Information technologies and their impact on electronic marketing

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Abstract. The main theoretical hypotheses for studying the characteristics of the influence of information technology on electronic marketing are considered. Using methodological analysis and scientific synthesis, the key components of the strategy and the main trends in the modification of electronic marketing are identified. It is substantiated that the introduction of innovative business management tools in order to optimize business processes and increase profitability leads to a change in the marketing strategy. The influence of information technology on the main trends in changes in electronic marketing has been revealed. The main channels of electronic marketing are argued using information technologies, on the basis of which the main tools of electronic marketing are structured. Methodological approaches to economic and mathematical forecasting of trends in electronic marketing modification under the influence of information technology have been developed, with justification of costs and profitability of implementation. The results obtained and scenarios for forecasting long-term trends in the modification of electronic marketing under the influence of information technology for the next 5 years can be applied in practice when strategically planning a company's marketing.

1 Introduction

The modification global business according to application intensity of IT technologies in economic sectors is due to changes and the need to improve business management strategies of companies. The emergence of IT technologies and their implementation in all spheres of the world economy leads to significant optimization of the functioning of companies and increased business efficiency, which has provoked interest and increased the significance of these modifications in electronic marketing. Modern information technologies have been implemented in various sectors of the global economy and act as a lever for intensive modification of the business environment. Innovative IT technologies have become popular within e-marketing because they can be used to improve conceptual business that cover the main strategic goals of a business. The implementation of IT technologies in the business segment of the global economy largely destroys barriers in communications with the audience, which has a positive impact on the strategic indicators of profitability of companies. Global market competition generates interest in improving management tools

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and methods to achieve strategic goals and maintain market positions. Today, the existence of global markets is characterized by an intensification of the process of studying research on changes and the emergence of new innovative IT technologies for their timely implementation in the company’s strategy to improve competitive positions, increase the level of consumer satisfaction to enter a new stage in positioning and the future implementation of electronic marketing. It is important to state that in today’s realities the concept of classical marketing has been implemented into the concept of electronic marketing on the basis of continuously developing and improving IT technologies. It should be emphasized that the evolution of electronic marketing in the world is due to the fact that new IT technologies are implemented with maximum continuity, which ensures the enhancement of the company’s cost accounting stages in a short period with subsequent scaling of activities by intensifying electronic channels for web promotion of goods and services. Thus, the activation of the processes of modification of the marketing strategy and its transformation into a digital one under the influence of innovative IT technologies determine the relevance and constructive need for in-depth analysis and detailed research.

2 Research methodology

The achievement and implementation of the goals in the article is ensured by the versatile use of basic approaches and tools: conceptual analysis of the theory and argumentation of hypotheses to study the processes of modifying a classical marketing strategy into an electronic one based on the influence of innovative IT technologies; systematic analysis of the main marketing tools and their modification under the influence of innovative IT technologies with subsequent application in the business segment; retrospective analysis of the evolution of IT technologies in the world together with the development of business logic for the strategic organization of electronic marketing; modelling of electronic marketing evolutions under the influence of IT technologies based on trend analysis tools with subsequent determination of medium-term prospects. The information base and platform for the research were scientific hypotheses and business analytics in the field of the evolution of electronic marketing under the influence of IT technologies.

3 Research results

To retain customers, the modern realities of business functioning in the global market are characterized by the fact that the use of a classical marketing strategy is insufficient and ineffective, which in turn facilitates the process of modifying the marketing strategy into an electronic one under the influence of IT technology. Certain changes in digital devices and specific software tools, methods of implementing a marketing business strategy from offline to online increase the attention and relevance of studying modern development trends in order to highlight the main ones and take them into account in further marketing planning and developing e-strategies. It is important to note that in marketing activities the concept of embedded marketing communications is based on planning interaction through electronic marketing with the involvement of its conceptual elements. However, a long-hair element of today's complex of embedded interactions and communications is electronic marketing, which drives new forms of electronic positioning and advance channels.

