

Article

Development of Methods for the Strategic Management of Web Projects

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Abstract: In this article, we have explored methods for the strategic management of web projects. By introducing a long-term web project development strategy into the operation of a web project, mechanisms can be developed to improve the efficiency and effectiveness of the web project. An important factor is to develop a strategy taking into account all possible crisis situations and ways out of these situations. The authors analyzed and simulated the web project structure, working out methods of web project strategy realization and implementation in a crisis situation. Additionally, in this article, the authors have presented the model for the strategic map of the balanced scorecard of a web project. The authors tested the developed methods on six web projects of university departments. The received results confirmed the appropriateness and necessity of the development and implementation of methods of the strategic management of web projects.

Keywords: web project; project management; user; content; COVID-19; strategy; social network; crisis; business environment



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1. Introduction

In a turbulent business environment, and with the dynamic development of web technologies, developing and implementing an optimal web project strategy, taking into account all possible crisis situations and ways out of these situations, is a crucial task for managers in the field. Optimal web project strategy to take into account positive and negative effects of likely changes when implemented for a long time in the functioning of the web project enables the development of mechanisms for improving the efficiency and effectiveness of a web project. The response to the coronavirus disease 2019 (COVID-19) pandemic has caused psychological and social impacts on society.

The effects of the COVID-19 pandemic were initially most dramatic for the domestic transport, international transport, real estate, catering, culture, entertainment, and other service sectors, but they quickly spread to other sectors of human activity, causing devastating effects on the wider economy. This crisis has enveloped and significantly impacted various industries, from the specifics of how goods and services are supplied and travel service delivery models, to the behavior of online service consumers and web project users. To alleviate financial problems and “stay afloat”, business communities, public institutions, large and small companies, and individual private entrepreneurs have moved to real-time conditions through virtual services.

Thus, the COVID-19 crisis has brought about a significant demand for virtual services on the one hand, but on the other hand it has led to an unsustainable burden on them, both technically and socially, through a targeted permanent impact on society through web services, resulting in negative psychological and social consequences. This is a unique

opportunity to explore the disruptive changes occurring in web projects during the COVID-19 crisis in real time.

The aim of this work was to explore the effective methods of web project management and to develop a new method for the strategic management of web projects. The developed methods are effective in managing web projects in the crisis period.

2. Materials and Methods

Experts use classical evolutionary, process, and systemic approaches to define strategic goals and form strategies. The economic sphere also uses approaches to strategy development based on the study and formation of strategic objectives, perceptions of success and the necessary results of project activities, as well as conditions, knowledge and experience of the management and functioning of the object. Basically, foreign specialists use formalized approaches to form a strategy. The team of scientists Ivanova A., et al. [1] investigated the strategic management of a company under conditions of technological development; additionally, Byun J., et al. [2] investigated the life cycle of change within innovation strategy. A targeted approach to strategy development involves the use of planned and properly calculated and justified technical means, based on knowledge and experience. The content of a generic strategy should be consistent with the strategic objectives of the project, the requirements for the formation of that strategy, and a clearly planned structure. The level of effectiveness of a strategy depends on compliance with SMART conditions (specific, measurable, achievable, related, time-bound) in the formation of the strategy itself and the strategic objectives [3].

An effective approach to scenario planning is the Ansoff Matrix [4], a thorough causal analysis [5]. A separate area of research is the development of software tools for strategy formation for heterogeneous companies, such as educational institutions [6,7]. Exceeding the topical challenge for immediate science is the development of an approach to adapt and upgrade strategies in crisis situations [8]. Alekseyeva K. investigated the problem of online project management strategy selection under conditions of incomplete or inaccurate data [9,10]. Additionally, the scholar proposed a method for selecting web project management strategies based on a set of project factors. The transformation of corporate strategy to project strategy was investigated by Morris P. W., Jamieson A. [11]. It is also important to comprehensively explore the types and kinds of strategies that are popular and effective in today's society. For example, researchers Druckman J. N., Kifer M. J., and Parkin M. investigated one of the most widespread types of strategem-negative attitudes [12].

The life cycle of web projects from the perspective of successful management of software projects has been investigated by Mendes E., Mosley N., and Counsell S. [13]. The development of a web-based Agile Software Engineering Environment, an integrated tool by Aoyama M. [14], has solved the problem of rapid process management in the life cycle of a web-based environment [15–21].

Additionally, the web project was analyzed from the economic point of view [22–25]. Digital society was investigated by Mura L. and Sleziak J. [26], and Svec M., Olsovska A. and Mura L. [27], and a strategic analysis was by Milošević I., et al. [28].

The most commonly used business case frameworks are PESTEL (political, economic, social, technological, legal, and environmental) analysis, SWOT analysis (analysis of strengths, weaknesses, opportunities, and threats), positioning, Ansoff Matrix, Porter's Five Forces analysis, segmentation, and BCG (Boston Consulting Group) matrix.

2.1. Analysis and Modelling of the Structure of a Web Project

A web project is an autonomous and independent resource on the internet or a page/group/community on a large popular web resource. A web project is usually based on a business idea, the realization of which enables the project to be successful in the long term. The key people in the functioning of the web project are the web project management staff and the web project participants (persons registered on the web project platform

and those who actively use the features available to them). Each web community user is characterized by a number of parameters: member name; access password; email; date of last visit; personal data; number of posts created; number of discussions started; number of reviews received; and number of reviews expressed.

Based on their rights and powers, participants in a web project fall into one of four classes:

- guests—who view the web project content available to them;
- participants—who actively participate in the web project, creating text content, posting photo and video content, posts, topics, and pages;
- moderators—who have the ability to manage the project on the first level and all access rights belonging to the web project participants;
- administrators—who act as web project managers with all available access rights to manage the web project.

Each of the participants, depending on their membership in one of the classes, is given certain rights to manage the web project. The least privileges are given to the guest and the most privileges to the administrator. Here are all possible atomic operations for each class of participant. Each type of participant has certain rights, which are shown in Figure 1 for clarity.

Before setting up a project, the authors of the idea must determine how the project will be financed, the purpose for why the web project exists, and a scenario for its development. These three components influence each other. Usually, the goal of web project authors is to make a profit, gain credibility in the community, provide information and technical support to clients, and attract an audience to related web projects. In terms of profitability, web projects are divided into profitable, non-profits (self-sustaining) and unprofitable. If the admins choose other goals for the web project management, then profit is included in all three options for profitability of web projects. However, the optimal situation is when the business project depends on as few factors as possible.

