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IMPROVING THE DEVELOPMENT OF BENCHMARKING IN
THE DIGITAL ENVIRONMENT

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Abstract

This article shows the need to apply benchmarking as the main mechanism for improving the development of the digital economy. The main types of benchmarking in the digital environment are revealed and the most relevant ones are highlighted. The authors pay attention to advantages of benchmarking as a necessary attribute for analyzing an enterprise in the digital space (performance, efficiency of using digital modules, financial indicators). The advantages of implementing information and communication technologies are proved that allow enterprises to enter an innovative development path, expanding the possibilities of using Internet resources, digital modules and technologies. In the field of optimization and improvement of development, an information program has been developed that can effectively function for an enterprise in the digital environment. The necessity of confidentiality in the process of collecting, transmitting and storing information is proved. Digital technologies are shown, which will lead enterprises to an innovative development path and new stages of growth when improving benchmarking. A program of organizational changes necessary for the implementation of other people's experience is developed, and only after that the actual stage of implementing best practices begins. At the same time, it makes sense to regularly monitor the applied innovations in order to assess the quality and effectiveness of their implementation.

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1. Introduction

Currently, digital platforms are used by all businesses, regardless of their form of ownership. More than 20 years ago, Gates noted the significant impact of the economy digitalization on the industrial development and the overall economy of each country. In his opinion, in the future, there will be two types of companies on the market: those who are online, and those who have gone out of business (Gates, 1999). Current trends confirm the correctness of his idea. Moreover, countries that do not pay attention to the processes of "digitalization" and do not invest in the development of innovative technologies will soon be unable to compete in the global market. The modern period is characterized by the process of transition to the development of high-tech industries, the formation of a new information society. At the same time, there is an increasing need for software development and implementation, and the release of new specialized equipment (Bulavko et al., 2019). In the digital environment, the use of benchmarking is a prerequisite for the effective operation of any enterprise. Benchmarking is based on processes of understanding details of your own business processes, analyzing the business processes of other companies, and comparing these analytical results. Benchmarking requires advanced information technology and analytical skills. After identifying the fundamental reasons that determine the success factors, collecting the necessary information (using various methods of marketing research), the collected information is analyzed, the reasons for the success of some companies and the lag of others are identified, and the connection system of these factors with other elements of business processes is clarified. A program of organizational changes necessary for the implementation of other people's experience is developed, and only after that the actual stage of implementing best practices begins. At the same time, it makes sense to regularly monitor the applied innovations in order to assess the quality and effectiveness of their implementation.

Benchmarking in the digital environment is necessary for a comprehensive assessment of the economic status of enterprises, and in this aspect, benchmarking should be seen as a complex system, the ratio of the individual elements which allows to characterize the state of the object prevailing at a specific point of time to identify "pain points" of the system requiring more intensive treatment, as well as the subject being in a particular relationship with the outside world (with suppliers, consumers, banks, investors, with the government). These differences in views on the enterprise can be presented through a system of indicators evaluation that are used today in developed countries to analyze an economic organization and from which you need to form some sets of indicators that allow you to evaluate various aspects of the enterprise's work in the database. The main focus is on analyzing the enterprise as an economic entity (performance, resource efficiency, financial indicators). At this stage, there is a comprehensive financial and economic analysis of the company's economic activity based on its financial statements (preferably for a number of years), as well as a comparison of financial and economic indicators of specific enterprises with the average or best values of the relevant industries. This analysis will allow you to assess the rationality and efficiency of the resource usage, the stability of the economic activity, and the reliability of the enterprise in relation to the fulfilment of its obligations.

The set of financial and economic indicators for conducting a meaningful analysis of the situation at the enterprise and its dynamics is extremely diverse, since this analysis itself includes dozens of aspects. This is helped by the use of benchmarking, which is inextricably linked to digital models and information

technologies. Moreover, the process of collecting, transmitting and storing information should be as secure as possible. Thus, the used Internet resources perform a lot of operations with the received user data, and as practice shows, most people do not think about the safe storage of the latter in the first place (Schneider, 2015). For example, the report of the state corporation InfoWatch (2019) on personal data leaks shows that every year about 70% of all information leakage channels are on the Internet.