Electronic marketing is now an influential field and not yet another trend that will impact the business world as quickly and dramatically as innovative IT technologies. Processes of transformation and global economic change must move from traditional aggressive marketing tools to the development and implementation of products and services that contribute to expanding audiences and market share by increasing the value of products and
services through dialogue and communication. It should be discussed that the research topic is in demand and relevant in the business environment; Based on this, we should consider the main theoretical hypotheses in the scientific literature and identify the main directions.

Electronic marketing, as part of establishing interaction and communications, develops and implements diverse forms of electronic channels to promote the business strategy of companies. Electronic marketing communications allow you to start gaining an audience in the business sphere using mobile applications, notifications and street advertising displays [1]. This approach is a classic approach to the formation of marketing tension and communications with clients, but does not include innovative IT technologies that do not correspond to modern realities and require improvement. An interesting approach to the study of transformational marketing processes is presented in [2], where the role of digital television and the Internet, radio, monitors, displays and billboards as the main tools for interaction with potential customers is argued. This approach is the source of modification of the classical marketing strategy; however, it is outdated and does not correspond to modern realities of the global market, which confirms the need for further research. Noteworthy is the approach [3], which examines the main aspects of the ongoing changes in marketing using promotion through traditional channels, such as newspaper advertising, leaflets, television advertising, billboards and others. This approach is more focused on the offline marketing activities of companies and does not meet the requirements of modern business practice, which requires improvement and in-depth research.

A group of scientists [4-6] who conceptually determined that IT technologies are an integral part of a highly competitive position in the global market, generating a high level of customer loyalty, brand recognition and profitability, highlighted a modification of the classic marketing strategy under the influence of information technology. However, these approaches do not take into account innovations in IT technologies, which take place in the implementation of modern digital company strategies, which need to be structured and studied in more detail. The specifics of the evolution of electronic marketing today in scientific work [7] are considered, the need for a transition from the classical marketing strategy to digital with the subsequent argumentation of basic tools that ensure an increase in conversion and strengthening of competitive positions is emphasized. This approach corresponds to modern realities, but does not include in this research a definition of the evolution of electronic marketing under the innovative influence of IT technologies is given, which requires further development of this approach.

Global informatization of economic sectors under the influence of innovation and information technologies is emphasized and considered in a scientific approach [8]. This hypothesis argues for the intensity of the evolution processes of IT technologies in the world and their impact on the profitability of companies as a strategic business indicator, which focuses attention on these technologies and determines to their study and implementation in the activities of companies.

Taking into account what is presented; this hypothesis includes research into trends in the development of IT technologies, but does not focus on their impact on marketing, which needs to be studied in detail. Arguing the presented theoretical hypotheses and approaches, it should be noted that there is no single vision regarding the conceptualization of the evolution of electronic marketing under the influence of IT technologies, which needs to be studied in detail and practical recommendations formulated. Arguing the above, it should be noted that the modification of classical marketing into digital occurs under the influence of innovative IT technologies, which are reflected in the following tools: 1) paid resources that companies pay for the use of technologies in the process of organizing marketing; 2) own information IT technologies and resources: websites, pages on social networks that the company owns and can manage; 3) earned resources: so-called word of mouth or earned media - free or purchased communication channels [9]. To argue the influence of IT
technologies on electronic marketing in the modern business segment, attention should be paid to the specific features of digital marketing in Fig. 1.

- Systematic promotion of the company in the electronic environment, which has maximum coverage of the audience necessary for the business.
- Integration of IT technologies into electronic marketing to improve the service and achieve the desired conversion rates.
- Effective implementation of interaction and feedback within the electronic marketing strategy.
- Rational correlation and implementation of IT technologies and traditional tools into the electronic marketing strategy to achieve strategic business objectives.
- Conceptual growth of basic marketing KPI benchmark on the ambuses of IT technology implementation in electronic marketing.
- Flexible IT tools within the framework of the yellow market marketing strategy ensure maximum clustering of consumers and adjustment of the strategy taking into account values and needs.

