Factor Analysis of the Results of Digital Technology Applications in the Company's Marketing Activities

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Abstract— **The conceptual issues of conducting factor analysis of enterprise's marketing activity are being discussed, in the example of digital marketing communications. The general rules and the algorithm for conducting such analysis are proposed, and its purpose is justified. The questions of how to define the causal relationships of marketing costs and results, the ability to search for reserves and the increase of marketing efficiency, and the determination of the contribution of marketing activities to the overall economic performance of the enterprise are being discussed.**

Keywords—marketing activities; factor analysis; digital marketing communications; marketing costs; marketing activities results

I. INTRODUCTION

A review of publications in the field of international and Russian practice of marketing performance management points to a number of problems in marketing performance analysis: weak use of management and financial techniques with a formalized algorithm of analysis [1], the need to quantify the marketing budgets [2], the absence of measure of marketing costs with strategic implications or the intangible results [3], lack of communication of marketing indicators with the financial results of the company [4] etc. As a result of the search for new opportunities of decision making process in the marketing field the authors consider the tools of economic analysis that has a number of merits: the high degree of structuring of the subject area, the universality of a number of methods, the unambiguous application of the method and the results, the possibility of identifying causal relationships through factor analysis.

Specific features of marketing activities (the need to take into account the product life cycle, irregularity of marketing costs, the existence of temporary lags in the effects measurement, etc.) require additional measures to adapt the economic analysis methods to marketing activity.

Solution to the problem of customizing the economic analysis methods might be considered as an example of a study of the results of digital marketing communications application, as one of the most required marketing communications tools according to [5].

II. THE PREREQUISITES FOR A TASK

The urgency of use of digital marketing communications has been confirmed by research project [5], in 2016. 95% of participants in market of advertising of Russia used Internet advertising, 57% mobile advertising, 77% of companies expected to increase the share of interactive advertising in the marketing budget (Fig. 1). However, there is a gap in the study of the results of digital marketing communications and the factors influencing them, and the methodologies described in the analysis and evaluation of marketing in the enterprise [6] due to the lack of quantitative methods and the subjectivity of the formation of values it's impossible to apply to digital marketing communications analysis
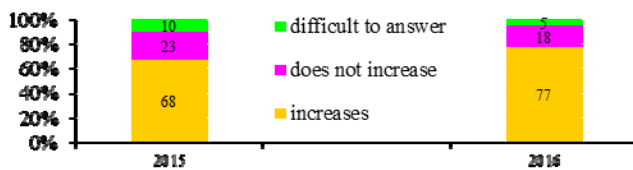
Fig. 1. Change the budget share of interactive advertisements to the research companies [5

Fig. 2. Interconnection of resources, results, and marketing activities

At the same time, in the context of the dynamic development of the information economy and Internet technologies, it is possible to trace the "route", the consumer's actions, and thus new possibilities are opening for investigating the causal relationship between the advertising impact and the consumer response, in particular through factor analysis.

III. TASK SETTING

The features of the factor analysis of the results of digital technology applications in the marketing activities of the enterprise are as follows:

1. Marketing activity is a part of a higher level system, namely economic activity. Marketing objectives are subordinated to the objectives of the enterprise, which makes it necessary to measure the results of digital technologies in the form of contribution indicators to the performance of the enterprise.

2. The formulation of the findings of the factor analysis of digital technologies depends on the strategic and operational marketing objectives pursued.

3. The existence of threshold effects, such as a minimum level of sales incentives, time lags (consumer response to advertising has time lag).

4. The need to identify the economic impact of such digital technology application as a company recognition and image, loyalty, customer satisfaction.

5. The difficulty of measuring the cost ratios and strategic or social results of digital technology applications.

These features identified the research problem-the development of a methodology for factor analysis of the results of digital technology applications in the enterprise's marketing activities, in the case of Medexport - Severnaya zvezda, a limited liability company under the laws of Russian Federation (Pharmakopejka pharmacy chain brand, which includes more than 600 pharmacies).