2. Problem Statement

Considering the problems of tracking and information leakage when using benchmarking, it is necessary to understand which parties exist in the data collection process. If we do not talk about listening to network traffic, then in an ideal situation, only two parties can know about the user's actions: the client (the browser and the user himself) and the server (the visited resource). But even a server that knows about any performed action cannot be considered as a trusted person. In practice, there are usually far more than two sides. Just visit any site and look at the list of uploaded documents via the developer console or a program for tracking traffic passing through the network card. According to this list, the browser makes 172 requests when loading the page under test. More than half of these requests are not directly related to documents that are located on the servers of the visited resource. Instead, the uploaded files link to 27 foreign domains owned by various companies. And the first problem is that these requests take 90% of the time when loading the site. In this case, both the user and the resource owner suffer various types of damage. The site user has to spend extra traffic to download all the documents, which also clogs the browser cache. The owner of the service may suffer material damage, as search engines have the right to underestimate the site's rating, or a potential client may not be satisfied with the speed of the resource, and it will go to competitors. For the most part, the victims are ordinary Internet users. They can be people who use the world wide web space for personal purposes, such as searching for products or communicating on social networks. The negative effect of collecting and leaking user data in this case can be expressed in material damage or disclosure of personal data to the public. More serious damage may be caused to an organization or enterprise if the user is an employee who has been subjected to social engineering methods by fraudsters due to the leakage of collected data. In this case, the damage depends on the ultimate goal of the attacker's vector and the stored corporate information at the automated workplace or in the company's corporate network.

The list of subjects of the party collecting user data can be quite extensive. The main part consists of web services that record the user's online behavior for displaying ads. These services are approximately 43% of the total number, and they are engaged in targeting ads. The remaining 57% of all tracking services are in the categories of web analytics tools and web beacons. The "web analytics tools" category consists of all services that collect data for statistical purposes and do not collect parameters for subsequent targeting of advertising (or other) content. Examples of these services include traffic counters, referral traffic measurement tools, time spent on the page and behavioral factors, as well as geolocation services and A/B testing tools. The "web beacons" category includes services that uniquely track the user, including on multiple devices and domains, as well as tracking pixels, beacons, and other non-trivial tracking methods. Services that track specific users on different domains and devices form the "web beacons" category. They may also include beacons, tracking pixels, and other non-trivial tracking methods. Thus, almost all well-

known services monitor user actions, but most often there are such advertising networks as: Google Adwords and Google Analytics, Yandex Metrika, Atlas Solutions, Oracle Bluekai, Facebook, AppNexus and others. These are followed by various web analytics tools and counters (Negrini, 2016).

3. Research Questions

In the digital environment, there are several types of benchmarking that differ in their tasks and the scope of the performed work. First, functional benchmarking, which involves comparing the effectiveness of individual functions and stages of business processes "in parts". Second, competitive benchmarking, which consists of analyzing the organization of business in competing companies based on information that they distribute about themselves, as well as information from customers and suppliers. Third, general (cross-industry) benchmarking, which is based on studying the state of affairs in other industries and identifying valuable experience that can be used in your business. Finally, internal benchmarking is focused on comparing divisions within the company itself, identifying and spreading successful experience. Benchmarking, like no other method, allows you to analyze and compare products, business processes, services, methods, the enterprises themselves or the environment surrounding the enterprise. This method, after making appropriate changes and improving productivity, allows you to reach the highest positions in the lists of leading enterprises. One of the most important competitive advantages is digital modules that allow you to organize the process of collecting, transmitting and storing information in a high-quality and timely manner. In the field of optimization and improvement of development, it is necessary to create an information program that can effectively operate the enterprise in the digital environment.