**Fig. 1.** Structuring the specific aspects of electronic marketing of modern companies.

Based on what has been presented, it should be emphasized that the influence of innovative IT technologies has a positive impact on trends in the evolution of electronic marketing. The classification of basic tools based on IT technologies, which have their application in electronic marketing strategy in the modern business segment in the world, is presented in Fig. 2.

**Fig. 2.** The classification of basic tools based on IT technologies, which have their application in electronic marketing strategy in the modern business segment in the world.
It is important to state that the intensity of processes for modifying electronic equipment and specialized software allows for the most flexible and effective transformation of the classic marketing strategy into digital, based on the IT segment, which ensures the efficiency of the core activity. Today, the global marketing business segment and the IT technology stack that is implemented in their activities are due to versatility and diversity: someone implements all IT technologies and observes promising growth; someone suffers losses and this is all due to the approach to organizing electronic marketing. However, it should be noted that the processes of global modification of rialto and the maximum implementation of IT technologies will raise the question of the selection and implementation of the most effective marketing tools, which are based on innovative IT technologies [9-10].

Numerous companies are conceptually using the latest email marketing tools that are sold online or based on IT technology. Traditional forms and approaches are not effective and require modernization through the penetration of the digital component to maximize the capture of the audience of the required business segment and draw it into the digital world. Stating what was presented, the author conducted a statistical analysis of the dynamics of the introduction of IT technologies and their use in marketing in Fig. 3.

![Electronic marketing tools based on IT technologies](image)

**Fig. 3.** Structuring the dynamics of the implementation of innovative IT technologies in electronic marketing tools in %

Based on the presented in fig. 3 should argue the fact that innovative IT technologies are implemented in a modern tool that can be used not only in marketing, but also in other areas of global economics. Based on what has been presented, it should be emphasized that the implementation of the presented innovative IT technologies into the marketing strategy is not enough; there must be an implementation plan describing expectations and scenarios for achieving business goals.

The influence of innovative IT technologies makes it possible to modify marketing within three basic aspects, which ensure the fulfillment and implementation of strategic tasks and business goals: 1) Maximum transfer of manual processes into digital form. Digitization of documentation, automation of commodity accounting and logistics processes, simplification and optimization of interactions with suppliers and clients. 2) The implementation of
intelligent IT technologies ensures work with data, which plays a significant role in marketing in collecting, consolidating and evaluating information on clients, consumers and competitors. 3) Optimization and changes in the activities of companies that are associated with the implementation of innovative IT technologies and require corporate culture, personnel training and the establishment of internal processes taking into account IT technologies [11].

Basic electronic marketing mechanism under the influence of innovative IT technologies in Table 1.

Table 1. Basic electronic marketing mechanism under the influence of innovative IT technologies.

<table>
<thead>
<tr>
<th>Basic electronic marketing tools</th>
<th>Features of modification of classic marketing under the influence of innovative IT technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Content about goods and services is prepared using IT technologies and electronic marketing tools to meet the needs and interest in the brand.</td>
</tr>
<tr>
<td>SMM</td>
<td>Electronic marketing using social networks is based on audience traffic through these electronic channels. Maximum activity is implemented as a stage of the strategy to popularize the brand and improve conversion.</td>
</tr>
<tr>
<td>Landing</td>
<td>A conceptual framework for engaging with audiences by leveraging electronic channels to generate leads and maximize online sales.</td>
</tr>
<tr>
<td>Appstore</td>
<td>Electronic platforms that offer various tools and resources for companies, which ensure brand scaling, recognition and vocation ratings.</td>
</tr>
<tr>
<td>SEO</td>
<td>IT tool for architectural optimization of company websites and improvement of search queries on company topics within the framework of electronic marketing.</td>
</tr>
<tr>
<td>Press</td>
<td>A controlled process of disseminating information about the company's brand through the press with possible sources of influence and dissemination of information in the interests of the electronic marketing strategy.</td>
</tr>
<tr>
<td>Support</td>
<td>Service support throughout the entire life cycle of interaction with the company with an individual approach, care and value for the client.</td>
</tr>
<tr>
<td>User experience</td>
<td>Modification of the process of interaction of consumers with a company's product or service through the IT lens of the interface, which has an impact on the perception of the brand through web design, information, etc.</td>
</tr>
<tr>
<td>Partnership</td>
<td>The evolution of mutually beneficial relationships with other companies within the same business segment, but not competitors, to expand coverage and scale the market.</td>
</tr>
<tr>
<td>Outsourcing marketing promotion</td>
<td>Outsourcing marketing promotion by other companies with minimizing operational risks and reserving the final result.</td>
</tr>
<tr>
<td>Mailings</td>
<td>Mailing information about the company to the maximum number of consumers.</td>
</tr>
</tbody>
</table>