The main priorities for the development of a web project, taking into account the provided member goals, are the quality and volume of the project content, quotability of the resource on the internet, attendance, and number of project participants.

The priorities of web project managers will differ according to the goals set. The different objectives and priorities are listed below:

- profit—the most important priority would be attendance, because there is a direct correlation between “attendance” and “profit”;
- authority in the community—citation rate and number of participants will be significant;
- information and technical customer support—the quality and volume of information content is the most important priority;
- attracting audiences to related web projects—the top priorities will be attendance and number of participants.

Identifying sources and methods of funding for a project in advance, defining its objectives, and specifying the direction of a web project will help to avoid many problems later on and to develop an effective web project.

The main components of a web project's structure are the leaders, participants, and content of the web project. The analysis of web project participants is performed in two ways—the analysis of the new participants and the activity of the existing participants. We analyzed the increase in content, taking into account its subdivision into types, i.e., the increase in the number of postings and the increase in the number of discussions.

All these indicators of web project activity are interdependent. An increase in the number of participants indicates the relevance and attractiveness of the web project's content. Additionally, the increase in the amount of interesting content contributes to an increase in the number of visitors, and due to this, in the number of participants. A decrease in the number of new participants leads to a decrease in the activity of existing

participants. In order to ensure smooth operation and development of the web project, it is essential that the performance indicators are not lost over long periods of time.

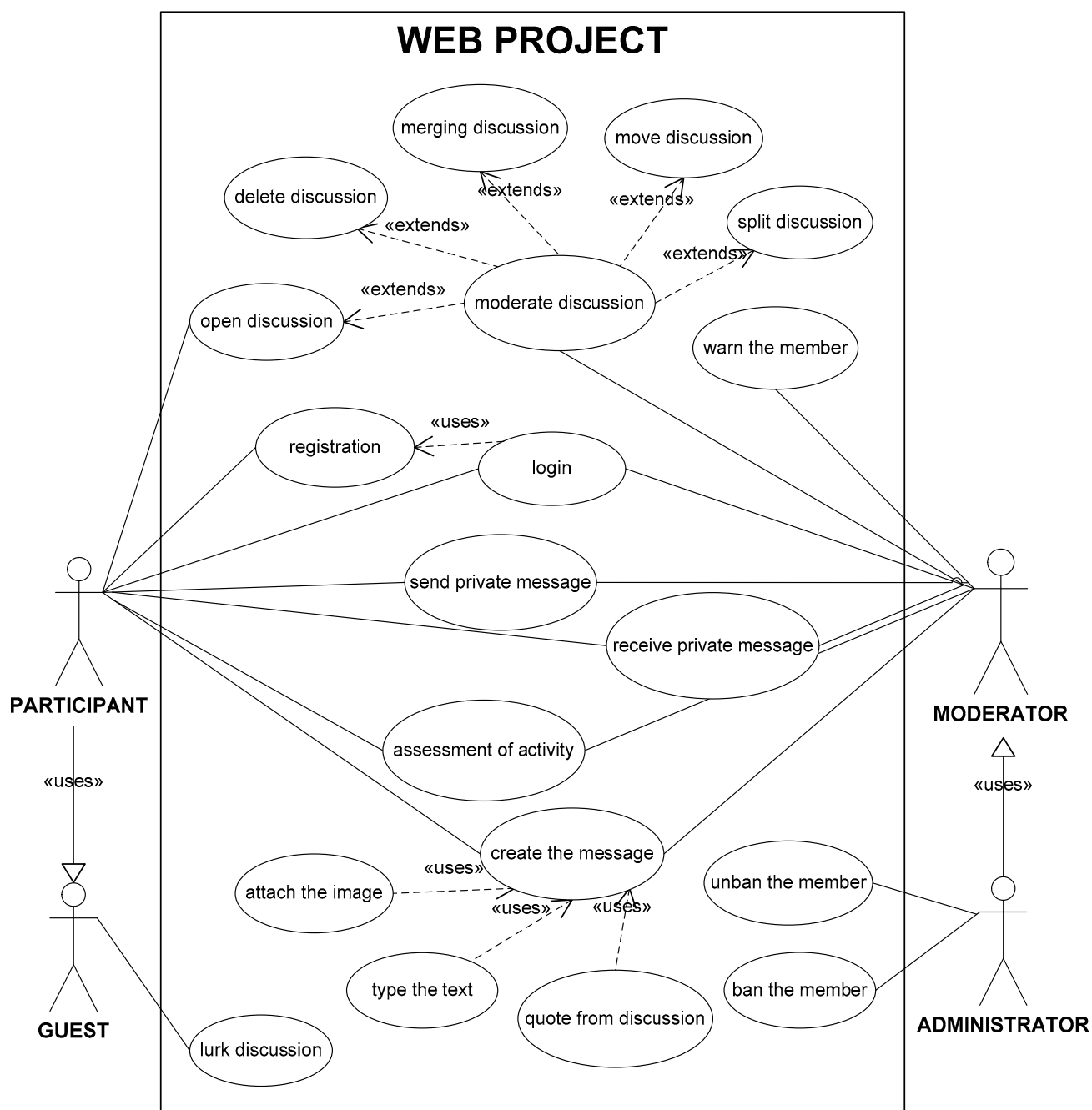


Figure 1. UML (Unified Modeling Language) diagram of web project precedents.

The extended database scheme was developed to carry out the necessary analysis of the web project status, to determine the indicators of its effectiveness, as well as the monitoring and possible forecasting of its development. An expanded data scheme for web project status analysis is shown in Figure 2.

The first step in developing this software is to develop and select the optimal web project strategy.