4. Purpose of the Study

The purpose of this study is to analyze existing methods for collecting information about users and design methods in the form of a complete system. In accordance with this goal, the following tasks should be completed:

- study existing methods and solutions to prevent information collection;
- develop security methods and implementation of a software solution that demonstrates the performance of the designed algorithms;
- conduct experimental studies of the developed system.

The efficiency of obtaining information is achieved by using communication tools (fax, Internet) and computerization of workplaces. The information should be reliable, i.e. truthful, in accordance with regulations including internal ones. Truthfulness of information means that all the facts of the company's business activities must be objectively reflected in the documents. In addition, the reliability of information is characterized by the ability to verify it and its transparency. Information should be rational, which implies its sufficiency, efficiency, high utilization rate of primary information, and the absence of unnecessary data. This requirement makes it necessary to study the usefulness of information and, on this basis, to improve information flows by eliminating unnecessary data and introducing the necessary ones. Comparability of the information used for benchmarking in terms of economic analysis makes it possible to neutralize the mutual influence of cost, quality and structural factors. Disparity of indicators can be caused by various

reasons: different price levels, volume of activity, structural changes, etc. Comparison of disparate indicators leads to incorrect conclusions as a result of analysis. Thus, when preparing information for use in the analysis process, it should be checked for compliance with the certain requirements. Competition in the economy has become global and even more aggressive. Businesses that want to survive in this difficult time must make the necessary changes, and the people who work for these businesses have to learn to communicate with each other in a different way, more effectively. The organization of an enterprise as a system can be optimally improved only if the interdependence of all system components is taken into account. As practice has shown, it is almost impossible to achieve the optimal state of the entire system due to the high level of complex, complex tasks. The goal in this case is to find a way to its optimal state. Benchmarking analysis can help you solve this problem.

5. Research Methods

In the course of the research, modelling methods were applied, and comparison methods were used. The authors used methods of statics and dynamics. The solution of the tasks set in the study was carried out on the basis of general scientific methods. The authors also use comparative and statistical analysis. In the course of the research, methods of observation and analysis of the obtained data were used. Fundamental to this research is the descriptive method, which includes the method of comparison, generalization, and observation. Part of the research is based on interpretation methods.

6. Findings

Summarizing the conducted study, we can conclude that benchmarking is the search for the best techniques and methods of organizing production. Benchmarking allows you to identify and use in your business what others do better. Practice shows that looking at your organization through the prism of the experience of the world's best companies or industry leaders makes it possible to find new guidelines for improving management efficiency and solve the following applied questions:

- is the optimal number of employees in a particular department?
- can we continue to reduce unit costs and by how much?
- why is labor productivity 10 times less than that of a foreign competitor?
- by what promotion methods did our competitor manage to increase the market share by 5%?
- how should we properly build interaction between salesmen, developers and production workers?

how do the best companies do it?

- what business organization models are most effective in our industry?
- how to adapt the best experience to the conditions of our organization?

Digital modules facilitate the use of effective benchmarking. These include:

- ad networks;
- web analytics systems;
- social networks;
- payment services;
- marketing companies;
- government agencies.

The most relevant digital platforms are social networks that have similar goals as advertising companies. Popular media hosting services like Youtube, Instagram, Facebook and Vkontakte are directly linked to the search service Mail.ru Group – all of them can follow the user not only in the internal content feed. Most modern sites have social widgets and buttons that take into account a variety of factors and analyze the movement of resources on the world wide web (Sokolova, 2016). The user's browsing history allows you to analyze gender, age, interests, wealth, marital status, and even health status with high accuracy. This is used for more accurate selection of ads. Most of the listed parties are looking for material gain, while we can only guess about the reasons for possible state surveillance and data collection by fraudsters (Tudge, 2011). The side effect is that visiting and using websites and the Internet in general is no secret. An important point in this case is the process of maintaining the confidentiality of information.