Analyzing the dynamics and evolution and implementation of innovative IT technologies in marketing, all of them are focused on optimization, automation of existing business processes of companies, improvement of service and quality of service, developing a mobile application for this, improving the quality of interaction with clients by using CRM systems, strengthening the process of collecting information and data about potential clients for their further segmentation and study of preferences and values.

Modification of marketing under the influence of IT technologists is characterized by generative trends in development. This is confirmed by the growth of IT in marketing and the development of a multitude of tools and marketing management approaches based on it. When approaching the formation of methodological aspects of identifying promising tendency in the evolution of electronic marketing under the influence of IT technologies in the world, it should be noted that there is a logical methodological approach that will allow
us to identify important trends in the evolution of electronic marketing based on the evolution of IT tools in marketing, marketing costs and income from digital marketing.

Application of mathematical methods for forecasting prospects based on trend models by implementing the selected indicator (n) and value (t) into the equation:

\[ t = n + 1; \quad t = n + 2 \] (1)

The calculated intervals depend on the standardized error in estimating the forecast indicator and the timeliness of the resulting forecast, the number of stages and properties in the periodic series, as well as the weight (error) of the long-term forecast. The root mean square stationary error when assessing the mathematical forecasting of the dynamics of the evolution of electronic marketing under the influence of IT technologies is determined by the formula:

\[ S_y = \sqrt{\frac{\sum (y_i - \bar{y})^2}{n - k}} \] (2)

where, \( y_i \) - is the dynamics of electronic marketing evolution indicators under the influence of IT technologies; \( \bar{Y}_i \) - obtaining the results of an e-marketing study based on the model; \( n \) - is the number of levels of electronic marketing ; \( k \) - is the number of model parameters [12].

Quality and reliability are determined by:

\[ R^2 = \frac{\sum_{i=1}^{n} (y_i - \bar{y})^2}{\sum_{i=1}^{n} (y_i - y)\bar{y}^2} \] (3)

where, \( y \) - indicators of the evolution of electronic marketing under the influence of IT technologies; \( \bar{y} \) – average evolutionary data; \( y \) - is the actual values of the evolution of electronic digital marketing under the influence of IT technologies [13].

To interpret the negative aspects in the evolution of electronic marketing under the influence of IT technologies, one should consider the dynamics of cost indicators and the share of electronic marketing in Fig. 4.

![Fig. 4. Structuring evolution indicators in the dynamics of costs and profitability of electronic marketing (indicated in billions of US dollars).](image-url)
To justify the long-term evolution of electronic marketing under the influence of IT technologies, it is necessary to constructively structure the results of mathematical modelling of the evolution of electronic marketing and its dependence on IT (Table 2).

### Table 2. Interpretation of the main results of identifying the evolution of electronic marketing under the influence of IT technologies (the relationship between the costs and profitability of electronic marketing and the influence of IT technologies).