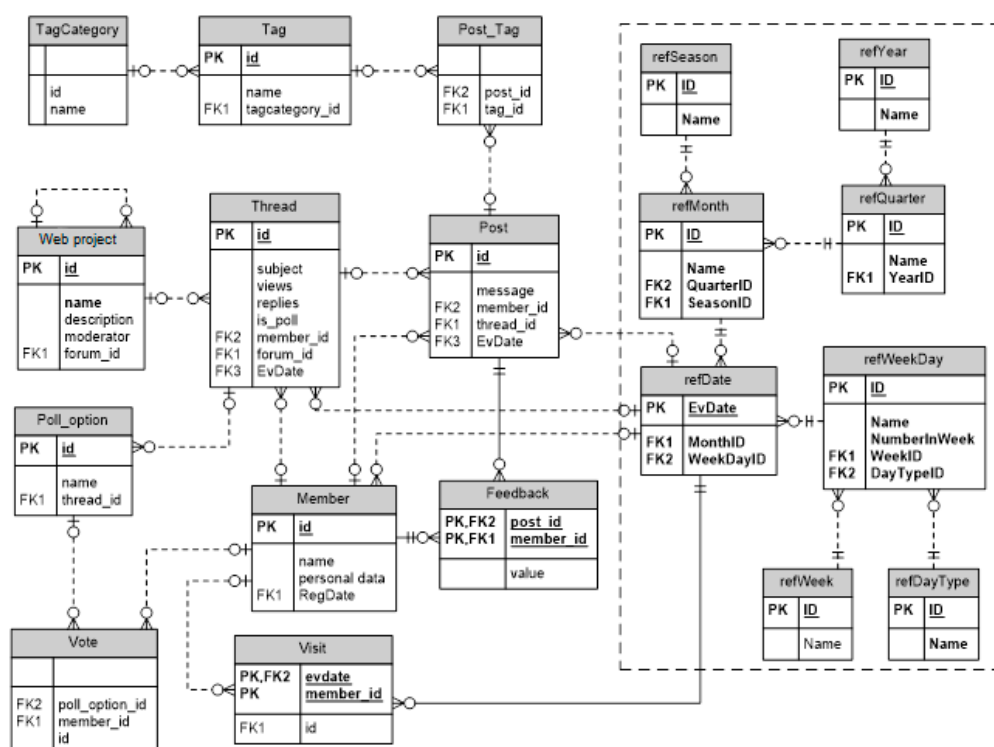


Figure 2. Data diagram of the web project status and process analysis.

2.2. Methods for Designing and Implementing a Web Project Development Strategy

A web project development strategy is a well-designed plan for the development of a web project with specific objectives. The specifics for project functioning in the virtual space require a flexible strategy and permanent monitoring to update the strategy and adjusting/adding/substituting/cancelling the fundamental parameters of the strategy.

The main factors for strategy adjustment may be changes in the web space, changes in the profile of the potential audience, changes in the needs of web project users, strategic actions of competitors, experience, new opportunities and potential threats, crisis situations, unprecedented events and relevance to new trends and development trends, and innovative trends in the technical field. The disadvantage of a web project strategy is the overly detailed plan of action, because the e-project and the functioning of projects in the web space is quite unpredictable.

In order to develop an optimal strategy for a web project, a list of criteria for the strategy can be formulated:

- balance—management of the web project in accordance with the concept of a balanced strategic management of all areas of company functioning, i.e., implementation of the planned indicators on the basis of the developed strategy;
- competitiveness—examination of the weaknesses of web projects management of the competitors and establishing a competitive advantage over competitor web projects through the implementation of an effective strategy;
- efficiency—strategic management of the web community in compliance with the objectives of the set strategy contributes to a prolonged increase in the performance of the web project in the long term according to the results of the implemented strategy changes achieved by the implementation of previous strategic decisions;
- quality—the clear and precise formulation of strategic goals of the web project for the successful functioning of the community, consistency of the strategic goals and overall strategy with trends and requirements of the web environment projects, resistance to change, flexibility, objectivity and compliance with the web project capacities and control over it;

- responsiveness—the responsiveness of the developed strategy to the web project's internal and external environment to achieve the intended results, taking into account the web project's strengths and weaknesses, the web project's opportunities, threats to the web project, and the specifics of the web space sector;
- scope—capturing key aspects of the web project's functionality, internal consistency of the components, the level of risk, and the flexibility of the strategy.

It should be noted that all criteria are equally important for the development and implementation of a productive and efficient strategy. The optimal and most promising variant of the strategy is with the maximum value of all the criteria of the strategy. These criteria serve as indicators of the implementation of the strategy, which is an important tool for achieving the goals of the strategy. Web project managers will be able to monitor the implementation process and check the success of the strategy without any complications, and quickly make decisions to necessarily adjust to the chosen strategy.

The strategy implementation indicator is a comprehensive indicator consisting of a multitude of criteria for the implementation of an optimal web project strategy WP_i :

$$CR (OptStrat^{WP_i}) = \left\{ CR_j (OptStrat^{WP_i}) \right\}_{j=1}^{N_i^{Cr}}, \quad (1)$$

where N_i^{Cr} represents the number of criteria for an optimal strategy WP_i .

$$CR_j (OptStrat)^{WP_i} = k_1 \times Bl^{WP_i} + k_2 \times Cm^{WP_i} + k_3 \times Ef^{WP_i} + k_4 \times Ql^{WP_i} + k_5 \times Sr^{WP_i} + k_6 \times Cv^{WP_i} \quad (2)$$

where $k_1, k_2, \dots, k_6$ are the value coefficients of each criterion for the strategy implementation, which are determined by the expert based on the strategic objectives, subject matter, specificity and type of the web project. Whereby, $\sum_i k_i = 1, k_i \geq 0$; Bl^{WP_i} is the balance of the optimal web project strategy WP_i ; Cm^{WP_i} is the competitiveness of the optimal web project strategy WP_i ; Ef^{WP_i} is the effectiveness of the implementation of the optimal web project strategy WP_i ; Ql^{WP_i} is the quality of the optimal web project strategy WP_i ; Sr^{WP_i} is the suitability of the optimal web project strategy WP_i ; and Cv^{WP_i} is the coverage of the optimal web project strategy WP_i .

The effectiveness of the optimal web project strategy implementation is an indicator that determines the level of achievement of the set strategic goals in implementing the optimal strategy, i.e., it determines the effectiveness of the optimal strategic solution.

This indicator is presented in the form of:

$$Ef^{WP_i} = w_1 \times Ql^{(StAims)} + w_2 \times MQl^{(StAims)} + w_3 \times Ef^{(StAims)}, \quad (3)$$

where $Ql^{(StAims)}$ is the quality of strategic objectives implementation; $MQl^{(StAims)}$ is the quality of the strategy's objectives implementation mechanism; $Ef^{(StAims)}$ is the strategic efficiency in implementing the objectives of the strategy; and $w_1, w_2, \dots, w_i$ are the values of a particular indicator.

If the value of the performance indicator for the implementation of the optimal strategy of the web project WP_i is high, then the team has undergone a positive change (which was expected for the results of the implementation of the strategy) and achieved high results in the implementation of the strategic objectives.

Web project managers who implement a management and development strategy in the functioning of a web project need to clearly formulate strategic goals for the management of the web project and continuously monitor every stage of the implementation of the strategy in the operation of the web project to identify the real benefits of the implementation of e-business objectives in the web project, to be prepared for changes in the business model of web project management.