The methodology developed is based on the idea of considering marketing activities as a process of converting resources through a certain technics to the results (Fig. 2).
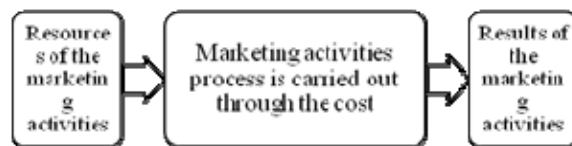
Input   *Output*

The conversion of resources to the results in the marketing activity is carried out through the cost of implementing marketing activities (providing technical devices, paying salaries, etc.) and performing operations (conducting marketing research, creating marketing mix, etc.).

The factor analysis of the results of digital technology applications corresponds to the general stages of factor analysis described in [7]: objective setting, factor selection, factor classification, dependency definition, relationship modeling, model selection, factor analysis, model comparison, conclusions. Deterministic factor analysis is performed by following methods: chain substitutions, index and integral revealing of the isolated influence of factors that differ by the presence of an "undefined residue" and a way of determining the order of the arrangement of factors in the chain of cofactors.

To implement the methodology, the following types of digital marketing communications of Medexport – Severnaya zvezda were chosen: E-mail, SMS, Internet advertising, promotion on social networks. At the end of 2016, the company found the deviation of the gross margin of 16% of the plan (Fig. 3).
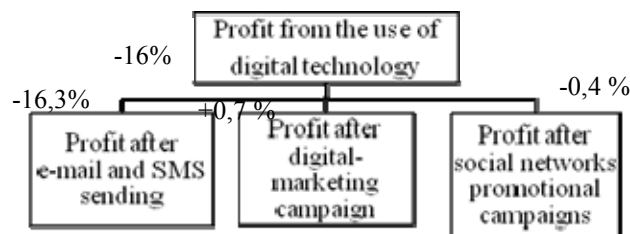

Fig. 3. Profit-making scheme from digital technology application

Thanks to the method of chain substitutions we have revealed that profits after e-mail and SMS sending have decreased by 16.3%, the use of Internet advertising has increased by 0.7%, as a result of progress in social networks decreased by 0.4%.

In order to determine the influencing factors, a deeper factor analysis was made (Fig. 4, 5, 6), according to which the factors that had the greatest impact on profit change are: the

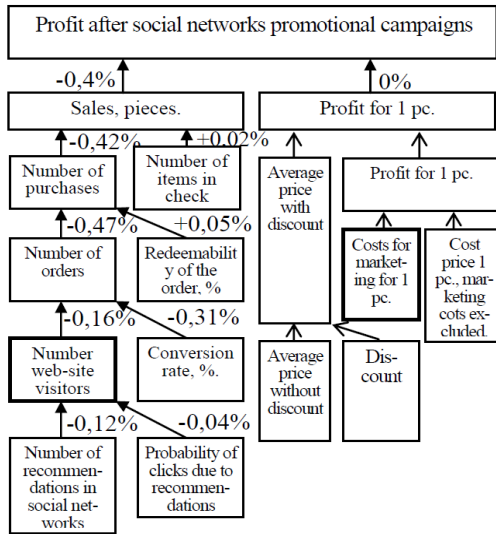probability of opening an e-mail (28.7) and click-ability of the banner (10%).

Fig. 4.   Diagram of factor analysis of progress in social networks

Fig. 5.   Scheme of factor analysis based on the results of Internet advertising

TABLE I.