<table>
<thead>
<tr>
<th>Indicator of dynamics</th>
<th>Model equation</th>
<th>Influence (R²)</th>
<th>Interpretation of results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic Marketing Tool Costs</td>
<td>( y = 0.0099x + 0.0874 )</td>
<td>0.99</td>
<td>The increase in costs for electronic marketing is directly related to the use of IT technologies. The influence of IT is significant on the budgeting indicators of marketing activities in this area.</td>
</tr>
<tr>
<td>Electronic Marketing Revenue</td>
<td>( y = -0.0002x^2 + 0.013x + 0.0791 )</td>
<td>0.48</td>
<td>The profitability of marketing does not depend much on IT technologies; the connection is weak. Profitability does not directly depend on the influence of IT technologies.</td>
</tr>
<tr>
<td>Electronic marketing tools based on IT technologies</td>
<td>( y = 0.0042x + 0.5125 )</td>
<td>0.92</td>
<td>IT technologies and their evolution of electronic marketing largely depend on costs and profitability. Close relationships and influence.</td>
</tr>
</tbody>
</table>

Considering the presented dynamics, it should be noted that in modern realities there is an increase in the costs of digital marketing and the implementation of its innovative tools in the activities of companies around the world to improve competitive positions and increase profitability. Analysis of evolution in the modification of electronic marketing and the results of assessing the relationship and impact on the costs and profitability of marketing IT technologies confirm the relationship of these indicators, which is by the results of the reliability of the obtained models.

### 4 The discussion of the results

The modification of markets conceptually occurs under the evolution of electronic marketing tools. The effectiveness of company management, taking into account modern paradigms, should be based on an electronic marketing strategy. An in-depth analysis of scientific literature in the field of the evolution of electronic marketing ensured a statement of the absence of a methodology for substantiating the evolution of electronic marketing under the influence of IT technologies, which determines the relevance of the topic. An advanced methodology for substantiating the evolution of electronic marketing under the influence of IT technologies using mathematical modeling tools.

The developed approach to determining the evolution of electronic digital marketing in the world, which, unlike existing ones, is based on modeling the relationship and dependence of marketing costs, the profitability of electronic marketing based on IT technology, which can be applied in practice when planning the strategic functioning of a company's electronic marketing. A statistical assessment of the evolution of electronic marketing in the world under the influence of IT technologies has been carried out, an analysis of the dynamics in the evolution marketing tools and its basic types and channels has been argued. It is stated that in order to obtain adequate results to determine the evolution and modification of electronic marketing under the influence of IT technologies, it is necessary to use mathematical modeling. The resulting methodological aspects take into account the
dependence of marketing costs and profitability on IT technologies, but are not exhaustive and can be supplemented when developing this approach.

5 Conclusions

The basic theoretical hypotheses for the modification of electronic marketing under the influence of IT technologies are constructively identified. The analysis of scientific research on electronic marketing and its basic tools has been updated, which has confirmed conceptual necessity of identifying approaches to argumentation of the evolution of electronic marketing under the influence of IT technologies. Since there is no single approach to the argumentation of the conceptual tools of electronic marketing, a breakdown of the central electronic marketing is proposed. The breakdown of the central electronic marketing tools of companies around the world led to the statement of electronic channels depending on IT technologies and their implementation in the business segment. It is substantiated that the modification of the global market determines the evolution of the use of IT technologies to generate profits and increase the effectiveness of the electronic marketing strategy with further growth in online sales, improving customer satisfaction and adapting their values to the requirements of the brand. The relationship and dependence of indicators on costs and profitability of electronic marketing based on IT technologies was determined using mathematical modelling. The resulting model indicates the existence of a close relationship and the influence of these indicators, taking into account the considered evolution of electronic marketing. The results of mathematical modelling to determine the evolution of electronic marketing and the relationship with the influence of IT technology confirmed the theoretical hypotheses and provided justification for the prospects for their development. The results of the study can be applied in practice when building a company’s electronic marketing strategy.

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