In general, there is a lack of commitment on the part of web project managers to ensure the consistency of project management with their actual performance. Approximately 87% of executives of large and small web projects believe that implementation of the

strategy is important for the project in terms of making the web project competitive in the business environment. Web projects with effectively implemented optimal management and development strategies obtain higher performance.

2.3. Strategic Planning of Web Project Development for Its Effective Functioning

Strategy development is a complex task that determines the precise planning of the web project strategy development process. Developing a web project strategy requires the introduction of flexibility to make rapid changes to the development strategy through the constant updating of the web environment.

In the process of strategic planning of web project development in order to consider all possible situations in the web project, it is important to analyze the current situation, future prospects for the development of the web community, and create an action plan.

An algorithm for developing a web project strategy is shown in Figure 3.

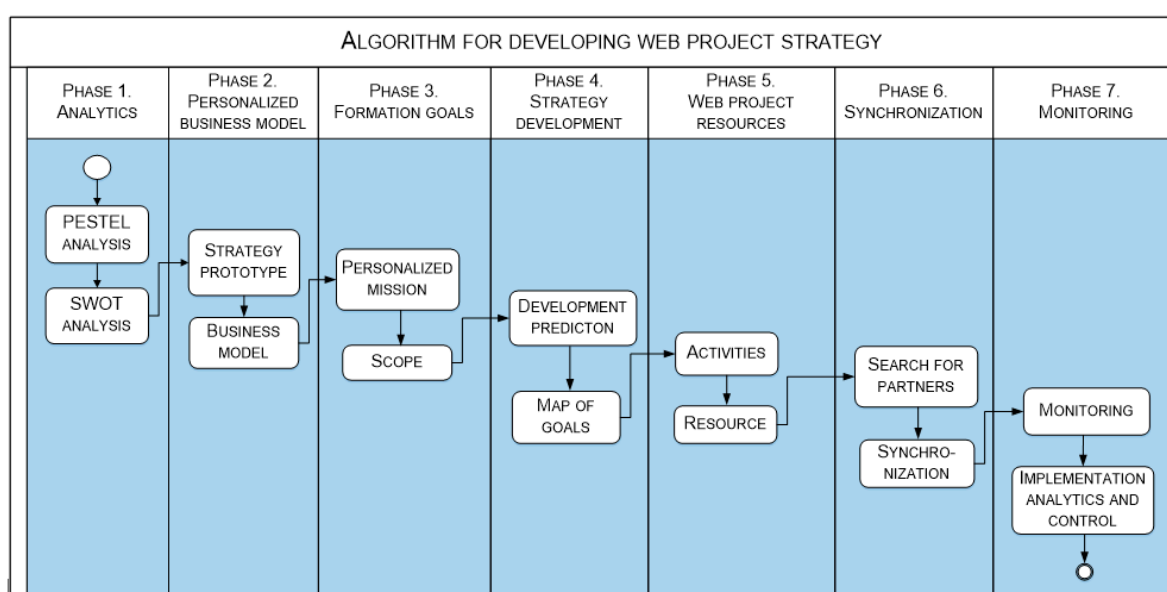


Figure 3. Scheme of the web project strategy development algorithm.

To implement these tasks, the authors have developed an algorithm for developing a strategy for web projects (see Figure 3), which includes seven phases:

Phase 1. Analytics (analysis of the current status of the web project and formulation of initial strategic goals):

1. PESTEL analysis. A structured analysis of external factors and their impact on the development of the web project.
2. SWOT analysis. Analysis of the strengths and weaknesses of the web project.

Phase 2. Personalized business model (analysis and design of a personalized business model for the web project):

3. Prototype strategy. Initial strategic ideas based on a personalized SWOT analysis.
4. Business model. Visualization of the personalized business model and the cost and profit model.

Phase 3. Goal setting. Formulation of the vision and personalized strategic objectives of the web project:

5. Establishing a mission statement. Formation of the personalized mission of the web project and its designation.
6. Areas of activity. Establishment of a function for the implementation of the web project's personalized objectives.

Phase 4. Strategy development. Identification of ways to achieve the personalized strategic objectives of the web project:

7. Predicting development. Predicting the development and status of the web project in 5–10 years.
8. A map of goals. Development of a logical framework for achieving the set personalized objectives in the development of the web project and the formation of a personalized strategy map of the web project.

Phase 5. Web project resources. Planning of updating and optimizing web project resources (financial, human and others):

9. Activities. Planning personalized strategic actions to achieve the objectives.
10. Resources. Planning the resources needed to implement the strategic projects.

Phase 6. Synchronization. Recruitment and search for partners to implement the personalized strategy:

11. Partner Search. This process is carried out to find partners for the implementation of a personalized web project strategy.
12. Synchronization. The process of synchronization with interested representatives of potential partners.

Phase 7. Monitoring. Evaluation of the implementation of the web project strategy:

13. Monitoring. Continuous monitoring of the implementation of the strategic objectives of the web projects and, if necessary, updating the strategy in order to update objectives.
14. Analyzing the implementation of the strategy and monitoring. Evaluation and control of the strategy implementation.

2.4. Assessments of the Web Project Environment in a Strategic and Structured Way Using PESTEL Analysis

A PESTEL model is created to evaluate the web project environment in a strategic and structured way. We used a comprehensive approach—we evaluate the current state, the dynamics of the web project (from creation to current state) and possible future perspectives. Additionally, the heterogeneity of subjects, specifics, and specializations of web projects are taken into account when developing this model. This model can easily be adapted to any web project (Table 1).

All of the factors investigated in Table 1 affect a web project a priori. However, administrators and the web project owner should be aware of trends that can affect the future development of projects.

The analysis helps to better understand the business environment and shapes and develops the strategic vision of web project managers, helps to reduce the impact of future business threats, finding new opportunities and using them effectively to achieve success in web project management. The key factor is dramatic and rapid change in the virtual space. Web project managers and developers of strategies for developing these projects find it difficult to predict events and directions of change in this area.

The PESTEL analysis framework looks at opportunities and threats from political, economic, social, technological, environmental, and legal forces to inform web project management planning and decision-making. In web project management, the PESTEL analysis is effective in terms of understanding the development of the area under investigation and the business, provided the results of the PESTEL analysis are used competently.

Table 1. PESTEL (political, economic, social, technological, legal, and environmental) analysis of web project.