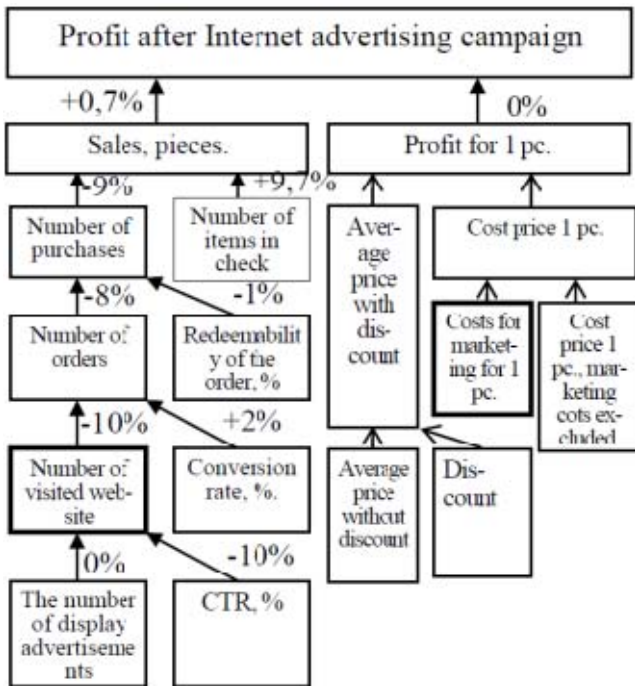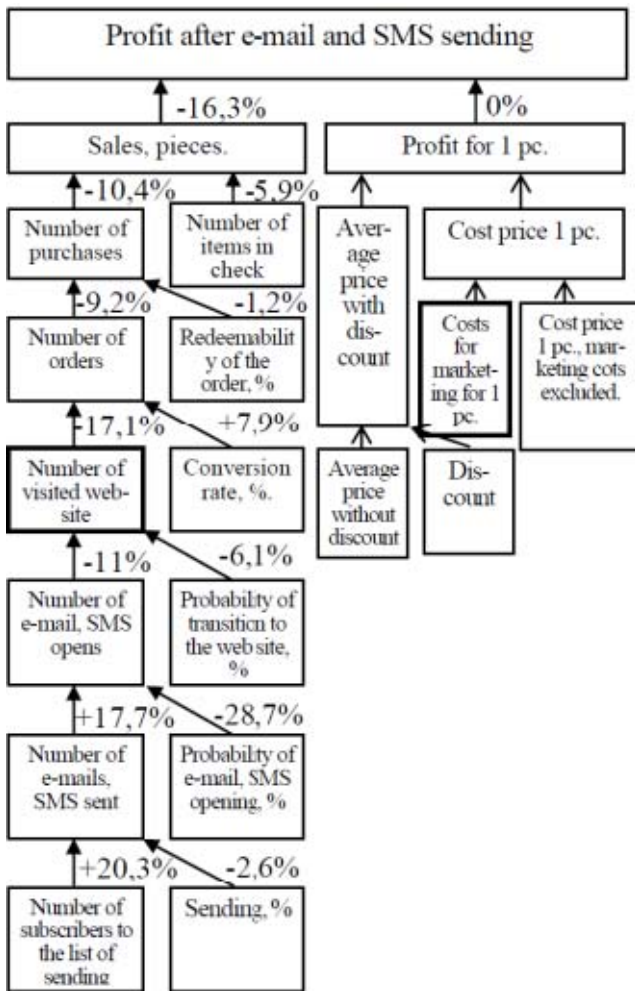| #	The investigated object of digital technologies	Marketing activities results		Devi ation s +/–	In charge	Corrective actions
		Plan	Fact			
Communication results						
1.1	The number of advertising messages impressions million.	90	90	0	Advertising department	Increase the level of control over the implementation of contracts with advertising agencies
1.2	CTR, %	0,05	0,03	-0,02		Choice of a more effective way of advertising and the place of advertising on the Internet
1.3	Number web-site visitors	45	27	-18		
Financial and economic results						
2.1	Conversion rate	2	2,3	0,3	Web-analytics team, orders support, quality goods department	Improvements of the product description on the web-site, aster-sales services, stock control
2.2	Number of orders	900	621	-279		
2.3	Redeemability of the order, %	95	94	-1	Sales department	Increase the speed of order confirmation and consultancy assistance
2.4	Number of purchases	855	584	-271		
2.5	Number of items in check	4	6	2	Category management group	Diversify the range of sales options: in stet or one by one

Fig. 6. A factor analysis scheme resulting from

A tabular report was generated (Table 1), including recommended corrective action, in particular: develop, test, and select the best options for e-mail headers that are of interest and trust in the target audience, and consider alternative ways of display advertising as well as locations with a higher rate of clickability.

IV. CONCLUSION

Thus, a factor analysis based on the of obtained digital marketing communications shows that the factor analysis tools can be used for marketing activities analysis tasks: Determination of marketing activities contribution to the overall economic performance of the enterprise, the identification of influencing factors and the causal relationship of the costs and results of marketing activities, the search for reserves and the new possibilities for enhancing the effectiveness of marketing activities.

The methodology used for factor analysis makes it possible to use it as a formalized basis for informed decision-making on the management of marketing activities.

The main focus of further use of the factor models discussed in the article is their adaptation to the new types of digital marketing communications (native advertising, retargeting, content-marketing, and so on) to keep track of the causal links between the advertising impact and the consumer response.

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