on the increase in the purchase of services. The constructed model is aimed at modelling the acquisition of service once and does not consider modelling repeat purchases. Based on the constructed graphs, changes in the number of existing and potential customers and the effect on the flow of customers from various types of advertising are analyzed. From this, conclusions were drawn about which particular type of advertising has the greatest impact, and which is the least and how communication affects the acquisition of services.

1. Introduction

In the modern world, one way or another, but every person is faced with the need to purchase service. The service sector is defined as the totality of activities that produce and sell services. The service sector includes housing and communal services, public services, public education, health care, physical education and social security, culture and art, passenger transport, consumer services, retail, catering [1].

The primary purchase of organization’s services is influenced by the effectiveness of advertising and the effect of communicating with people who previously used the services of the company (people who are currently in the status of customers). Advertising can be divided into several types; in this model, the most understandable and well-known types of advertising will be presented. Television advertising is advertising on TV, and advertising on social networks is advertising on social networks such as Instagram, VKontakte, Facebook. Outdoor advertising includes graphic, textual or other information of an advertising nature, which is placed on special temporary or stationary structures located in an open area. Event advertising is a set of marketing events aimed at the promotion of the product or the company in relation to a specific event [2].

One of the widely used approaches for modelling the impact of advertising and communication is a system-dynamic modelling approach [3, 4]. It is aimed at studying complex systems, their behaviour in time and depending on the structure of system elements and the interaction between them [5].
2. Model for calculating the level of advertising and communication influence on the activities of the organization

A graphic diagram of the model, which calculates the level of influence of advertising on the activities of the organization, is presented in Figure 1. The model includes two levels:

- Customers.
- Potential customers.

The diagram also shows one flow, which informs those potential customers, when purchasing service, become customers of the organization: primary service purchase.

![Figure 1. Flows and levels diagram.](image)

In addition to the listed flows and levels, auxiliary variables are present in the diagram. Since all the basic elements have been added, the next logical step will be to describe the available variables.

The influence of advertising consists of producing some fraction of potential buyers on the effectiveness of advertising. In this model, the effectiveness of advertising and the likelihood that a service will be acquired under its influence are defined as constant. In this model, the approximate proportion of people who purchase the services of the organization is indicated. This efficiency will be added for each variable with the influence of advertising [6].

Description of variables is presented in Table 1.
Table 1. Description of variables.

| Name                                         | Value                                                                 |
|----------------------------------------------|-----------------------------------------------------------------------|
| The impact of television advertising         | Potential clients*The effectiveness of television advertising          |
| The impact of social media advertising       | Potential clients*The effectiveness of advertising in social networks  |
| The impact of outdoor advertising            | Potential clients*The effectiveness of outdoor advertising             |
| The impact of event advertising              | Potential clients*The effectiveness of event advertising              |
| Power of persuasion                          | Clients*Contacts with other people*Power of persuasion                |
| Communication impact                         | Potential buyers/Population                                           |
| Primary service purchase                     | The impact of television advertising+The impact of social media advertising+The impact of outdoor advertising+The impact of event advertising+Communication impact |

Figure 2. User interface.

3. Management interface of the model calculation

Figure 2 shows the “User interface”, which consists of five graphs:
• Service acquisition dynamics.
• Customer dynamics.
• The impact of advertising on social networks and television advertising.
• The impact of the event and outdoor advertising.
• Communication impact.

4. Experimental results
During the experiment, a model was built that shows the effect of various advertising and communication on the consumption of services.

Input values for the calculation are presented in Table 2.

| Name                                           | Value      |
|------------------------------------------------|------------|
| Clients                                        | 0          |
| Population                                     | 1000000    |
| The effectiveness of television advertising    | 0.00027    |
| The effectiveness of advertising in social networks | 0.00055    |
| The effectiveness of outdoor advertising       | 0.00027    |
| The effectiveness of event advertising         | 0.00001    |
| Contacts with other people                     | 150        |
| Power of persuasion                            | 0.0015     |

The results are shown in Figure 3.

![Figure 3. User interface with model results.](image)
After analyzing the changes in the number of customers and potential customers, the graph shows that over time, under the influence of various types of advertising and communication, the “Customers” schedule is gradually growing, which means that the number of customers who purchased the service increases, while the schedule “Potential customers” is decreasing. The flow of “Primary service purchase” is gradually growing, and subsequently decreases, since a predetermined number of potential buyers have purchased the service and no longer need it [7].

Also, on the graphs, which show the effect of various types of advertising, it can be concluded that advertising on social networks has the greatest impact on the acquisition of services, and event advertising has the lowest impact. However, most acquire the service precisely under the influence of communication, the graph shows that the initial purchase of services under the influence of communication takes place gradually, this is due to the fact that people may not be limited to one review but over time collect information about the organization [8].

5. Conclusion
In this work, the model described in the example was built with the available input data. It was concluded that over time, after the influence of various types of advertising and communication, the “Clients” schedule is gradually growing and the “Potential customers” schedule is decreasing.

The flow of “Primary acquisition of services” is gradually growing, and subsequently decreases, since a predetermined number of potential buyers have purchased the service and no longer need it. It also became clear that the main factors influencing the influx of new customers are advertising on social networks and communication with people [9].

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