External Factors	Opportunities	Threats
Political factors	• international cooperation • international grant support • government initiatives for business • subsidy policy • freedom of speech and thought	• instability of political power • information wars • geopolitical factors • government regulation of competition • increasing corruption • governmental deregulation of IT industry • tariff increase
Economic factors	• economic growth of the project • income and costs of web project management • staff salary level • additional funding sources • communication costs • increase in maintenance costs of the web project	• economic crisis • rising inflation • employment rate • bank interest rates • UAH exchange rate dynamics • employment dynamics • effective demand • decline in consumer purchasing power • credit availability • budgetary deficit • price fluctuations
Social-cultural factors	• the elements of society (culture, religion, beliefs, and others) that can influence the functioning of the web project • trends in modern society • emergence of new trends • predicting possible changes in the different stages of development of the web projects • cultural norms and values	• socio-demographic indicators (age of the population, family structure and others) • changes in basic values in society • cultural threats • deterioration of the educational system • decrease in income levels and standard of living of the population • change in lifestyles, habits, and user/fashion preferences • unconscious attitudes to the importance of health (mental and physical) • attitudes to work and leisure • demographic changes (population size and growth rates, mortality, fertility) • religious factors • media impact • age distribution • family size and structure, marriage and divorce rates • levels of immigration and emigration • life expectancy • social class distribution • average disposable income • purchasing habits and ability • ethical concerns • gender disparities
Technological factors	• technical trends • technology • changes in information and virtual technology • development of advanced technologies • improvement and implementation of digital tools • level of investment • technological incentives for automation • access to new technologies • technological awareness	• low rate of innovation • the cost of access to new technologies • adaptation to new formats of web project activities • new forms and standards of information dissemination • web infrastructure • internet access • life cycle of technologies • technological changes

Table 1. Cont.

External Factors	Opportunities	Threats
Eco-factors	- environmental protection measures - regulation of resource consumption - trends in web project management policies, standards and public or target audience attitudes that may affect the project's prospects	- climate change - lack of technical and communication means to solve environmental problems - environmental unawareness of the population(s) - environmental policy of the state - natural disasters - emergency situations - factors which cause society's activities and affect the environment (physical, climatic, etc., factors which are beyond human control)
Legal factors	- changes in Ukrainian legislation - adaptation of the legislative field on web projects to the international level - improvement of state intellectual property laws, protection of service user rights, copyright protection, data protection laws, etc. - antitrust laws	- failure to implement new regulations - on health and safety at work - consumer protection - implementation of laws that strictly regulate the IT sector - non-adaptive legal framework for modern realities (cybersecurity, labor safety, data protection, etc.)

2.5. Modelling a Strategic Map for a Balanced Scorecard of a Web Project

The balanced scorecard (BSC) was proposed by R. Kaplan and D. Norton. The balanced scorecard is the most effective concept for implementing a web project strategy, due to its decomposition to the level of operational management control based on key performance indicators (KPIs). It is worth noting that this system is widely used in the global experience.

A balanced scorecard ensures the integration of financial and non-financial indicators, taking into account the cause–effect relationships between the resulting indicators and the factors that influence them. Using this system allows a detailed monitoring of the web project's activities in the strategic focus, increasing the efficiency and effectiveness of management decisions, monitoring the most important financial and non-financial performance indicators (KPIs) which are targets of the web project, and the degree of achievement which determines the movement of the web project along with the optimal strategy. The KPI values imply the effectiveness of the business project as well as the efficiency of each business process and human resources.

The balanced scorecard model of a web project (Figure 4) is a model of a web project performance measurement system with a strategic focus, which is a full-fledged web project management system.

The proposed approach makes it possible to trace the impact of each individual indicator on the overall level of achievement of the objectives. The evaluation of the effectiveness of the strategy is determined by the extent to which the targets are achieved. Most of the indicators used in practice in building a balanced scorecard model (BSC) are performance oriented.

The balanced scorecard defines four strategic boundaries that reflect a company's respective perspectives: financial perspective, customer perspective, internal business process perspective (competitive requirements), and learning and development (availability of innovation, development, motivation, and growth programs).

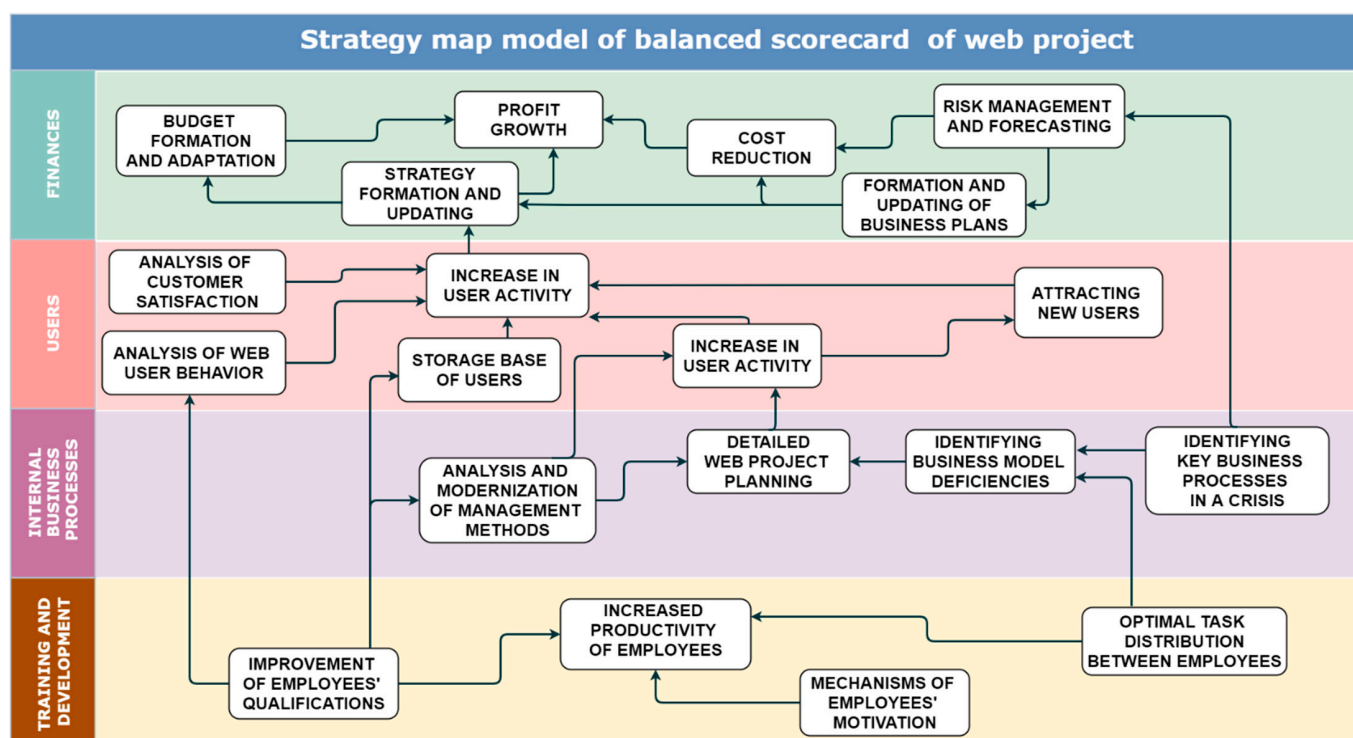


Figure 4. Balanced scorecard strategic map model of web project.