The method of tracking on the Internet can be any action or set of actions aimed at extracting and transmitting unique parameters that identify the user. In general, data collection is performed using publicly available methods of web programming languages, features of network protocols, and open sources of information. More rare, but no less dangerous, are methods for collecting private information through vulnerabilities in client applications (browsers), zero-day vulnerabilities in the used operating system, listening to traffic on an unsecured network, and analyzing user account leaks. To design a reliable tracking prevention system and analyze the shortcomings of existing solutions, you need to understand the features of various tracking methods. There are two main groups of legal tracking methods: data collection from the client application and data collection from the server. In a non-listening network, these parties always interact and exchange information with each other when using the Internet and visiting a resource. You can also draw an analogy between tracking methods and software vulnerabilities in applications. There are a number of known and used ways of data collection by marketing companies, most of which have approaches to prevent these methods. But, as in the case of zero-day vulnerabilities, from time to time new methods of tracking the user appear that were not previously known to the public. They can be implemented using unusual approaches, and therefore it is not always possible to clearly assign them to any group. These methods are called non-trivial tracking methods.

Thus, the classification of methods for tracking a user on the Internet includes:

- methods of collecting information on the client side;
- methods for collecting information on the server side;
- non-trivial methods of collecting information.

7. Conclusion

Thus, benchmarking is a method of using other people's experience, advanced achievements of the best companies, divisions of your own company, and individual specialists to improve the efficiency of work, production, and business processes; it is based on the analysis of specific results and their use in your own activities. Benchmarking is a constant study of the best practice of competitors, comparing the company with the created reference model of its own business. Digital technologies in the application of benchmarking are closely related to some functions of devices and programs. On the client side, the browser application acts as an intermediary between the device and the server. Given that the various built-in functions of the device are available to the browser through the program interface, the data that can be used

to create a complete digital footprint of the user is very diverse. The main way to extract and manage client information is through a set of functions in the JavaScript web programming language. It is so widespread that it is used in almost any field of information technology, and any major Internet resource necessarily uses it along with other technologies. In order to track a user, you need to be able to identify them. Cookies are the most common and easy-to-interact identification method. They are small fragments of key-value data that are stored in the user's computer memory and sent between the client and the server. The equivalent of cookies is LocalStorage. Regardless of the visited sites, it stores a variety of parameters in the browser and can collect data about many domains at once and store them even after the browser is closed. Also, there are less frequently used ways to store data on the client side: SessionStorage, local web databases (IndexedDB and WebSQL). These are repositories that marketing companies and analytics services use. Through the built-in Javascript functions, it is possible to transmit and record any user actions and thus make a complete impression of the behavior of a particular person on the network. This method (writing and reading local storage) is the most common for user identification, since it is always possible to save a unique client ID and quickly restore the history of its actions from the database. And despite the fact that the data in storage is isolated within a single domain, analytics companies can have advertising banners and embedded code on multiple partner sites and, thus, have access to their domain data from various resources. The following tracking opportunities are opened by the user himself, who installs a variety of browser plugins, search bars, and extensions in search of additional functionality. They can significantly expand the capabilities of the client application, but thanks to the modern browser architecture, most of them are created using Javascript and can also control the actions of the browser itself. Such third-party extensions can not only read information about all actions on all sites, but also replace it with false information or control the process of interacting with servers. Almost any browser has many built-in add-ons that are needed for various operations. These add-ons can provide an easy way to communicate between browsers, extend the capabilities of JavaScript, and enable operating system functions. But at the same time, they also open up a number of new opportunities for collecting information. And, finally, the features of the device itself, which interacts with Internet resources, has certain parameters that are used to create a complete footprint of the user on the network. These parameters can be data from various sensors, registration data of the device itself, any features of the device architecture, local time and time zone, operating system version, etc. If some of them can be read using the methods described earlier, and they turn out to be unique for the current connection, this will help analytical scripts re-identify the user with high accuracy in the future (Sychev, 2018).

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