The following steps have been implemented to implement the balanced scorecard of the web project:

1. Setting strategic goals;
2. SWOT analysis and identification of success factors;
3. Definition of indicators and its target values;
4. Determining how to calculate the indicators;
5. Causal chains of strategic goals;
6. Cascading strategic goals;
7. Strategic action plan;
8. Maintain, update, and develop the balanced scorecard (BSC).

Implementing these steps of the balanced scorecard system in a web project enables an increase in the rate of achievement of strategic goals, assessing the effectiveness of management decisions within the web project strategy, obtaining key business information in a summarized and systematic way that is understandable, and improving employee interaction and motivation by clarifying personal goals and objectives and allocate all resources in a targeted way.

2.6. Model Web Project Scenario in a Situation

Before setting up a web project, the authors of the idea define for themselves the goal of developing and implementing a web project, the desired scenario of their project, and develop such administrative policies and measures to promote the project to achieve the goal. Usually, web project owners have the following goals: profit, credibility in the community, informational and technical support for clients, and attracting an audience to related projects. However, developers and owners rarely think about designing and implementing a web project strategy.

Depending on the purpose of the web project, all web projects are classified according to their development scenario.

- Active scenario of web project development: the goal is to create a stable project without overly active spoilers. Priority is the stability of the web project and the quality of its content, rather than popularity.
- A hyperactive scenario of web project development: the goal of a hyperactive web project is to achieve high popularity by attracting as many active participants as possible.
- Reactive scenario of web project development: this scenario is chosen when the goal of creating a web project is to obtain feedback from the participants to observe how the community reacts to a particular event. Typically, this development scenario is chosen by news project owners.
- Cumulative development of a web project: this development scenario is chosen when the goal is to accumulate quality information in a particular field. Such information is accumulated through the involvement of experts in the field, who will fill the web project with rich and informative messages. Emphasis is placed on the quality and thoroughness of the content, not on the quantity or frequency of updates.

Depending on the chosen goal, the virtual community owner chooses one of the scenarios discussed for the development of a web project. The recommended scenario options depending on the owner's objective are shown in Figure 5.

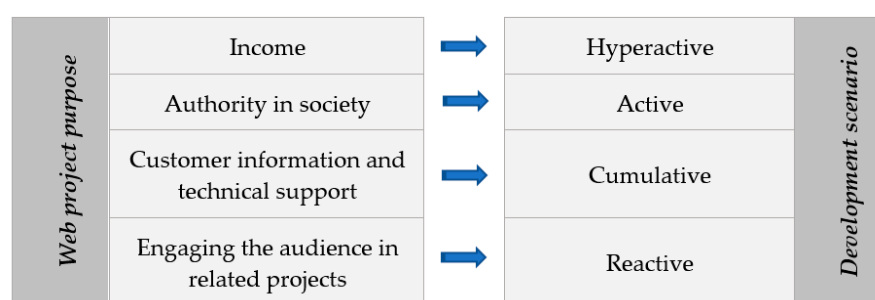


Figure 5. Recommended community development scenarios depending on the objective.

For certain web projects, it is effective to use a mixed scenario of web project development because web project managers, in designing a web project development strategy in certain situations, identify several vectors for the functioning of the web project, each of which is directed towards a specific goal.

In the process of implementing a web project strategy, first of all, a strategic analysis of external factors is carried out, as well as a strategic analysis of the goal and requirements of the web project. The next step is the development and assessment of strategic alternatives, based on the results of the assessment, the selection of a web project strategy, and the implementation of the web project strategy. The last step is the analysis of the results of the strategy implementation in the web project activities and the determination of whether it is necessary to conduct a strategic analysis of the external factors that affect the development and functioning of the web project again. A diagram of the implementation algorithm in the functioning of the web project is shown in Figure 6.

Usually, the underlying external bases for a crisis in web projects are crisis shocks in the following areas: socio-political, health, economic, technological, educational, environmental, cultural, religious, and ideological spheres. Common causes of crises in web project management are web project mismanagement, changes of trends in web space, insufficient control, ineffective planning and lack of strategy of web project, lack of or ineffective decision-making systems, inconsistency between web project management and managers, lack of financial resources, and extremely high costs of web project management and support.

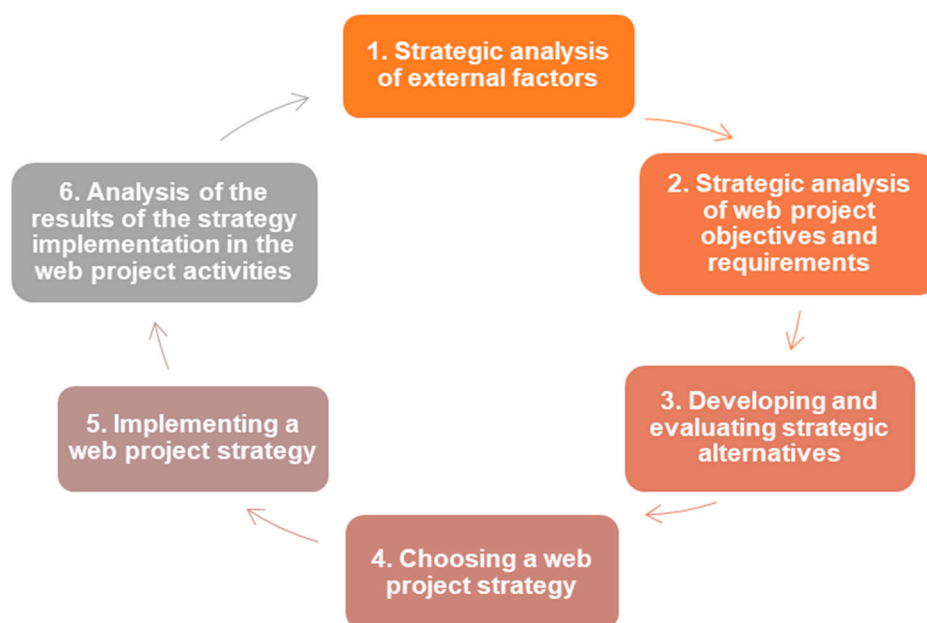


Figure 6. Scheme of the strategy implementation algorithm in the functioning of a web project.

To overcome a web project crisis, the method of web project management strategy implementation in crisis conditions was developed. The scheme of the developed method of implementation of web project management strategy in times of crisis is shown in Figure 7.

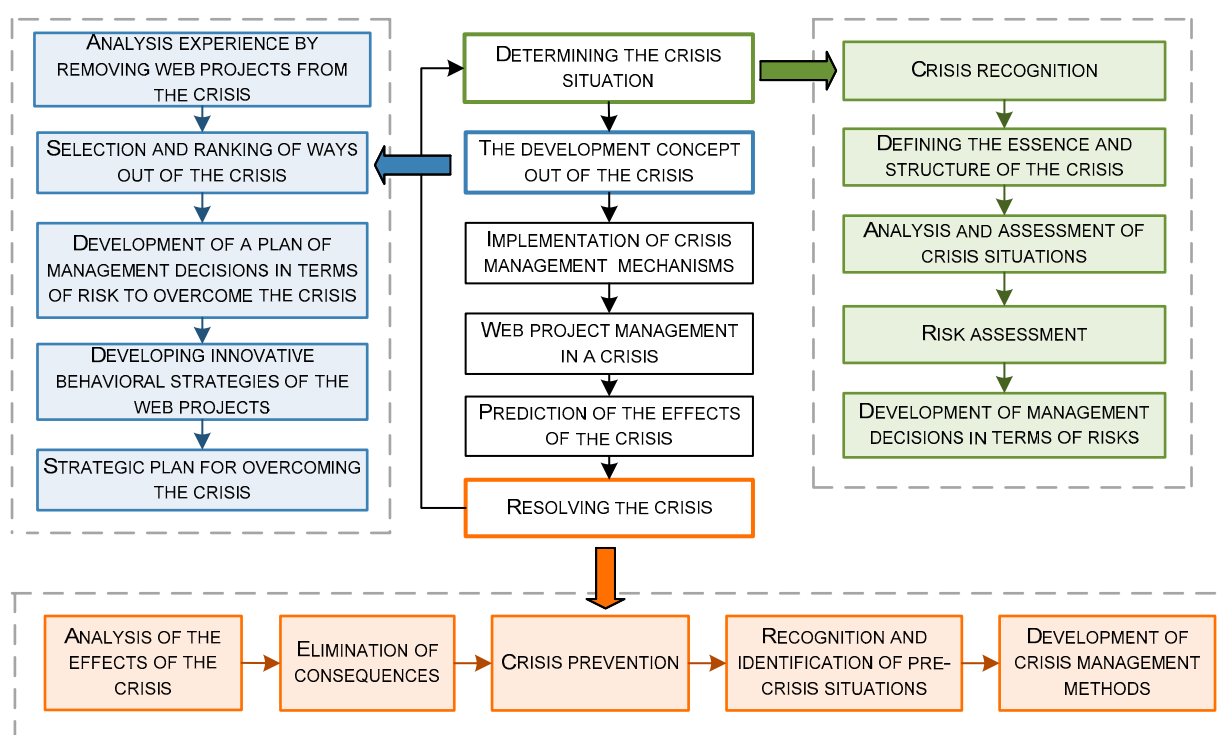


Figure 7. Schemes of a method for implementing a web project management strategy in a crisis.

The first step in the implementation method of a web project management strategy in a crisis is the identification of the crisis situation. The first stage involves recognizing the crisis situation, defining the essence and structure of the crisis, analysis and evaluation of crisis situations, risk assessment, and the development of risk management solutions.

During the crisis exit concept development phase, the experience of web projects out of crisis is analyzed, ways out of crisis are selected and ranked, a risk management plan for crisis exit is developed, an innovative web project behavior strategy is developed (involving additional specialists if necessary, for example, a crisis manager) and a strategic crisis exit plan is worked out. After the development of the concept, crisis management mechanisms are implemented, namely the process of managing a web project in crisis and predicting the effects of the crisis. At the stage of web project remediation, the analysis of crisis consequences, crisis management, crisis prevention, recognition and identification of pre-crisis situations and the development of crisis management methods take place.

In order to define specific tasks of crisis management of web projects, it is necessary to take into account the content and dynamics of parameters of the crisis situation in its individual stages, the content of diagnostic tasks, development of the concept of crisis prevention and direct implementation of the anti-crisis program and the specifics of perception of the crisis situation and related information, such as the emotional mood among the participants of the web project.

3. Results and Discussion

The implementation and testing of the developed web project management methods under psychological, social, and economic impacts during the COVID-19 pandemic was carried out in six web projects of university departments: (Scientific Cluster “IntelliGo” (Instagram; Insta), SKID-Press (Facebook; Fb), Lviv Polytechnic Institute of Humanities and Social Sciences (Fb), Department SKID (Fb), Linguistic Educational Centre (Fb) and IntelliGo-Scientific Cluster (Fb). The dynamics of the value of indicators of effectiveness of the optimal web project strategy implementation (see Equation (3)) of six web projects of university are represented in Figure 8.

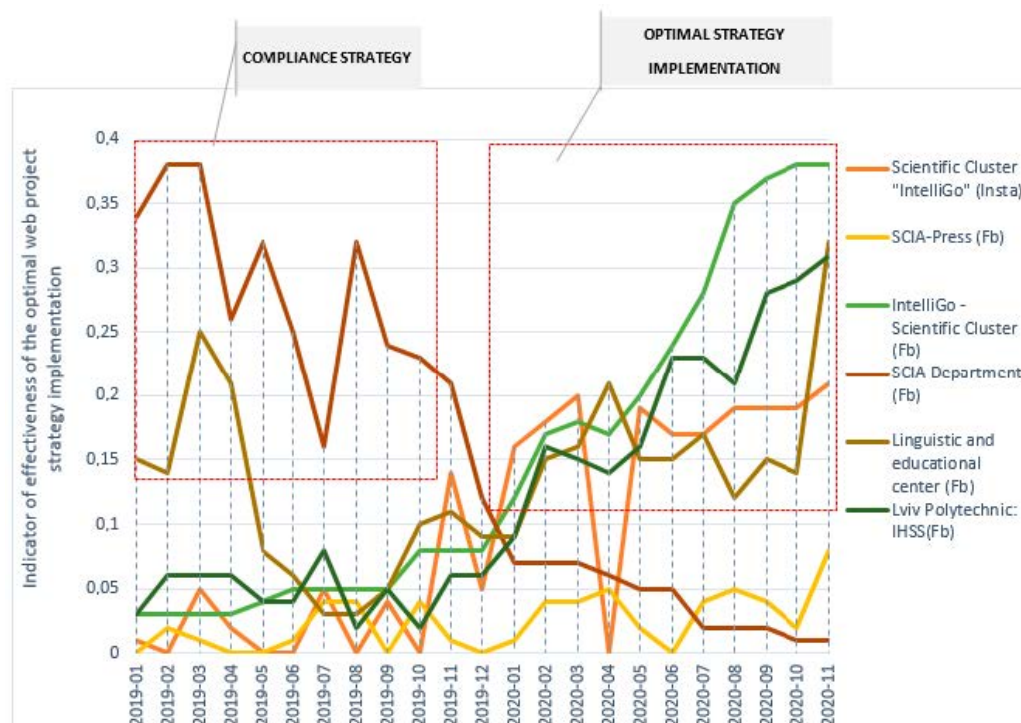


Figure 8. Graph of dynamics of the indicator of the web project strategy implementation of 6 university web projects.

The project managers for the six communities studied chose a mixed type of development scenarios (Active + Accumulation scenario), because the goal of the projects was community credibility and information and technical support for the clients.

The authors investigated (Figure 8) the implementation of the strategy in these six communities which took place at this level:

- Scientific Cluster “IntelliGo” (Insta)—in November 2019, the web project managers began to implement a development strategy. The project was in crisis in April, but successfully emerged from this crisis situation and continues to adhere to the strategy.
- The Language Learning Centre (Fb)—web project that has been operating since 2016. In May 2019, it hit a crisis period that lasted for seven months. The management developed a strategic plan to overcome the crisis and introduced appropriate management solutions.
- SKID-Press (Fb)—web project managers have not implemented development strategies; therefore, the web project is unsuccessful with low performance.
- Department SKID (Fb)—managers were successfully implementing the developed strategy until January 2019, but since December 2020 the performance of this project has been steadily declining.
- Lviv Polytechnic Institute of Humanities and Social Sciences (Fb) and IntelliGo-Science Cluster (Fb)—in October 2019, the leaders of these web projects started to implement development strategies. Their performance indicators are increasing.

In general, common platforms for creating web spinoffs are Facebook, Instagram, Telegram, etc., to explore selected web communities hosted on Facebook and Instagram platforms. Each of the platforms has its own specifics of creating and managing the project, but the methods developed will be universal. One of the biggest risks that will affect the implementation of the project is the failure or limitation of access to the platforms on which the web projects are created.

What follows is a closer examination of the dynamics of the IntelliGo Science Cluster (Fb) web project. The strategy of this web project does not include the use of paid advertising in its activities, but the project is successful. This is confirmed by statistics (Figure 9): from November 2020 to December 2020 the organic reach was 7.406 (increase of 23%) and the total reach was 7.432 (increase of 23%).



Figure 9. Reach: overview in November 2020.

We have also seen a steady increase in audience reach in 2020. The data in the Figure 10 show that the popularity of the community is steadily increasing.

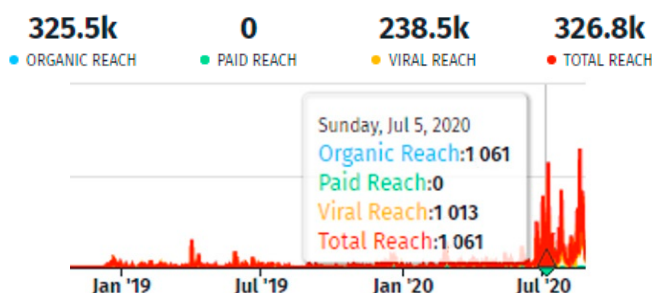


Figure 10. Overview statistics 2019–2020.

Since December 2020, leaders decided to incorporate the publication of videos in the content plan of the web projects on a regular basis, which also increased the success of the project; in the beginning of using this method, the total videos autoplaying over 3 s on web pages per day (Figure 11) was 168 views (increase of 59%), which after six months increased to over one thousand views.

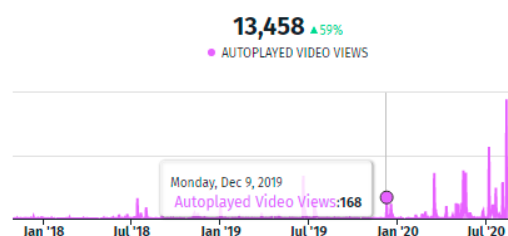


Figure 11. Total video autoplays on page over 3 s.

The results show that the optimal strategy developed and implemented for the IntelliGo-Science Cluster (Fb) web project is effective and efficient.

4. Conclusions

The developed methods of web project management in crisis conditions caused by psychological, social, and economic actions during the COVID-19 pandemic are aimed at finding and applying management solutions in order to overcome the crisis as soon as possible and to minimize the impact of the crisis on the web project. The development of a risk management solution plan to overcome the crisis will allow a step-by-step introduction of innovative strategies in the web project's activities, adjusting the strategic plan of the project. The implementation of crisis management mechanisms will enable the prediction of the effects of a crisis on web projects in various subject areas. The proposed methods of web project management can be applied in the impact of other crisis situations. Research results are useful for owners and administrators of web communities, owners and developers of technical means of organization of social environments, representatives of law enforcement and surveillance authorities and state security, specializing in personal security in network communications, particularly in the areas of combating pedophilia, online fraud and phishing, representatives of special services, which, in conditions of intense information warfare, monitor and identify users. Reducing the psychological, social, and economic impact on the web identity and increasing the safety of children in virtual communication is also important. The control and administration of web-communities will contribute to reducing the financial and time costs for the owners of these web-communities.

The proposed solution to the problem would increase the profitability of web projects, allowing their owners to adapt quickly and efficiently to crisis situations, develop an exit plan from the crisis, and mitigate negative psychological, social and economic effects of the contemporary COVID-19 crisis on virtual projects.

In further research, we plan to develop methods of web project remediation, which consist of thorough analysis of crisis consequences, elimination of those consequences, prevention of crisis situations, recognition and identification of pre-crisis situations, as well as the development of crisis coping methods.

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